Preliminary draft - May 2019
Please do not quote without permission

Martina Dattilo (*CREM-CNRS, University of Rennes 1*)

Fabio Padovano (*Condorcet Center for Political Economy, University of Rennes 1 and DSP, Università Roma Tre, Italy*)

Yvon Rocaboy, (*Condorcet Center for Political Economy, University of Rennes 1*)

MORE IS WORSE: DECREASING MARGINAL QUALITY OF THE UNESCO WORLD HERITAGE LIST

ABSTRACT

This paper empirically analyzes the evolution of the quality of the sites included in the UNESCO World Heritage List (WHL) from 1972 till 2018, testing the hypothesis that as the number of sites that a country has in the WHL increases, their marginal quality decreases. Sites' quality is proxied by the number of the criteria set by UNESCO to identify quality that each site satisfies. Data lend support to this hypothesis, suggesting that, since the stock of cultural capital is fixed, countries first propose sites of high quality and then of lower quality. Furthermore, the quality of a country's bureaucracy plays a role for the inclusion of a site into the list.These results are robust to the nature of the sites cultural or natural) to tests of the stability of the UNESCO evaluation criteria and to changes of the econometric estimators. The results call into question the credibility of the UNESCO WHL as well as the policies that UNESCO adopts to have a more balanced geographical distribution of the WHL sites.

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

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

1. *Introduction*

Since 1972, UNESCO recognize 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*'[1]. As of 2018, 1092 sites, 845 of the cultural type and 209 natural ones, have been included in the World Heritage List (henceforth, WHL). The sheer size reached by this list calls the evolution of its quality into question. To appreciate the problem, in 1979 UNESCO included the Grand Canyon in the list, one of the first natural sites to receive recognition; 22 years later, in 2001, it was the turn of the East Coast of Devonshire. Even if one might agree that both sites deserve being preserved, the astonishing scenery of the first outshines the modesty of the second (Aa, 2004). It is then worth verifying whether the marginal quality of the sites decreases as the stock of the "cultural capital" still available, i.e. the sites potentially eligible but not yet included in the WHL, shrinks.

The analysis of the evolution of the quality of the WHL is important for at least two reasons. First, keeping a high average quality of the sites inscribed in the WHL is crucial for the credibility of the organization and for the success of the preservation of the world cultural heritage. It is no accident that UNESCO foresees the possibility that a site be removed from the list if it fails to maintain certain standards.[2] Notwithstanding the long scholarly interest in various aspects of the UNESCO WHL (Aa, 2005; Bertacchini and Saccone, 2012; Bertacchini et al. 2015, 2016; Frey et al., 2010a, b; Stainer and Frey, 2011; Parenti and De Simone, 2015), the issue of the evolution of the quality of the sites has never been examined so far. The second motive is more scholarly. Such an inquiry allows analyzing the concept of quality in the domain of the arts in a non-subjective way – or at least in a way that minimizes the impact of subjective evaluations of quality. This because, as we shall see, UNESCO appraises the quality of the sites on the basis of criteria that have

[1] UNESCO (1972).

[2] UNESCO Operational Guidelines (2013) section IV C. So far three sites have been removed from the WHL, one in Oman, another in Germany and the third in Georgia. Many more have been threatened to be delisted should the degradation of the standards of conservation continue.

remained rather constant over time; furthermore, the decision about the inclusion of a new site into the list is quite complex and involves many "veto-players", which minimizes the importance of individual assessments. The evaluation of quality has always represented an important and still unsolved analytical challenge in the economics of art and culture (Ginsburgh and Weyers, 1999; Ginsburgh 2003; Throsby, 1990). All in all, the characterization of the quality of the sites of UNESCO WHL and the analysis of its evolution over time are the two goals of this paper.

To assess the quality of the UNESCO WHL sites we exploit the fact that, to enter the list, each site must meet 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, such as its historical, artistical, representative relevance and the like. Our approach to measure the quality of a site is simple and straightforward: the greater is the number of criteria that the site satisfied at the moment when it had been accepted into the WHL, the greater is its quality. In this way we have a quantitative assessment of quality that is based on the original evaluation of the site made by the UNESCO itself. We prefer this approach for evaluating quality to the available alternatives, which either rely more heavily on the subjective appraisal of the analyst or suffer of endogeneity bias, such as number of tourists attracted and the like. Finally, this quantitative measurement of quality can be handled in regression analysis.

For our analysis to be valid, two fundamental hypotheses must be satisfied. The first is that since the inclusion in the UNESCO WHL is a competitive rent seeking process, countries should first propose sites of higher quality, i.e. those that have better chances to enter the list, and then move down in their (subjective) evaluation of remaining national sites[3]. The second is that the criteria that UNESCO adopt to evaluate the sites do not substantially change over time.

[3] Although the hypothesis of rational behavior by governments is generally accepted, it is worth remembering here, since many countries went through a learning curve in the process of having sites included

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. This because every new site that obtains UNESCO recognition reduces the stock of the country's cultural capital still available for future recognitions, which forces the country itself to propose new sites of lower quality. This effect is more evident for countries with more than 10 sites in the WHL, which represent 12% of total countries and 51% of total sites. Furthermore, we find that the quality of the country's bureaucracy, more than lobbying, plays a role in obtaining the inclusion of new sites in the list. This is at variance with the public choice literature on the UNESCO WHL, which has always found that lobbying plays an important role in the selection of the WHL sites (Pohle, 2016; Stainer et al., 2011; Bertacchini and Saccone, 2012). Yet it is doubtful that lobbying can affect the quality of the sites; intuitively, sites of high and therefore undisputed quality should not need much political or economic influence to be included in the WHL. [4]

The rest of the paper is organized as follows: section 2 reviews the literature about the evaluation of quality in economics of arts and culture and about the political economy of the UNESCO WHL. Section 3 illustrates the process through which UNESCO select the sites to be included in the WHL, as well as the criteria that sites must satisfy to be recognized. In section 4 the variables included in the specification of the empirical model and the econometric issues associated with the estimation of the model are discussed. Section 5 presents the empirical strategy and the results of the estimates, as well as the robustness checks. Finally, section 6 summarizes the main conclusions of the analysis.

in the UNESCO WHL. Italy very first UNESCO site, for instance, were the cave paintings in Valcamonica, in the Alps, certainly as famous as Rome, Florence or Venice.

[4] It seems rational that the lobbying power of a country plays a role only in the case of marginal, "in or out" decisions. Countries can be expected to engage their political and lobbying power only for sites whose quality is borderline or insufficient to satisfy at least one criterion, because in order to attract tourism – the real economic return on lobbying for sites - what matters is only whether the site is included in the WHL. This point goes beyond the scope of the present analysis, but it is certainly worth exploring in a specific analytical setting.

2. *Literature review*

2.1 Evaluation of quality. Although standard microeconomic models of consumers' choices are expressed in terms of quantities, quality is indeed an important, yet difficult to characterize, dimension of individual choices. As Ginsburgh and Weyers (1999) argue, this is *a fortiori* true for works of art and culture-related commodities, because their aesthetic and cultural qualities are often the main, if not the only, reason for consuming them. Furthermore, as many works of art are essentially unique, quality is the only dimension that motivates consumers' willingness to pay. Yet quality is difficult to characterize in empirical analysis, because, differently from quantity, it is a subjective and not directly observable concept. Hence it must be approximated. Proxies based on the standard theoretical indicator of quality, consumers' willingness to pay (Bedate at al., 2004; Albertini and Longo, 2006; Ruijgrok, 2006), are fraught with difficulties, because in situations of asymmetric and/or imperfect information quality becomes a function of price, which generates a problem of endogeneity (Noonan, 2003). Not surprisingly many aesthetic philosophers and art historians have been and still are unwilling to examine art in terms of fact and figures; even some cultural economists, like Throsby (1990), affirm that qualitative characteristics must not necessarily be measured along numerical scales. Yet, as we cannot study what we cannot measure, cultural economists have kept looking for ways to minimize subjectivity in the characterization and evaluation of quality.

In a recent survey Ginsburgh (2003) argues that two alternative approaches exist for the empirical assessment of the quality of cultural and artistic goods, both with ancient roots in aesthetic philosophy. The first follows De Piles'[5] original idea of first decomposing the evaluation of quality into several dimensions, then establishing criteria to rate each dimension and finally aggregating the scores. The second approach instead follows Hume's

[5] Nowadays considered a pioneer, the French art critic Roger de Piles (1635–1709) was the first to try to provide a quantitative definition of the characteristics of beauty. In his *Cours de Peinture par Principes* (1708), he decomposed painting into four fundamental characteristics — composition, drawing, color, expression — and rated each of them on a scale from 0 to 20 for 56 painters from his and from previous times. His approach is remarkably similar to Lancaster (1966) model of consumer choices, whereby a good is intended not as a single item but as a vector of characteristics, each of them providing different levels of utility.

idea (1757), in his classic essay *On the Standard of Tastes*, of having experts expressing their evaluations of quality and then checking whether these evaluations endure the test of time.

An important advantage of the first approach is that identifying and expressing the characteristics of cultural and artistic goods in some metric allows using this information in empirical analysis. Gergaud and Chossat (2003) for instance follow this approach in their analysis of the *GaultMillau* guide to the quality of restaurants. They construct a scale ranging from 0 to 20, based on the more or less laudatory expressions in comments for evaluating the chef (creativity, technical skills, quality of the ingredients, etc.) as well as the setting (ambience, service, cellar, etc.).

Applications of the second approach are more common and can be found in various areas of inquiry. Exploiting the Eurovision Song Contest as an opportunity to evaluate the quality of songs, Ginsburgh (2004) uses the rankings obtained by the various songs in each competition as an indicator of quality. He shows that cultural tastes and language proximity largely affect the jury's votes (e.g., songs in English tend to receive higher scores), to the point that winners of the Eurovision Song Contest often lose the test of time. Today many winning songs are actually less popular than others that had lost against them[6]. Similar inconsistencies and lacks of durability appear also in the book industry (Ginsburgh, 2003), in the evaluation of wines (Orley and Jones, 2000), and in the performance arts (Tobias, 2004).

Our study actually adopts a mix of these two methodologies for the evaluation of quality. On the one hand, our approach includes experts' opinions, which are features of the second approach, inasmuch as UNESCO resorts to committees and panels of experts to evaluate whether each site satisfies the various criteria for eligibility. On the other hand, these criteria are expressed in a binary scale, reflect a multiplicity of characteristics that the sites must possess and are eventually aggregated; all these are features of the first approach.

[6] The 1958 edition of the Eurovision is a good example of such a pattern of outcomes; the winning song, *Dors mon amour* by André Claveau, is nowadays virtually forgotten, whilst *Nel blu dipinto di blu* by Domenico Modugno, which participated at the same edition, got only the third place but is still very popular.

Furthermore, 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 have a low impact on experts' opinions, since cultural heritage is *per se* recognized after a long period of time. In addition, as we shall see, the final ruling by UNESCO is the outcome of a decision making process fragmented between many different veto players, upon which each individual subjective evaluation has little bearing. All these characteristics enable to minimize the subjectivity in the evaluation of quality. Finally, when compared with other methods of quality evaluation adopted in the literature, our idea of summing the number of criteria that each site satisfies presents the advantage of being straightforward and transparent.

2.2. 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 economics of the arts and in the public choice literatures. Both strands have focused on two main points. The first is the so called problem of "inequality" in the composition of the WHL, i.e. the alleged over representation of European sites in the WHL, especially for cultural sites. Steiner and Frey (2011) claim that this inequality has increased from 1978 to 2007, reflecting UNESCO's inability to raise the share of sites from non-European countries. There is no reason to believe, however, that cultural capital is homogeneously distributed in the world. For example, up to the year 2000, Europe had 46% of the sites included in the WHL, but also 45% of the sites rejected (Aa, 2005). This suggests that it is UNESCO's aim of achieving spatial balances to be biased, if not altogether unfair.

The second issue is whether the recognition of the sites is actually an independent evaluation or it is distorted by rent seeking activities of the proposing countries. Here the rent is the increase in tourism determined by the inclusion in the WHL of as many sites as possible (Frey et al., 2010a; VanBlarcom et al., 2011; Lee et al., 2017; Bertacchini et al., 2009). Scholars concur that member countries in fact lobby hard the UNESCO to obtain more sites (Pohle, 2016; Stainer et al., 2011; Bertacchini and Saccone, 2012). Yet if inclusion in the WHL is indeed affected by lobbying, the evaluation of the sites' quality should less be so; since it

is just the inclusion in the WHL that matters to promote tourism, as the number of criteria that a site satisfies is usually not known, we can suppose that countries lobby only for "marginal" sites, I.e., those that risk to be excluded from the list. Sites of true outstanding quality, that everybody recognize as world heritage, should not need political pressure to enter into the WHL.

This literature review reveals that both lines of research, that of the alleged inequality in the geographic distribution of sites and that of lobbying for inclusion in the list, would benefit from the possibility of evaluating the quality of the sites; but a direct analysis of such quality has never been attempted in the literature. This is what the present paper sets out to do.

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

3.1. Organization of the UNESCO selection procedure. The UNESCO Convention disciplines the process of the assignment of the label UNESCO WHL to a site. The UNESCO department in charge of the WHL, the World Heritage Centre (WHC), is composed by two main bodies: the General Assembly, which includes all member countries of the UNESCO,[7] and the World Heritage Committee, the executive body composed by 21 representatives who remain in charge for six years. The tenures of the country representatives are staggered and rotating; every two years some countries enter into the Committee in the place of those that exit; furthermore, since 1994 countries may voluntary decide to reduce the length of their mandate, to maximize turnover. The distribution of seats per country takes it into account the geographical location of the country, with the aim of "*ensuring an equitable representation of the different regions and cultures of the world*"[8].

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

[8] 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.

To enter into the General Assembly, and thus acquiring the possibility to have a site included in the WHL, a country must 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 (WHF), computed as a fixed percentage of its total contributions to the UN, which cannot exceed 1%. When it ratifies the Convention, a country may also declare that its future contributions will exceed such limit[9]; in this case the country decides to donate each year a variable amount, called "voluntary contribution"[10].

Upon joining the UNESCO, a member country is encouraged to submit a "tentative list" of important natural and cultural sites located within its borders. This list is an anticipation of the sites that the country may candidate for inclusion in the WHL in the next five to ten years. The sites actually proposed are evaluated by two independent advisory bodies (actually, two NGOs): 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 for "non inscription" implies that that the member 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 revision (in the case of "deferral") and then resubmit the candidature at a later session. Upon consideration of the recommendations of the advisory bodies, the Committee takes the final decision; after formal discussions, and quite often many informal meetings, a site is inscribed if the proposal obtains a majority of 2/3 of the present members, who cast their vote through a secret ballot procedure. It is especially at this stage that the rent-seeking activities of the countries take place. This has generated

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

[10] Yet, art. 16 n. 5 of the UNESCO Convention (1972) states: "*In order that the Committee may be able to plan its operations effectively, the contributions of States Parties to this Convention (…) shall be paid on a regular basis (…) and should not be less than the contributions which they should have paid if they had been bound*".

criticism about the impartiality of the Committee and prompted demands to reform the procedure.[11]

At the times of the promulgation of the Convention no specific limits existed for the number of nominations per country or for the total number of sites that could be included in the WHL every year[12]. In 1994, however, UNESCO Committee approved the "Global Strategy for a Representative, Balanced and Credible World Heritage List" and since its 24th session in the year 2000 they introduced a series of measures aimed at improving the geographic representativeness of WHL. These consisted in an overall limit of 30 nominations examined per year and a limit of one nomination proposed per country. In 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. Table 1 recapitulates the evolution of these limits over the five years following the application of the Global Strategy[13]. The limits have remained stable from 2004 to the present day.

[Table 1 about here]

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 (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. Such a broad definition is in practice inapplicable without a more precise characterization that experts and committee members can use when evaluating new proposals. To this end,

[11] As a result of this tension the United States, United Kingdom and Singapore withdrew from UNESCO in 1984. The allegation was that UNESCO was in fact supporting communist ideas.

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

[13] A "transboundary site" is one that requires the cooperation of two or more countries for geographical reasons (for example Mont Perdu which lies at the border between France and Spain) or for historical and political reasons (for example, the historic center of Rome which is shared by Italy and the Holy See). In our analysis we exclude all transboundary sites as we want to univocally assign each site to one specific country.

ten criteria, six for cultural sites and four for natural ones, have been enunciated in a document called "Operational Guidelines". Table 2 illustrates them.

[Table 2 about here]

These criteria identify the different "values" (in the jargon of UNESCO) that each site expresses (Jokilehto, 2008). Two issues clearly emerge from this table. First, it is indeed reasonable to maintain that not all sites have the same quality, since not all of them satisfy the same number of criteria or, again in the jargon of the guidelines, "express the same number of values". Second, all criteria are intrinsically binary, as each of them can be either fulfilled or not, with no possibility of a "partial satisfaction"; this greatly simplifies our quantitative evaluation of the quality of the sites. Yet, to be able to compare quality also over time, the criteria for its evaluation must have remained stable over time; this is a necessary condition for our study aimed at verifying how quality evolves as the number of sites that a country has increases. The definitions of the UNESCO criteria have in fact evolved over time in different stages, as figure 1 and table 3 illustrate. The point is assessing to what extent these changes are purely semantic or have produced consequences. Some of the changes reported in table 3 are merely forms of words (e.g., the way criterion 1 was changed in 1994) and are therefore negligible; others, however, appear substantial, like the possibility, envisaged since 2005, that the same site meets both cultural and natural criteria and can thus be considered a "mixed site"[14]. On this point the literature seems to lean towards the semantic view about the. 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 more or less 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; in section 5 we investigate the issue empirically.

[14] For example, Mount Athos in Greece is considered of outstanding universal value both for the orthodox monasteries and the forest around.

[Figure 1 and table 3 about here]

Assuming for the time being that we can use the number of criteria as an indicator to compare the sites' quality, figure 2 illustrates the distribution of the mean values of this variable by UNESCO geographical areas. It is quite clear that, although Europe is the area with the highest number of sites, it is not the one with the highest average quality, as Asia, the Pacific and Arabia have all higher average scores. This is *prima facie* evidence that the marginal quality of the WHL is decreasing.

[Figure 2 about here]

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, for countries with more than 10 sites, the correlation coefficient between the number of sites already inscribed and the quality of the marginal site on the x-axis, while the y-axis reports the number of sites. Beyond 20 sites (or just 14 if we consider Brazil as an outlier), the correlation coefficient becomes negative. This 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.

[Figure 3 about here]

4. Empirical strategy

4.1. Dependent variable and estimation issues. The hypothesis under test is that, as the number of sites increases, the quality of the marginal site decreases. This amounts to estimating the derivative $\frac{\partial Q_{it}}{\partial N_{it}}$, where N is the number of sites, and verifying that the sign is actually negative. Our dependent variable Q_{it} is the average quality of sites that country i has included in the WHL in year t. To calculate Q_{it}, we exploit the fact that criteria can be treated as dummy variables, assigning a value of 1 if criterion y is satisfied and 0 otherwise;

we have first summed the y, thus obtaining a measure of quality for each site, and then, to account for the fact that country i may have more than one site approved per year, we divide the sum of the scores by the number of sites enlisted in year t.

Although this specification has the advantage of simplicity, it also creates a number of econometric issues. First, modelling Q_{it} as yearly averages makes it impossible to consider it as a count variable, which prevents us from estimating negative binomial and/or zero-inflated models. Moreover, as our goal is analyzing the evolution of quality over time, we must use a panel specification, instead of the cross section most commonly used in the literature about the UNESCO sites so far. Within the panel, however, almost 90% of the observations are zeros, as quite often no new sites are recorded for a country/year combination. This creates two problems, one of estimation, another of interpretation. First, in years when a positive number of sites is included, both Q_{it} and $sites_{it}$ increase. The model might thus capture Q as a proxy for $sites$, biasing the estimates. To overcome this problem, we proxy $sites$ by the number of years that country i has been a member of the UNESCO at time t (variable *tenure*), as an alternative to the more direct specification, i.e., the total number of sites within the WHL that country i has at time t (variable $sites$). The idea behind *tenure* is that a longer membership should result in a greater number of sites, without it being directly connected with the value of Q. Second, the 0s in the sample might reflect either the fact that the country did not propose any site, or that it did propose one but was rejected. To sort out this problem, we test the model first with all the observations, including the 0, and then with only the positive ones, and check whether the sign and the statistical significance of the estimate of the derivative $\frac{\partial Q_{it}}{\partial N_{it}}$ change.

4.2 Model and explanatory variables. Even though figure 3 shows a negative correlation between the number of sites and their marginal quality, other conditioning factors could affect the dependent variable. The first is cultural capital, which should be positively correlated with the number of sites in the WHL, but it is not homogeneously distributed across geographical areas, since each country has a unique history of civilization.

Moreover, the baseline analysis encompasses both cultural and natural sites in the sample. Both types actually contribute to increasing the number of sites of the country; yet some control variables may have different effects on cultural and natural sites. For instance, a more developed civilization might have increased the number and quality of cultural sites, but this development might also have destroyed nature, thereby lowering the quantity and quality of the natural sites. To account for these potentially opposite effects, we provide also separate estimates for the two types of sites.

A second conditioning factor is the lobbying power of each country, which, as we have argued before, should be exerted more for sites of relatively low quality. Thirdly, the quality of the country's public administration plays an important role in having sites included in the WHL, because the preparation of the proposal, the explanation of how the site satisfies the UNESCO criteria are all bureaucratic tasks.

Our baseline model is therefore specified as follows:

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

For each of the explanatory variables of equation (1) appropriate proxies must be found. Beyond the reasons already explained, proxying *sites* by *tenure* has the further advantage of avoiding risks of multicollinearity with the other covariates, which all 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 4 shows.

[Table 4 about here]

As a measure of cultural capital ($CulturalK$), we first use *area* (in 100K squared km) and *population* (in 100M of inhabitants) as proxies[15]. These variables are standard in the literature about UNESCO sites (Steiner and Frey, 2011); the idea is that *population* reflects the country's potential capacity to produce cultural goods, while *area* is justified by the hypothesis that the larger is the country, the more likely it is to find some sites worth including on the list;

[15] The data come from the World Bank Database of World Development Indicators.

furthermore, both measures are easily available for a large number of countries. Yet the cultural heritage is a good originated in the past, hence historical proxies appear more appropriate. Moreover, as cultural goods do not necessary require a large space, the dimension of a country might not be relevant (e.g. the Nuraxi of Balumini in Sardinia, Italy, are a very small prehistorical sites that predate the very idea of a country). We then consider the historical population in the year 1500 and GDP in the year 1820[16]. The motivation is that the larger was the population of the country in the past, the greater should be its historical human capital and therefore the cultural capital produced then and still available today. Likewise, the higher was GDP per capita in the past, the more resources a country had to produce a cultural capital that might still remain. Unfortunately, these variables are available only for a limited number of countries; for the missing ones, it must be assumed that either the country's civilization was unable to produce enough cultural capital, or that data are not available. We admit both interpretations using two alternative specifications: either *POP_1500hk* and *GDP_1820hk*, which include only "high cultural capital" countries and consider the lack of information as data not available, which implies that those countries are excluded from the sample; or *POP_1500lk* and *GDP_1820lk*, which encompass the entire sample and treat the lack of information as lack of cultural capital, i.e., as 0 values.

To capture the effects of lobbying, we consider the country's membership in the selection Committee, as well as the money flows from each country to UNESCO. In particular, *Committee* is a cumulative variable equal to 0 when the country is not a member of the selection Committee, and becomes a positive integer corresponding to the total number of mandates it fulfilled. This specification permits not only to capture the effect of the inclusion in the Committee of country *i* in year *t*, but also of its permanence (and therefore the experience accumulated and the connections established) in the selection process[17]. Two other proxies are based on money flows: the first, *Expect_contr* is the sum of compulsory and

[16] Both variables are drawn from Maddison Historical Statistics.

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

voluntary contributions, i.e., the country's total contributions to UNESCO[18]. As this variable is expected to have an effect only after the contribution is budgeted, we lag it one period. Second, to capture the entire payment behavior of a country, we have also computed the variable *Unpaid_contr*. When a member country has paid all the compulsory contributions due, this variable is equal to 0, otherwise it is equal to the difference between the contributions due and those actually paid. In the case of countries that provide voluntary contributions, *Unpaid_contr* is set equal to 0, unless they have not contributed at all[19]. Just like *Expect_ contribution*, *Unpaid_contr* is lagged one period.

Finally, we resort to the *Government Effectiveness Index* (variable *Gov_eff*) to capture the efficiency of the country's bureaucracy. It is drawn from the *Worldwide Governance Indicators* of the World Bank database; it captures the perceptions of the quality of the country's public and civil services, their degree of its independence from political pressures, the quality of policy formulation and implementation and the credibility of the government's commitment to such policies. These scores are aggregated into a single index, in units of a standard normal distribution, ranging from -2.5 to 2.5. Table 5 reports the descriptive statistics, while table 6 summarizes the expected signs of the explanatory variables.

[Table 5 and 6 about here]

5. Empirical strategy and estimation results

5.1. Empirical strategy. The various econometric issues discussed in section 4.1 require estimating a series of variants of the baseline model, to minimize the risk of spurious

[18] 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.

[19] These data come from official documents of UNESCO (Statements of Compulsory and Voluntary Contribution to World Heritage Fund).

correlations or that the results be driven by misspecifications of the model and/or inappropriate estimation techniques.

All models are estimated using random effects. Intuitively, we cannot estimate a fixed effect model because of the presence of dummy variables or variables constant over time in the specification of the model. Furthermore, formal tests for the choice of the econometric model presented in table 13 support the application of a random effect model.

We first estimate the baseline model including the observations with a zero in the sample; in a second stage, we eliminate all the zeros of the dependent variable, at the cost of reducing the sample size. By that we rule out the issues related to their interpretation, which allows us to focus on the evolution of quality. Second, to ensure that our proxies for the number of sites are not capturing spurious correlations, we estimate a regression with continental dummies (*D_Cont*, where the missing observation is Europe). To the extent that the values of the coefficients reflect the distribution of average quality by continent of figure 2, the validity of our choice of proxies for *Sites* is corroborated.

Furthermore, we expect that the effect of *Gov_eff* be not the same for countries with high and low cultural capital. The way in which the nomination is prepared might have little effect in low cultural capital countries, where the choice of cultural sites is limited; but it might have a far greater one in countries with a large amount of cultural capital, where sites can be arranged in different manners (e.g., the choice of presenting Saint Peter's Basilica as a different site from the Center of Rome) and where low quality sites might be included in the WHL if properly presented. We therefore estimate *Gov_eff* together with *POP_1500hk* and *GDP_1820hk*, namely for countries with high cultural capital.

An important robustness check requires disaggregating the sample by the number of sites that a country has in the WHL. Testing the same model on the two subsamples permits to verify whether the sign of the derivative $\frac{\partial Q_{it}}{\partial N_{it}}$ remains the same for countries with a large and a small number of sites in the WHL. We set the threshold number of sites at 10 sites, as

this allows to have a first subsample that represents the top 10% of the distribution of sites by country and almost 50% of the sites included in the WHL.

As already anticipated, the hypothesis that the criteria have not significantly changed over time needs also be verified, to ensure the legitimacy of the intertemporal evaluations of the quality of the sites. We select three breakpoints: 1994, when there was a peak in the change of the wording of the definitions of criteria, illustrated in figure 2; the changes in the WHL admittance procedure of 2002, which restricted the number of new sites that each country could propose to only one and the number of total sites per year to 30; and the creation of a unique list of criteria in 2005 for both natural and cultural sites, creating the possibility of mixed sites, which also expanded again the number of sites that each country can propose per year to two and the total of number of sites to be examined to 45. In addition, since *tenure* always increases with time, we could have correlation problems between that variable and the temporal dummies, as shown in table 5. To control for that, we first test the model with only the time dummies, excluding *tenure*, and then including $sites_{t-1}$ instead.[20]

5. *Estimation and results*

Tables 7 to 12 illustrate the results of our econometric analysis. In table 7, the number of sites is proxied by *tenure*. Evidently, the most important result is that *tenure* is negative and statistically significant in every model. This lends support to our fundamental hypothesis, namely that countries that have ratified the Convention earlier and have therefore more sites, are experiencing a diminishing marginal quality of the accepted sites. Model 1 includes all observations, treating observations with 0 values as lack of sites; the continental dummies however point out that such a specification is probably inappropriate, because the

[20] 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 and are available upon request.

relative sizes of the estimated coefficients is quite different from the distribution of the average quality of the sites of figure 2. Model 2 reports the estimates of equation (1) using only observations where the dependent variable has nonzero values, reducing the sample to 580 observations. *tenure* keeps its negative and significant coefficient and the continental dummies are more consistent with the geographical distribution of average quality. Yet, from model 2 onwards, the proxies for lobbying (*committee*, *expected contributions* and *unpaid contributions*), although generally with the expected signs, are no longer statistically significant. This suggests that when the entire sample of sites is examined, it is the tenure of membership that determines the average quality of the country's sites. Also the quality of the country's public administration shows the expected negative sign (model 5), confirming that more efficient bureaucracies can push harder to approve, i.e., relatively low quality sites into the WHL. When the sample is restricted to counties for which historical population and GDP are unavailable, i.e., countries with a small stock of cultural capital, the coefficient on the quality of bureaucracy loses significance; regardless of the efficiency of their bureaucracy, these countries have very few sites to propose.

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 3), whereas when the sample is restricted to countries with high level of cultural capital, GDP per capita plays a more relevant, and still positive, role (model 5). When 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 are never significant (model 5 and 6).

Table 8 (models 7-11) presents the estimates of the same specifications of model 2-6 with *sites* lagged one year, instead of *tenure*, as the proxy of the number of sites that country *i* has included in the WHL at time *t*-1. The results do not change in any qualitatively relevant way, with the exception of models 7 and 11 where two proxies for lobbying (*Exp_contr* in model 7 and *Committee* in model 11) become marginally significant.

Table 9 presents the estimates where the sample is divided between countries with more or less than 10 sites in 2016. 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. The estimates indeed reveal that the negative and statistically significant coefficients found in table 6 and 7 are mainly driven by the countries with more than 10 sites. Models 12, 14, 16 and 18, regardless whether the proxy is *tenure* or *sites*, show that the correlation is always negative and statistically significant when countries have more than 10 sites; models 13, 15, 17 and 19 instead reveal that this effect vanishes for countries with less than 10 sites[21]. Likewise, greater government efficiency has a negative effect on quality only for countries with more than 10 sites (models 16 and 18), confirming that more efficient bureaucracies can have more sites of lower quality approved. The remaining results do not significantly change; contemporary *Population* seems to have a positive scale effect on quality (models 12-15), and so do the historical proxies for the stock of cultural capital (models 16-19). The proxies for lobbying are once more not significant.

Table 10 present the results of the control of the stability of criteria over time. We organize the test dividing the sample in two steps; in models 20-23 we test whether any of the beak-points have a direct effect on the quality of the sites, whereas in models 24-27 we verify whether including the proxies for the number of sites modifies this result. This is the case for the large number of corrections in the definition of criteria introduced in 1994; model 20 suggests that these changes apparently reduced the quality of the sites assigned; yet, once we control for the number of sites (model 24), they do not seem to be actually relevant, not so much at least as to modify the quantity-quality relationship that is the object of our study. In other words, 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. Conversely, the estimates confirm that 2005 was indeed a break point: sites included in the WHL after that year generally are judged to satisfy a lower

[21] In model 18, limited to countries with low levels of historical proxies for cultural capital, the sign on sites is negative but not statistically significant.

number of criteria, regardless of the number of sites that a country has. In other words, the change in the UNESCO policy for sites recognition of 2005 has led to a widespread reduction of the average quality of the sites included. Given that there is no reason to think that the inclusion of mixed sites lead to a reduction of sites' quality, we could not exclude that it is given by the general enlargement of the WHL. Interestingly we observe a peak of quality between 2001 and 2003, most likely as a consequence of the restrictions imposed on the number of nominations per country: this generates an incentive to submit sites with higher quality, to minimize the possibility to have a rejection among the (already limited) proposed sites. This suggests that the lower quality of sites registered after 2005 is a direct consequence of the positive peak in quality registered by the *Peak_01-03* variable. The negative quantity-quality relationship is thus corroborated, as imposing a limitation on the number of sites that could be nominated seems to increase the quality of sites included in the list. In other words, our hypothesis is valid in both senses. Moreover, regression 28 and 29 show that this effect is stronger for countries with less than 10 sites. If this is so, the relaxation of the constraints on the number of sites that can be proposed has rebooted the process of decreasing marginal quality of the WHL.

Table 11 (model 28-33) presents the estimates that distinguish cultural and natural sites. Here the focus of the analysis is on the effects of the historical population and GDP for countries with high and low levels of cultural capital, as well as on the impact of *area* on natural sites. As expected, for cultural sites the size of population in the year 1500 has a positive impact on the quality of the sites, regardless of the size of the cultural capital of the country (models 28 and 30); on the other hand, these variables have a negative effect (albeit not statistically significant one) on natural sites. GDP in 1820 has a positive impact on the quality of cultural sites for high cultural capital countries and a negative one for natural sites. *area* is positively and significantly correlated with the quality of natural sites (model 30) and negatively (but barely below statistical significance) with the quality of cultural ones. This pattern of results broadly confirms that historical indicators of civilization have a positive impact on the production of cultural sites of high quality but tend to destroy natural ones, whereas the size of a country has a positive effect on the availability and

preservation of natural wonders. Furthermore, *tenure* and the quality of public administration confirm their negative impact on the quality of the sites already found in the previous models.

Finally, changing the estimating technique from RE to a Tobit model (table 12), where the lower bound value of the dependent variable is censored at 0, does not qualitatively change the results; *tenure* is always negatively correlated with the quality of the sites.

6. Conclusions

Our study uses a definition of quality of the sites of the UNESCO WHL that has the advantages of being simple and straightforward. The estimates based on this appraisal corroborates our main research question: as the number of sites that a country has in the WHL increases, their marginal quality decreases; since the stock of cultural and natural capital is fixed, new entries into the WHL appear to be of lesser quality than the 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) changes in the criteria for the evaluation of quality that UNESCO has adopted in the 1972-2018 time interval. Finally, this relationship shows up also in the opposite sense, as in years in which limitations on the number of sites that could be proposed were more stringent, countries reacted by raising the average quality of their newly proposed sites.

This research, however, raises more questions that those to which it provides an answer, as it tackles an issue, the assessment of quality, that is at the same time quite important and difficult to handle in economics of arts and culture and in economics in general. 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 and lobbying plays in the assignment of the new sites, in particular by analyzing that sites whose quality is barely sufficient to make into the list. Another question that is still open is what it would be precise number of sites after which

the average quality of the whole list starts to decrease and if UNESCO should then officially set this limit. Finally, it could be possible to overcome our first hypothesis by verifying if countries take some time before completely understanding what quality is for UNESCO.

Bibliography

Aa, B. J. M. V. D. (2005). *Preserving the heritage of humanity? Obtaining world heritage status and the impact of listing,* Ph.D Dissertation, Faculty of Spatial Science, University of Groningen, Netherlands.

Albertini A. and Longo A. (2006), "Combining the travel cost and contingent behavior methods to value cultural heritage sites: Evidence from Armenia", *Journal of Cultural Economics*, 30:287–304.

Bedate A., Herrero L. C. and Sanz J. A. (2004). "Economic valuation of the cultural heritage: application to four case studies in Spain", *Journal of Cultural Heritage*, 5 101–111

Bertacchini E., Saccone D., and W. Santagata (2009). "Enhancing the valorization of UNESCO world heritage sites: a Pigouvian approach", *Working Paper New Series, Dipartimento di Economia 'S. Cognetti de Martis', Working Paper No. 3/2009*, Università di Torino

Bertacchini E. and Saccone D. (2012). "Toward a political economy of World Heritage" *Journal of Cultural Economics,* 36, 327-352

Bertacchini E., Liuzza C. and Meskell L. (2015). "Shifting the balance of power in the UNESCO World Heritage Committee: an empirical assessment", *International Journal of Cultural Policy* 23: 331-351.

Bertacchini E., Liuzza C., Meskell L., and Saccone D. (2016). "The politicization of UNESCO World Heritage decision making" *Public Choice*, 167: 95-129.

De Piles, R. (1708). *Cours de Peinture par Principes*. Paris.

Frey B., Pamini P., and Stainer L. (2010). "What determines the world heritage list? An econometric analysis", *Working Paper Series, Department of Economics, University of Zurich No. 1*, Zurich

Frey B., and Stainer L. (2010). "World Heritage list: Does it make sense?", *CESifo working paper Public Choice, No. 3078,* Centre for Economics Studies and Ifo Institute (CESifo), Munich

Gergaud O. and Chossat V. (2003). "Expert Opinion and Gastronomy: The Recipe for Success", *Journal of Cultural Economics*, 27(2):127-141

Ginsburgh V. (2003). "Awards, Success and Aesthetic Quality in the Arts", *Journal of Economic Perspectives*, 17: 99-111

Ginsburgh V. (2004). "The Eurovision Song Contest: Is Voting Political or Cultural?", *Working Paper ECARES, Université Libre de Bruxelles and Center for Operations Research and Econometrics*, Louvain-la-Neuve

Ginsburgh V. and Weyers S. (1999). "On the Perceived Quality of Movies", *Journal of Cultural Economics* 23: 269-283

Hume, David (1757). *Four Dissertations* (1 ed.). London: A. Millar in the Strand

Jokilehto J., Cleere H., Denyer S. and Petzel M. (2005). *The World Heritage List: Filling the gaps – An action plan for the future*. Documentation. ICOMOS (Monuments and Sites; XII), Munchen.

Jokilehto, J. (2008). *The World Heritage List: What is OUV? Defining the Outstanding Universal Value of Cultural World Heritage Properties*. Documentation, ICOMOS (Monuments and Sites; XVI), Berlin.

Labadi S. (2013). *UNESCO, Cultural Heritage, and Outstanding Universal Value: Value-based Analyses of the World Heritage and Intangible Cultural Heritage Conventions*, New York, Rowman & Littlefield.

Lancaster, K. (1966). "A New Approach to Consumer Theory", *Journal of Political Economy* 74:132–157.

Lee S., Phau I. and Quintal V. (2017). "Exploring the effects of a 'new' listing of a UNESCO World Heritage Site: the case of Singapore Botanic Gardens", *Journal of Heritage Tourism* 339-355.

Noonan D. S. (2003), "Contingent Valuation and Cultural Resources: A Meta-Analytic Review of the Literature", *Journal of Cultural Economics*, 27: 159–176.

Orley A. and Jones G. (2000). "The Demand for Expert Opinion: Bordeaux Wine", *Les Cahiers de l'OCVE* 3: 1–17.

Parenti B. and De Simone E. (2015). "Explaining determinants of national UNESCO Tentative List: an empirical study", *Applied Economics Letters* 22: 1193-1198

Payson, S. (1994). *Quality Measurement in Economics.* Cheltenham, Edward Elgar

Pohle J. (2016). *Information for All? The emergence of UNESCO's policy discourse on the information society (1990 – 2003)*, Ph. D. diss., ZBW – Deutsche Zentralbibliothek fur Wirtschaftswissenschaften, Leibniz – Informationszentrum Wirtshaft, Kiel, Hamburg

Ruijgrok, E.C.M. (2006). "The three economic values of cultural heritage: a case study in the Netherlands", *Journal of Cultural Heritage*, 7: 206-213

Stainer L., and Frey B. S. (2011). "Imbalance of World Heritage List: Did the UNESCO Strategy Work?" *Working Paper Series, Department of Economics, Working Paper No. 14, University of Zurich*

Throsby, D. (1990). "Perception of Quality in the Demand for Theatre", *Journal of Cultural Economics* 14: 65–82.

Throsby, D. (1999). "Cultural Capital", *Journal of Cultural Economics* 23: 3–12

Tobias, S. (2004). "Quality in the Performing Arts: Aggregating and Rationalizing Expert Opinion", *Journal of Cultural Economics* 28: 109–124

UNESCO (1972). *Convention Concerning the Protection of the World Cultural and Natural Heritage.* Available at: www.whc.unesco.org

TABLES AND FIGURES for MORE IS WORSE: DECREASING MARGINAL QUALITY OF THE UNESCO WORLD HERITAGE LIST

By Martina Dattilo, Fabio Padovano and Yvon Rocaboy

Table 1. Evolution of the implementation of the Global Strategy for decisions about the WHL

Year	*Decision*	*Overall limit*	*Limit per country*	*Exemptions per country*
2000		30 Nominations	1 Nomination	States Parties with no sites on the List
2001	24 COM VI.2.3.	30 Nominations	1 Nomination	States Parties with no sites on the List
2003	27 COM 14	40 Nominations	1 Nomination	States Parties with no sites on the List
2004	28 COM 13.1	45 Nominations, *including* deferrals, referrals, extensions, emergency and transboundary	2 Nominations at least 1 natural	
2004	7 EX COM 4B.1	45 Nominations, *including* deferrals, referrals, extensions, transboundary	2 Nominations at least 1 natural	
2005	29 COM 18A	45 Nominations, *including* deferrals, referrals, extensions, transboundary	2 Nominations at least 1 natural + transboundary	States Parties who participate in transboundary nominations submitted on another country

(adapted from "Global Strategy: Evaluation of the Cairns-Suzhou Decision", 31 COM 8B.I.A.2)

Table 2. Cultural and natural criteria in 2018

N.	*Cultural Criterion*	*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 3. Changes in criteria over time

N. of criterion	*Changes of the definition of the criterion, as reported in the Operational Guidelines*
1	Represent ~~a unique artistic achievement~~ [1995], a masterpiece of ~~the~~ [1994] human creative genius
2	~~Have exert great considerable~~ [1980] ~~influence~~ *exhibit an important interchange of human values* [1997] over a span of time or within a cultural area of the world, on developments in architecture *or technology* [1997], monumental arts, town-planning ~~and landscaping~~ *or landscape design* [1994]
3	Bear a unique or at least exceptional testimony *to a cultural tradition or* [1994] to a civilization *which is leaving or* [1997] which has disappeared
4	Be an outstanding example of a type of ~~structure~~ *buildings* [1984] *or architectural* [1984] *or technological ensemble* [1997] *or landscape* [1994] which illustrates (a) significant stage(s) in *human* [1994] history
5 *6*	Be an outstanding example of a traditional human settlement *or land-use* [1994] or *sea-use* [2005] which is representative of a culture *(or cultures)* [1994] *or human interaction with the environment* [2005] ~~which~~ *especially when it* [1994] has become vulnerable under the impact of irreversible change Be directly or tangibly associated with events or *living traditions* [1994] with ideas, or beliefs, *with artistic and literary works* [1994] of outstanding ~~historical~~ *universal* [1980] significance. (*the Committee considered that this criterion should ~~justify inclusion in the List only in exceptional circumstances~~* ***preferably be used*** *[2005]* ~~*or*~~ ***and*** *[1997] in conjunction with other criteria* ***cultural or natural*** *[1996])* [1980]."
7	Contain superlative natural phenomena ~~formation of features, for instance, outstanding examples of the most important ecosystems~~ [1994] or areas with exceptional beauty ~~or exceptional combination of natural and cultural elements~~ and *aesthetic importance* [1994];
8	Be outstanding examples representing ~~the~~ [1994] major stages of ~~the~~ [1994] earth's ~~evolutionary~~ [1994] history, *including the record of life, significant on going geological processes in the development of landforms or significant geomorphic or physiographic features* [1994]
9	Be outstanding examples representing significant on going ~~geological process~~ *ecological* [1994] and biological *process in* [1994] the evolution and ~~man's interaction with his natural environment~~ *development of terrestrial, fresh water, coastal and marine ecosystem and communities of plants and animals.*

N. of criterion	*Changes of the definition of the criterion, as reported in the Operational Guidelines*
10	Contain the most important and significant natural habitats *for in situ conservation of biological diversity* [1994] including those containing threated species *of animals and plants* [1994] of outstanding universal value from the point of view of science or conservation.

Figure 1. Evolution of criteria over time

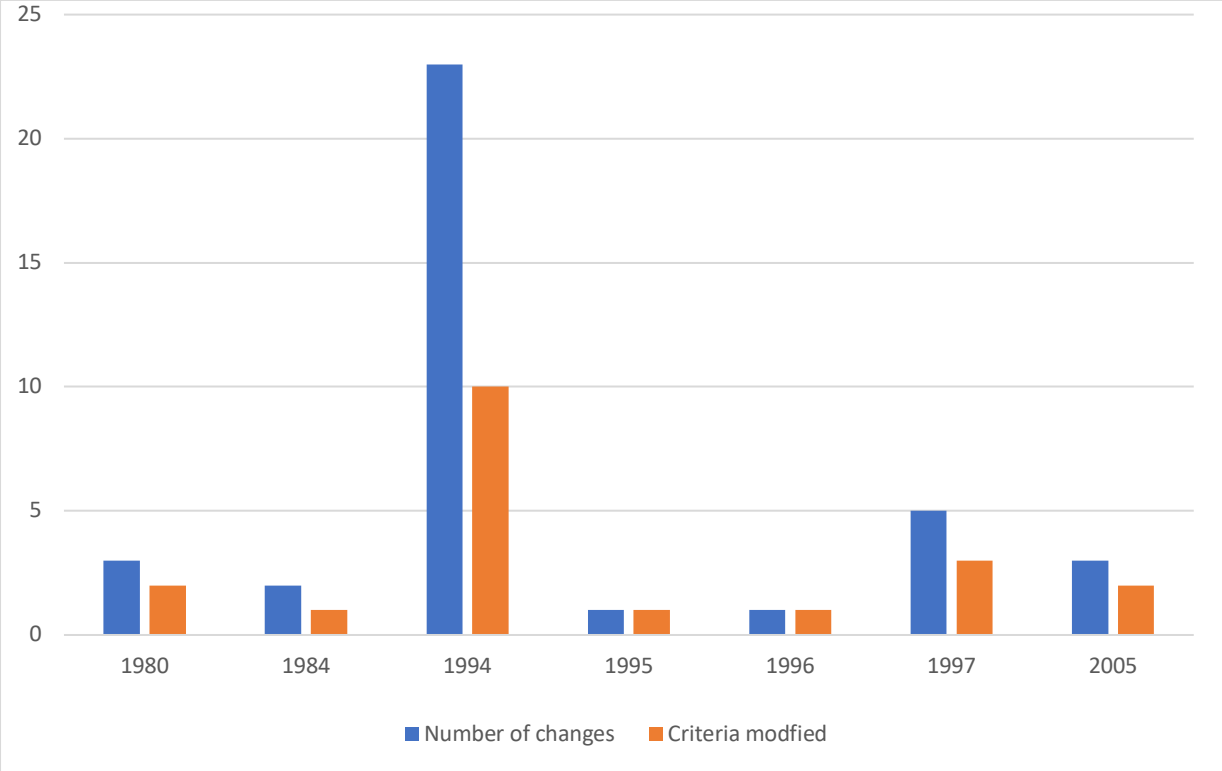

Figure 2. Mean quality of sites by UNESCO geographical area (n. of criteria satisfied)

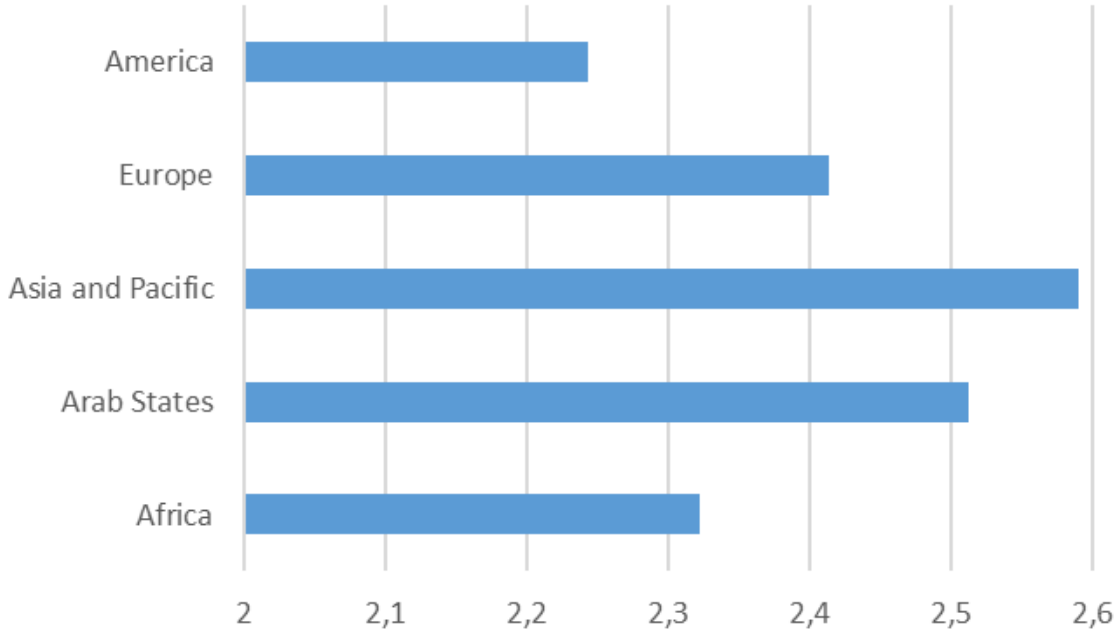

Figure 3. Correlation between quantity and quality of UNESCO sites

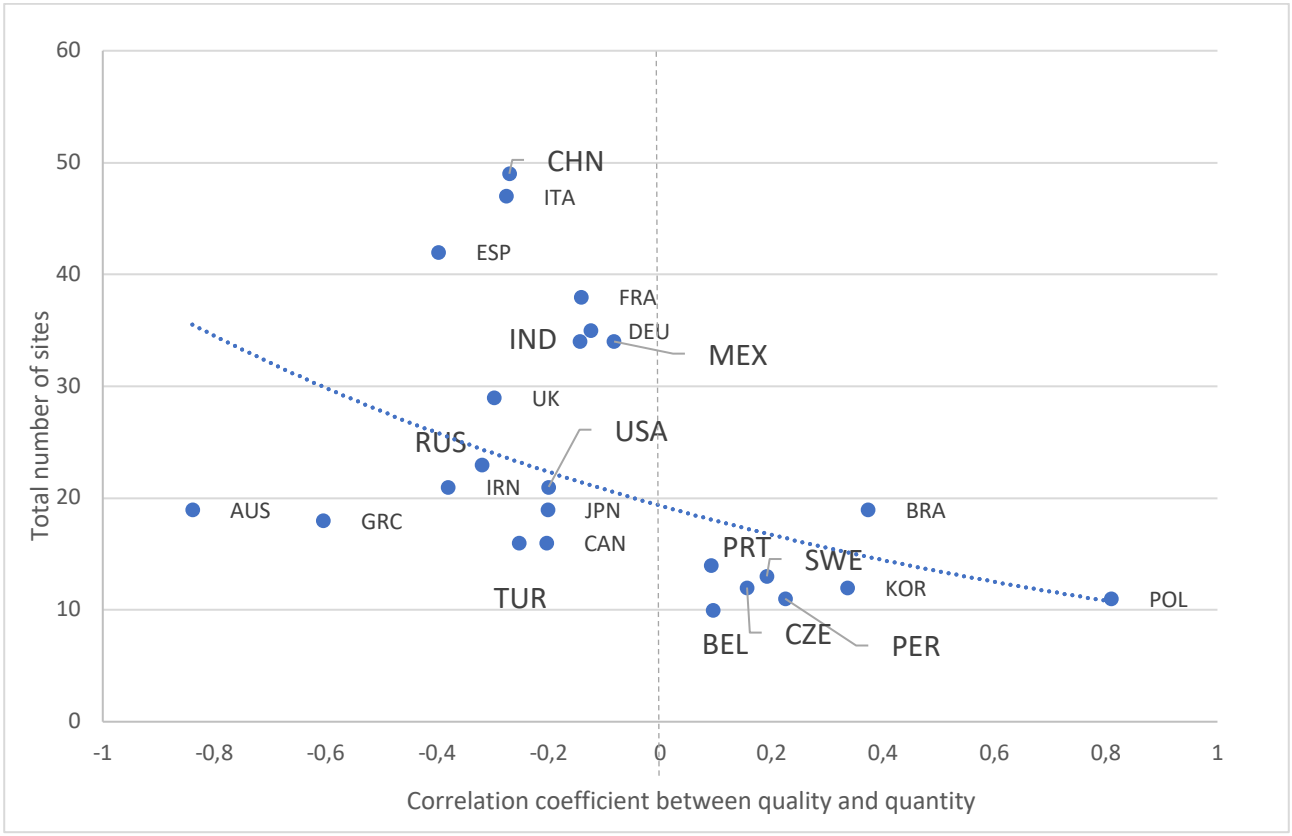

Table 4. Correlation Matrix

	Peak	*Tenure*	*Break94*	*Break02*	*Break05*	*Committe*	*Quality*	*Pop*	*POP_1500lk*	*Area*	*Exp_cont*	*Unpaid*	*Gov_Eff*	*Sites*	*GDP_1820lk*
Peak	1	-0.21	0.24	0.17	-0.58	-0.019	0.0039	-0.01	-0.002	-0.01	-0.023	-0.017	-0.013	-0.05	-0.019
Tenure		1	0.61	0.66	0.4	0.17	0.037	0.13	0.085	0.18	0.11	0.047	-0.028	0.32	0.18
Break94			1	0.66	0.56	0.07	0.05	0.04	0	0	0.1	0.03	0	0.26	0
Break02				1	0.84	0.06	0.01	0.03	0	0	0.06	-0.02	0	0.25	0
Break05					1	0.042	-0.05	0.011	-0.002	0.004	0.011	-0.03	0.0072	0.08	0.0022
Committe						1	0.19	0.23	0.22	0.23	0.2	0.034	0.16	0.34	0.25
Quality							1	0.29	0.3	0.2	0.23	0.062	0.11	0.39	0.26
Pop								1	0.96	0.44	0.22	0.11	-0.008	0.52	0.18
POP_1500lk									1	0.31	0.17	0.02	0.044	0.52	0.19
Area										1	0.32	0.32	0.035	0.42	0.14
Exp_cont											1	0.58	0.33	0.5	0.47
Unpaid												1	0.093	0.15	0.17
Gov_Eff													1	0.31	0.56
Sites														1	0.59
GDP_1820lk															1

Table 5. 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	724207	118480	1985150.85	2	17098250	6992
Population	3.216e+07	6.197e+06	1.212e+08	1.212e+04	1.379e+09	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	0.014	-0.146	0.98	-2.271	2.437	2982

Table 6. Expected signs

	Expected sign
Tenure	Negative
Sites $_{t-1}$	Negative
Area	Positive
Population	Positive
POP_1500hk	Positive
GDP_1820hk	Positive
POP_1500lk	Positive
GDP_1820lk	Positive
Committe	Negative
Exp_contr	Negative
Unpaid	Positive
Gov_Eff	Negative
Break_94	Not significant
Break_02	Positive
Break_05	Negative
Peak 2001-03	Positive

Table 7. Regression results. Number of sites proxied by tenure

	Model 1 *With zeros* *N=4259*	*Model 2* *Without zeros* *N=580*	*Model 3* *Without zeros* *N=580*	*Model 4* *Without zeros* *N=308*	*Model 5* *Without zeros* *N=168*	*Model 6* *Without zeros* *N=129*
Tenure	-0.006*** (0.001256)	-0.0091** (0.003681)	-0.008144** (0.003632)	-0.01892*** (0.005025)	-0.02446*** (0.007711)	0.00358 (0.01)
D_Africa	-0.2046*** (0.05911)	0.1732 (0.1553)				
D_America	-0.16308*** (0.005971)	-0.02427 (0.1395)				
D_Arabia	-0.1458** (0.07294)	0.2122 (0.1696)				
D_Asia	-0.1407** (0.05998)	0.2546* (0.1363)				
Committee	0.1059*** (0.01928)	0.01216 (0.03908)	0.003171 (0.03922)	-0.00267 (0.04811)	0.03854 (0.05259)	0.09598 (0.1007)
Expect_ contr	0.0000021*** (0.0000003)	0.0000006 (0.0000005)	0.0000003 (0.0000005)	0.0000005 (0.0000007)		-0.0000026 (0.000007)
Unpaid_contr	-0.0000008*** (0.0000003)	-0.0000004 (0.0000004)	-0.0000003 (0.0000004)	-0.0000004 (0.0000008)	-0.0000003 (0.0000007)	-0.00000035 (0.0000006)
Gov_Eff					-0.5363*** (0.106)	-0.06995 (0.114)
Pop 1500lk			0.000006** (0.000003)			
GDP 1820lk			0.0001167 (0.000114)			
Pop 1500hk				0.0000054* (0.0000032)	0.0000012 2.5217e-06	

GDP 1820hk				-0.0001259 (0.0002591)	0.0006283** (0.0002714)	
Area	0.003297*** (0.001449)	-0.0007915 (0.001843)	-0.00668 (0.00171)	-0.001261 (0.00281)	0.002122 (0.002589)	-0.000315 (0.004487)
Population	0.0001198*** (0.0000171)	0.00004169 (0.00000259)				-0.00008158 (0.0004)
Intercept	0.40036*** (0.0428)	2.3313*** (0.0978)	2.3848*** (0.081)	2.8178*** (0.2663)	2.8329*** (0.2935)	2.1424*** (0.19)
Adj. R^2/pseudo R^2	0.056554	0.062591	0.055078	0.041979	0.15788	0.11389
F-statistic	26.5172***	4.27682***	5.4931***	2.5171**	5.4728***	3.35011***

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

Table 8. *Regression results. Number of sites proxied by sites*

	Model 7 *Without zeros* *N=580*	*Model 8* *Without zeros* *N=580*	*Model 9* *Without zeros* *N=308*	*Model 10* *Without zeros* *N=168*	*Model 11* *Without zeros* *N=129*
Sites$_{t-1}$	-0.0144*** (0.005278)	-0.01793*** (0.005151)	-0.01926*** (0.005883)	-0.007341 (0.00688)	-0.08722** (0.0431)
D_Africa	0.091 (0.1556)				
D_America	-0.09941 (0.1385)				
D_Arabia	0.0827 (0.1677)				
D_Asia	0.161 (0.1369)				
Committee	0.01435 (0.039)	0.00756 (0.03897)	-0.006512 (0.04829)	0.02592 (0.05428)	0.1786* (0.1035)
Expect_contr	0.000001* (0.0000005)	0.0000007 (0.0000006)	0.0000008 (0.0000007)		0.000003 (0.000008)
Unpaid_contr	-0.0000005 (0.0000004)	-0.0000004 (0.0000004)	-0.0000006 (0.0000008)	-0.0000002 (0.0000007)	-0.000001 (0.0000007)
Gov_Eff				-0.45745*** (0.1056)	-0.043438 (0.1144)
Pop 1500lk		0.0000088*** (0.000003)			
GDP 1820lk		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	-0.0005936 (0.001788)	-0.001938 (0.001724)	-0.001512 (0.00278)	0.0002128 (0.002577)	0.004783 (0.005163)
Population	0.000064** (0.0000271)				0.001493 (0.005163)
Intercept	2.3191*** (0.09184)	2.3080*** (0.06717)	2.5784*** (0.2512)	2.3112*** (0.245)	2.2615*** (0.1122)
Adj. R^2	0.059248	0.072239	0.034685	0.11125	0.14991
F-statistic	3.84477***	6.88437***	1.94965*	3.98641***	4.21297**

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

Table 9. Robustness checks. Sample divided by number of sites per country

	Model 12 *Country sites>10* *N=273*	*Model 13* *Country sites<10* *N=286*	*Model 14* *Country sites>10* *N=273*	*Model 15* *Country sites<10* *N=291*	*Model 16* *Country sites>10* *N=143*	*Model 17* *Country sites<10* *N=162*	*Model 18* *Country sites>10* *N=143*	*Model 19* *Country sites<10* *N=162*
Tenure	-0.02262*** (0.00536)	0.0002435 (0.005324)			-0.024*** (0.0084)	0.001656 (0.00773)		
Site$_{t-1}$			-0.01943*** (0.00576)	-0.01784 (0.0264)			-0.01591* (0.0083)	-0.04298 (0.0362)
Committee	0.02473 (0.04676)	-0.05179 (0.07901)	0.00483 (0.047)	-0.02551 (0.08044)	0.03485 (0.0511)	0.03234 (0.093)	0.02026 (0.0515)	0.08092 (0.0974)
Expect_contr	0.0000006 (0.0000006)	-0.0000044 (0.000005)	0.00000055 (0.0000006)	-0.0000029 (0.0000052)				
Unpaid_contr	-0.0000004 (0.0000004)	0.0000003 (0.0000061)	-0.0000005 (0.0000004)	0.0000003 (0.000006)	-0.0000006 (0.0000007)	-0.0000032 (0.0000068)	-0.0000006 (0.0000005)	-0.0000027 (0.0000068)
Gov_Eff					-0.37615*** (0.1282)	-0.1178 (0.0866)	-0.45983*** (0.14)	-0.10672 (0.0862)
POP1500lk					0.0000045** (0.0000022)	0.0001319** (0.0000054)	0.0000059** (0.0000023)	0.0001467** (0.0000562)
GDP1820lk					0.00069** (0.00027)	-0.0000778 (0.0002163)	0.000835*** (0.000311)	0.0000086 (0.00022)
Area	-0.0027 (0.00195)	0.001415 (0.00943)	-0.003 (0.00205)	0.001197 (0.00937)	-0.0009922 (0.00182)	0.00952 (0.0115)	-0.001342 (0.00184)	0.0115 (0.0114)
Population	0.0000584** (0.0000254)	0.000364** (0.000183)	0.00007** (0.0000279)	0.0004** (0.000188)				
Intercept	2.7400*** (0.1422)	2.1885*** (0.1011)	2.6696*** (0.144)	2.2288*** (0.0842)	2.6515*** (0.2782)	2.1355*** (0.1579)	2.3791*** (0.2524)	2.2192*** (0.1185)
Adj. R^2	0.045423	0.03896	0.029433	0.046893	0.14336	0.063214	0.11572	0.063214
F-statistic	2.9077***	2.9004***	1.9404*	3.3601***	4.39477***	2.31579**	3.65462***	2.54477**

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

Table 10. Robustness checks. Stability in the definition of criteria, breakpoints

	Model 20 N=580	*Model 21 N=580*	*Model 22 N=580*	*Model 23 N=580*	*Model 24 N=580*	*Model 25 N=580*	*Model 26 N=580*	*Model 27 N=580*
$Site_{t-1}$					-0.01334** (0.00564)	-0.01551*** (0.00561)	-0.01197** (0.00559)	-0.01821*** (0.00505)
Committee	0.001039 (0.0388)	0.000865 (0.0389)	0.006724 (0.0388)	-0.0021 (0.0383)	0.01189 (0.0389)	0.01252 (0.039)	0.0151 (0.039)	0.01482 (0.0383)
Expect_contr	0.0000005 (0.0000005)	0.0000004 (0.0000005)	0.0000004 (0.0000005)	0.0000003 (0.0000005)	0.0000009* (0.0000005)	0.0000009* (0.0000005)	0.0000009 (0.0000005)	0.000001* (0.0000005)
Unpaid_contr	-0.0000003 (0.0000004)	-0.0000004 (0.0000004)	-0.0000004 (0.0000004)	-0.0000003 (0.0000004)	-0.0000004 (0.0000004)	-0.0000005 (0.0000004)	-0.0000005 (0.0000004)	-0.0000004 (0.0000004)
Area	-0.001708 (0.00178)	-0.001384 (0.00174)	-0.001595 (0.00181)	-0.001373 (0.00168)	-0.001423 (0.00179)	-0.001175 (0.00177)	-0.001432 (0.00181)	-0.001233 (0.00174)
Population	0.0000569** (0.0000237)	0.0000552** (0.0000233)	0.0000583** (0.0000244)	0.0000515* (0.0000223)	0.0000789*** (0.0000256)	0.0000804*** (0.0000255)	0.0000785*** (0.00002615)	0.000084*** (0.0000251)
Break_94	-0.2** (0.0837)				-0.11 (0.092)			
Break_02		-0.11 (0.0764)				-0.02 (0.0834)		
Break_05			-0.2591*** (0.0777)				-0.1875** (0.0844)	
Peak_01-03				0.5418*** (0.129)				0.5824*** (0.0128)
Intercept	2.4542*** (0.08)	2.3664*** (0.0649)	2.4023*** (0.0626)	2.2769*** (0.056)	2.4296*** (0.081)	2.3702*** (0.065)	2.4113*** (0.0626)	2.3223*** (0.0582)
Adj. R^2	0.052281	0.042153	0.068338	0.059478	0.066103	0.063929	0.078238	0.096811
F-statistic	5.7238***	4.55847***	7.5729***	6.47493***	5.94148***	5.60852***	7.24583***	8.88314***

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

Table 11. Robustness checks. Cultural and natural sites

	Model 28 *Cultural* *N=472*	*Model 29* *Natural* *N=141*	*Model 30* *Cultural* *N=260*	*Model 31* *Natural* *N=71*	*Model 32* *Cultural* *N=142*	*Model 33* *Natural* *N=35*
Tenure	-0.00327 (0.003886)	-0.0229** (0.006915)	-0.0148** (0.005266)	-0.0231** (0.009555)	-0.0263*** (0.008525)	-0.00953 (0.01848)
Committee	0.042 (0.04233)	-0.0821 (0.067628)	0.0466 (0.05127)	-0.0832 (0.08568)	0.0497 (0.05607)	0.0198 (0.0985)
Expect_ contr	-0.0000003 (0.0000006)	-0.0000005 (0.000001)	0.00000002 (0.0000007)	-0.0000003 (0.0000011)		
Unpaid_contr	0.0000004 (0.0000006)	-0.0000003 (0.0000004)	0.0000007 (0.0000008)	0.0000003 (0.000002)	-0.0000001 (0.0000007)	0.0000005 (0.000001)
Gov_Eff					-0.497*** (0.1198)	-0.4142 (0.2465)
Pop 1500lk	0.00001*** (0.000003)	-0.0000006 (0.000003)				
GDP 1820lk	0.00012 (0.00012)	0.000091 (0.00022)				
Pop 1500hk			0.00001*** (0.0000035)	-0.000003 (0.000003)	0.000005 (0.000003)	-0.000005 (0.000004)
GDP 1820hk			-0.00012 (0.00027)	-0.000334 (0.00044)	0.00051* (0.0003)	-0.00024 (0.0008)
Area	-0.0021 (0.001937)	0.000774 (0.002179)	-0.0065** (0.003185)	0.0051 (0.0031)	-0.000355 (0.003274)	0.00415 (0.0048)
Intercept	2.2772*** 0.088681	2.4797*** 0.13820	2.7403*** 0.28235	2.6919*** 0.46168	2.9726*** 0.32960	2.4240** 0.69059
Adj. R^2	0.031143	0.17074	0.03805	0.052025	0.079195	-0.059335
F-statistic	2.47597**	5.09536***	1.9944*	1.54025	2.63523**	0.727945

Table 12. Robustness checks. Tobit estimations

	Model 34 *Tobit* *Uncensored = 580*	*Model 35* *Total = 4259* *Uncensored=580*	*Model 36* *Total = 974* *Uncensored=308*	*Model 37* *Total = 552* *Uncensored=168*
Tenure	-0.04019*** (0.00863)	-0.0406*** (0.008584)	-0.0181* (0.01087)	-0.0151* (0.008641)
D_Africa	-1.373*** (0.371)			
D_America	-1.012*** (0.3598)			
D_Arabia	-0.6805 (0.4336)			
D_Asia	-0.7403** (0.3536)			
Committee	0.5969*** (0.1112)	0.5222*** (0.1092)	0.1997* (0.1108)	0.00322 (0.04648)
Expect_ contr	0.000008*** (0.0000016)	0.000004** (0.0000016)	0.0000052*** (0.0000017)	
Unpaid_contr	-0.0000024* (0.0000013)	-0.0000012 (0.00000013)	-0.0000053*** (0.0000018)	-0.0000009 (0.0000007)
Gov_Eff				-0.207 (0.1611)
Pop 1500lk		0.000032*** (0.0000075)		
GDP 1820lk		0.002378*** (0.0003)		
Pop 1500hk			0.000026*** (0.0000068)	0.000013*** (0.0000034)
GDP 1820hk			0.001196* (0.00063)	0.00065* (0.000037)

Area	0.002195*** (0.005879)	0.0206*** (0.005)	0.009768 (0.006441)	0.005236 (0.003497)
	0.0003241*** (0.000087)			
Intercept	-3.369*** (0.2946)	-4.584*** (0.263)	-2.87*** (0.6384)	0.557 (0.4315)
Pseudo. R2	0.299	0.31	0.686	0.821
Log-likelihood	-2495.618	-2474.661	-1086.922	-779.4749

Table 13. 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