

EVALUATING THE PERFORMANCE OF PUBLIC PROCUREMENT CONTRACTS  
FOR CULTURAL HERITAGE CONSERVATION WORKS IN ITALY

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# Evaluating the performance of public procurement contracts for cultural heritage conservation works in Italy"

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## Abstract

This paper is aimed at investigating a specific area of public procurement, namely the capital expenditure for the conservation of Cultural Heritage (CH). The procured activities, such as, for instance, CH restoration or maintenance as well as archaeological excavations, are crucial for the conservation and the enhancement of CH. Though the economic relevance of CH is increasingly recognised in the literature, so far no much attention has been paid to the economic features of the procurement for CH conservation. The paper aims at filling this gap, using Italy as a case study. Employing a detailed data set on Italian public contracts for CH conservation in the period 2000 to 2005, the paper tries to investigate whether the characteristics of the decision-making process underlying CH conservation, e.g. the high degree of specialization of contracting authorities, play a role to explain the delays and costs overrun occurring in the execution stage.

To address such a question a two-stages analysis is carried out. At a first stage, a non-parametric approach (Data Envelopment Analysis - DEA) is used to investigate the relative performance scored by each single contract. At a second stage, an empirical analysis on the determinant factors of the scores variability is carried out. The results of the empirical analysis show that, *ceteris paribus*, the expertise characterizing the CH field affects the performance of CH contracts: specialized contracting authorities are, on average, less efficient than the less specialized ones, paying more attention to the completion of the contract than to the control of the final cost. The performance of CH contracts, as measured by the efficiency scores, is mainly affected by the degree of specialization of the contracting authority and by the openness of the tendering procedure.

JEL: H57, D24, Z1

Keyword: cultural heritage, conservation, procurement, cost overruns, delays

## 1. Introduction

In most countries Government intervention in Cultural Heritage (CH) conservation is widespread. Among the various tools available to Government in the CH conservation field we focus our

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attention on public spending for conservation and, namely, on the direct demand exerted by the public sector through its procurement activity. Strange to say, though it is increasingly recognised that heritage is a strategic factor in the promotion of local development and that its economic impact is affected by the efficiency and effectiveness of public policies put in practice (Rizzo-Peacock, 2008), no much attention has been devoted to such an issue in the literature; at the best of our knowledge, this paper can be considered one of the first attempt to investigate the economic features of CH conservation contracts<sup>1</sup>.

The paper aims at filling this gap looking at the main economic features of public spending for CH conservation, using Italy as a case study. The rich CH endowment of the country, the relevant size of CH in public ownership and the extensive role of the public sector make Italy an interesting example to be analyzed. Employing a detailed data set on Italian public contracts for CH conservation in the period 2000 to 2005, the paper tries to investigate whether the characteristics of the decision-making process underlying CH conservation, e.g. the high degree of specialization of contracting authorities, play a role to explain the delays and costs overrun occurring in the execution stage.

To address such a question a two-stages analysis is carried out. At a first stage, a non-parametric approach (DEA - Data Envelopment Analysis) is used to investigate the relative performance scored by each single contract. At a second stage, an empirical analysis on the determinant factors of the efficiency scores variability is carried out. The results of the empirical analysis show that, *ceteris paribus*, the expertise characterizing the CH field affects the performance of CH contracts: specialized contracting authorities are, on average, less efficient than the less specialized ones, paying more attention to the completion of the contract than to the control of the final cost. The performance of CH contracts, as measured by the efficiency scores, is mainly affected by the degree of specialization of the contracting authority and by the openness of the tendering procedure.

This paper is organized as follows: in Section 2, we briefly discuss some theoretical issues of public intervention in CH conservation and describe the main institutional and economic features of the implementation of CH conservation in Italy. Section 3 investigates the concept of performance, the methodological approach for measuring it and provides estimates for CH conservation contracts in Italy. The empirical analysis of the determinants of the performance in CH conservation is developed in Section 4. Section 5 provides some concluding remarks.

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<sup>1</sup> The performance of CH contracts in relation with overall public works contracts has been investigated, with a different approach by Guccio and Rizzo (2010).

## 2. Public intervention for cultural heritage conservation in Italy

### 2.1. Some theoretical issues

Almost everywhere public intervention in the CH field is widespread and it is implemented with monetary as well as non monetary means (Rizzo-Throsby, 2006). In this paper, attention is paid to public expenditure, i.e. to direct monetary intervention<sup>2</sup>, aimed at the conservation<sup>3</sup> of built heritage. No much attention, so far has been devoted to analyse this specific area of public intervention in the CH field, a possible explanation lying in the fact that public spending for CH conservation constitutes a very small share of GDP.<sup>4</sup> However, notwithstanding such a small size, the analysis of the public spending for CH raises some interesting theoretical issues and offers a fruitful room for investigation. Italy will be used as a case study: the rich CH endowment of the country, the relevant size of CH in public ownership, the extensive role of the public sector and the major role plaid by the experts within the heritage authorities (*Soprintendenze*) make Italy an interesting case study for empirical analysis.

In the economic literature as well as in the economic debate there is an increasing awareness that CH has relevant economic potentialities to foster sustainable economic development; urban policies increasingly rely on the rehabilitation of CH to support economic activities and the services related to culture and tourism. At the same time, it has been stressed (Peacock and Rizzo, 2008) that to be *input* of economic development CH has to be the *output* of conservation policies and, therefore, the way how these policies are designed and implemented crucially affects the overall economic impact of CH.

A stream of literature focuses attention upon the features of the decision –making process and on the crucial role plaid by experts (Peacock-Rizzo, 2008). It is claimed that conservation decisions are not neutral and that the outcome of decision-making process is crucially affected by experts (art historian, architect, archaeologist, urban planner); they enjoy an informative advantage and are entitled to decide *which* type of conservation has to be carried out in each specific case and *how*.

Experts decisions are highly subjective: a good example is offered by the debate on the adoption of standards for conservation, showing how difficult is to find the specialists' agreement on this topic.<sup>5</sup>

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<sup>2</sup> The non monetary intervention, e.g. regulation, is explored by Rizzo, forthcoming.

<sup>3</sup> According to the definition provided by the World Bank (1994) conservation "encompasses all aspects of protecting a site or remains so as to retain its cultural significance. It includes maintenance and may, depending on the importance of the cultural artefact and related circumstances, involve preservation, restoration, reconstruction or adaptation, or any combination of these" ..

<sup>4</sup> Data on the public spending for culture in general are provided by OECD (2006) and Klamer, Mignosa and Petrova (2006).

<sup>5</sup> For instance, see the Canadian Federal Heritage Buildings Review Office (1996).

The overall implication is that the efficiency and effectiveness of CH conservation are affected by *who* takes the decisions and *how* they are implemented.

Reputation plays a relevant role in their utility function (Finocchiaro – Rizzo, 2009); experts are interested in restored buildings, archaeological excavations or any conservation activity which offer a testimony to their expertise and allows them to gain professional prestige and reputation among their peers. In doing so, the specificity and the uniqueness of CH is stressed and the importance of quality is enhanced.

In this paper we try to address these issues taking for granted the decisions regarding the type of conservation and investigating only the implementation stage, focusing our attention on the conservation activities carried out within the public sector, e.g. on the direct public capital expenditure<sup>6</sup> implemented through procurement activities and to the threat for CH conservation arising if public spending is not carried out efficiently and effectively. As we said before, Italy is used as a case study.

## 2.2. *Some institutional features*

The CH conservation is heavily regulated in Italy; it is at the intersection of two set of rules, e.g. the Code of heritage (*Codice dei beni culturali*) and the Code for the award of public supply, services and works contracts (*Codice dei contratti pubblici di lavori, servizi, forniture*). The former defines the principles for the conservation and enhancement of heritage and the allocation of responsibilities between central and local governments, with the former playing a major role; the latter provides the rules governing the national procurement system, according with the principles set up in the EU Directive, with a specific reference to the CH conservation field.

As far as public works in general are concerned, the law tries to reduce bureaucratic discretion: competition is promoted as much as possible, as a tool to select the most convenient bidder. To prevent opportunistic behaviour of private contractors, cost plus contract are not allowed. Moreover, to ensure the quality in the execution of works, the access to the public works market is heavily regulated: in fact, the firms need to be qualified according to a complex system referring to two criteria, type of the works carried out in the past and financial dimension. An independent Authority (*Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*) supervises the functioning of the market for public works, the proper implementation of the existing regulation by

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<sup>6</sup> In this paper no attention is paid to indirect public spending, namely tax expenditures, since they raise different economic problems. On this issue, see Schuster (2006).

the public authorities and the contractors as well as the functioning of the qualification system for the firms.<sup>7</sup>

Within such a framework, CH conservation field is regulated with some specific provisions. The qualification of firms entitled to enter the market is designed to ensure that they possess the specific expertise required by the restoration of heritage; the scope for restricted procedures to select the firm is enlarged as well as the scope for the renegotiation of the contract. In other words, the idea that each conservation case is “special” seems to be taken into account by the rules and more degrees of freedom are left to the negotiation between the contracting authority and the firm at the execution stage than in the general procurement case.

### 2.3 The features of the public demand for CH conservation

Public contracts for CH conservation in Italy have a relevant size. Table 1 shows that in the period 2000-05, 4,997 public contracts above 150,000 euros were awarded,<sup>8</sup> (4.92 % of the total number of public works contracts awarded) amounting to about 3,545 millions of euros (3.75 % of the total amount of public works). These figures somehow represent the overall public demand for CH conservation<sup>9</sup> at its initial stage. On average, the size of the CH conservation contract is small (709.37 thousand euros), lower than the average size in public works<sup>10</sup>, and it exhibits a high standard deviation.

**Table 1.** CH conservation contracts awarded in the period 2000-2005

Sector	Number of contracts	Total amount	Average amount	Dev. St.	Min	Max
CH conservation contracts	4,997	3,544,699	709.37	1,704	150.01	52,678
% of total contracts	4.92	3.75				
<b>Total public contracts awarded</b>	<b>101,589.00</b>	<b>94,651,035.43</b>	<b>931.71</b>	<b>4,238</b>	<b>150.00</b>	<b>857,720</b>

**Source:** Our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

**Note:** monetary values in thousand euro at current prices

The public demand for CH conservation is fragmented in terms of the size of contracts. As Table 2 shows, in the CH field 3,363 contracts (67.30% of the total number) are between 150,000 and

<sup>7</sup> A closer analysis of the Authority is provided by Rizzo (2008).

<sup>8</sup> According to the estimates of the *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*, almost 64% refers to “restoration” while the others are classified as “maintenance” (24%), “new intervention” (8%) and “others” (5%).

<sup>9</sup> Indeed, there might be an underestimation of the overall public demand for CH conservation for two reasons. On one hand, the figures refer to the final stage of the tender, e.g. when the winner is chosen, while the number of the tenders just issued might be higher (but data are not available); on the other hand, the above figures are based on the data which each contracting authority has communicated to the Authority while it is likely that some of them do not fulfill the obligation on time.

<sup>10</sup> The average size for the public works in general is 931,705 euros.

500,000 euros and, at the other extreme, only 61 contracts (1.22%) are between 5 millions and 15 millions and only 9 contracts (0.18%) are above 15 millions of euros. On the other hand, the contracts between 150,000 and 500,000 euros account for 25.03% of the total amount and those in the last two classes, above 5 million euros, account for 20.59% of the total amount.

**Table 2.** Number of CH conservation contracts per classes of value in the period 2000-2005

Classes of value	Number of contracts	%	Total amount	%	Average amount
<b>CH conservation</b>					
$\geq 150.000 \text{ €} < 500.000 \text{ €}$	3,363	67.30	887,230	25.03	263.82
$\geq 500.000 \text{ €} < 1.000.000 \text{ €}$	867	17.35	612,050	17.27	705.95
$\geq 1.000.000 \text{ €} < 5.000.000 \text{ €}$	697	13.95	1,315,441	37.11	1,887.29
$\geq 5.000.000 \text{ €} < 15.000.000 \text{ €}$	61	1.22	469,058	13.23	7,689.48
$\geq 15.000.000 \text{ €}$	9	0.18	260,907	7.36	28,989.71
Total contracts	4,997	100.00	3,544,699	100.00	709.37
<b>All public works contracts</b>					
$\geq 150.000 \text{ €} < 500.000 \text{ €}$	69,351	68.27	18,810,172	19.87	271.23
$\geq 500.000 \text{ €} < 1.000.000 \text{ €}$	17,020	16.75	11,969,584	12.65	703.27
$\geq 1.000.000 \text{ €} < 5.000.000 \text{ €}$	13,271	13.06	27,018,120	28.54	2,035.88
$\geq 5.000.000 \text{ €} < 15.000.000 \text{ €}$	1,387	1.37	11,244,983	11.88	8,107.41
$\geq 15.000.000 \text{ €}$	560	0.55	19,260,545	20.35	34,393.83
Total contracts	101,589	100.00	94,651,035	100.00	931.71

**Source:** Our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

**Note:** monetary values in thousand euro at current prices

As far as contracting authorities are concerned, also in the CH conservation field<sup>11</sup> municipalities play a major role in terms of the number of contracts awarded, but central government shows some peculiar feature from a qualitative point of view. Table 3 shows that 54.91 % of the CH contracts are awarded by local governments (municipalities) and 30.44 % of the contacts are operated by central government, mainly through its specialized heritage authorities (*Soprintendenze*)<sup>12</sup>, run by experts and operating on a decentralized basis. However, as it is expected, the central government appears to be rather specialized in the field of CH conservation contracts, compared with the overall public works contracts; in fact, CH conservation contracts account for the 24.37% of the total contracts awarded by central government while at local level they account only for 5.47%. In other words, it seems that, for central government contracting authorities CH conservation can be

<sup>11</sup> The 49.39% of the overall public works contracts are awarded by municipalities and 6.14 by central government.

<sup>12</sup> According with the reform of the organization of the Ministry of Cultural Heritage and Activities occurred in 2007 (and revised in 2009), nowadays, the formal responsibility of being contracting authority pertains to the Regional Branches of cultural heritage and landscape (*Direzioni Regionali per i beni culturali e paesaggistici*). Such a reform, however, does not apply to our analysis since our sample covers the period 2000-05. *Provveditorati* are central government contracting authorities operating at interregional level on behalf of other public bodies.

considered a “core business” while for municipalities (as well as for the other contracting authorities) CH conservation is just one the several fields of activity.

**Table 3.** CH conservation contracts awarded by contracting authority in the period 2000-2005

Contracting authority	All sector		CH intervention						
	Total contracts	%	Number of CH contracts	%	% of total contracts	Total amount	%	Average amount	Dev St
Central government	6,241	6.14	1,521	30.44	24.37	789,902	26.54	630	1,354
<i>of which Soprintendenze</i>	--	--	1,075	21.51	--	620,179	20.84	576	1,529
<i>of which Provveditorati</i>	--	--	57	1.14	--	169,722	5.70	602	2,539
Regions and provinces	15,935	15.69	535	10.71	3.36	289,610	9.73	681	844
<i>Of which Sicilian region</i>	--	--	83	1.66	--	121,321	4.08	870	2,552
Municipalities	50,175	49.39	2,744	54.91	5.47	1,647,593	55.36	687	1,661
Others	29,238	28.78	197	3.94	0.67	249,291	8.38	1,392	4,161
<b>Total</b>	<b>101,589</b>	<b>100.00</b>	<b>4,997</b>	<b>100.00</b>	<b>4.92</b>	<b>2,976,397</b>	<b>100.00</b>	<b>699</b>	<b>1,749</b>

**Source:** Our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

**Note:** monetary values in thousand euro at current prices

Another indicator of the specialization of central government contracting authorities in the CH conservation field, compared with others contracting authorities, is offered by the fact that 66.53% of the CH conservation contracts awarded by central government are based on in-house projects, while such a percentage is much lower, less than half, for the other contracting authorities (table 4)<sup>13</sup>. The composition of demand raises a question of whether the specialization of the contracting authority affects the contract performance.

**Table 4.** In-house projects for CH conservation contracts awarded by contracting authority in the period 2000-2005

Contracting authority	Number of contracts	%	In-house project	%	% for each contracting authority
Central government	1,252	29.60	833	45.79	66.53
<i>of which Soprintendenze</i>	1,075	25.41	719	39.53	66.88
<i>of which Provveditorati</i>	57	1.35	--	--	--
Regions and provinces	425	10.05	141	7.75	33.18
Municipalities	2,396	56.64	800	43.98	33.39
Others	157	3.71	45	2.47	28.66
<b>Total</b>	<b>4,230</b>	<b>100.00</b>	<b>1,819</b>	<b>100.00</b>	<b>43.00</b>

**Source:** Our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

A further feature of the CH conservation market is that restricted procedures are more widespread than in the overall public works contracts market: 27.64% of CH contracts are assigned through restricted procedures (accounting for the 14.73% of the total amount of the CH contracts)<sup>14</sup> while only 13,87% of the overall public works contract is assigned through restricted procedures, (i.e. 6,40% of the total amount). These figures reflect the fact that the existing regulation provides more

<sup>13</sup> Table 4 reports a small difference in the overall number of contracts, 4,252 instead of 4,997 since the information regarding the in-house project was not available for all the observations.

<sup>14</sup> Restricted procedures are mainly concentrated in the contracts between 150,000 and 500,000 euros.



scope for restricted procedures in the CH conservation, the rationale being that these contracts, because of their highly specialized features, require a closer relationship between the experts in the contracting authorities and the supplier, leading to more degrees of freedom in the selection of the supplier. What are the effects of such a closer relationship and such a greater discretion on the performance of the CH contracts is an open question which will be investigated below.

**Table 5** CH conservation contracts awarded in the period 2000-2005 by tendering procedure

Tendering procedure	Number of contracts	%	Total amount	%	Average amount
<b>CH conservation</b>					
Open	3,375	67.54	2,901,098	81.84	859.59
Restricted	1,381	27.64	521,962	14.73	377.96
n.c.	241	4.82	121,638	3.43	504.72
<b>Total</b>	<b>4,997</b>	<b>100.00</b>	<b>3,544,699</b>	<b>100.00</b>	<b>709.37</b>
<b>All public works contracts</b>					
Open	83,131	81.83	84,850,012	89.65	1,020.68
Restricted	14,089	13.87	6,054,160	6.40	429.71
n.c.	4,369	4.30	3,746,862	3.96	857.60
<b>Total</b>	<b>101,589</b>	<b>100.00</b>	<b>94,651,035</b>	<b>100.00</b>	<b>931.71</b>

**Source:** Our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

**Note:** monetary values in thousand euro at current prices

Table 6 shows that the demand for CH conservation is not evenly distributed across the country, being mainly concentrated in the Centre, with 42.05% of the number of contracts awarded (36.88% of the total amount).<sup>15</sup>

**Table 6.** Geographical distribution of CH conservation contracts awarded in the period 2000-2005

Areas	Number of contracts	%	Value	%	Average amount
<b>CH conservation</b>					
North-West	953	19.07	781,333	22.04	819,867.01
North-East	539	10.79	481,645	13.59	893,591.17
Centre	2,101	42.05	1,307,411	36.88	622,280.74
South	897	17.95	598,381	16.88	667,091.61
Islands	507	10.15	375,927	10.61	741,474.36
<b>Total</b>	<b>4,997</b>	<b>100.00</b>	<b>3,544,699</b>	<b>100.00</b>	<b>709,365.50</b>
<b>All public works contracts</b>					
North-West	27,147	26.72	26,989,940	28.52	994,214
North-East	15,661	15.42	12,335,967	13.03	787,687
Centre	31,814	31.32	28,470,522	30.08	894,905
South	17,111	16.84	16,603,453	17.54	970,338
Islands	9,856	9.70	10,251,151	10.83	1,040,092
<b>Totale</b>	<b>101,589</b>	<b>100.00</b>	<b>94,651,035</b>	<b>100.00</b>	<b>931,705</b>

**Source:** Our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

**Note:** monetary values in thousand euro at current prices

<sup>15</sup> The same pattern, though with a less marked concentration, also characterizes the overall public works contracts market.

#### 2.4. The features of the supply of CH conservation

The access to the public works market is heavily regulated. The firms must be qualified to participate to tenders above 150.000 euros and they can obtain their qualification certificate on the base of their technical, economic and organizational features.<sup>16</sup> Namely, the qualification is obtained according with categories (type of expertise)<sup>17</sup> and classes (financial dimension).<sup>18</sup> The categories which are relevant for the field of CH conservation are: OG2 *Restoration and maintenance of built heritage*; OG4 *Underneath works of arts* ; OS2 *Decorated surfaces and mobile heritage*; OS25 *Archaeological excavations*.

The supply in CH conservation consists of 4,449 firms. e.g. firms which are qualified for at least one of the categories OG2, OG4, OS2 and OS25. Table 7 shows that the qualifications obtained in the CH sector represent a small share of the overall qualifications, ranging from 3.58% (OG2) to 0.33% (OS25)<sup>19</sup> of the overall qualifications. As far as the classes (i.e. the financial dimensions) are concerned, the firms qualified in the conservation field show different features depending on the category. OG2 exhibits a distribution similar to the overall set of firms: 50% of the firms are concentrated in the two lowest classes and only a very small share in the two highest classes. Such a concentration in the lowest classes is even more marked for the specialized categories (OS2 and OS25), showing that small firms prevail in these categories. Only OG4 exhibits a high share in the two highest classes (32.32%), showing that big firms tend to prevail. Whether and how this feature of the supply affects the performance of the CH contracts is an open question which is addressed below.

**Table 7** Composition of supply by categories and classes – 2005

Categories	Number of qualifications	%	% of firms in the two lowest classes	% of firms in the two highest classes
Category OG2	2,956	3.58	50.22	2.06
Category OG4	362	0.44	25.41	32.32
<b>All general categories</b>	<b>54,411</b>	<b>65.88</b>	<b>54.07</b>	<b>3.45</b>
Category OS2	494	0.60	71.26	0.20
Category OS25	275	0.33	66.91	0.00
<b>All special categories</b>	<b>28,179</b>	<b>34.12</b>	<b>63.90</b>	<b>2.75</b>
All firms qualified in CH	4,449	5.39	47.47	11.37
<b>All qualified firms</b>	<b>82,590</b>	<b>100.00</b>	<b>57.42</b>	<b>3.21</b>

**Source:** Our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

<sup>16</sup> Qualification is costly for the firms; a payment is due for each category and class which are obtained. The system is run by private companies (Società Organismo di Attestazione – SOA); they evaluate whether each firm is entitled or not to obtain the required qualification.

<sup>17</sup> There are 13 general categories, so called OG (such as roads, restoration and maintenance of built heritage, dams, underneath works of arts, railways, etc.) and 34 specialized categories, so called OS (such as, decorated surfaces and mobile heritage, archaeological excavations, telecommunications infrastructures, landscape, etc.).

<sup>18</sup> There are 8 classes ranging from 258,228 up to 15,493,708 euros.

<sup>19</sup> These shares are higher if calculated within the general and the specialized sectors.

If we compare the composition of supply as illustrated by Table 7 with the composition of demand in terms of number of tenders, by classes and categories (Table 8) it appears that the decisions of firms with respect to the classifications somehow matches the compositions of demand; in other words, it seems that “demand creates supply”, e.g. firms qualify according with the demand.

**Table 8** Distribution of tenders by categories and classes - 2005

Categories	Absolute values		Weighted values	
	% of tenders in the two lowest classes	% of tenders in the two highest classes	% of tenders in the two lowest classes	% of firms in the two highest classes
Category OG2	58.48	0.61	36.70	2.15
Category OG4	24.39	19.51	10.00	38.13
<b>All general categories</b>	<b>74.29</b>	<b>0.68</b>	<b>53.44</b>	<b>2.95</b>
Category OS2	70.51	5.13	46.20	18.99
Category OS25	63.77	0.00	42.25	0.00
<b>All special categories</b>	<b>71.51</b>	<b>0.66</b>	<b>50.22</b>	<b>2.80</b>
<b>All qualified firms</b>	<b>73.75</b>	<b>0.68</b>	<b>52.81</b>	<b>2.92</b>

Source: *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture (2006)*

A similar conclusion holds looking at the geographical distribution of firms operating in the CH conservation field: table 9 shows that they are mainly concentrated in the Centre and in the South in almost all categories, e.g. with a geographical distribution very similar to the demand<sup>20</sup>.

**Table 9** Geographical distribution of qualified firms by categories - 2005

Categories	North-West	North-East	Centre	South	Islands	NC	Total
Category OG2	13.43	16.61	28.86	28.76	11.87	0.47	100.00
Category OG4	28.21	19.61	25.14	19.34	8.01	2.76	100.00
<b>All general categories</b>	<b>17.38</b>	<b>15.95</b>	<b>19.78</b>	<b>33.23</b>	<b>12.96</b>	<b>0.70</b>	<b>100.00</b>
Category OS2	13.16	22.47	38.87	17.61	7.49	0.40	100.00
Category OS25	6.18	7.64	33.09	30.91	21.09	1.09	100.00
<b>All special categories</b>	<b>23.88</b>	<b>21.14</b>	<b>21.48</b>	<b>23.24</b>	<b>9.42</b>	<b>0.84</b>	<b>100.00</b>
<b>All qualified firms</b>	<b>19.60</b>	<b>17.72</b>	<b>20.36</b>	<b>29.82</b>	<b>11.75</b>	<b>0.75</b>	<b>100.00</b>

Source: Our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

Further features of the market for CH conservation contracts which deserve attention refer to the specialization of the contract and to the interactions between the contracting authorities and the suppliers. Table 10 shows that the composition and specialization index<sup>21</sup> in CH conservation contracts varies across categories: OG2 contracts do not exhibit marked differences with respect to

<sup>20</sup> A similar pattern holds for overall set of qualified firms.

<sup>21</sup> More formally, if  $S_{ij}$  is the  $i$ -th category and  $W_j$  is the relative import of the public work  $j$ -th then:  $CI_j = \sum_i S_{ij}$ ;

$$WCI_j = \sum_i S_{ij} \frac{W_{ij}}{\sum_j W_j}; \quad SI_j = \sum w_{ij}^2 / (\sum w_{ij})^2$$

the overall public works while the contracts pertaining to the other categories are more specialized (the most specialized being OS2).

**Table 10** Specialization index of CH contracts awarded

Categories	Composition index – CI	Weighted Composition Index - WCI	Specialization Index - SI
OG2	1.287	1.251	0.793
OG4	1.104	1.091	0.915
OS2	1.062	1.037	0.947
OS25	1.129	1.115	0.834
<b>All public works</b>	<b>1.231</b>	<b>1.197</b>	<b>0.825</b>

**Source:** Our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

Table 11 reports an indicator of the degree of interaction between the contracting authority and the supplier: interaction is measured by the number of contracts awarded, on average, to each firm by the same purchasing authority. Interaction differs across categories but it follows a pattern which is not systematically related to specialization.

**Table 11** Interaction in the CH conservation market

Categories	Interaction
OG2	2.28
OG4	7.63
OS2	1.92
OS25	2.38
<b>All CH</b>	<b>2.31</b>

**Source:** Our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

### 3. The measurement of performance in public procurement for CH works

#### 3.1. *The notion of performance*

On the ground of the analysis developed in the previous section, we try to carry out an empirical investigation about the performance of public spending for CH works.

In general, public works performance can be measured alongside different aspects related to both the output of the work (e.g. the quality of the work, its capability of satisfying the objectives and the needs for which it has been carried out, etc.) and the process of its realization. We will focus on the latter issue. Following a previous work (Guccio et alii, 2008), we define performance in terms of the achievement of time and cost objectives. We will, therefore, consider whether a work is completed on time or its completion is delayed, and the existence of cost overruns, *i.e.* the additional costs above the value of the winning bid, incurred by contracting works authorities.

These two dimensions of performance are somehow correlated: the presence of delays in the completion of a work is likely to imply cost overruns, since the delay is, in fact, representative of problems connected with the implementation of the work. However, delays are representative of other costs that are not included in cost overruns for the contracting authorities. Bajari and Lewis (2009) underline the relevance of completion time for social welfare and, referring to highways construction, suggest that slow completion times may generate “significant negative externalities for commuters through increased gridlock and commuting times”. The time of completion can be extremely relevant in the CH case especially when the intervention of conservation is carried out on artefacts which are in danger and, therefore, delays might even lead to their destruction. Therefore, delays may generate social costs and benefits shortfalls, over and above the increase in costs for the contracting authorities. Actually, it may happen that delays occur even in the absence of cost overruns.

Costs overruns and delays have been increasingly investigated in the literature. Flyvbjerg et al., (2002) report that almost 9 out of 10 projects experienced some cost overruns in transport infrastructure in 20 developed and developing countries over the world and Flyvbjerg, (2005) estimates that the cost overrun of infrastructure caused by the delayed construction is at 4.6 percent per year. Bajari et al., (2006) estimate that the economic costs of ex post adaptations account for about ten percent of the winning bid for California highway contracts. For developing countries Alexeeva et al.(2008), show that the value of a public road contract exceeds its engineering cost estimate by more than 20 percent and that the average delay in project completion reaches 10 months and Iimi (2009) estimate that for road procurement in Africa about 70 percent of contracts experienced some cost overruns and adaptation cost is estimated at 93 cents per one dollar of contract adjustment.

Table 12 shows the relevance of cost overruns and delays in the execution of CH conservation contracts, in comparison with overall public works in Italy. Namely, in the period 2000-2005, 43.45% of CH conservation contracts has experienced cost overruns above 10.00% of the original cost. The results in terms of delays are even more striking: 66.39% of CH conservation contracts involved a delay longer than 20.00% of the completion time agreed upon in the contract. No major differences seem to occur between the CH conservation sector and all public works contracts as far as delays are concerned. On the contrary, cost overruns are more severe for CH conservation works than for public works in general.

**Table 12** – Distribution of public works for classes of normalized cost overruns and delays – 2000-2005

Intervals (%)	CH conservation				All public works contracts			
	Cost overruns		Delays		Cost overruns		Delays	
	No.	%	No.	%	No.	%	No.	%
≤ 0	102	16.89%	140	23.18%	2,724	27.60%	2,767	28.03%
>0<5	103	17.05%	9	1.49%	2,120	21.48%	128	1.30%
≥ 5 <10	136	22.52%	10	1.66%	2,034	20.61%	240	2.43%
≥ 10 <20	149	24.67%	44	7.28%	1,634	16.56%	641	6.49%
≥ 20	114	18.87%	401	66.39%	1,358	13.76%	6,094	61.74%
<b>Total</b>	<b>604</b>	<b>100.00%</b>	<b>604</b>	<b>100.00%</b>	<b>9,870</b>	<b>100.00%</b>	<b>9,870</b>	<b>100.00%</b>

**Source:** our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

Therefore, the issue seems to be relevant and worth of investigation to understand what are the major determinants of the CH conservation performance, measured by the two above mentioned indicators.

### 3.2. The methodology for measuring performance

The measurement of each single dimension of the performance of CH works, as defined in the previous section, is relatively easy and straightforward. As for the time of completion of a work, it is generally measured the delay (i.e the difference between the actual time of completion and the planned time of completion) in percent of the time planned for completion. Cost overruns represent “actual costs minus estimated costs in percent of estimated costs” (Flyvbjerg et al., 2002). When one searches for the causes of bad performances, or of the differences in performance across different works and authorities, however, the use of two, or even more indicators complicates the analysis, since a single work or a single authority, can have very different scores on each indicator, as compared, for instance, to other works or authorities. Aggregation of the different measures, then, can be of great help.

We will try to aggregate the time and cost measures of performance of CH works through data envelopment analysis (DEA). DEA is a nonparametric technique, generally used to estimate a production function with minimal assumptions, and it can easily handle multiple inputs/outputs situations. By constructing envelopment unitary isoquants corresponding to comparable DMU (Decision Making Unit) across different situations, DEA identifies as productive benchmarks those DMU that exhibit the lowest technical coefficients, *i.e.* lowest input amount to produce one unit of output. Once these reference frontiers have been defined, it is possible to assess what would be the potential efficiency improvements available to the inefficient DMU if they were to produce according to the best practice technologies of their benchmark peers. From an equivalent

perspective, these simulations identify the necessary changes that each DMU needs to undertake in order to reach the efficiency levels of the most successful DMU. More formally DEA calculates the efficiency frontier for a set of units (DMU), as well as the distance from the frontier for each unit. This distance (efficiency score) provides a measure of the radial reduction in inputs that could be achieved for a given measure of output.<sup>22</sup> However, normally DEA technique does not allow for any statistical inferences. Only recently, Simar and Wilson (1998, 2000) introduced a bootstrapping methodology to determine the statistical properties of the DEA estimators<sup>23</sup>. In this section, we use this approach for compute the bias-corrected estimates of DEA efficiency scores.

To the best of our knowledge there are no empirical estimates of the performance of the public work execution in general or with respect to CH works, that take jointly into account cost overruns and time delay. DEA will help us to construct a unique performance score for CH works. In the DEA framework, the expected cost, equal to the winning bid, and the expected duration as agreed in the contract, will be regarded as outputs, while the final cost and the actual duration of the work will be considered as inputs (Table 13). Of course, we are not identifying a proper production function, since our objective is to use DEA as a methodology for a weighted aggregation of the performance scores along the two dimensions (time and cost), through benchmarking among the different works.

**Table 13** “Inputs and outputs” of CH conservation intervention

Variables	Model
INPUTS	<i>Actual duration (X1)</i>
	<i>Final cost (X2)</i>
OUTPUTS	<i>Expected duration (Y1)</i>
	<i>Expected cost (=winning bid) (Y2)</i>

22 As illustration, a DEA input-oriented efficiency score  $\theta_i$  is calculated for each DMU solving the following program, for  $i=1, \dots, n$ , in the case of constant returns to scale (CRS):

$$\begin{aligned}
 & \text{Min}_{\lambda, \theta_i} && \theta_i \\
 & \text{subject to} && -y_i - Y\lambda \geq 0 \\
 & && \theta_i x_i - X\lambda \geq 0 \\
 & && \lambda \geq 0
 \end{aligned}
 \tag{1}$$

where  $x_i$  and  $y_i$  are respectively the input and output of  $i$ -th DMU;  $X$  is the matrix of input and  $Y$  is the matrix of output of the sample;  $\lambda$  is a  $n \times 1$  vector of constants. The model [1] can be modified to account for VRS (variable returns to scale) by adding the convexity constraint,  $\sum \lambda = 1$ , which allows to distinguish between Technical Efficiency (TE) and Scale Efficiency (SE).

<sup>23</sup> Bootstrapping consists of using random selection of thousands of “pseudo samples” from the observed set of a sample data. Pseudo estimates are obtained from each of these samples. These thousands of pseudo estimates form an empirical distribution of the estimator of interest. This distribution is used as an approximation of the true underlying sampling distribution of the estimator.

### 3.3. The performance scores of CH works

The data used in the following analysis are those collected by *Osservatorio per i lavori Pubblici*” of the “*Autorità di Vigilanza sui contratti pubblici di lavori, servizi e forniture*” for the public works contracts in Italy, including, therefore, also CH conservation interventions. The observation unit is given by the single intervention; very detailed information are available on the various steps of the procedure – project, selection of the contractor, execution and conclusion.

The sample employed in the following analysis consists of 604 CH conservation contracts, awarded and concluded in the period 2000-2005. Tables 14 shows the composition of this sample focusing upon the 4 categories included in this field and the main descriptive statistics. By far, the largest share of the CH conservation contracts falls in category OG2 *Restoration and maintenance of built heritage*; while the others categories (OG4 *Underneath archaeology*; OS2 *Decorated surfaces and mobile heritage*; OS25 *Archaeological excavations*) refer to a very small number of contracts.

**Table 14** – Composition of the sample for CH conservation contracts

Sectors	Number of obs.	Total amount	Mean	St. Dev.	Minimum amount	Maximum amount
OG2	551	238,892	433.56	394.62	150.00	3,220
OG4	16	8,651	540.71	406.75	189.09	1,936
OS2	31	9,190	296.46	223.15	159.34	1,321
OS25	6	1,671	278.61	114.45	165.27	433
<b>Cultural heritage</b>	<b>604</b>	<b>258,406</b>	<b>427.82</b>	<b>388.07</b>	<b>150.00</b>	<b>3,220</b>

**Source:** our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

**Note:** monetary values in thousand euro at current price

Summary statistics of inputs and outputs, distinguished by type of contracting authority, are provided in table 15

**Table 15** Inputs and outputs of CH conservation contracts

Contracting authorities	N. DMU	Input		Output	
		X1	X2	Y1	Y2
All	604	409.92	428,071	267.21	377,433
<i>of which Soprintendenze</i>	109	399.27	375,244	293.14	323,740

**Source:** our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

Using DEA methodology, we have computed the overall performance scores for each work. The average score of all the CH works is reported in table 16 , where we also represent, separately, the average values for the works carried out by *Soprintendenze* and for the other institutions responsible for such works. In the last two columns, we report the values of the average percent reduction in each input, for the achievement of full efficiency.



**Table 16** Efficiency scores of CH conservation contracts

Contracting authorities	N. Observation	Eff. Scores (CCR) Mean	% reduction of X1	% reduction of X2
All	604	90.13	-14.80	-9.87
<i>of which Soprintendenze</i>	109	89.48	-13.72	-10.51
<i>of which other contracting authorities</i>	495	90.27	-15.04	-9.72

**Source:** our elaboration on data provided by *Autorità di vigilanza sui contratti pubblici di lavori, servizi e forniture*

The results obtained applying the DEA approach show that the overall performance of CH contracts is quite high. However, the values of the scores need to be interpreted with caution. DEA measures relative efficiency and, therefore, in our case the observations on the frontier, those fully efficient relative to the others, need not to be those that simultaneously fulfil time and cost efficiency. Moreover, there are no major differences between specialized contracting authorities (*Soprintendenze*) and the other contracting authorities. However, if we disentangle such a result looking at the “efficiency” for each dimension (time and cost), as measured by the reduction in each “input”, needed to achieve full efficiency, DEA seems to offer some support to our previous conclusion, i.e. that *Soprintendenze* are more concerned than the others on minimizing delays. On the other hand, when the minimization of costs is taken into account, their distance is greater. An interesting development of the analysis might be to explore the differences of performance existing across the different categories included in the CH conservation; however, the small number of observations available for categories OG4, OS2 and OS25<sup>24</sup> does not allow for such an investigation.

Finally, following Simar and Wilson (1998), we implement the homogeneous bootstrap procedure to correct the bias in DEA estimators and obtain their confidence intervals. The confidence intervals and the bias-corrected efficiency scores have been estimated using the homogeneous bootstrap procedure with 2,000 bootstrap draws as described by Simar and Wilson (1998).

**Table 17– Bias corrected efficiency estimate – mean value**

Contracting authorities	N. Observation	Eff. Bias corr - mean value	Lower bound - mean value	Upper Bound - mean value
All	604	89.78	88.68	90.12
<i>of which Soprintendenze</i>	109	88.90	87.26	90.01
<i>of which other contracting authorities</i>	495	89.98	89.00	90.24

<sup>24</sup> See table 14

In Table 17 column 2 provides the number of observation, columns 3 provide the bias-corrected efficiency scores. Columns 4 and 5 provide the two boundaries of 95% confidence intervals for the bias-corrected efficiency scores that range, in mean, from 88.68 to 90.12, with an average value of 89.78. This analysis confirms the *Soprintendenze*, overall, are slightly less efficient than the other contracting authorities but that, they exhibit a higher degree of variability, as measured by the range of the confidence interval.

#### 4. The determinants of performance in CH contracts

4.1. In this section, we investigate the determinants of the performance in CH public works. The estimated model can be expressed by the following general formulation:

$$\theta_i = f(z_i) + \varepsilon_i \quad [1]$$

where  $\theta_i$  is the efficiency scores that resulted from previous stage,  $z_i$  is a set of independent variables and  $\varepsilon_i$  is a vector of error terms.

As far as independent variables are concerned, we identify five different groups of variables which can affect the CH conservation contract performance: the *specialization of the contracting authority*, the *contractor selection mode*, the *complexity of the intervention*, the *execution mode*, the *market characteristics*, and other *control factors*.

Firstly, we investigate the relation between the *specialization* of the contracting authority and the performance of CH contracts. As it was pointed out in section 2, central government is a specialized contracting authority. Its activity is concentrated on CH, to issue regulation and to carry out conservation; in other words, CH conservation can be considered a “core business” for central government authorities, while, for municipalities (as well as for the other contracting authorities operating in the field), CH conservation is just one the several fields of activity. Central government operates mainly through specialized heritage authorities (*Soprintendenze*) run by experts, who are likely to be very much interested in the quality of the conservation since they gain prestige and reputation among their peers. We would expect, therefore, that the objective function of this highly specialized contracting authority, when compared with the others, affects the performance of the contract: the DEA scores estimated before showed that *Soprintendenze* are on average less efficient than other contracting authorities though their behaviour differs with respect to time and costs. Costs overruns are likely to be more accepted in the light of the search for quality but, on the other hand, to maximize prestige and reputation among the peers, the completion of the contract is

relatively more important. As a natural development of the previous analysis, to test for the role of *specialization* of the contracting authority on performance, we use two variables: **SOPRINTENDENZA** and **IN\_HOUSE\_PROJ**. The former is a dummy variable indicating that the contracting authority is a specialized one; the latter represents the percentage of in-house projects, as an indicator of the specialization of the contracting authority.

The *contractor selection mode* variable refers to the impact of the different procurement procedures –whether it is an open auction or a restricted procedure. Earlier, it has been pointed out that, broadly speaking, in Italy the existing procurement rules tend to favour the use of open tendering procedures with the consequence that a large portion of bidders are selected through competitive auctions, such a tendency being somehow mitigated in the CH conservation field, because of the specific role played by quality. Indeed, firms are more inclined to perform well whenever they can use such a record for obtaining further contracts in the future; however, such a strategy holds only if a restricted selection procedure is adopted while it does not if an auction takes place. Moreover, elsewhere (Guccio et alii, 2008) it has been pointed out that if bidders cannot invest in a long-term relationship with the contracting authority, as it is in the case of the auction, they could find convenient to underbid, at the auction stage, so as to increase the probability of winning the auction, since the expectation of renegotiation will reduce the loss associated to this strategy. To express the role of the selection procedure, we use a dummy variable for open tendering procedures (**OPEN**) with an expected negative sign.

As for the *complexity*, our hypothesis is that contracts implementation becomes more uncertain and, therefore, cost overruns and delay are more likely to occur the higher the degree of complexity. As proxy for complexity, we use the weighted composition index of the work, calculated on the different sub-categories involved in the work, weighted for their relative amount (**WCI**)<sup>25</sup>. Complexity makes more difficult to forecast exactly the time required to execute the work and, therefore, the higher the complexity the more likely are delays, with an expected negative impact on efficiency scores.

As for the *execution mode*, the factor which potentially affects the performance is the existence of legal disputes between the firm and the purchasing authority (**DIS**): **DIS** involves bureaucratic effort, tends to increase the duration of the intervention, because legal disputes require time, and also the final costs, though the extent of the latter effect depends on the outcome of these disputes, whether it is favourable or not to the purchasing authority.

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<sup>25</sup> Public works are articulated in sub-categories, i.e. the different components of the overall work, which contribute, according with their relative relevance, to the estimated total value. It is plausible to assume that the more complex is a public work the higher is the number complexity of sub-categories involved in its implementation.

The *market characteristics* are related to the relationship between the firm and the contracting authority. First of all, we take into account the relevance of negotiations in the procurement of CH works, as noted in section 2.2 above. In such a context, the firm may have an interest in building up reputation for completing works on time and without cost overruns. *Ceteris paribus*, the incentive to behave efficiently, for the purpose of developing reputation, depends on the strength of *market competition*: the higher the potential competition, the greater the incentives for the firms to behave efficiently, because of the challenges deriving by the greater number of potential competitors. To measure market competition we employ the number of potential bidders, i.e. the number of firms qualified for the public work categories and classes (*P\_BID*). The expected sign for the impact of this variable is positive.

We also consider the role, if any, of the existence of a long-term relationship between the firm and the contracting authority, again as a reflection of the relevance of negotiations in CH procurement. The variable used to represent the existence, and to measure the “intensity” of this long-term relationship is the number of works awarded to each firm by the same purchasing authority (*INT*), during the period considered in the analysis, even if they are not finished yet. It is not clear, in principle, the direction of the effect of such long-term relationships. One may think that the larger the “accumulation” of relations with the same authority, the larger the potential value of this stock in terms of reputation to be spent for the award of future contracts, and, therefore, the stronger the incentive, for the firm, to behave efficiently. At the same, however, given the role played, in the field of CH, by considerations about the “quality” of the work carried out by the firm, on the side of the contracting authorities, above all by Soprintendenze, it may be possible that a long term relationship is a reflection of the trust developed in the capability of the firm of carrying out high quality works, even if this may require longer time of completion and/or higher costs.

Moreover, since our data reveal quite a wide variation of the number of interactions across the different firms, we will also consider the squared value of the interaction (*INT*<sup>2</sup>), to investigate whether there is a dimensional effect.

Finally, we control for some factors. We consider the *geographical area* in which the work is carried out, representing the three major areas – North, Centre and South - characterized by different economic conditions<sup>26</sup>, which are likely to impact on the efficiency of public contracting authorities. We use two dummy variables (*NORTH*, *SOUTH*) and we estimate their effects relatively to the Centre area, used as benchmarking, because of the major share of the contracts awarded in this geographical area. We do not have *a priori* expectations for the sign of these

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<sup>26</sup> Per capita income is lower in the South than in the North area and in the Centre.

variable but we want to see whether there is a territorial dimension affecting the efficiency scores of CH contracts. Finally, we control for the year of award. The summary statistics for the variables are reported in table 18.<sup>27</sup>

**Table 18** – Descriptive statistics of the variables employed

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>SCORE</i>	604	0.90	0.09	0.36	1.00
<i>Specialization of the contracting authority</i>					
<i>SOPRINTENDENZA</i>	604	0.18	0.38	0.00	1.00
<i>IN_HOUSE_PROJ</i>	604	0.48	0.50	0.00	1.00
<i>Contractor selection mode</i>					
<i>OPEN</i>	604	0.66	0.47	0.00	1.00
<i>Complexity and specialization</i>					
<i>WCI</i>	604	1.29	0.49	0.00	3.69
<i>Work execution mode</i>					
<i>DIS</i>	604	0.02	0.15	0.00	1.00
<i>Market characteristics</i>					
<i>P_BID</i>	604	687.17	217.53	31.00	899.00
<i>INT</i>	604	2.41	3.39	1.00	30.00
<i>Other control factors</i>					
<i>Geographical area</i>					
<i>NORTH</i>	604	0.33	0.47	0.00	1.00
<i>CENTRE</i>	604	0.50	0.50	0.00	1.00
<i>SOUTH</i>	604	0.17	0.38	0.00	1.00
<i>Year of award</i>					
<i>D_2000</i>	604	0.28	0.45	0.00	1.00
<i>D_2001</i>	604	0.29	0.45	0.00	1.00
<i>D_2002</i>	604	0.24	0.43	0.00	1.00
<i>D_2003</i>	604	0.15	0.36	0.00	1.00
<i>D_2004</i>	604	0.04	0.19	0.00	1.00

Since efficiency scores are truncated from below at one, we have used the truncated regression model<sup>28</sup>. The results from the regressions described in [1] are listed in Table 19.

**Table 19** – Estimation results on determinants of efficiency scores

Variable	(1) DEA_SCORE
Constant	0.911*** (0.019)
<i>Specialization of the contracting authority</i>	
<i>SOPRINTENDENZA</i>	-0.023** (0.011)
<i>IN_HOUSE_PROJ</i>	-0.012 (0.008)
<i>Contractor selection mode</i>	

<sup>27</sup> Although for the sample dimension multicollinearity is probably not a severe problem we test for pairwise collinearity and find that correlation between independent variables is largely acceptable.

<sup>28</sup> We apply semi-parametric two-stage technique suggested by Simar and Wilson, (2007).

<i>OPEN</i>	-0.026*** (0.008)
<i>Complexity and specialization</i>	
<i>WCI</i>	-0.001 (0.008)
<i>Work execution mode</i>	
<i>DIS</i>	0.037 (0.024)
<i>Market characteristics</i>	
<i>P_BID</i>	0.000* (0.000)
<i>INT</i>	0.003 (0.002)
<i>INT</i> <sup>2</sup>	-0.000* (0.000)
<i>Geographical area</i>	
<i>NORTH</i>	-0.013 (0.008)
<i>SOUTH</i>	0.005 (0.010)
<i>Control for year of award</i>	yes
<i>Observations</i>	604
<i>Log likelihood</i>	621.60

The above analysis seems to show that the specialization of the contracting authority exerts a significant effect on the CH contract performance: the variable *Soprintendenza* is significant with the expected negative sign. Such a result is in line with the theoretical tenet that experts play a major role in CH conservation and that, unless incentives are in operation, the decision-making process is likely to be supply-oriented. Moreover, the variable **OPEN** is significant with the expected negative sign; such a result would provide some support to the claimed beneficial effects of the more extended use of restricted procedure in the CH field. Indeed, as expected, the higher the discretionary power of the contracting authority (as it is the case when restricted procedures are used) the greater the challenge deriving by potential competition, as it is showed by the positive sign of the variable **P\_BID**, which is also significant. As for the effect of long term relationships, we can see that it becomes significant when the number of interactions is greater, and the sign is negative.

## 5. Concluding remarks

This paper lies at the intersection of two streams of literature: on one hand, the political economy analysis of decision-making process underlying CH conservation and, on the other hand, the economic analysis of procurement. The paper tries to address the question whether the major role plaid by the experts in the heritage field affects the performance of CH conservation contracts.

The results of the DEA analysis show that, *ceteris paribus*, CH contracts carried out by specialised contracting authorities, on average, are slightly less efficient than those carried out by the less specialized ones: specialized contracting authorities seem to pay more attention to the completion of the contract than to the control of the final cost. One explanation of the results is that the specialized

contracting authorities, such as *Soprintendenze*, tend to maximize reputation among the peers and that, coherently with this objective function, their efforts are mainly allocated toward the completion of the works, with less attention to the control of costs. The parametric analysis on the determinants of the performance of CH contracts, as measured by the efficiency scores, suggests that it is negatively affected by the degree of specialization of the contracting authority and by the openness of the tendering procedure and by a very marked interaction between the contracting authority and the firm. On the other hand, potential competition exerts a positive and significant effect on efficiency scores.

Our results, far from being conclusive, offer some insights on the main economic features of the CH contracts and on their performance. The available data do not allow for measuring the quality dimension of these contracts; however, a tentative suggestion coming from the analysis is that, to improve the performance of CH contracts, the adoption of standards of conservation should be taken into account. Indeed, our results suggest to look for some form of benchmarking or of best practices to orientate practitioners and professionals in the CH field and to reduce the asymmetrical information enjoyed by contracting authorities. Though standards are highly criticized in this field, they could offer a solution for a better control of the final cost of CH contracts which, according with our results, is called for.

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