"Better an egg today than a hen tomorrow?" On the implications of deaccess policies on donations to museums

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Abstract

The recent global crisis has forced many countries to a tight fiscal discipline. As a consequence, the cultural sectors in those countries have experienced severe budget cuts. In this context, disparate suggestions for additional sources of revenue available to public institutions have emerged. In particular, deaccessioning seems able to guarantee the sustainability of public cultural institutions without serious negative impacts on the fruition of cultural goods. This paper addresses the consequences that a widespread deaccessioning would have on private bequests to public institutions. We develop a sequential game with incomplete information between a Museum and a Donor. There are two types of museums: one type is committed not to sale its collection; the second type has no restriction on selling a share of its art endowment. The Donor does not know the type of Museum. The non-committed Museum can sale items in the first stage and/or in the third stage. Donors contribute only in the second stage. Therefore, deaccessioning triggers a moral hazard problem. We derive a number or results concerning the allocation of gifts and the decision of deaccessioning and provide numerical simulations to interpret the parameters. Most notably, with respect to a benchmark case where deaccessioning is illegal, contributions are reduced when the non-committed Museum deaccesses in the first stage (separating strategy). If, however, that Museum does not deaccess at the beginning (pooling strategy), also the committed Museum receives less than in the benchmark case. Interestingly, an increase of public grants to Museums (of any type) allows the non-committed Museum to adopt a pooling strategy, causing a reduction of donations to the committed Museum. This result provides an intuition for the widespread resistance of museum directors to deaccessioning and for their efforts to enforce common and strict guidelines.

1 Introduction

Recent economic crisis has caused a severe shortage of public and private funding for many museums. They have been forced to reduce expenditures and search for additional sources of revenue. Is deaccessioning, i.e. selling off works from a museum collection,[1] a viable option? This

[1]This is the general interpretation of deaccessioning adopted also in our analysis. Actually, deaccessioning indicates the permanent removal of an item from a museum's collection. In principle, the deaccessed item could

question has ignited a lively debate among various stakeholders. Although a limited economic literature highlights its pros and cons (see: Frey and Meier, 2006; Grampp, 1996; Montias, 1995; O'Hagan, 1998; Towse, 2010), it is rather surprising to notice that the decision and effects of deaccessioning have hardly been investigated formally. To the best of our knowledge, this paper is the first attempt to fill this lacuna. It analyses this specific museum's strategy in a context of uncertainty. In our view, uncertainty about the museum's choice of deaccessioning generates a moral hazard problem that can have relevant effects on the contributions received by a museum, independently from the use of sales' revenue. Firstly, a museum that sells artworks can make private and public funders think that their support is less needed. In this case, the option for a museum to deaccess part of its collection may have a negative impact on public and private funding. Secondly, active deaccessioning gives a signal that may discourage future bequests from donors who expect their work to stay in the museum's collection. We expect that donations are motivated by the possibility that these will be enjoyed by the public, eventually in connection to the identity of the donors. This expectation is also consistent with the restrictions (on disposal, exhibition etc.) that used to be imposed by donors and that now tend to be rebuffed by museums, with the consequences that donors tend to set up their own private museums following rules aiming at preserving their collection.[2]Clearly de-accessioning can still give some recognition to the donors of deaccessed items, if their names as shown as contributors for new acquisitions. However, when donors contribute in kind rather than cash we can expect that they have a special attachment to a specific work or collection that they do not want in the hands of other private collectors. Our hypothesis is also confirmed by the National Museum Directors' Conference (2003, page 12):

> *"It may be more difficult to persuade people to give or leave their treasured possessions to museums if they suspect that in the long-term the objects which meant so much to them may be traded or otherwise disposed of. The John Rylands University Library of Manchester lost an important loan collection as a result of its sale of books in 1988 and has found it more difficult to attract donations since. For many, donation to a museum is motivated by a desire for a lasting memorial as well as a wish to confer public benefit."*

We present a model with two museums of different types: one can undertake deaccess policies and one cannot. The former, if it exploits deaccessioning, may use the proceeds to buy services helpful to increase attendance (such as new exhibition spaces, new artworks, longer visiting hours).[3] The Donor does not know the type of Museum. The non-committed Museum can sale items in the first stage and/or in the third stage. Donors contribute only in the second stage. Therefore, deaccessioning triggers a moral hazard problem. We derive a number or results concerning the allocation of gifts and the decision of deaccessoning and provide numerical simulations to interpret the parameters. Most notably, with respect to a benchmark case where deaccessioning is illegal, contributions are reduced when the non-committed Museum deaccesses in the first stage (separating strategy). If, however, that Museum does not deaccess at the beginning (pooling strategy), also the committed Museum receives less than in the benchmark case.

be loaned for long term loan (e.g., over 25 years), transferred to another museum (in exchange of other works, for example), donated, destroyed, or sold.

[2]See, for example, the Barnes Museum in Philadelphia, or the Clyfford Still Museum in Denver, built by the city to host the works of the painter in perpetuity and exclusively according to his will that also explicitly forbids to sell, give or even exchange any work.

[3]The use of revenue from deaccessioning can be restricted by national legislation, self-commitment of the museum, or regulation of museums' associations (see Section 2). However, through budget transfers, revenue from sales can actually finance a broad set of expenditure. For example, if deaccessioning is restricted just to finance additional acquisitions, other resources already intended to be used for this objective can now be distracted to finance other categories of expenditure, as building a new wing.

Interestingly, an increase of public grants to Museums (of any type) allows the non-committed Museum to adopt a pooling strategy, causing a reduction of donations to the committed Museum. This result provides an intuition for the widespread resistance of museum directors to de-accessoning and for their efforts to enforce common and strict guidelines.

The study is organized as follow. Section 2 reviews briefly the justifications in favour or against deaccessioning and discusses some recent cases that illustrate the widespread public resistance to this practice. Section 3 shows the analytical model and the results. Section 4 provides numerical simulations to support the interpretation of parameters. Section 5 concludes the paper with few preliminary comments.

2 Deaccess Policies

There are clear economic justifications for the adoption of deaccessioning policies. Revenue from disposal can be used, for example, to maintain a steady supply of services and museum facilities and avoid reducing personnel, opening time, exhibition space, or putting at risk the security of the museums[4]. In addition, it widely recognized that it is often the case that substantial shares of museums' collections are not on display. Sales of stored items rarely or never shown will cut conservation and insurance costs or, if used to finance new acquisitions, can contribute to revamp and focus the museum's collection and improve attendance. As expressed by the National Museum Directors' Conference (2003, page 11): *"This process of 'trading up' is analogous to private individuals improving their collections by continuously disposing of objects which have fallen out of favour and replacing them with others that they value more highly"*.

On the other hand, there are strong reasons to evaluate the option of deaccessioning with some caution. Museums are institutions that hold works in public trust. They are custodians of our memory and their collections have a fundamental educational role. Even if the bulk of items they preserve (think of the objects from archaeological excavations, for example) cannot possibly be displayed, they may still be helpful for scholars. Deaccessioning not only may hinder conservation, education, and research, but also tends to weaken the motivation of donors to endow their collections, as suggested in the Introduction. Furthermore, we may regret deaccessioning in the future. A disposal can be influenced by tastes prevalent at the time it takes place; or, even worse, the deal can be done underestimating the true economic or cultural value of the item sold.

International legislation is rather heterogeneous. At one extreme, we have countries where deaccessioning is basically prohibited, as in France, Spain or Italy[5]; at the other extreme, we find countries, as the US[6] and UK, where public institutions can legally deaccess artworks. In between, there are countries where deaccessioning is not excluded but performed cautiously, as Germany and Norway.[7]

[4]The austerity measures introduced in reaction to the Greece economic crisis has forced museums in that country to cut expenditures and loosen security. The forced budget cuts were blamed to be the main responsible of two robberies in the first two months of 2012, at the National Gallery, in Athens, and at the Museum of the History of the Olympic Games, in Olympia and lead to the resignation offered by the Greek culture minister (The Art Newspaper, n.233, March 2012)

[5]The Italian code of cultural goods forbids the sale of artworks belonging to public collections having an age inferior to fifty years, but allows the sale of items older than fifty years if they are declared to be of no specific artistic, historic, anthropological or ethno-anthropological interest by the Ministry of culture

[6]Recent legislation in the State of New York, which is considered particularly stringent within the federation, allows deaccessioning only in very specific cases (such as when the item is inconsistent with the mission of the institution, or has failed to retain its identity, or is redundant, etc.) and only for the acquisition or the preservation of collections excluding explicitly that proceeds from deaccessioning be used for operating expenses or for any other purposes.

[7]See: http://www.deaccessioning.eu/

On the other hand, museums' administrators generally show a rigid attitude against the widespread use of deaccessioning. This is the case even in those countries (UK and US) where deaccessioning is rather common (see also O'Hagan, 1998). There is a common intention to restrict the use of the earnings from the sale of deaccessed works. The UK Museums Association changed its stance on allowing deaccessioning only in 2008. But still museums can deaccess just "non-core" items to raise money in "exceptional circumstances". The (North American) Association of Art Museum Directors states that deaccessioning, although legitimate, *"should be done in order to refine and improve the quality and appropriateness of the collections"* and that proceeds from the disposal of a deaccessioned work *"may be used only for the acquisition of works in a manner consistent with the museum's policy on the use of restricted acquisition funds"*. Similarly, the code of ethics of the American Association of Museums asserts that deaccessioning proceeds shall never be used for anything other than acquisition or direct care of collections. The code of ethics of the ICOM follows the same path, when it indicates that money received from deaccessioning should be used just for the benefit of the collection and usually for acquisitions. It also adds that *"there will be a strong presumption that a deaccessioned item should first be offered to another museum"*. There are numerous examples of strong reactions against the violation of this ethical code. Among the recent ones, we can recall the sale of a painting of the contemporary artist Marlene Dumas by the Museumgouda, whose collection focuses on religious artworks dating from 16th century. This sale was highly stigmatized by the Netherlands Museum Association (NMA), which threatened the expulsion of the museum from the Association for breaching the NMA's code of ethics (The Art Newspaper, n.233, March 2012). The director of the British Empire and Commonwealth Museum in Bristol (which was closed to the public in 2008, for financial difficulties) was dismissed last year for "unauthorised disposal of museum objects", although payments were done to the museum. The justifications for this action was that the disposal fell short of the UK's current ethical guidelines, but it is not clear if any laws have actually been broken. In 2008, the National Academy Museum in New York sold two paintings in a private sale, earning about $15 million. The proceeds from this sale were used for operating costs, because of the financial crisis. The Association of Art Museum Directors reacted by halting exhibition collaborations and suspending loans to the museum. It is, perhaps, worth noticing that the stiff reactions just described targeted rather little museums. We may speculate whether the same treatment would be applied to outstanding museums, which systematically engage in deaccessioning.

We believe that there are at least two important reasons for the resistance of museum directors against a more widespread use of deaccessioning. The first reason is that the latter may crowd-out public support. Actually, the public sponsor can take advantage from the opportunities to save money provided by deaccesioning and support trading-up, starting with the works not on display. In such a case, museums, especially the smaller ones, may face a progressive reduction of resources available for their activities. Moreover, the reward mechanisms for the administrators do not show to be compatible with this expenditure reduction scheme (see Frey and Meier, 2006). An additional reason, proposed and investigated here, is that relaxation of the restrictions for deaccessioning would be sufficient to reduce overall donations. In fact, in absence of a clear commitment, as that imposed by a severe regulations, donors are uncertain about the future intentions of a specific museum about the disposal of gifts. Therefore, donors may be reluctant to bestow a collection and would rather establish their own museum, if they have enough resources. This problem would be more relevant in those countries, where deaccessioning is generally allowed and where private donations represent the main bulk of their collections. On the other hand, countries like Italy, France or Spain have a legislation that guarantees a commitment by museums. Therefore, in these countries, donations would not suffer this moral hazard problem and they would be protected, although they may not be sufficiently encouraged by tax incentives. The

following section analyses the moral hazard problem succinctly described.

3 The Model

The model is a sequential game with incomplete information. There is a Museum (M) and a Donor (D). There are two types of museums, one is committed (co) to non–deaccessioning of its art collections. While the other type has no restriction (nco) on selling its endowment of art.

In stage zero Nature selects the type for the Museum, which is a private information, since the donor does not know it. The Museum is committed with probability p, and not committed with the opposite probability.

In the first stage the Museum is endowed with a certain quantity of art items (E_1) and money transfers from the central Government, which amount for R.

The Museum maximises, in this stage, the number of visitors given the transferred resources and the proceeds by the potential sale of a share (ρ_1) of collections at its disposal, if consistent with the type.[8] In second stage, the Donor decides the optimal amount of private consumption and donations to the Museum. He disapproves the future demise of his donations.

In the third stage, the Museum will maximise the number of visitors given the donations and the endowment of art E_2. We assume that no resources are transferred in the second period by the central Government.

The number of visitors is a function $V_t(A_t, S_t) = A_t^{\alpha} S_t^{\beta}$, where A is the amount of art shown to visitors, and S_t represents services offered to the general public in each time t. It could represent also the amount of money spent, for instance, to renovate a wing of the museum. In general, it refers to those expenses used to increase the number of visitors, and it is linked to the exhibition/access function (O'Hagan, 1998). The number of visitors is maximised considering the resource constraint, given by endowments, donations and transfers, depending on the stage. Furthermore, we assume parameters to be $0 < \alpha < 1$ and $0 < \beta < 1$.

The Donor maximises his own utility $U(x, g) = \ln x + a\rho_2 g$. Where x is a good with price 1, a is an approval parameter (greater than zero), ρ_2 is the amount of art retained (not–sold) by the Museum in the third stage, and g represents donations. Therefore, utility depends on the share, of the donated collection, sold *ex–post* by the museum.

The structure of the game is depicted in Figures 1 and 2. Depending on the value of the parameters there are two possible representations, which differ for the possibility of signalling of the museum's type.

3.1 Third stage

In the last stage M chooses the optimal amount of services and collections at the disposal of the public. In this stage, there are no transfers from the central Government; museum's resources are donations and the endowment E_2.

A committed museum will never sell its collections, and it always sets $\rho_2 = 1$. Consequently, we will focus on the choice made by the other type of museum, which will maximise the number of visitors in this stage:

[8] The assumption of attendance maximisation seems consistent with our goal of investigating public as well as private museums, although their objectives may not coincide (see Frey and Meier, 2006). Moreover, comparisons between museums are often based on the visits' indicator.

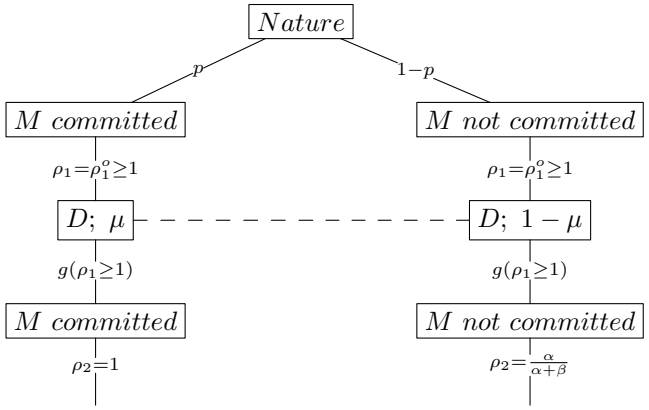

Figure 1: Representation of the game when $\rho_1^o = \frac{\alpha}{\alpha+\beta}\frac{R+E_1}{E_1} \geq 1$

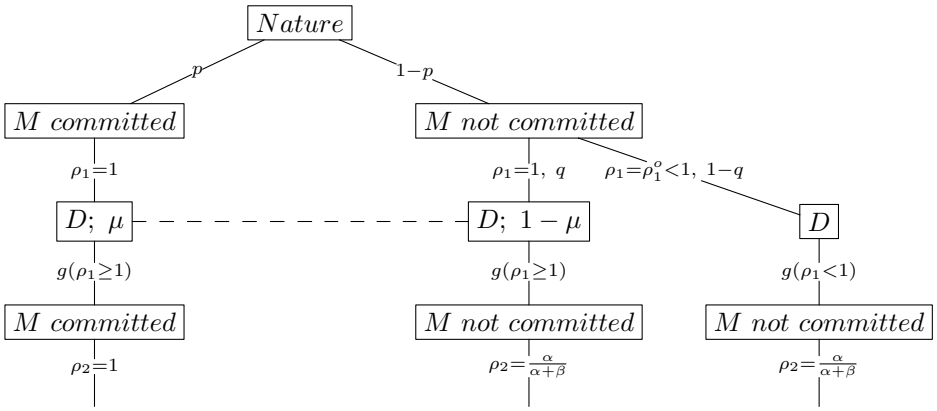

Figure 2: Representation of the game when $\rho_1^o = \frac{\alpha}{\alpha+\beta}\frac{R+E_1}{E_1} < 1$

$$\begin{aligned} & \max_{\rho_2} A_2^{\alpha} S_2^{\beta} \\ s.t.: \quad & A_2 = (g + E_2)\rho_2 \\ & S_2 = (g + E_2)(1 - \rho_2) \end{aligned} \tag{3.1}$$

The optimal retaining rate is, therefore, $\rho_2^* = \frac{\alpha}{\alpha+\beta}$, which is smaller than one. This is a moral hazard problem: since in the last stage the non–committed museum cannot be controlled by the donor, he will sell the optimal (percentage) quantity $1 - \rho_2^*$ of its collection.. The number of visitors in this period will be $V_2 = \alpha^{\alpha}\beta^{\beta}\left(\frac{g+E_2}{\alpha+\beta}\right)^{\alpha+\beta}$.

A remark should be done at this point. We assume that donations are artworks and not money. Therefore, the museum should sell them in order to finance itself. We will further analyse this point later in this paper.

3.2 Second stage

In this stage the donor chooses the amount of contribution g of artworks, together with the optimal quantity of consumption of the good x.

Due to asymmetric information about the museum type, donations depend on the signal received in the previous stage. The previous move of the Museum can indeed be a signal for the type. There are two cases to be considered. In the first one, the donor has previously observed that the Museum has sold a certain share of its collections. We will refer to this strategy as a *separating strategy* of the museum. Therefore the donor infers, after observing a *separating strategy*, that the Museum is not committed.

Given the signal *"the Museum has practised deaccessioning"* ($\rho_1 < 1$), he will maximise his utility considering that the museum will sell a share $1 - \rho_2^*$ of its art collection in the next stage, *i.e.:*

$$\begin{aligned} g(\rho_1 < 1) = \quad & \arg\max_g \ln x + a\rho_2^* g \\ s.t.: \quad & x + g = w \end{aligned} \tag{3.2}$$

The solution of the problem is $g(\rho_1 < 1) = w - \frac{1}{a\rho_2^*} = w - \frac{\alpha+\beta}{a\alpha}$. We further assume that w is big enough to have non–negative donations.

On the other hand, the donor can observe that the museum *has not practised deaccess policies before.* We will refer to this strategy of the non–committed museum as a *pooling strategy.* Given this signal, he is not able to distinguish between the two types of museums; in this information set there is either a committed museum, or a non–committed museum which follows a pooling strategy. Therefore, we have to specify beliefs about the museum type.

Definition 1. *Given that the information set is reached, the donor holds beliefs μ about the Museum type. The value μ represents the probability that the Museum is committed if the art collection has not been sold in the previous period. It is equal to:*

$$\begin{aligned} \mu \quad &= Pr(co|\rho_1 \geq 1) = \frac{Pr(\rho_1 \geq 1|co)Pr(co)}{Pr(\rho_1 \geq 1|co)Pr(co)+Pr(\rho_1 \geq 1|nco)Pr(nco)} \\ &= \frac{p}{p+q(1-p)} \end{aligned} \tag{3.3}$$

Where p is the probability that a Museum is committed, and q is the probability that the non committed Museum will follow a pooling strategy ($\rho_1 \geq 1$).

Given beliefs about museum type, with probability μ the museum is committed, and with opposite probability it will demise part of donations in the next stage. Consequently, D maximises the following expected utility:

$$\begin{aligned} g(\rho_1 \geq 1) = \quad & \arg\max_g \mu\left[\ln x + ag\right] + (1-\mu)\left[\ln x + a\rho_2^* g\right] \\ s.t.: \quad & x + g = w \end{aligned} \tag{3.4}$$

The optimal donation is: $g(\rho_1 \geq 1) = w - \frac{1}{\mu a+(1-\mu)a\rho_2^*} = w - \frac{1}{\mu a(1-\rho_2^*)+a\rho_2^*} = w - \frac{\alpha+\beta}{a(\mu\beta+\alpha)}$.

Putting together the above considerations, we can define the optimal strategy and optimal donations for D.

Proposition 1. *Given the signal from the Museum, and beliefs about the Museum type, optimal donations will be:*

- *when the donor observes deaccessioning (i.e. the signal $\rho_1 < 1$), $g(\rho_1 < 1) = w - \frac{\alpha+\beta}{a\alpha}$;*

- *on the opposite case, donations amount for* $g(\rho_1 \geq 1) = w - \frac{\alpha+\beta}{a}(\mu\beta + \alpha)^{-1}$.

When the donor observes that the Museum has sold previously, he infers that M is not committed with probability one. Therefore he donates a quantity of artworks which is lower than that which would be donated to a committed gallery. On the other hand, when he observes that the Museums has not done deaccessioning before, he infers that with probability μ the Museum is committed. This probability depends on q, which is the probability that a non–committed museum will follow a *pooling strategy* (*i.e.* not–sell in the first stage, even if it would be profitable).

3.3 Comparative statics

Donations are lower when the Donor receives the signal "deaccessioning", i.e. $g(\rho_1 < 1) < g(\rho_1 \geq 1)$. Therefore, there exists an incentive, for the non–committed museum, in choosing the *pooling* strategy, because it leads to a greater amount of donations.

It can be easily seen that donations, after both signals, are increasing in the donor's income and on his approval parameter a. Donations, when the signal is $\rho_1 < 1$, are:

- decreasing in β;
- increasing in α;

Donations, when the signal is $\rho_1 \geq 1$, are:

- increasing in μ, $\partial g(\rho_1 \geq 1)/\partial\mu > 0$;
- increasing in the probability p, $\partial g(\rho_1 \geq 1)/\partial p > 0$;
- decreasing in q, $\partial g(\rho_1 \geq 1)/\partial q < 0$;
- decreasing in β;
- increasing in α;

The comparative statics show that private contributions are positively affected by the commitment. Then a commitment mechanism enforced by legislation would have a positive impact on bequests. Moreover, if β is high, this implies that sale revenue are particularly successful in increasing visits. That discourages the commitment not to sale and gifts are therefore reduced. This result provides an interesting intuition for the restrictions in the use of the proceeds of the sale, which are imposed by museum association but also avoid pursuing optimal utilisation of available resources.

When there is a total separation between the two types of Museums (*i.e.* $q = 0$), donations to the committed Museum are the highest possible, *i.e.* $g(\rho_1 \geq 1|q = 0) > g(\rho_1 \geq 1|q > 0)$.

Proof. See Appendix A for derivations. □

3.4 First stage

The Museum maximises the number of visitors in the first period, given Government transfers and the endowment in the first period:

$$\begin{aligned} & \max_{\rho_1} A_1^{\alpha} S_1^{\beta} \\ s.t.: \quad & A_1 = E_1\rho_1 \\ & S_1 = R + E_1(1-\rho_1) \end{aligned} \tag{3.5}$$

The maximisation problem results in the optimal $\rho_1^o = \frac{\alpha}{\alpha+\beta}\frac{R+E_1}{E_1}$. The number of visitors in the first period in this case is $V_1 = \alpha^\alpha\beta^\beta\left(\frac{R+E_1}{\alpha+\beta}\right)^{\alpha+\beta}$.

This optimal parameter can be over or below 1. The committed museum will always set $\rho_1 = \max\{1, \rho_1^o\}$, to avoid the selling of part of its collections.

When $\rho_1^o \geq 1$, the Museum, even the one that is not committed, finds optimal not to sell the endowment of artworks. And, when the disequality is strict, all types of museums will improve their art collections. Therefore, the donor cannot distinguish between museums which are committed and museums which are not. This case can be seen in Figure 1. In this case, the non–committed museum will always choose the optimal quantity ρ_1^o.

On the other hand, when $\rho_1^o < 1$, the non–committed museum can choose between two strategies, which are the *pooling strategy* and the *separating strategy* (see Figure 2). In the former, M decides not to sell part of its art collections and, in this way, it mimics the behaviour of the committed museum. The incentive for this strategy can be found on the greater amount of donations, which will be obtained, and in a greater number of visitors in the last period. The latter strategy consists in choosing the optimal selling rate $1 - \rho_1^o$, and revealing its type. Incentives can be found on the greater number of visitors which will visit the museum in the first period. Therefore there exists a trade–off between the two strategies, which depends on the number of visitors in the two periods.

Furthermore, M can decide to mix between the two strategies. Note that donations depend, as we have seen before, on the previous move and on Donor's beliefs.

Assume that he mixes – given that q is the probability of the *pooling strategy* $\rho_1 = 1$ – the expected utility is the following:

$$\begin{aligned} V^e = \; & \underbrace{q\left[E_1^\alpha R^\beta + \alpha^\alpha\beta^\beta\left(\frac{g(\rho_1 \geq 1) + E_2}{\alpha+\beta}\right)^{\alpha+\beta}\right]}_{pooling} \\ & \underbrace{+ (1-q)\alpha^\alpha\beta^\beta\left[\left(\frac{R+E_1}{\alpha+\beta}\right)^{\alpha+\beta} + \left(\frac{g(\rho_1 < 1) + E_2}{\alpha+\beta}\right)^{\alpha+\beta}\right]}_{separating} \end{aligned} \tag{3.6}$$

This expected utility function can be (1) increasing in q (2) decreasing in q, or (3) concave in the probability of pooling strategy. In the first case, the optimal strategy is the pooling strategy. In the second case, the Museum will follow a separating strategy. In the third case, it will mix between the two strategies.

Due to the non–linearity in q of the expected number of visitors, it is not possible to derive a closed form solution. The solution, however, can be derived through numerical computation.

Definition 2. *Given that $\rho_1^o = \frac{\alpha}{\alpha+\beta}\frac{R+E}{E} < 1$, define the probability q^o as follows:*

$$q^o = \arg\max_q V^e \tag{3.7}$$

Where V^e is defined in Expression 3.6.

Proposition 2. *Defining q as the probability of choosing $\rho_1 \geq 1$. When $\rho_1^o \geq 1$, then the (non–committed) Museum sets a $q^* = 1$. On the other case, it sets a probability $q^* = q^o$. The optimal ρ_2 is $\rho_2^* = \frac{\alpha}{\alpha+\beta}$.*

Proof. When $\rho_1^o \geq 1$, the non-committed museum does not find optimal to sell any item from its collection in the first stage. Therefore, with probability one he will not follow deaccessioning policies. On the opposite case, however, it has to decide whether selling a share of its collections and signal its type, or choose a pooling strategy. In this case, the two-period number of visitors is maximised – by Definition 2 – by setting $q^* = q^o$.

□

The optimal strategy outlined above describes incentives of the non committed museum in following – or not – deaccess policies. Museums want to increase the overall number of visitors in the two periods; deaccessioning can be used as an instrument of resource reallocation in order to make a museum more attractive to the public. Note that, since ρ_1 can be above one, resource can be used also to improve art collections, by acquiring new items.

Deaccessioning has an effect on future donations to museums and, consequently, on future resources. Therefore there is an incentive in partially avoiding deaccessioning, which is measured by the probability q.

Furthermore, as can be easily seen, transfers from the central government have the effect of increasing ρ_1; the explanation is straightforward, deaccessioning is not necessary when resources are enough for museums. Transfers, however, have another effect: depending on parameters, the pooling strategy can be always chosen by the non-committed museum (this is the case depicted in Figure 1). The effect of an increase of transfers from the government on donations is, perhaps, non–trivial. It depends on the probability of a separating strategy, because the inability of donors of distinguishing committed museums, from non–committed ones, has a negative effect on donations (after the signal "not deaccessioning"). Therefore, transfers have two major effects to be considered when implementing government policies.

4 Numerical simulation and interpretation of parameters

Due to complexity of the objective function is not possible to derive a closed form solution for q^*. We can use, however, the computational software to derive the optimal probability of a pooling equilibrium which maximises the function V^e.

To do so, we use the software *Mathematica,* we find the optimal probability q when some regularity conditions are satisfied. In particular we must have that $\rho_1^o < 1$, because otherwise there will be only one strategy for the non committed museum. We have also to check that donations are non negative.

In Figure 3 we show how the optimal probability q changes with respect to p, considering several values of the parameters (see Table 1). When the proportion of committed museums increases, it is more likely that a non committed museum will follow a pooling strategy.

To check for the two inequality constraints we set $R < \frac{\beta}{\alpha} E_1$, to have $\rho_1^o < 1$, and $w \geq \frac{\alpha+\beta}{a\alpha}$ to have non negative donations.

As can be seen in Figure 3, the probability of following a pooling strategy increases with p.

The probability p can be interpreted as an exogenous constraint to deaccessioning. It can be the probability that a Government will avoid the demise of collections operated by museums, or it could be the proportion of public museums if, for instance, deaccessioning is prohibited for public institutions. This probability, therefore, can be referred to all cases in which exogenous conditions determine the avoidance of deaccessioning. In general, this parameter can describe also implicit or non-written rules – which prohibit deaccess policies – followed by museums.

The probability q, instead, can be referred to an endogenous avoidance of deaccessioning. To increase donations, non committed museums (or museums which do not have any restriction on

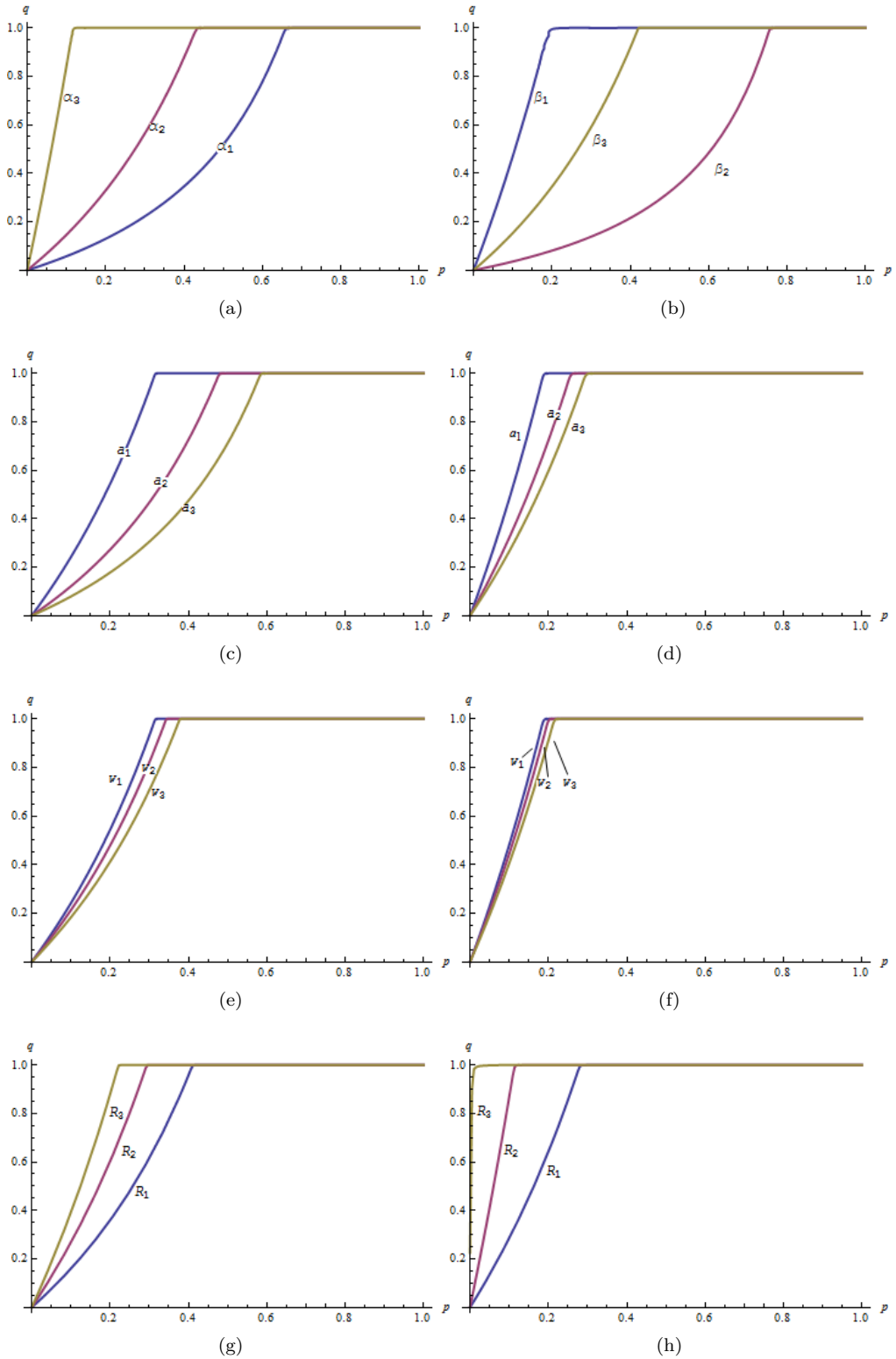

Figure 3: Optimal probability q^* with respect to p

	Figure 3.a	Figure 3.b	Figure 3.c	Figure 3.d	Figure 3.e	Figure 3.f	Figure 3.g	Figure 3.h
a_1	2	2	1.2	1.2	1.2	1.2	1.2	1.2
a_2	-	-	2	2	-	-	-	-
a_3	-	-	2.5	2.5	-	-	-	-
α_1	0.2	0.2	0.3	0.4	0.3	0.4	0.3	0.4
α_2	0.3	-	-	-	-	-	-	-
α_3	0.5	-	-	-	-	-	-	-
β_1	0.3	0.1	0.4	0.3	0.4	0.3	0.4	0.3
β_2	-	0.4	-	-	-	-	-	-
β_3	-	0.6	-	-	-	-	-	-
w_1	7	7	7	7	7	7	7	7
w_2	-	-	-	-	10	10	-	-
w_3	-	-	-	-	15	15	-	-
R_1	0.6	0.5	0.6	0.6	0.6	0.6	0.5	0.5
R_2	-	-	-	-	-	-	0.7	0.7
R_3	-	-	-	-	-	-	0.9	0.9
E_1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
E_2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

Table 1: Numerical simulation, parameters

art selling) can decide not to practice deaccessioning. The value of q represents the likelihood that this self–commitment will be carried on.

The parameterα has a positive impact on the probability q; as well as the transfers R. Furthermore, the effect of transfers is higher when the parameter α is bigger than β (Figures 3.g and 3.h).

The approval parameter a, and the donor income w, have a negative effect on the probability q. This is because the willingness to donate increase for the donor, and this makes less costly to choose a separating strategy. Moreover, the effect on probability is bigger when β is greater than α (it can be seen, for instance, in Figure 3.c and in Figure 3.d).

Finally, the effect of β is not univocal. It is shown in Figure 3.b. When β is below α (the case of β_1) then the probability of a pooling strategy is relatively high. This because collections are preferable to services for the museum, because they lead to a greater impact on visitors. When β becomes greater than α, q suddenly decreases. This because the effect on the "production function of visitors" (greater productivity of services) overcomes the effect on donations (which decrease with β), leading to a decrease in the probability of a pooling strategy. After this point, further increases of β have a negative effect on donations, and q becomes again increasing in this parameter. Therefore, the probability q is not a monotonic function of β.

5 Concluding preliminary comments

This paper represents a first attempt to provide an analytical investigation of deaccess policies. The main result is that when deaccessioning is allowed, this causes a moral hazard problem that may reduce private donations also to those museums which do not sale portion of their collections. An additional interesting result is that reduction in public grants may benefit museums committed not to deaccess. This contrasts with the common wisdom that budget cuts hurt especially museums that choose to discard the option of selling their collections. The analysis, however, presents some limits that require further investigation. Firstly, public grants are given in the model. Future investigation should treat public policy endogenously to investigate the impact that deaccesioning may have on the former. Secondly, we overlook potential penalties for deaccessioning. As described, museums selling art may suffer retaliation form other institu-

tions that may discourage forms of utilisation of the proceeds. Thirdly, tax expenditure is not addressed in the model. Its inclusion could be helpful to derive testable hypotheses to be verified empirically in order to contribute to our understanding of the often strikingly different cultural policies that we observe internationally.

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Appendix

A Comparative statics

- Donations are lower when the signal is $\rho_1 < 1$, i.e. $g(\rho_1 < 1) < g(\rho_1 \geq 1)$:

$$g(\rho_1 < 1) = w - \frac{\alpha+\beta}{a\alpha} < w - \frac{\alpha+\beta}{a}\left(\frac{p}{p+q(1-p)}\beta + \alpha\right)^{-1} = g(\rho_1 \geq 1) \quad \text{(A.1)}$$
$$\frac{p}{p+q(1-p)}\beta + \alpha > \alpha$$

- Donations are increasing in a and w:

$$\frac{\partial g(\cdot)}{\partial w} = 1 > 0; \quad \frac{\partial g(\rho_1<1)}{\partial a} = \frac{\alpha+\beta}{a^2\alpha} > 0; \quad \frac{\partial g(\rho_1\geq 1)}{\partial a} = \frac{\alpha+\beta}{a^2(\mu\beta+\alpha)} > 0; \quad \text{(A.2)}$$

- Donations after the signal $\rho_1 < 1$ are:
  - increasing in α:
$$\frac{\partial g(\rho_1 < 1)}{\partial \alpha} = \frac{\beta}{a\alpha^2} > 0; \quad \text{(A.3)}$$
  - decreasing in β:
$$\frac{\partial g(\rho_1 < 1)}{\partial \alpha} = -\frac{1}{a\alpha} < 0; \quad \text{(A.4)}$$

- Donations after the signal $\rho_1 \geq 1$ are:
  - increasing in μ:
$$\frac{\partial g(\rho_1 \geq 1)}{\partial \mu} = \frac{\partial}{\partial \mu}\left(w - \frac{1}{\mu a + (1-\mu)a\rho_2^*}\right) = \frac{(1-\rho_2^*)a}{\left(\mu a + (1-\mu)a\rho_2^*\right)^2} > 0; \tag{A.5}$$
  - increasing in the probability p, since $\mu = p/p + q(1-p)$ and:
$$\frac{\partial \mu}{\partial p} = \frac{q}{(p+q(1-p))^2} > 0; \tag{A.6}$$
  - decreasing in q, since:
$$\frac{\partial \mu}{\partial q} = -\frac{p(1-p)}{(p+q(1-p))^2} < 0; \tag{A.7}$$
  - decreasing in β:
$$\frac{\partial g(\rho_1 \geq 1)}{\partial \beta} = \frac{\partial}{\partial \beta}\left(w - \frac{\alpha+\beta}{a}\frac{1}{\mu\beta + a}\right) = -\frac{(1-\mu)\alpha}{a\left(\mu\beta+\alpha\right)^2} < 0; \tag{A.8}$$
  - increasing in α:
$$\frac{\partial g(\rho_1 \geq 1)}{\partial \alpha} = \frac{\partial}{\partial \alpha}\left(w - \frac{\alpha+\beta}{a}\frac{1}{\mu\beta + a}\right) = \frac{(1-\mu)\beta}{a\left(\mu\beta+\alpha\right)^2} > 0; \tag{A.9}$$
- Finally we have that (note that $q > 0$ implies $\mu > 1$) :
$$\begin{gathered} g(\rho_1 \geq 1 | q = 0) = w - \tfrac{1}{a} > w - \tfrac{\alpha+\beta}{a}\left(\mu\beta+\alpha\right)^{-1} = g(\rho_1 \geq 1 | q > 0) \\ \tfrac{\alpha+\beta}{\mu\beta+\alpha} > 1 \iff (1-\mu)\beta > 0; \end{gathered} \tag{A.10}$$