

“Better an egg today than a hen tomorrow”
On the implications of deaccess policies
on donations to museums*

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Abstract

Severe budget cuts in the cultural sectors of many countries have spurred disparate suggestions for alternative sources available to public institutions. Deaccessioning may contribute to guarantee the survival of cultural institutions without serious negative impacts on the fruition of cultural goods. This paper addresses the consequences of a widespread deaccessioning on in-kind bequests to museums, by developing a sequential game with incomplete information. We look at the interactions between a donor and a museum. The latter could be either institutionally committed not to sale its collection, or free to sell part of its art endowment. Our main results show that when deaccessioning is allowed, contributions to museums of both types may decrease. Interestingly, public grants to museums cause a negative externality to the committed museum, which experiences a reduction in donations. Results provide intuitions also for the widespread resistance to deaccessioning of public museum directors, for their efforts to enforce common regulation, and also for the proliferation of private art museums.

Keywords: deaccessioning; museums; asymmetric information; sequential game.

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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 collection¹, a viable option?

This question has ignited a lively debate among various stakeholders. In our view, this problem needs to be evaluated within an inter-temporal perspective. Uncertainty about the future decision of a museum to deaccess may have a negative impact on private donations of artworks to museums, with the consequence of making deaccessioning even more needed. Firstly, a museum that sells part of its collection can make private and public sponsors think that their funding is less needed. Secondly, active deaccessioning gives a signal that may discourage future bequests from donors who expect that their gifts (when particularly valuable) will be kept and eventually shown in the museum's collection. This event would be particularly worrying for museums, which are increasingly dependent on bequests to acquire artworks that they are unable to buy on the basis of their financial endowments².

This study focuses on in-kind bequests that we expect to be strongly motivated by the intrinsic reward (such as warm-glow, status, popularity) that donors receive when the former are enjoyed by the public, which will eventually link them to the identity of donors³. The behavioural underpinnings of our study are taken from the extensive literature on voluntary provision of public goods and philanthropy. Two central motivations, based on impure altruism, are warm-glow and social prestige that have been investigated in a large extent both theoretically and empirically (see, among many others, Andreoni, 1990; Glazer and Konrad, 1996; Harbaugh, 1998; Harbaugh et al., 2007). We depart from that literature for our focus on the utilisation of the gift, namely its sale to finance the museum services. Our conjecture on the behaviour of donors is also consistent with the restrictions on disposal of the contributed items and the obligation to exhibit them that donors tend to request to museums. Clearly, deaccessioning can

¹This 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 be loaned for long term loan (e.g., over 25 years), transferred to another museum (eventually in exchange of other works), donated, destroyed, or sold.

²For example, from 2004, the Guggenheim Bilbao allocates for the acquisitions 6 million Euros each year (Plaza, 2012). This sum may not be sufficient to buy even a single representative work of a top Post-War artist.

³Often works in the collection are not on display. We address this issue further in paper.

still give some recognition to the donors of items eventually deaccessed, if their names are shown as contributors for new acquisitions. However, when donors contribute in-kind, rather than cash, we would 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.”

Although a limited economic literature highlights pros and cons of deaccessioning (see: Frey and Meier, 2006; Grampp, 1996; Montias, 1995; O'Hagan, 1998; Towse, 2010), formal investigation is lacking. This paper aims at contributing to fill this lacuna by providing, to the best of our knowledge, the first inter-temporal analysis of this phenomenon, based on a dynamic game between donors and museums in a context of uncertainty about museum's strategy.

We present a model with two different types of museum: one type can undertake deaccess policies and one cannot (for instance, because of institutional constraints). If a museum exploits deaccessioning, it may use the proceeds to finance services (such as new exhibition spaces, or longer visiting hours) or to buy new artworks with the aim of increasing attendance⁴. The type of museum is its private information. The non-committed Museum can sell items in the first stage and/or in the third stage. The Donor contributes only in the second stage. Therefore, deaccessioning triggers a moral hazard problem.

We derive a number of results concerning the allocation of gifts and the decision of deaccessioning and provide numerical simulations to interpret the parameters. With respect to a

⁴The 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 for this objective can now be distracted to finance other categories of expenditure, such as building a new wing. Srakar (2012) investigates the incentives that a museum may have to use deaccessioning rather than other sources of revenue to finance its activity.

benchmark case where deaccessioning is always forbidden, contributions decrease 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. In such a situation, it is interesting to notice that public support may have a perverse effect because an increase of public grants to Museums allows the non-committed Museum to adopt a pooling strategy, causing a reduction of donations to the committed one. Results provide an intuition for the widespread resistance of museum directors to deaccessioning and for their efforts to enforce common and strict guidelines.

The study is organized as follows. Section 2 reviews 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 results. Section 4 provides numerical simulations to support the interpretation of parameters. Section 5 compares the options of storing parts of the museum collection or of deaccessioning through sale. Section 6 extends the analysis by including a congestion effect of donations on arts displayed. Section 7 concludes the paper with few comments.

2 Deaccess Policies

There are clear economic justifications for deaccessioning. Revenue from disposal can be used, for example, to maintain a steady supply of services and museum facilities without reducing personnel, opening time, exhibition space, or putting at risk the security of the museums⁵.

In addition, 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*

⁵The austerity measures introduced in reaction to 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)

others that they value more highly”.

On the other hand, there are also educational 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. Therefore deaccessioning may hinder conservation, education, and research, with an additional negative impact on the motivation of donors endowing their collections. Furthermore, society may regret deaccessioning in the future. A disposal can be influenced by tastes prevalent at the time it takes place, or it 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 largely prohibited, as in France, Spain or Italy; at the other extreme, we find countries, such as US and UK, where public institutions can legally deaccess artworks. In between, there are countries where deaccessioning is not excluded but performed cautiously, such as Germany and Norway.

In general, museums’ administrators show a rigid attitude against the widespread use of deaccessioning. Even in those countries where deaccessioning is accepted, there is a common intention to restrict it, for instance by limiting the use of earnings from the sales of deaccessed works⁶. The UK Museums Association allowed deaccessioning in 2008. However museums are authorised to deaccess just “non-core” items, in order 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

⁶Recent 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.

that money received from deaccessioning should be used just for the benefit of the collection and usually for acquisitions.

There are also several examples of strong reactions against the violation of ethical codes⁷. We believe that there is an important reason for the resistance of museum directors against a more widespread use of deaccessioning. Relaxing restrictions for deaccessioning would be sufficient to reduce overall donations. In fact, in absence of a clear commitment, as that imposed by 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 resources⁸. 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, in those countries where legislation guarantees commitment by museums, donations would not suffer this moral hazard issue. The following section provides a model to analyse the impact on bequests of uncertainty about deaccess policy.

3 The Model

The model is a sequential game with incomplete information and two players, a Museum (M) and a Donor (D). There are two types of museum: one is committed (co) to non-deaccessing its art collections, while the other type has no restrictions (nco) on selling its endowment of art.

At stage zero, Nature selects the type for the Museum, which is private information unknown to the Donor. The Museum is committed with probability p (and not committed with probability $1-p$). In the first stage, the Museum is endowed with a quantity of art items E_1 and money

⁷The sale of a painting of the contemporary artist Marlene Dumas by the Museumgouda, whose collection actually focuses on religious artworks dating from 16th century, was vehemently 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 in 2010 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, even though no law seems to have been violated. 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.

⁸An additional reason, not investigated here, is that deaccessions may crowd-out public support. In such a case, museums – especially the smaller ones – may face a progressive reduction of resources available for their activities.

transfers from the Government amounting to R . The Museum maximises the number of visitors⁹ given R and the proceeds by the potential sale of a share $(1 - \rho_1)$ of collections at its disposal, if such a sale is consistent with the type of Museum. Proceeds are used to provide services to the public to attract visitors. In the second stage, the Donor decides the optimal amount of private consumption and donations. He disapproves the future demise of his donations. The parameter $\rho_1 \geq 0$ could be greater than one, which means that the Museum does not deaccess and in fact it buys more artworks to add to its collection. In the third stage, the Museum will choose the share $(1 - \rho_2)$ of its collection to deaccess (and buy services) in order to 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 Government.

The number of visitors is a function $V_t(A_t, S_t) = \bar{v} + A_t^\alpha S_t^\beta$, where \bar{v} is an exogenous number of visitors that is not dependent on the Museum's policy; A is the amount of art shown to visitors, and S_t represents services offered to the general public at each time t . The latter 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 $U(x, g) = \ln x + a \min\{\rho_2; 1\}g$, where x is a private good with price 1, a (greater than zero) parametrises the social approval - or a warm glow - received because of the gift, ρ_2 is the share 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 Museum¹⁰.

Figures 1 and 2 depict the structure of the game. Depending on the value of the parameters, there are two possible representations, which differ for the possibility of signalling the Museum's

⁹The assumption of attendance maximisation is consistent with our goal of investigating public as well as private museums. Although their objectives may not coincide (see Frey and Meier, 2006), open comparisons between museums (such as those published in *The Art Newspaper*) are often based on yearly visits.

¹⁰Note that if ρ_2 is greater than one, the Museum will not sell the donated collection, and Donor's utility is $U(x, g) = \ln x + ag$ because of the min operator. Notice also that the approval parameter a is assumed to be exogenous, in our model. We could reason, however, that the amount of visitors may have a positive impact on the recognition of the donors and thus imply a larger social approval received for the donation. We argument further about the consequences of such endogenisation in section 5.

type.

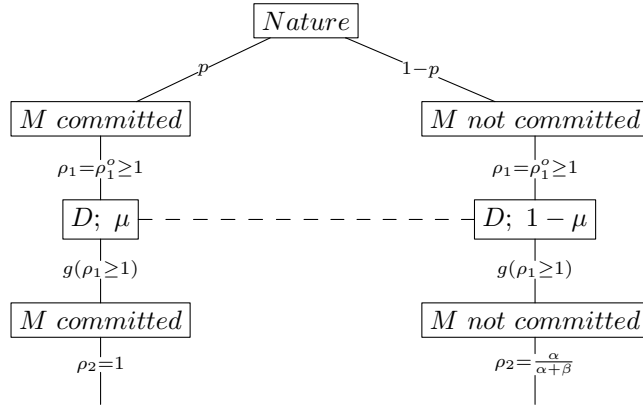


Figure 1: Representation of the game when $\rho_1^o = \frac{\alpha}{\alpha+\beta} \frac{R+E_1}{E_1} \geq 1$

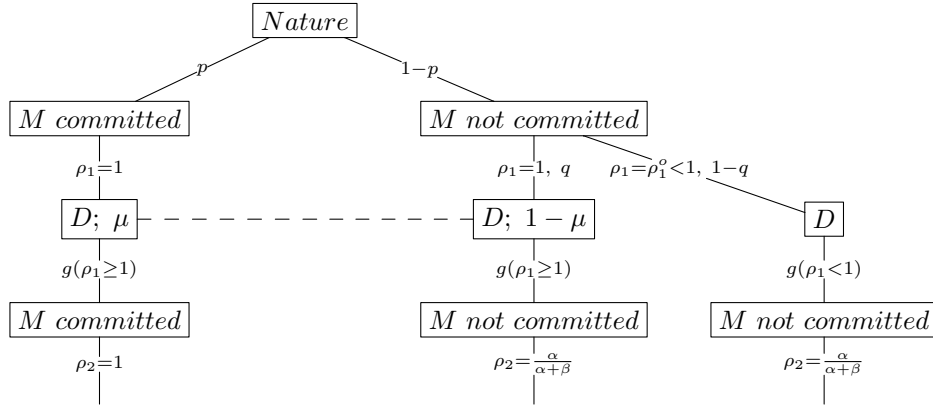


Figure 2: Representation of the game when $\rho_1^o = \frac{\alpha}{\alpha+\beta} \frac{R+E_1}{E_1} < 1$

3.1 Third stage

In the last stage, the Museum chooses the optimal amount of services and collections for the public. In this stage, there are no transfers from the Government; Museum's resources consists in donations and the endowment E_2 (the subscript refers to values of variables for the Museum in this stage). We distinguish between a committed Museum that cannot sell its collections and always sets $\rho_2 = 1$ and a Museum that may sell part of its collection to achieve its goal. Since we want to study the effect of deaccessioning, we will focus on the choice made by the latter type

of Museum, which will maximise the number of visitors in this stage:

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

The optimal retaining rate is, therefore, $\rho_2^* = \frac{\alpha}{\alpha + \beta}$, which is smaller than one. In the last stage, the Donor cannot react to a non-committed Museum that will sell the optimal (percentage) quantity $1 - \rho_2^*$ of its collection. The number of visitors in this period will be $V_2 = \bar{v} + \alpha^\alpha \beta^\beta \left(\frac{g + E_2}{\alpha + \beta}\right)^{\alpha + \beta}$.

In this stage there are no differences between the perfect information case and the asymmetric information one. Given donations – which, however, are different for the two cases – the optimal ρ_2^* is as derived above.

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 . Donations depend on the type of Museum, as the Donor anticipates that the non-committed Museum will undertake deaccession. Because of quasi-linear utility function, we assume that Donor's income (w) is large enough to avoid corner solutions and to have non-negative donations.

Perfect Information Benchmark

With perfect information, when the Donor faces a committed Museum, he knows that it will not sell part of its collection in the next stage (*i.e.* $\rho_2 = 1$). Therefore, the optimal donation which maximises his utility is:

$$\begin{aligned} g(\text{co}) = \quad & \arg \max_g \ln x + ag \\ \text{s.t.} \quad & x + g = w \end{aligned} \tag{3.2}$$

that is $g(co) = w - \frac{1}{a}$.

The donor anticipates that, in the next stage, a non-committed Museum will follow a deaccession policy and set $\rho_2^* = \frac{\alpha}{\alpha+\beta}$. He will maximise his utility choosing the optimal donations, as follows:

$$\begin{aligned} g(nco) = \quad & \arg \max_g \ln x + a \min\{\rho_2^*, 1\}g \\ & s.t. : \quad x + g = w \end{aligned} \tag{3.3}$$

The solution of the problem is $g(nco) = w - \frac{1}{a\rho_2^*} = w - \frac{\alpha+\beta}{a\alpha}$ ¹¹. Unsurprisingly, with perfect information, donations to the non-committed Museum are smaller than donations to the committed one.

Asymmetric Information

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 its type. There are two cases to consider. 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 this signal, 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.*:

$$\begin{aligned} g(\rho_1 < 1) = \quad & \arg \max_g \ln x + a \min\{\rho_2^*, 1\}g \\ & s.t. : \quad x + g = w \end{aligned} \tag{3.4}$$

This case is equal to the previous one, since the Donor knows – with probability one – that the Museum is non-committed. The solution of the problem is, as before, $g(\rho_1 < 1) = w - \frac{1}{a\rho_2^*} = w - \frac{\alpha+\beta}{a\alpha}$.

On the other hand, the Donor can observe that the Museum has not practised deaccession

¹¹Since ρ^* is less than one we can remove the min operator.

policies before. We will refer to this strategy of the non-committed type as a *pooling strategy*. Given this signal, the Donor is not able to distinguish between the two types of Museum; in this information set, both the committed and the non-committed Museums follow 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:*

$$\begin{aligned}\mu &= Pr(co|\rho_1 \geq 1) = \frac{Pr(\rho_1 \geq 1|co)Pr(co)}{Pr(\rho_1 \geq 1|co)Pr(co) + Pr(\rho_1 \geq 1|nco)Pr(nco)} \\ &= \frac{p}{p+q(1-p)}\end{aligned}\tag{3.5}$$

Where p is the probability that the 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 probability $1 - \mu$ it will demise part of donations in the next stage. Consequently, the Donor maximises the following expected utility:

$$g(\rho_1 \geq 1) = \arg \max_g \mu [\ln x + ag] + (1 - \mu) [\ln x + a\rho_2^*g]\tag{3.6}$$

$$s.t. : x + g = w$$

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 the Donor.

Proposition 1. *Given the signal from the Museum, and beliefs μ 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 the Museum is not committed with probability one. Therefore he donates a quantity of artworks which is lower than what would be donated to a committed gallery. On the other hand, when he observes that the Museum 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).

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 is an incentive for the non-committed Museum to choose 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 ;

Proof. See Appendix A for derivations. □

The comparative statics show that private contributions are positively affected by the commitment. A commitment mechanism enforced by legislation would have a positive impact on

bequests. Moreover, a high β , implying that sale revenues are particularly successful in increasing visits, discourages the commitment not to sale and gifts are therefore reduced. This result provides an interesting intuition for the restrictions on deaccessioning and on the subsequent use of the sale proceeds imposed by museum associations. Museums fear that a fundamental and traditional support, namely bequests, will be endangered by deaccessions. To avoid free-riding by a single museum, in those countries where deaccessioning is allowed, museum associations have tried to restrict this practice and to discourage it by imposing further limitations on the use of the sale revenue, should the latter occur. In some cases the risks of deaccessioning, or of a modest and restricted presentation of donated collections, may have induced wealthy donors to set up their own private museums in order to preserve and show properly their collections¹².

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.* $g(\rho_1 \geq 1|q = 0) > g(\rho_1 \geq 1|q > 0)$. In fact, in this case, donations to the committed Museum are the same as in the perfect information case, *i.e.* $g(co) = g(\rho_1 \geq 1|q = 0)$. Asymmetric information determines a level of donations to the committed Museum which are at most equal to the perfect information case.

Moreover, when there is not total separation between the two types, the non-committed Museum, which follows a pooling strategy, receives a higher level of donations with respect to the perfect information case, *i.e.* $g(\rho_1 \geq 1|q > 0) > g(nc)$.

3.3 First stage

Perfect Information

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

¹²See, for example, the Barnes Museum in Philadelphia, The Crystal Bridges Museum established by Wal-Mart in Bentonville, or the Clyfford Still Museum in Denver. The latter was built by the city to host the works of the painter in perpetuity and exclusively according to his will. Consistently with the underlying hypothesis of this paper, that will also explicitly forbids to sell, give or even exchange any donated work.

$$\begin{aligned}
& \max_{\rho_1} \bar{v} + A_1^\alpha S_1^\beta \\
& s.t. : A_1 = E_1 \rho_1 \\
& S_1 = R + E_1(1 - \rho_1)
\end{aligned} \tag{3.7}$$

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 $V_1 = \bar{v} + \alpha^\alpha \beta^\beta \left(\frac{R+E_1}{\alpha+\beta} \right)^{\alpha+\beta}$.

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.

With perfect information the non-committed Museum will choose the unconstrained optimal value $\rho_1 = \rho_1^o$

Asymmetric information

With asymmetric information the problem is similar to that shown in expression 3.7. The committed Museum will always choose $\rho_1 = \max\{1, \rho_1^o\}$.

When $\rho_1^o \geq 1$, the Museum, which is not committed, finds optimal not to sell the endowment of artworks. Moreover, when the disequality is strict, all types of museums will improve their art collections. Therefore, the Donor cannot distinguish between committed and non-committed museums. 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). With the former, the Museum 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, the Museum can decide to mix between the two strategies. Note that donations depend on the previous move and on Donor's beliefs, as seen before.

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

$$\begin{aligned}
 V^e = & \underbrace{2\bar{v} + q \left[E_1^\alpha R^\beta + \alpha^\alpha \beta^\beta \left(\frac{g(\rho_1 \geq 1) + E_2}{\alpha + \beta} \right)^{\alpha + \beta} \right]}_{\text{pooling}} \\
 & + \underbrace{(1 - q) \alpha^\alpha \beta^\beta \left[\left(\frac{R + E_1}{\alpha + \beta} \right)^{\alpha + \beta} + \left(\frac{g(\rho_1 < 1) + E_2}{\alpha + \beta} \right)^{\alpha + \beta} \right]}_{\text{separating}}
 \end{aligned} \tag{3.8}$$

This expected utility function can be either (1) increasing in q , or (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:

$$q^o = \arg \max_q V^e \tag{3.9}$$

Where V^e is defined in Expression 3.8.

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 adopting – or not – deaccessioning. 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. Notice 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, it can be easily seen that 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, not trivial. It depends on the probability of a separating strategy, because the inability of donors to distinguish between committed and not committed museums has a negative effect on donations (after the signal “not deaccessioning”). Therefore, transfers have two major effects, *i.e.* a positive effect on ρ_1 and in the probability of pooling equilibrium, which need to be considered carefully when implementing government’s policies because of non-triviality of the outcome¹³.

¹³Moreover, if the last two stages are repeated infinitely, the Folk Theorem applies. In this case – considering a discount rate $\delta < 1$ – the expected number of visitors is:

$$v^e = \frac{1}{1-\delta} \bar{v} + q \underbrace{\left[E_1^\alpha R^\beta + \frac{\delta}{1-\delta} \alpha^\alpha \beta^\beta \left(\frac{g(\rho_1 \geq 1) + E_2}{\alpha + \beta} \right)^{\alpha+\beta} \right]}_{\text{pooling}} + (1-q) \alpha^\alpha \beta^\beta \underbrace{\left[\left(\frac{R + E_1}{\alpha + \beta} \right)^{\alpha+\beta} + \frac{\delta}{1-\delta} \left(\frac{g(\rho_1 < 1) + E_2}{\alpha + \beta} \right)^{\alpha+\beta} \right]}_{\text{separating}} \quad (3.10)$$

As it can be seen in Expression (3.10), adding an infinite number of periods increases the chances of following a non-deaccessioning strategy. This is because the penalty induced by deaccessioning is relatively big in the infinite horizon. Note, however, that this result depends on the “grim trigger strategy” used by the Donor, who will punish infinitely the museum. Therefore, results change if the penalty does not apply after a certain amount of time. Dynamic results are sensitive to the assumptions on penalties. Insights, however, remain the same. The decision of deaccessioning must consider future consequences in terms of donations. It would be a viable option only if penalties are relatively small with regards to the gain from the sale of artworks.

4 Numerical simulation and interpretation of parameters

Due to complexity of the objective function, we cannot derive a closed form solution for q^* . Therefore we use computational software (*Mathematica*) to derive the optimal probability of a pooling equilibrium which maximises the function V^e . 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 also check that donations are non-negative. For sake of simplicity, we set the parameter \bar{v} equal to zero, since it has no effect on the probability q , nor in the optimisation problem.

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 $w \geq \frac{\alpha+\beta}{a\alpha}$ in order to have positive donations.

From 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 Government will avoid the demise of collections operated by museums, or it could be the proportion of committed museums (such as public museums if, for instance, deaccessioning is prohibited for public institutions). Therefore, we can refer this probability 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 art selling) can decide not to practice deaccessioning. The value of q represents the likelihood that this self-commitment will be carried out.

The parameter α 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's income w have a negative effect on the probability

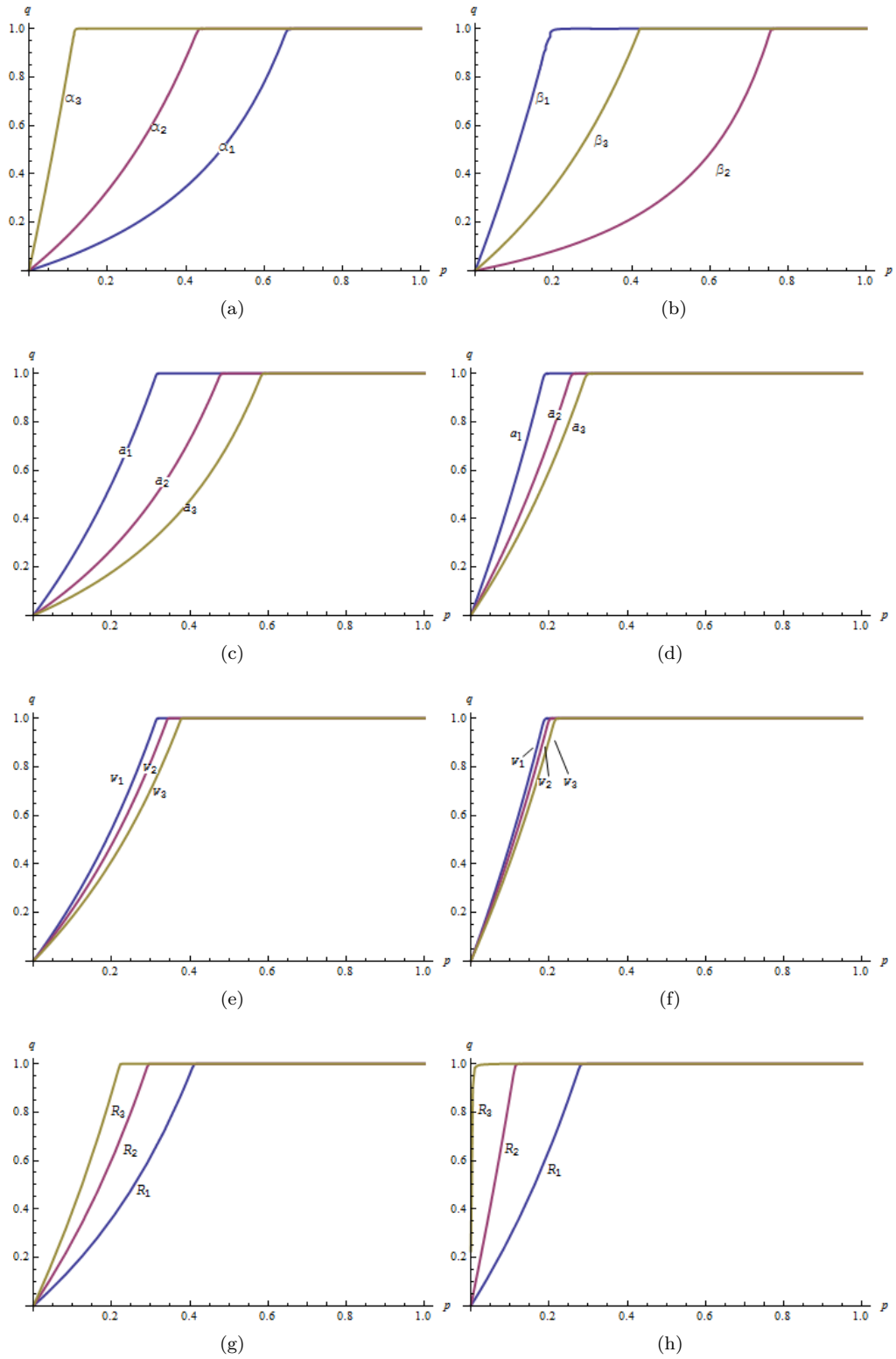


Figure 3: Optimal probability q^* with respect to p

q . The reason is that the willingness to donate increases 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, or they lead to a greater impact on visitors. When β becomes greater than α , q suddenly decreases, because the effect on the “production function of visitors” (greater productivity of services) outweighs 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 Deposit Vs Sale

In our model, we consider only the potential sale of artworks. We may think that museums’ directors could deposit some artworks which cannot be shown due to space limitation. Therefore, we should analyse costs and benefits of this operation in relation to the sale of art items.

Regarding costs, the storage of artworks determines the increase of management costs for the museum. These costs are, for instance: conservation costs, rent of the deposit, and so on. Furthermore, we have to consider the opportunity costs of not selling the items. Then the removal from the collection without the sale of artworks is more costly.

A different approach is needed to evaluate benefits of the deposit. To look at this issue, we should consider what is the public penalty for deposit, *i.e.* if the Donor considers the sale and the deposit in a different way. If there is a smaller penalty when the sale is avoided, and artworks are stored, then there exists a benefit of deaccessioning via deposit rather than by sale.

We can think that donors are concerned by the fact that the artworks are not shown to the public. In this case, deaccessioning by selling or by deposit creates the same penalty; the Museum will not have any incentive in storing artworks. On the other hand, the Donor may still prefer that Museum will keep the donated items rather than sell it, because the collection is not dispersed in the market yet and may eventually be shown in the future. In this case, storage

would lead to a smaller penalty in terms of donations. If, then, the benefits of a smaller penalty outweigh the greater costs of deposit, the Museum will not sell part of its collection, but only store it. However, the basic insights of our results remain qualitatively unchanged. Deaccessioning still creates a moral hazard problem, since museums obtain the property of artworks and they can sell it later.

6 Adding congestion effect

The model assumes that the Donor obtains a positive utility from seeing his donations shown in the Museum. This particular willingness discourages donations to the non committed museum, because it will probably sell a share of its collection in the future. In our problem, however, we do not consider the possibility that the Museum is not able to show all the donated items. In this section we address the problem of crowding out effect on donations.

Suppose that donated item are not shown to the public with probability $P(A_2)$ that increases with the overall amount of art in the Museum, A_2 , resulting from the sum of donations and endowment (see 3.1). Furthermore, we assume the second derivative to be negative. Donor's utility function could be rewritten as:

$$\ln x + a(1 - P(A_2)) \min\{\rho_2; 1\}g \quad (6.1)$$

Since in the third stage the non committed Museum will sell part of its collection (because $\rho_2^* < 1$), we have that $P(A_2^c) > P(A_2^{nc})$.

Without our new assumption the willingness to donate to a committed museum was represented by $a\rho_2 = a$, while to a non committed one was $a\rho_2^* = \frac{a\alpha}{\alpha+\beta}$. Therefore it was higher for committed museums.

With congestion, the willingness to donate to a committed museum is $a(1 - P(A_2^c))$, and to a non committed one is $\frac{a\alpha}{\alpha+\beta}(1 - P(A_2^{nc}))$. The difference between the two¹⁴ is no more constant but decreasing in A_2 (which depends on the optimal ρ_2 , the endowment E_2 and on private donations), it is also not assured to be positive.

¹⁴The difference is $a(1 - P(A_2^c)) - \frac{a\alpha}{\alpha+\beta}(1 - P(A_2^{nc}))$.

The willingness to donate to a non committed museum increases with respect to the basic model. Therefore this new assumption could have several implications. Since the level of donations are higher, there will be higher incentives to deaccessioning for non committed museum, because the opportunity costs of selling the collection is lower. In an extreme case, when the above difference is negative, non committed museums could not find profitable to follow a *pooling strategy*. Furthermore, a relatively high level of endowment, which affects $P(A_2)$ and could also be interpreted as a form of public support, implies a relatively low willingness to donate.

This new assumption could further explain the particular resistance of public (committed) museums to deaccessioning. Allowing deaccessioning would result in a higher level of donation to non committed museums, which would have also extra-revenues from the sale of their collections. While committed ones would receive a lower level of donations and would be constrained in their deaccess policies. Since it would not be possible to sell donated artworks, the restriction policy would have the effect of raising funds for public museums, and it would correct the bias towards private museums due to the crowding out.

7 Concluding comments

This paper represents a first attempt to provide an analytical investigation of the impact of deaccessioning on donations. Results provide a theoretical underpinning to the resistance of museum associations (and of public museums, in particular) against deaccessioning, and also to the proliferation of private museums. It is shown that allowing such a practice causes a moral hazard problem that reduces private donations, also to those museums that are committed not to sell part of their collection. A striking result is that a reduction in public grants may benefit museums committed not to deaccess, because it makes more likely that the non committed museum mimics the committed one by not selling at the first stage. This contrasts with the common wisdom that budget cuts hurt especially those museums that, institutionally or by choice, do not surrender to the option of selling their collections. In terms of the analytical investigation we provide numerical simulations to derive the probability of a pooling equilibrium and to better interpret the parameters. We also consider two generalisations. The first one considers the case when donations are stored rather than sold. The second one makes the

probability of showing donated items depending (negatively) on the amount of donations received overall by the museum.

This study also presents policy implications for the government and the highlights the influence that museum managers, as an organized interest group, may have on regulation limiting deaccessioning. However, further analysis will require the modelling of public policies that are now presented in a reduced form. In fact, endogenous public grants to museums or retaliations by other museums can be used to internalise the externality caused by deaccessioning and discourage it. Additional extensions may also focus on the effect of tax expenditure on donations. Future analysis focusing on the political decision-making process can also 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 :

$$\frac{\partial g(\rho_1 < 1)}{\partial \beta} = -\frac{1}{a\alpha} < 0; \quad (\text{A.4})$$

- Donations after the signal $\rho_1 \geq 1$ are:

- increasing in μ :

$$\frac{\partial g(\rho_1 \geq 1)}{\partial \mu} = \frac{\partial}{\partial \mu} \left(w - \frac{1}{\mu a + (1 - \mu)a\rho_2^*} \right) = \frac{(1 - \rho_2^*)a}{(\mu a + (1 - \mu)a\rho_2^*)^2} > 0; \quad (\text{A.5})$$

- increasing in the probability p , since $\mu = p/p + q(1 - p)$ and:

$$\frac{\partial \mu}{\partial p} = \frac{q}{(p + q(1 - p))^2} > 0; \quad (\text{A.6})$$

- decreasing in q , since:

$$\frac{\partial \mu}{\partial q} = -\frac{p(1 - p)}{(p + q(1 - p))^2} < 0; \quad (\text{A.7})$$

- decreasing in β :

$$\frac{\partial g(\rho_1 \geq 1)}{\partial \beta} = \frac{\partial}{\partial \beta} \left(w - \frac{\alpha + \beta}{a} \frac{1}{\mu\beta + a} \right) = -\frac{(1 - \mu)\alpha}{a(\mu\beta + \alpha)^2} < 0; \quad (\text{A.8})$$

- increasing in α :

$$\frac{\partial g(\rho_1 \geq 1)}{\partial \alpha} = \frac{\partial}{\partial \alpha} \left(w - \frac{\alpha + \beta}{a} \frac{1}{\mu\beta + a} \right) = \frac{(1 - \mu)\beta}{a(\mu\beta + \alpha)^2} > 0; \quad (\text{A.9})$$

- Furthermore, we have that (note that $q > 0$ implies $\mu > 0$) :

$$g(\rho_1 \geq 1|q = 0) = w - \frac{1}{a} > w - \frac{\alpha + \beta}{a} (\mu\beta + \alpha)^{-1} = g(\rho_1 \geq 1|q > 0) \quad (\text{A.10})$$

$$\frac{\alpha + \beta}{\mu\beta + \alpha} > 1 \iff (1 - \mu)\beta > 0;$$

- Perfect Information Benchmark:

$$g(co) = w - \frac{1}{a} = g(\rho_1 \geq 1|q = 0); \quad (\text{A.11})$$

$$g(nco) = w - \frac{\alpha + \beta}{a\alpha} < w - \frac{\alpha + \beta}{a(\mu\beta + \alpha)} = g(\rho_1 \geq 1|q > 0);$$

	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