Protecting Antiquities: A Role for Long-Term Leases?*

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In order to preserve cultural patrimony for future generations, most countries ban exports of antiquities. However, this may drive trade underground, particularly in low-income and low-state capacity contexts. Illegal and clandestine trade in antiquities can irreversibly damage cultural heritage because looters sometimes use rapid but destructive methods, such as pneumatic drills, and deliberately destroy the archeological record that is vital to understanding the past. Even with perfect enforcement, export bans may reduce maintenance incentives. We argue that complementing export bans with fixed-duration, long-term leases can strengthen incentives for maintenance and revelation of antiquities, while preserving cultural patrimony and raising revenue. Allowing only leases rather than sales limits potential losses from corrupt deals between foreign collectors and government officials. Standardized contracts specifying procedures for care and insurance of leased antiquities, lease length, and procedures for qualifying bidders may also be necessary to limit corruption and establish a well-functioning market.

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Dull is the eye that will not weep to see
Thy walls defaced, thy mouldering shrines removed
By British hands, which it had best behoved
To guard those relics ne'er to be restored.
Curst be the hour when from their isle they roved,
And once again thy hapless bosom gored,
And snatch'd thy shrinking gods to northern climes abhorred!

- Byron, Childe Harold's Pilgrimage.

1 Introduction

From 1801 to 1812, Lord Elgin, the British ambassador to the Ottoman Empire, had workers remove and ship to England 75 meters of the original 160 meter Parthenon Frieze, structurally weakening the remainder of the Parthenon. Elgin claimed he received permission from Ottoman officials, but the Greek government has long sought their return, challenging the legitimacy of the permissions allegedly granted by Ottoman officials long ago.

Like Byron, quoted above, many see the export of antiquities as repugnant. Most countries now see at least certain antiquities as constituting national patrimony and ban their export. Beginning with restrictions imposed by the Vatican on the right of churches to sell off relics and art, export bans have spread to 140 countries around the world. Many countries have declared unexcavated antiquities to be national property, and have adopted a de facto policy that antiquities in government hands cannot be sold. 119 countries, including the United States and most of Europe, have ratified the 1970 UNESCO convention or the 1995 UNIDROIT convention designed to bolster enforcement of these export bans by committing to return all antiquities declared national property and illegally exported after the conventions' ratification dates.

While in some cases export bans may be effective at keeping antiquities at home, they can also drive trade underground, particularly in antiquity-rich, low-income con-

texts where state capacity is limited. Illegal and clandestine trade is particularly damaging to cultural heritage because those engaging in this trade must work quickly and surreptitiously. As depicted in Figure 1, looters use fast methods of excavation such as pneumatic drills and dynamite (Coggins 1972, Bator 1982, Prott & O'Keefe 1990). They work to keep site locations secret, and often obscure the origin of antiquities by intentionally damaging sites and breaking antiquities into fragments to pass international borders. As the social and stratigraphical relationship of antiquities provides archeologists and historians with more insights than an antiquity in isolation, clandestine trade jeopardizes scientific inquiry and limits understanding of past civilizations.

Figure 1: Before and after picture of a pediment damaged by looting in the Banteay Chhmar complex in Cambodia. Large parts of the complex were systematically looted in 1998 and 1999. Stolen antiquities included two 12 meter wall sections that were cut into blocks and intended for international sale. Original pictures taken by Michael Freeman (1997) and Andy Brouwer (2008).

Many who study the antiquities market argue for either stricter enforcement of export bans or for these laws to be repealed in favor of free markets. However, both of these polar policies are are unlikely to be fully implementable in practice. Artifact-rich countries who are trying to enforce export bans often do so with limited resources for

maintenance and security. Such limited resources makes it difficult to monitor potential looting sites and to protect objects already in government control. For instance, Nigeria's total budget for its museums and monuments was just over $26 million in 2013, with security being only a subset of those costs; large museums in Nigeria have been the victims of major robberies seven times in the last three decades, with estimated losses of up to $200-250 million from a single case (Akinade 1999, Shyllon 2000).

Countries must also contend with corruption and potential breakdowns in state control, which may limit the efficacy of export bans. Fisman & Wei (2009) find evidence that corruption influences the size of the cultural black market by using the gap between the reported value of exports of cultural property and the reported value of imports of receiving countries as a proxy for illicit trade. The authors find that more corrupt countries have a larger import-export gap and that this relationship was strongest in artifact-rich source countries.

In cases where the difficulties of enforcement can be overcome, even perfectly enforced export bans may weaken incentives to maintain antiquities that are not under direct government control. Despite their durable-goods nature, antiquities are fragile and may be damaged or permanently destroyed with improper care. If those in possession of these artifacts do not have the means or incentive to maintain the antiquities and are unable to sell them to those who do, the antiquities may be at risk of damage or destruction. Scholarly knowledge may also be lost if those in possession of artifacts of illegal or uncertain status — whether in the country of origin or in another country to which the antiquities have been transferred — have a disincentive to display, lend, or document them due to a fear of seizure and prosecution.

Noting the difficulties inherent in restricting trade, others such as Posner (2006) argues that export bans should be abandoned and replaced by a free trade regime. While this view may appeal to some economists who see gains from trade, the prospects for

full legalization of trade in antiquities seems remote given the national legislation and international treaties restricting trade and the strong opposition of the overwhelming majority of archaeologists (Renfrew 1993, Brodie, Doole & Watson 2000). Roth (2007) argues that repugnance is a constraint on the operation of some markets. Such repugnance constraints may make the cross-border sale of certain antiquities infeasible.

We examine the problem facing a government that has at least some citizens who value keeping antiquities intact and in the country of origin, creating a potentially time-varying social benefit that may or may not exceed the value placed on the antiquity by foreign collectors in any time period. An unconstrained social planner would allocate antiquities to their highest value use, but we assume the government is constrained: it does not know the location or existence of all antiquities, has imperfect enforcement technology, and must work through potentially corruptible officials.

We first consider unexcavated antiquities and those which have been excavated but are in private hands. Banning exports allows the government to keep antiquities in the country of origin but reduces maintenance incentives for those in possession of antiquities and disincentivizes those with private information on the existence of unexcavated archaeological sites from revealing this information. We argue that allowing fixed-duration leases but not sales could ensure the source country retains long-run ownership of its cultural patrimony, while also creating incentives for citizens to reveal and maintain antiquities. Thus, even in cases where a social planner would keep antiquities at home, a government with limited information might allow leases.

Leases are an attractive way to provide information rents necessary to induce maintenance and revelation, because they automatically link the value of rents to the value of the antiquity. If the government paid a fixed amount for every antiquity revealed, it would be vulnerable to forgeries. By using a competitive market to determine the reward for those revealing and maintaining antiquities, leases do not require antiquities

to be appraised by potentially corruptible agents.

We then consider the case of antiquities that have already been excavated and are in government hands. We show that even if some antiquities are valued more by foreign collectors and an unconstrained social planner would transfer them abroad, a government constrained by the possibility that officials may be corrupt may ban their sales. In the absence of laws banning sales, corrupt officials can collude with foreign collectors to sell antiquities valued more at home and appropriate a share of the proceeds. We show that a blanket ban on export of antiquities may be preferable to allowing government officials discretion to sell off the cultural patrimony of future generations. However, we show that over a broad range of probabilities that future officials may be corrupt, allowing leases will be preferable to either free trade or complete export bans. Leases prevent the expropriation of value from future generations and prevent corruption in one generation from destroying cultural heritage in all future generations. However, unlike complete export bans, leases can be used to move antiquities to places that value them more in the short term and generate revenue. Depending on parameter values, allowing lease transactions may also help preserve antiquities by increasing maintenance incentives.

Precedents suggest that leases are feasible. The Menil collection in Houston the Church of Cyprus negotiated a long-term lease of two 13th century Byzantine frescoes that had been recovered from sources with disputed claims. The Menil Foundation restored the frescoes as part of the lease requirements and displayed them from 1992 to 2012, when they were returned to Cyprus. The King Tut exhibit which circulated in the United States and London from 2005-2008 was leased to a private company which charged $5M per city and generated proceeds that went to the renovation of the Egyptian Museum in Cairo.[1] To reduce museum-side moral hazard, the lease agreements

[1]The exhibit circulated again between 2008 and 2011 with additional stops in the United States

for the King Tut exhibit specified transportation, display, and storage conditions, and required insurance for $650 million costing roughly $1 million per city (Boehn 2005). Leases have also been successful in the exchange of artwork. In 2007, the Louvre agreed to lease between two and three hundred artworks to its counterpart in Abu Dhabi over a ten-year period for a total sum of $247 million (Riding 2007).

These examples suggest that legal and other institutions currently used for loans between museums could be adapted to ensure leaseholders exercise proper care of antiquities.[2] They also suggest that lease transactions can be politically feasible and avoid repugnance constraints if the proceeds are used for protection of antiquities (as in the Egyptian example) or are in-kind, and involve protection and restoration (as in the Cyprus example).

While these examples seem to have been successful, it is worth noting that corrupt officials could be bribed to structure lease deals that do not adequately protect antiquities or that improperly favor particular bidders. To develop a well-functioning lease market, it may therefore be necessary to establish norms on lease length, storage and maintenance conditions, and insurance. Moreover, standard procedures would be needed for advertising lease auctions, qualifying bidders, and standardizing certain aspects of the contracts, so that bids are not so high-dimensional as to leave government authorities excessive discretion and thus scope for corruption. The involvement of international organizations in establishing standards in these areas could create legitimacy for these transactions complying with these standards, making citizens of source countries and museums in receiving countries more willing to engage in lease transactions.

and Australia.

[2]From a legal perspective, Beltrametti (2013) studies whether current Italian and Greek laws would allow leases of antiquities that involve monetary compensation. Italian law does not explicitly prohibit monetary compensation and there are some indications that practitioners in the legal system would be in favor of such leases. Greek law is less clear on this issue but does not explicitly rule out monetary transfers in reciprocal exchange agreements.

They could also reduce the fixed costs of negotiating these terms from scratch for every transaction.

The rest of the paper is organized as follows. Section Two provides background on the antiquities market. Section Three models incentives for citizens to maintain and reveal antiquities unknown to the goverment. Section Four examines trade in antiquities already in government possession, arguing that when government officials may be corrupt, leases may be superior to either free trade or complete export bans. Section Five argues that corruption could be limited by the establishment of a standard set of contracts and the involvement of respected international institutions with the power to certify legitimate transactions. Section Six discusses ways to address the risk that allowing leases may spur efforts to secure open-access antiquities through looting. Section Seven concludes.

2 The Illicit Antiquities Market

The illicit trade of antiquities is considered to be one of the largest black markets in the world. While estimates of its size are imprecise and vary widely from $300 million up to $7.4 billion per year (Atwood 2006, Calvani 2009), the damage that the trade has done to the archeological record is extensive and well documented. Table 2 provides quantitative evidence collected primarily by Brodie et al. (2000) and Brodie & Renfrew (2005), on the scale and scope of damage in particular settings.[3] As can be seen in these examples, looting is widespread and systematic.

Illicit trade persists despite export bans, international conventions and bilateral treaties designed to prevent illegal exports.[4] Many countries also nationalize antiquities

[3]See also Atwood (2006), Gill & Chippindale (1993), O'Keefe (1997), and Toner (2002).

[4]The most important international agreement concerning antiquities is the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership

Italy	Italian Carabinieri recovered more than 326,000 antiquities from clandestine excavations between 1969 and 1999, of which 100,000 were recovered between 1994 and 1999 (Pastore 2001, p. 159).
Greece	Greek police recovered over 23,000 artifacts between 1987 and 2001 (Doole 2001).
Spain	A 2000 study of Andalusia, Spain reported damage due to illicit excavation in 14% of known archeological sites (Fernandez, Cacho & Sanjuan 2000).
Belize	A 1983 study of Mayan sites in Belize found that 58.6% of sites surveyed were damaged by looters (Gutchen 1983).
Ecuador	A single Italian dealer was found to have illegally removed nearly 12,000 antiquities from Ecuador, where hundreds of sites have been damaged (Brodie, Doole & Watson 2000).
Cyprus	In 1997, German police in Munich revored 50-60 crates containing 138 icons, 61 frescoes, and 4 mosaics that had been torn from the walls of a north cypriot church (Watson 1998, p. 11).
Turkey	Between 1993 and 1995 there were over 17,500 official investigations into stolen antiquities. A recent Turkish government lists antiquities smuggling as the fourth largest source of illicit income, after arms, drug smuggling, and fraud (Kaye 1995).
Iraq, Afghanistan, and Syria	Iraq, Afghanistan , and Syria have experienced widespread looting both from their museums and from the archaeological sites that once were under government control (Wright, Wilkinson, Stone & Gibons 2003, Feroozi & Tarzi 2004, Parkinson, Albayrak & Mavin, 2015).
Pakistan	A survey in a district of northern Pakistan showed that 45% the buddhist shrines, stupas and monasteries had been badly damaged or destroyed by illegal excavations (Ali & Coningham 1998).
Cambodia	In Cambodia decorative friezes and sculptures belonging to Khmer period temples have been systematically looted. A single lorry stopped on the Cambodian-Thai border was found to contain 117 sandstone carvings from the 12th-century AD temple of Banteay Chhmar (Brodie, Doole & Watson 2000). Looting in Cambodia has been so extensive that the government has replaced many of the statues in the region of Angkor with replicas so that the originals can be more securely stored (Jessup 2004).
Mali	Between 1989 and 1991 a regional survey in Mali discovered 830 archaeological sites, but 45% had already been damaged, 17% badly. In 1996 a sample of 80 were revisited and the incidence of looting had increased by 20% (Bedaux & Rowlands 2001).

Figure 2: Scope of Damage to Archeological Record by Illegal Trade in Antiquities (Selected Examples)

and make it illegal for private citizens to search for and extract antiquities still in the ground.[5] Since international treaties are not retroactive and antiquities exported prior to a treaty's ratification therefore enjoy a different legal status than those exported after a treaty's passage, many in the antiquities trade obfuscate or destroy information about the origin and context surrounding antiquities so that illicit antiquities can more easily be passed off as legal ones. The pooling of licit and illicit material makes policing the antiquities market difficult and has made the systematic identification of stolen antiquities difficult if not impossible.

The mixing of licit and illicit objects has also created scope for forgeries in the antiquities market. These forgeries have become increasingly sophisticated over time and many are hard to identify even by well trained archaeologists.[6] The potential that objects are forged makes it difficult for archaeologists to draw scientific conclusions from objects that have not been excavated from pristine sites (Chippingdale & Gill 2000, Gerstenblith 2007).

The trade of illicit antiquities typically flows from poor countries to rich countries with a long chain of intermediaries. These intermediaries manage the smuggling of antiquities across borders and help to obfuscate the origins of antiquities by shifting

of Cultural Property, which has been ratified by 119 countries. In the United States, the Convention on Cultural Property Implementation Act (1983) implements portions of the 1970 UNESCO convention and prohibits the import of stolen antiquities that have been documented in the inventory of a public or secular institution in countries that are signatories to the convention. The legislation also allows for bilateral agreements with individual states to restrict importation of specific classes of archaeological artifacts. There are currently agreements with Cyprus, Italy, Bolivia, El Salvador, Guatemala, Honduras, Nicaragua, Peru, Mail and Cambodia (Brodie & Renfrew 2005). The legislation provides for civil forfeiture of antiquities but does not include criminal penalties. The United Kingdom's 2003 Dealing in Cultural Objects (Offences) Act goes further and makes it a criminal offense to deal in antiquities that have been illegally excavated or removed from an archaeological site anywhere in the world after the Act came into force (Brodie & Renfrew 2005).

[5]Such laws increase the ability of a country to prosecute smugglers in importing countries by specifying an initial owner. See Bator (1982), Borodkin (1995), and Phelane (1993) for a broader legal discussion.

[6]The ability to detect fraud differs by the medium of the object in question. Marble, for instance cannot be carbon dated and there is no easy way to test whether an object made of marble is genuine (Brodie et al. 2000).

them through multiple jurisdictions.

Studies that trace the supply chain of an illegally traded antiquity estimate that the original holder of antiquities typically receive less than two percent of the antiquities' final sales price (Beech 2003, Brodie 1998). For example, The Euphronius Krater, which was at the heart of the dispute between the Metropolitan Museum and Italy, was bought by the museum for $1 million in 1972 but is reported to have been purchased by the looter who first illegally excavated the vase for roughly $21,500 (8,800 pounds) one year earlier (Slayman 1998). This is likely in part because illegally exporting antiquities from the source country, importing it into the receiving country, and finding a buyer is risky and expensive, and in part because there is limited competition among intermediaries and they are better informed than sellers, and hence likely to extract a large portion of the rents associated with looted antiquities.

Most museums will not knowingly accept antiquities that have been illegally excavated after 1971, based on the legal framework developed in the 1970 UNESCO convention.[7] These rules are intended to reduce the demand for excavation and to prevent private collectors from obtaining tax relief or recognition for donating illicit material (Brodie & Renfrew 2005).[8] A byproduct of these laws is that many antiquities now in private collectors hands do not have a path by which they can reenter the public domain.

Based on the discussion above, we model antiquities trade in environments where there is imperfect enforcement of antiquity law, where the authorities are not always aware of the existence of antiquities in private hands, where some government officials may be corrupt, where some antiquities may be forged, and where looters receive only

[7]Brodie & Renfrew (2005) and Gerstenblith (2003) argue that museums are not doing enough to ensure their collections do not have illicit material. They discuss how museums may be attempting to relax their criterion for accepting material without provenance.

[8]There are large tax incentives in the US and other countries for donating items to museums. See Fullerton (1991) for a discussion.

a small share of antiquities' potential value. Section 3 below considers antiquities unknown to governments, and Section 4 considers antiquities already in government hands.

3 Antiquities Unknown to the Government

Source country governments may be unaware both of unexcavated antiquities in unknown sites and of antiquities which have been illegally excavated but remain in the source country. Citizens with private information on the existence of these antiquities may require information rents to induce them to maintain and reveal them. We argue that allowing those holding antiquities to lease out their antiquities for a fixed period can create these incentives and that because leases automatically link payments to the antiquity's value, they are less subject to corruption than discretionary incentive payments for revelation.

3.1 Model Assumptions

We treat antiquities as durable resources that are either unexcavated or excavated and in private hands. Unless there is an explicit need to differentiate between the two cases, we refer to an individual who has private information about a site or who is holding an antiquity as an "informed citizen" and refer to the site or antiquity in their possession as an "antiquity."

As a central concern in the antiquity market is the preservation of antiquities, we consider situations in which the preservation of an antiquity requires a payment of M at the beginning of each period by the owner for *maintenance*. For antiquities that are already excavated, this could involve proper storage that controls for heat, humidity, and sunlight and that mitigates the risk of damage from fire, flood, vandalism, or theft.

For unexcavated antiquities, this could be the opportunity cost of not using the land and the cost of protecting the site from vandals or other potential looters. We consider M to be a reduced form parameter that includes the cost of preventing damage and theft by looters. For convenience, rather than modeling a continuous and stochastic relationship between effort and damage, we assume that M is binary and that if it is not paid, the antiquity or site is immediately destroyed.

To allow for some potential heterogeneity in valuation, including the existence of outright forgeries, we consider an environment with high (H) and low (L) quality antiquities.[9] We assume that at least a portion of citizens may value having antiquities revealed, maintained, and in the country of origin. High- and low-quality antiquities that are revealed and maintained generate a domestic externality of d_t^H and d_t^L respectively in period t. For excavated antiquities, this externality includes the amenity value of having the antiquity in the country of origin, its curatorial value to domestic museums, and information on the location of active looting. For unexcavated antiquities, the externality includes the scientific and historical value generated from proper excavation along with the amenity and curatorial value of antiquities recovered from the site.

We study the problem from the perspective of a government that is trying to maximize social utility taking into consideration the domestic externality. Relative to the size of the total government budget, the value of this externality is assumed to be small. As such, we simplify the government's objective by assuming a linear tradeoff in each period between antiquity usage and government expenditures on non-antiquity related programs,

$$u(g_t, x_t) = g_t + x_t d_t^q, \tag{1}$$

where $x_t \in \{0, 1\}$ is one if the antiquity is maintained and transferred to the government

[9] In the case of an unexcavated site, we assume that the value of a site is equal to the total value of antiquities that are contained within it and that sites can also be of high and low quality.

and zero otherwise. Discounting at rate δ, the government selects policies to maximize

$$\mathbb{E}\Big[\sum_{t=0}^{\infty}\delta^t u(g_t, x_t)\Big] \tag{2}$$

subject to its budget. We assume that the government's overall budget is fixed in each period and that any transfers paid to secure antiquities reduce government expenditures one-for-one.[10] Likewise, any antiquities sold or leased by the government increase government expenditures one-for-one.

To highlight the issues that are unique to unexcavated objects, this section specializes to the case where d_t is constant over time.[11] A high- and low-quality antiquity that is transferred in government hands therefore generates a domestic benefit with an NPV of $\frac{1}{1-\delta}d^H$ and $\frac{1}{1-\delta}d^L$, respectively. We consider the more general case in Section 4 where we focus on antiquities that are in the hands of the state.

We assume two informational inefficiencies that limit the policies that can be employed by the government. First, while we are considering the case in which the government has nationalized antiquities and is the *de jure* owner of all antiquities, we assume "informed citizens" have antiquities in their possession or know the location of unexcavated sites. Second, we assume that whether antiquities are of high or low quality is not perfectly observable and can only be assessed by experts. If an antiquity is revealed to the government, a bureaucrat can perfectly estimate the antiquity's value and deter forgeries, but some proportion b of bureaucrats are corrupt and can report a low-quality antiquity as a high-quality antiquity in exchange for a bribe B.[12] We assume that the

[10]This formulation treats government expenditures and transfer payments symmetrically for simplicity, but results would be qualitatively similar if taxation generated deadweight loss and the government maximized citizen welfare.

[11]As the value to the government is in expectations and we only care about the overall NPV of a revealed object, there is little change to the model in this section if we allow the usage value of antiquities to vary over time.

[12]Our model can easily accommodate the case where bureaucrats can also hold up informed citizens who report high-quality antiquities by threatening to report these antiquities as low quality unless a

informed citizen does not know the type of official he will be assigned to before making the decision to reveal his antiquity.

Informed citizens in our model have some potential of meeting a smuggler in each period and thus have private incentives to keep antiquities undisclosed. To study how optimal policy is likely to change with income, we also allow informed citizens to receive private benefits v^q, $q \in \{L, H\}$, at the end of each period that their antiquity is undisclosed and in their possession. In a low-income context with unexcavated antiquities, v^L and v^H are likely to be small and close to zero. We also consider the case where low-quality antiquities are forgeries and where v^H may differ from v^L and where $d^L = 0$. In all cases, we assume that the informed citizen knows whether their antiquity is of high or low value.[13]

Finally, we assume that if an object is put up for sale internationally, there exists a foreign collector with per-period valuation $\overline{a}^q$ who is willing to pay $\frac{\overline{a}^q - \delta M}{1-\delta}$ in total for the antiquity.[14]. We consider two cases of our model that vary in the relationship between $\overline{a}^q$ and d^q. In the first case, $d^q > \overline{a}^q$ for $q \in \{H, L\}$ and the government would like to retain all antiquities. We view this case as the environment envisioned by cultural nationalists and others who view the value of domestic usage as very high. Second, we consider the case where $d^H > \overline{a}^H$ but where $d^L = 0$ and $\overline{a}^L = M$. In this case, low-quality antiquities can be thought of as forgeries which can be produced by citizens in the domestic country.

bribe is paid. We discuss how such hold up can impact revelation payment programs in footnote 17.

[13]The model can easily be extended to the case where the informed citizens have imperfect signals about the quality of their antiquities.

[14]This price can be generated more formally as follows. Let there be $i \in \{1, \ldots, N\}$ foreign collectors who are potentially interested in using a legally procured antiquity. Each foreign collector has a private per-period value for art consumption of a_i^q bounded between $\underline{a}^q$ and $\overline{a}^q$ and distributed according to the time-invariant cdf $F^q(.)$ with associated pdf $f^q(.)$. Without loss of generality, we assume that the buyers are ordered in ascending value. Thus a_N^q and a_{N-1}^q represent the highest and second highest values respectively. We also assume that $N \to \infty$ so that $a_N^q = a_{N-1}^q = \overline{a}^q$. Any efficient auction will now generate returns of $\overline{a}^q$ for the current period and $\overline{a}^q - M$ for all subsequent periods.

The timing of our game, shown in Figure 3, is as follows: in an initial law-writing phase, the government passes laws regarding the way in which antiquities that are disclosed to the government are processed. We initially assume that the government may allow for free trade or pass an export ban. We assume that under free trade, the informed citizen sells his object to the foreign buyer (or the government) at price $\frac{\overline{a}^q - \delta M}{1-\delta}$. Under export bans, antiquities that are disclosed or detected by the government are confiscated.

We then consider policies that combine export bans with systems that reward public disclosure of antiquities and sites. We first consider a discretionary payment system where objects revealed to the government are assessed by bureaucrats and where rewards are conditioned on the bureaucrats reports. Under this policy objects that are disclosed to the government are randomly assigned to bureaucrats. If an informed citizen is assigned to a corrupt bureaucrat, the informed citizen chooses whether to offer a bribe to certify that an antiquity is of a particular quality. The bureaucrats then generate their reports and the governments incentive mechanism is implemented.

Finally, we consider a lease system where the government can choose to lease antiquities that are revealed to them for t periods and pay the proceeds of these leases to the informed citizen. Antiquities are retained by the government at the end of the lease.

Following the initial law writing phase, informed citizens make a series of decisions regarding the maintenance and revelation of their antiquity. For each time $t \in \{0, \ldots, \infty\}$, an informed citizen holding an antiquity must pay M in order to prevent the antiquity from being destroyed. If the antiquity is preserved, the informed citizens must decide whether to publicly disclose their antiquities or not disclose their antiquity and wait for a potential smuggler. Disclosed antiquities are processed according to the country's laws.

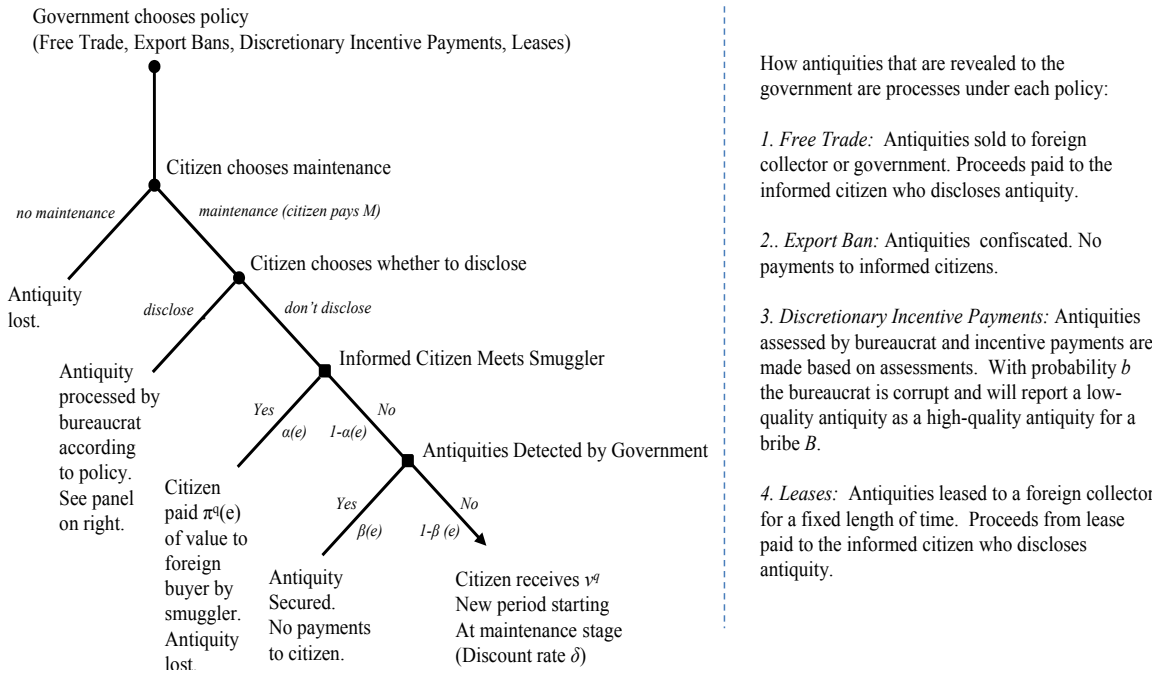

Figure 3: Timing chart

If informed citizens elect not to disclose their antiquities, they are matched with smugglers with probability α. Smugglers pay the informed citizen a proportion π of the amount that the informed citizen could receive under a free market. The government detects and confiscates antiquities that have not been smuggled with probability β. The likelihood of each of these outcomes is determined by an exogenous enforcement level e. Greater enforcement reduces the probability $\alpha(e)$ that an informed citizen who has chosen not to disclose an antiquity is matched with an intermediary or smuggler. Greater enforcement also reduces $\pi^q(e)$.[15] Finally, greater enforcement increases the probability $\beta(e)$ that antiquities that are not sold are detected by the government and are either excavated or confiscated. We concentrate on the case where $\pi^q(e)\overline{a}^q >$

[15]While we have treated π^q as exogenous, it is likely to be the outcome of a bargaining process where the smuggler has significant bargaining power. Greater enforcement is likely to increase a smugglers costs and is thus likely to lower π^q.

$\frac{(1-\beta(e))v^q-\delta M}{1-\delta}$ as this is the case where informed citizens sell antiquities to smugglers when given the chance.[16]

3.2 A Welfare Comparison of Free Trade and Export Bans

We first compare free trade and export bans without the possibility of providing information rents to informed citizens through incentive payment programs or leases in the first case of our model where $d^q > \overline{a}^q$ for $q \in \{L, H\}$. As it is an easily comparable measure that captures all welfare effects associated with antiquities, we report the government's net payoff from each antiquity: the difference in expected utility that the government receives for a given antiquity under the policy and the utility the government receives under a policy where the government expends no money but the antiquity is destroyed.

Under an export ban, the informed citizen will invest in maintenance only if the expected return is higher than the maintenance cost, or $\alpha(e)\pi^q(e)\frac{\overline{a}^q-\delta M}{1-\delta}+(1-\alpha(e))(1-\beta(e))v^q > M$. If the informed citizen maintains the antiquity or site, the government detects with probability $\beta(e)$ each period, and receives an expected net present value of

$$S^{Ban}(e) = \frac{(1-\alpha(e))\beta(e)}{1-\delta[(1-\alpha(e))(1-\beta(e))]}\frac{d^q-\delta M}{1-\delta} \tag{3}$$

per antiquity. The proportion $\alpha(e)[1-(1-\alpha(e))(1-\beta(e))]^{-1}$ of antiquities are lost to smuggling.

Increasing $\beta(e)$, the probability of detection, through tougher enforcement will increase what the government recovers, but there is a limit to what the government can recover. If enforcement is toughened and the expected return of holding the antiquity

[16] If $\pi^q(e)\overline{a}^q < (1-\beta(e))v^q$, informed citizens hold antiquities instead of selling them to the smugglers. Since smuggling will never occur, the analysis of this case is identical to our standard model with $\alpha(e) = 0$. Note that for unexcavated sites v^q is close to zero and this case is unlikely to occur.

falls below M, individuals lose their incentive to protect and maintain antiquities, leading to their destruction. As $\pi^q(e)$ is likely to be very small, a policy based purely on enforcement (as opposed to one that also rewards for revelation of antiquities) may generate fewer incentives for protection and ultimately lead to inefficient social outcomes.

Based on our model, export bans are likely to lead to a large proportion of antiquities lost to smuggling in environments where there is limited enforcement and may lead to destruction in environments where the maintenance cost is high and the private benefits for antiquities are small. We view this to be the case in environments where citizens are poor and where antiquities are unexcavated.

In settings where private individuals are holding illegal antiquities and direct property rights can be traced to a specific individual, it might be possible to design a revelation scheme based on high punishment for possession and a token reward for revelation. However, such policies are unlikely to be effective in most of the settings we consider. For antiquities that are unexcavated, it would be inherently difficult to prove an individual is aware of a site and hold them directly accountable for the site's outcome. For other antiquities, it is likely that many innocent individuals would get swept up in these policies since it may be difficult to know if antiquities they come into contact with are licit or illicit.

One can also examine the consequences of allowing informed citizens to sell antiquities abroad, with the government either having the right to bid on the antiquities or purchasing them back afterwards. As discussed above, we focus on the case where $d^q > \overline{a}^q$ so it is efficient for the antiquities to stay in the country. Note that such procedures could be vulnerable to collusion and corruption that could lead the government to overpay for antiquities, but even in the absence of these factors the government and foreign collector would end up bargaining to a price between $\frac{\overline{a}^q - \delta M}{1-\delta}$ and $\frac{d^q - \delta M}{1-\delta}$ per antiquity. Thus, in the absolute best case for free trade, the government would need

to pay $\frac{\overline{a}^q - \delta M}{1-\delta}$ per antiquity it purchases. If $d^q > \overline{a}^q$, the government will purchase all antiquities of quality q that are put up for auction, leading to a net payoff of

$$S^{Free} = \frac{d^q - \overline{a}^q}{1-\delta} \tag{4}$$

per antiquity. As $\overline{a}^q > M$, all antiquities are preserved under this scheme. However, the additional payments made in recovering antiquities may lead the government to prefer export bans and enforcement.

3.3 Incentives For Revealing and Maintaining Antiquities

The preceding discussion suggests that augmenting an export ban policy with explicit incentives for revealing the location of antiquities may improve social welfare. Payments for revelation may not only resolve the information asymmetry but also provide incentives for informed citizens to maintain their antiquities in the first place.

We consider two types of incentive programs: purchase programs which allow for discretionary incentive payments based on the quality of the antiquities and lease programs which allow informed citizens to lease antiquities abroad for a number of periods in exchange for revealing its location. We show that discretionary incentive payments are vulnerable to corruption and that the lease system leads to greater social surplus for the government than both discretionary incentive payments and the export bans considered in the previous section.

As it will be useful for simplifying notation, let

$$V^q = \max\left\{M, \frac{\alpha(e)\pi^q(e)\frac{\overline{a}^q - \delta M}{1-\delta} - (1-\alpha(e))(1-\beta(e))(\delta M - v^q)}{1-\delta[(1-\alpha(e))(1-\beta(e))]}\right\} \tag{5}$$

represent the potential outside option of an informed citizen holding an antiquity of

quality q. Note that this outside option encapsulates both the case where the informed citizen has no incentive for maintenance and the case where she has incentives to maintain the antiquity in hopes of selling it to a smuggler.

Consider first discretionary incentive payments which pays quality-contingent incentives in exchange for antiquities revealed by informed citizens. As the potential values of antiquities are unknown *ex ante* and must be estimated by bureaucrats, discretionary incentive payments are vulnerable to corruption.

In the case where $d^q \geq \overline{a}^q$ for $q \in \{H, L\}$, let p be the proportion of H-quality objects. Similarly, in the case where L quality objects are forgeries, assume that the supply function for forgeries is upward sloping and if the expected value of making a forgery is bV^H, the proportion of real antiquities is p and the proportion of forgeries is $(1-p)$. Then the net social surplus of both programs is as follows:

Proposition 1 *When $d^q \geq \overline{a}^q$ for $q \in \{H, L\}$, so the government would like to retain both high- and low-quality antiquities, the net payoff from combing an export ban with discretionary incentive payments for revelation and maintenance of antiquities is:*

$$S^{Discretionary} = p\left[\frac{d^H - \delta M}{1-\delta} - V^H\right] + (1-p)\left[\frac{d^L - \delta M}{1-\delta} - V^L\right] - (1-p)bB \qquad (6)$$

When $d^L = 0$ and $d^H > \overline{a}^H$, so that the government would like to retain only high-quality antiquities, the net payoff is

$$S^{Discretionary} = p\left[\frac{d^H - \delta M}{1-\delta} - V^H\right] - (1-p)bV^H. \qquad (7)$$

Proof: Starting with the case where the government would like to retain all antiquities, first note that in any equilibrium where bribes exist, $B \in [0, V^H - V^L]$ depending on the bargaining power of the bureaucrat relative to the informed citizen. The individual rationality constraint for informed citizens holding high- or low-quality antiquities de-

mand that their expected transfers (net of the bribe) weakly exceed the value of their respective outside option. Defining T^H and T^L as the transfers made to informed citizens whose antiquities are reported as high and low respectively, individual rationality requires

$$\begin{aligned} T^H &\geq V^H, \quad (8) \\ (1-b)T^L + b(T^H - B) &\geq V^L. \quad (9) \end{aligned}$$

The first equation here simply states that the transfer to a high type must exceed the informed citizen's outside option. The second equation states that the transfers paid to an informed citizen holding a low-quality antiquity when matched with an honest bureaucrat plus the additional transfers gained by the informed citizen when matched with a corrupt bureaucrat must exceed the outside option.

In the optimal purchase program, both constraints will hold with equality. Thus, rearranging equation (8) yields

$$T^L = V^L - \frac{b}{1-b}\left(V^H - V^L - B\right), \quad (10)$$

which is strictly less than V^L. The reduction in T_L is due to the possibility of a holder of an antiquity matching with a corrupt bureaucrat and receiving a positive surplus.

The expected cost for procuring each antiquity is

$$[p + (1-p)b]T^H + (1-p)(1-b)T^L, \quad (11)$$

where p is the proportion of high quality antiquities. Plugging in (8) and (10) yields an expected cost per item of:[17]

$$pV^H + (1-p)V^L + (1-p)bB. \quad (12)$$

Let us now consider the second case in which the government only wants high-quality antiquities and where low-quality antiquities are interpreted as forgeries with no domestic value. In this case, the social planner only wants to retain high-quality antiquities but, due to corruption, also ends up purchasing a proportion $(1-p)b$ of forgeries. Using (11) and noting that $T_L = 0$ in this environment, the cost of the program is

$$[p + (1-p)b]V^H \quad (13)$$

[17] Corrupt bureaucrats could, of course, also charge bribes to individuals with high-quality antiquities to truthfully reveal quality. In this case the information rents for high types must be increased by bB and the rents to the low types can be decreased by $\frac{b}{1-b}bB$. The total transfers for the project increase by pbB.

while the gross value of the high-quality antiquities is only:

$$p\left(\frac{d^H - \delta M}{1-\delta}\right). \tag{14}$$

■

Misreporting by bureaucrats increases the cost to the government of a program designed to incentivize citizens to reveal antiquities. In the case where the government only wants to retain high-quality antiquities, discretionary incentive payments also lead to allocation distortions. When p is small relative to $(1-p)$, the cost of this program may be very large relative to its benefit. This will be the case, for instance, if forgeries are generated endogenously and V^H is high relative to the cost of making forgeries.

By requiring expert advice from bureaucrats who can gain privately from misreporting, discretionary incentive payments leads to distortions both in the amount paid to secure antiquities and in the antiquities secured any time that $b > 0$. The advantage of a lease program is that the information rents generated by an antiquity can be linked directly to its value without relying on private assessments.

Proposition 2 *There always exists a lease program that will induce maintenance and revelation of antiquities. Let τ be the smallest integer such that*

$$\sum_{t=0}^{\tau} \delta^t(\overline{a}^q - \delta M) \geq V^q. \tag{15}$$

Then, all lease programs that allows for leases of length greater or equal to τ in exchange for future ownership rights are sufficient for generating maintenance and revelation incentives for an antiquity of quality q.

Proof: Proof is in the appendix.

Proposition 2 states that it is always possible to find a lease contract that will induce

all informed citizens to reveal their antiquities to the government. This is because the alternative of waiting to sell on the black market requires informed citizens to share rents with smugglers and exposes them to the risk that the government will confiscate an unreported antiquity before the informed citizen can match with a smuggler.

The necessary lease length depends on the value that a smuggler can provide to an informed citizen relative to the market price for legally transferred leases, as can be seen by noting that V^H is a function of the enforcement technology. The necessary lease length is shorter the greater the ability of the country to police illegal markets and the smaller the value of illicit antiquities is to licit antiquities to final purchasers. We thus see leases as a complement to enforcement policies and policies that actively reduce foreign demand for illicit material. Note also that V^H is increasing in the informed citizen's private value, v^H, and thus lease lengths will be shortest in environments where the informed citizens have little intrinsic value for their antiquities.

In cases where informed citizens are poor and maintenance incentives do not exist without the potential of smuggling, short leases are sufficient to induce maintenance and have a clear advantage over other policies. Comparing the outcome of leases, discretionary incentive payments, free markets and export bans without revelation incentives in these environments leads to the following proposition:

Proposition 3 *If $v^q < M$, there exists a $\underline{\delta} \in (0,1)$ such that for all $\delta > \underline{\delta}$ the government's net payoff of a lease is greater than the net payoff under of free trade, export bans without revelation incentives, and discretionary incentive payments for all enforcement technologies.*

Proof: Proof is in the appendix.

Proposition 3 states that if the discount rate is sufficiently small[18] and the usage value to informed citizens is less than the cost of maintenance, leases will always generate greater social surplus than free markets and export bans without leases. The intuition is that the cost of the temporary distortion in the location of antiquities induced by a lease program becomes small relative to permanently losing antiquities under an export ban without revelation incentives and the costs associated with misclassifying antiquities and paying bribes when discretionary incentive payments are made. Leases will also be much cheaper than allowing free markets, where the government must pay the full market value of all antiquities it wishes to secure.

Taxes on sales could also allow the value of antiquities to be split and could automatically link incentives for informed citizens to reveal antiquities to the antiquities' values without government discretion.[19] However, tax programs may be easier to game than leases. For example, antiquities may be broken into parts, sold in separate lots at low prices, and reassembled by a colluding foreign collector to bypass taxation. In the absence of repurchases by the government, sales cause the antiquity to permanently leave the optimal domestic location. Repurchase programs by the government would be expensive, since foreign collectors could always demand the full value of the object to the domestic government. Moreover, if there is asymmetric information on this value, then efficient repurchase transactions may always occur, creating further inefficiencies.

[18] As leases move antiquities abroad for at least one period, a very impatient source country may prefer to maintain export bans over leases because such bans allow them to capture and use at least some antiquities in the current period. However, since V^H is likely to be small relative to the overall value of the antiquity, the lower bound $\underline{\delta}$ at which a lease dominates sales markets and export bans will be relatively small.

[19] Another alternative way of providing information rents would be to use a lottery system where individuals who have information about the value of the good may retain the good with some probability. Like a tax or sale system, such programs do not provide an obvious way for antiquities to return. Further, under lotteries the informed citizens bear more risk.

4 Antiquities in the Hands of the Government

In the previous section we examined the case of antiquities that were not in government hands, and argued that even if the social value of the antiquity at home net were greater than the value to foreign collectors, so that in the first best the antiquity wold never move abroad, a government constrained by a lack of information might choose to allow those holding antiquities to lease them abroad temporarily as a way of providing information rents for revelation and maintenance. In this section we will consider the case of antiquities already under government control, and argue that even if the net value of an antiquity to a foreign collector might sometimes be greater than the net value domestically, so that the antiquity would move abroad in the first best, a government constrained to act through potentially corrupt bureaucrats may want to prohibit sales of antiquities and allow only fixed duration leases.

To do this, we will relax the assumption that the use value of the objects at home is fixed and greater than (i) the cost of maintenance and (ii) the value of foreign collectors. In particular, we also allow the domestic externality to change stochastically over time with a large enough support that in any given period it may be efficient for the object to be either at home or abroad. Absent any agency issues, an unconstrained government would therefore allocate the object to its highest value use each period.

As with the model in section 3, we assume that the government does not directly control antiquities, but instead chooses a policy in an initial law writing stage that can constrain the actions of all future officials. We assume that the policy choice can bind future officials who will each have influence over antiquities for one period.[20] We first consider the case where the government who is passing laws for officials who are never

[20]There may be some concern that if law makers are the same people as the officials, that decision makers won't be able to commit to leases. For the current model, we are considering cases where the official does not have direct influence over laws. Section 5 discusses how international organizations may help generate commitment in environments where regime change may occur.

corrupt. We show that in this environment, a government would never want to impose export bans since these policies reduce the net present value of antiquities and reduce maintenance incentives. We then consider the problem of a government where officials in charge of antiquities may be corrupt and show that in this environment export bans may be better than sales but that leases may be better than both alternative policies.

To focus directly on the dynamic aspects of antiquity policy, we consider a situation where a single high-quality antiquity is in the hand of the government and where this object may be bought or leased at the beginning of any period (prior to maintenance) at a constant per-period price $\overline{a}^H - M$. We relax the model of section 3 by assuming that the values of the domestic externality are drawn *iid* from a single time invariant cdf $H(.)$ with bounded support on $[\underline{d}, \overline{d}]$ and where $H(\overline{a}^H) \in (0,1)$ so that it may be optimal to keep the antiquity at home in some states of the world and move it abroad in others.[21] A period in the model can be thought of as a generation.

4.1 A comparison of policies without corruption

In the simple case without corruption, an official under a free trade policy and under a lease will move objects abroad in periods where $\overline{a}^H > d_t^H$ and keep objects at home in periods where the $\overline{a}^H < d_t^H$. Since $\overline{a}^H > M$, objects are always maintained in this setting. The governments net present value of an antiquity under free trade or a lease program is equal to:

$$NPV^{FT} = \sum_{t=0}^{\infty} \delta^t \mathbb{E}_d \left[\max(\overline{a}^H, d_t^H) - M \right]. \tag{16}$$

[21] The model can be extended to environments where the distribution of potential values is improving over time and where $H_{t+1}(.)$ FOSD $H_t(.)$. This relaxation would push policy toward leases due to the improved maintenance incentives and the higher likelihood that antiquities will survive into the next period.

In the case of an export ban, the government is forced to keep the objects at home in each period. If the official has a low value for the antiquity today and is pessimistic about the expected value of the object in the future, he may also choose not to maintain an object in a period and instead allow an object to be destroyed. Such no maintenance cases will occur if there exists a $\hat{d}$ in the support of H such that

$$\hat{d} + \sum_{t=1}^{\infty} \delta^t (1 - H(\hat{d}))^t [\mathbb{E}(d_t^H | d_t^H > \hat{d}) - M] = M. \tag{17}$$

Antiquities will be destroyed in this case any time that $d_t^H < \hat{d}$.

If there exists a $\hat{d} \in [\underline{d}, \overline{d}]$ satisfying 17, let $d^* = \hat{d}$. Otherwise, let $d^* = \underline{d}$. Then, the net present value of an export ban is

$$NPV^{EB} = \sum_{t=0}^{\infty} \delta^t (1 - H(d^*))^t [\mathbb{E}(d_t^H | d_t^H > d^*) - M] \tag{18}$$

Comparing the net present value of leases and export bans to the net present value of export bans yields the following proposition.

Proposition 4 *With no corruption, the net present value of leases and free markets exceeds that of an export ban. Leases and free market also lead to greater maintenance incentives than an export ban.*

4.2 A comparison of policies with corruption

We now consider a model in which there is a probability that the official who decides how to allocate the object is corrupt or does not represent the citizens. A corrupt official who can sell the object can appropriate its full value, while one who can only lease it can appropriate only one period's value. We show that for a large range of probabilities of corruption, laws allowing leases but not sales are optimal.

We first consider the case in which the government writing the initial policy can only decide between allowing free markets or completely prohibiting any overseas transfer of the antiquity. We then consider cases in which the government has the additional option to restrict foreign transactions to single period leases. Decisions about transfers of government property are made by a sequence of officials. Each official (including the one at time 0) has probability $1 - \epsilon$ of being *honest* and acting as a benevolent social planner and a probability of ϵ of being *corrupt* and maximizing their own consumption with no regard for current or future generations; we assume that the types of officials are uncorrelated over time.

Corrupt officials have access to some portion of the proceeds of sales and leases via kickbacks and thus always choose to move antiquities abroad or into private hands for the maximum amount of time legally possible. In effect a corrupt official can act in collusion with a foreign buyer to expropriate the cultural patrimony of the country.[22] For clarity, we study the stark case in which corrupt officials have access to the entire revenue from a transaction and thus consume all the proceeds from the exchange. If there are no export bans, a corrupt official sells the antiquity and consumes all future rents. Under an export ban, the corrupt official keeps the antiquity for private use for the period he is in office such that the country cannot benefit from it. More generally, under an export ban, a corrupt official would keep the object for private use if its value to the official exceeded the maintenance cost, and otherwise would not maintain the object. Allowing for this possibility would make export bans less attractive relative to free trade or allowing fixed duration leases. Finally, if foreign transactions are restricted to single period leases, the corrupt official leases the antiquity abroad and consumes the proceeds.

[22]The problem is thus in some ways analogous to that studied by Pogge (2001) and Kremer & Jayachandran (2006).

Assuming the potential for future corruption is not too high, an *honest official* will allow an antiquity to be used by the foreign collector in any time period when $d_t^H < \overline{a}^H$ and keeps the antiquity local otherwise.[23] Under a complete prohibition on international transfers of antiquities, honest officials simply keep the antiquity at home for domestic use.

Under *free trade*, honest officials must first decide whether to preemptively sell an antiquity today and distribute the earnings during their tenure to prevent corrupt officials from expropriating this value in the future or whether to make optimal short term decisions. The honest official will sell the antiquity abroad if the price for selling the antiquity today is greater than the expected value of optimally allocating the antiquity until the first corrupt official arrives:

$$\frac{\overline{a}^H - M}{1-\delta} > \sum_{t=0}^{\infty} \delta^t (1-\epsilon)^{t+1} \mathbb{E}_d \left[\max(\overline{a}^H, d_t^H) - M \right]. \tag{19}$$

Note that for ϵ close to zero, this will never be the case. However, if the chance that future officials are corrupt becomes sufficiently large, honest officials will sell the antiquity preemptively.

In the absence of preemptive sales by honest officials, the expected net present value of population welfare derived from each antiquity under free trade is:

$$NPV^{FT} = \sum_{t=0}^{\infty} \delta^t (1-\epsilon)^{t+1} \mathbb{E}_d \left[\max(\overline{a}^H, d_t^H) - M \right]. \tag{20}$$

Under an *export ban*, the antiquity always stays in the country resulting in a value of $\mathbb{E}[d_t^H] - M$ in each period that an honest official is in power. Under the assumption that it is always in an honest officials interest to maintain an antiquity, the expected

[23] As discussed below, if the potential for corruption is large enough, an honest official may wish to sell an antiquity today and distribute the earnings during his tenure to prevent corrupt officials from expropriating this value in the future.

net present value of population welfare derived from each antiquity is

$$NPV^{EB} = \sum_{t=0}^{\infty} \delta^t (1-\epsilon) \mathbb{E}_d \left[d_t^H - M \right]. \tag{21}$$

As can be seen by comparing equations (20) and (21), export bans act as a blunt tool to constrain corrupt future officials from acting in a malevolent way. To reduce the ability of future corrupt leaders to steal funds, the government also limits the ability of good officials to make welfare improving trades. This reduces the expected value in a given period to $\mathbb{E}_d(d) - M$ from the higher expected value of $\mathbb{E}_d \left[\max(\overline{a}^H, d_t^H) - M \right]$. Vice versa, the lack of control over the actions of corrupt officials leads to a lower probability that an antiquity will be preserved for the enjoyment of future generations. Thus, under free trade, the valuation of future periods is discounted by $(1-\epsilon)^{t+1}$ as opposed to $(1-\epsilon)$ as in the case of an export ban.

Leases are a way of balancing concerns about corruption with efficiency considerations. In particular, short-term leases can restrict the long-term damage by corrupt officials[24] while still giving benevolent ones the ability to make Pareto-improving short-term trades. To see this, consider the expected net present value of population welfare derive from each antiquity when only one-period leases are permitted:

$$NPV^{L} = \sum_{t=0}^{\infty} \delta^t (1-\epsilon) \mathbb{E}_d \left[\max(\overline{a}^H, d_t^H) - M \right] \tag{22}$$

Comparing this expression to equation (21), it becomes apparent that allowing one-period leases but not sales dominates passing complete export bans as long as the external price, $\overline{a}^H$, exceeds the domestic value, d_t^H, in some state of the world.[25]

[24] Recall that the foreign collector is in charge of negotiation on antiquities sold abroad. Since there is no asymmetric information, the home country gains nothing from recovering antiquities that were sold by a corrupt official.

[25] Leases also dominate preemptive sale as long as NPV^L is greater than $\frac{\overline{a}^H - M}{1-\delta}$.

Furthermore,comparing (22) to (20) reveals that one-period leases dominate free-trade as long as $\epsilon > 0$. It follows:

Proposition 5 *If the only law available to a benevolent social planner is restricted to an export ban or free trade, and* $\overline{a}^H < \mathbb{E}[d_t^H]$*,then as* $\delta \to 1$*, there exist thresholds* $\underline{\epsilon}$ *and* $\overline{\epsilon}$ *such that if* $\epsilon \in (\underline{\epsilon}, \overline{\epsilon})$ *the government chooses an export ban. Leases dominate both export bans and free trade as long as* $\epsilon > 0$ *and there exist some states of the world for which* $d_t^H > \overline{a}^H$*.*

Proof: Proof is in the appendix.

The model studied here can easily be modified to allow for situations in which there is an insufficient budget to protect all antiquities or there is a positive probability that the state is unable to maintain or protect antiquities in some periods. If officials are able to forecast these events, allowing leases provides honest officials tools to move antiquities abroad to protect them in times of heightened danger. In cases of armed conflict, restricting all transactions to leases also reduce incentives for combatants to search for antiquities for the purpose of selling them to fund war efforts.[26] However, such restrictions will only be binding if they can be enforced internationally. We discuss how international treaties and standardized contracts may help maintain lease laws in the next section.

5 Creating Standardized Contracts

If government officials in Section 4 are corrupt, then even if they are limited to leases they will do everything in their power to extract resources within the parameters al-

[26]Both looting from museums and illegal excavations have been common in the recent conflicts in Iraq and Syria (Brodie et al. 2000, Parkinson, Albayrak & Mavin 2015)

lowed. There is therefore a need to commit to standardized provisions in the contract such as the length of the lease, the storage conditions, and insurance provisions to protect against sweetheart deals. In dimensions where some flexibility may be required, such as rules governing the qualification of bidders, it is important to limit the scope of discretion to improve transparency in the process. This section discusses a series of safeguards that could be implemented to reduce the scope for corruption in lease contracts.

An important consideration in the design of lease contracts are the terms and provisions used to address renter-side moral hazard. Both the Menil Collection and King Tut exhibit shed light on the current laws used to control renter-side moral hazard. In common law countries, museum loan programs are considered bailments where one party gives possession of the antiquity to another for safe keeping. Museum contracts augment the common law by specifying the arbitration process for damaged goods and providing requirements for care.[27] In the King Tut case, the lease agreements specified transportation, display, and storage conditions. Based on the success of traveling exhibits and the extensive level of museum to museum lending which currently exists, our sense is that these issues could be adequately addressed contractually, as long as the legal system in the receiving country is sufficiently well functioning.

One positive sign regarding the feasibility of leases markets is provided by discussion of using leases in the simplest cases in the art disciplines themselves. Lease contracts have been briefly mentioned in press by Butcher & Gill (1990), Asgari (1993)[28], and Gerstenblith (2001) who proposed leases between museums to decrease demand for new pieces from foreign countries.

[27]Simpson (2008) provides further details into the contracts used in museum exchange and lending programs.

[28]As quoted in Erdem (1993), Asgari argues that ten year leases may be used between major museums to reduce incentives to purchase illicit artifacts.

To prevent collusion and corruption during the auction, to be transparent to citizens concerned about corruption, and to mitigate concerns by bidders that winning an auction could lead to bad public relations, standardized rules would be needed. This would include standardized procedures allowing qualified bidders to verify the condition and quality of goods prior to auction. Qualified bidders would need to meet some minimal level of trustworthiness along with demonstrating the financial resources to provide the proper level of insurance and care. To reduce potential corruption, the process of qualifying bidders and the scoring rules used to select winning bids would also likely need to be standardized.

The lease length should be long enough to provide information rents to private individuals and to make transaction costs worthwhile, but short enough to limit rent extraction from future generations by corrupt officials. For unexcavated sites where both information rents and protection must be organized prior to excavation, relatively longer leases may be desired. By contrast, for antiquities already in the hands of the state, we believe shorter leases are likely optimal. Lease lengths may also need to be longer for objects where the transportation costs are high relative to the value of the antiquity.

As in Kremer & Jayachandran (2006) and Pogge (2001), it may be important to bind market participants to specific types of exchanges in order to limit discretion of corrupt officials and provide for safeguards in times of political upheaval.[29] Restricting market participants to leases may be useful as they limit the loss of antiquities to conflict to a single generation. In order to bind market participants to leases, it may be desirable for an international organization to facilitate a lease system by serving as a standard

[29]The 1954 Hague convention on cultural property and its 1954 First Protocol and 1999 Second Protocol provide additional protections in times of war. It is well documented, however, that looting is widespread in times of war and afterwards. See, for example, Russell (1997) and Feroozi & Tarzi (2004) for a discussion of Iraq and Afghanistan.

intermediary. An international organization is more robust to regime change in the source and renting countries and is likely to have an easier time committing to follow standard policies. The participation of an established international organization could also provide legitimacy and address concerns that officials in source countries proposing such arrangements were pursuing this approach out of corrupt motives. To reduce costs and increase the number of international bidders, an international organization could also work with an established auction house to run the auctions. The international organization running the lease market could limit lease auctions to items with clear title and exclude antiquities believed to be inappropriately obtained.

6 Open Access Issues and Registration Systems

There may be unexcavated antiquities where property rights are ill defined or weakly enforced and where antiquities are at least partially an open access resource. In these cases, there is concern that increasing the value of an antiquity could increase incentives to appropriate the antiquity. This has implications both for the applicability of leases and for implementation.

When antiquities are unexcavated, safeguards must be taken to prevent appropriation risk. One possibility is to grant information rents only to individuals who report the location of sites and to make the reward contingent on confirmation by archeologists that antiquities in the site have been undisturbed. This restriction of information rents increases the value of providing information while generating no additional benefit from extracting antiquities illegally. This approach would involve no amnesty on objects that had been illegally excavated.

Another option would be to allow for reasonably long lease lengths for antiquities recovered from legal excavations but only short leases for individual antiquities. By

having a greater reward for disclosing sites than for declaring individual antiquities, a two-tiered policy can create incentives for disclosing both unexcavated sites and antiquities that are currently illegally in private hands, without increasing incentives to loot unexcavated sites.

The first of these approaches is likely to be favored by archaeologists who stress the importance of professional excavation and who may view paying an informed citizen a reward for revealing objects that might have resulted from past illegal digging repugnant. However, the second approach is likely to recover more objects and may generate information on sites that are currently in the process of being looted.

Unexcavated sites may be well known to a number of individuals and granting property rights to one may create incentives to appropriate the antiquity by others. It may therefore make sense for some share of the proceedings of lease auctions to go to the broader community.

There is likely a reasonable scope to provide sufficient information rents to multiple interests, since in the current environment, the price at which antiquities are purchased from informed citizens is often less than 2% of the final price, which itself is depressed by the illicit nature of illegally traded objects.

Given the limited budgets for protecting antiquities, it is likely that reported sites will require external funding for security and proper excavation. In these cases, firms or foreign entities could provide financial assistance for security and excavation in return for rights to lease or hold a subset of antiquities that are excavated for a fixed number of years. In the early 20th century, foreign archaeological expeditions often agreed to work for a share in the excavated antiquities. Iraq, for instance, had a policy where half of the duplicate antiquities from an expedition would be allowed to leave with the excavating party but all unique items went to the central museum (Bernhardsson 2003). A lease policy similarly shares rents but allows for the repatriation of all antiquities to

the source country in the long run. Using a share of the lease value as payment is also likely to be superior to fixed payments for security as it ties the value of the security contract to the value of antiquities at the site and thus provides proper incentives across a broad range of sites with varying value to looters.

One way to further reduce the chance that a lease system could encourage people to improperly appropriate objects would be to link leases to a registration system. As we indicated throughout this article, the current system often provides incentives to obscure or destroy information relevant for scholarship. An alternative system surrounding leases could instead encourage such information. Leases for individual antiquities could be made contingent on registering on the web with a description of the person who is seeking to lease the antiquity and a set of photos that could be used to check against a registry of previously registered or stolen antiquities. There could also be a waiting period under which the people who want to file an objection could do so.

We believe that there are likely complementarities between lease and registration systems. On the one hand, informed citizens would have limited incentives to use a registration system without leases as there is little way to make money from registering antiquities under current policies. A lease system encourages registration by providing option value on all antiquities registered. The lease system thus makes the registration system more workable. We also think the registration system offers an important way of mitigating the problem of the open access nature of many antiquities. By increasing documentation it will be more difficult to pass illegal antiquities off as legal ones. In addition, the existence of legally leasable antiquities should reduce the price of illegally traded antiquities.

While leases are likely suitable for museum quality antiquities, there may be many antiquities for which transaction costs associated with leases would be prohibitively expensive and where the government does not foresee a future value. For unexcavated

antiquities, it is likely that many low-quality antiquities could be combined into lots and leased to researchers based on their scientific value. For already excavated antiquities, however, it may be infeasible to combine lots and the price per antiquity may end up being very low. In these cases, the government may wish to allow very low-quality antiquities to be sold abroad but may be concerned that allowing sales contracts could give informed citizens incentives to misrepresent the value of antiquities and collude with foreign buyers to sell high-quality antiquities abroad.[30] In this context, we view option contracts as potentially useful where antiquities are allowed to be sold but where the government has the right to purchase the antiquity in the future at an inflation indexed multiple of the original sale price. Such contracts would create a path for repatriation of antiquities that were clearly misreported and would likely require less overhead than a long-term lease.[31]

6.1 Using Leases to Identify and Secure Previously Smuggled Antiquities

In recent years, public institutions have reduced their appetite for illicit antiquities. However, a large stock of antiquities are in the hands of private individuals outside the country of origin. There currently remain limited ways that illegally exported antiquities can reenter the public domain and (potentially) be repatriated by the country of origin. This has the potential to permanently destroy antiquities, particularly in cases where antiquities are bequeathed to a future generation who does not share the taste of the original collector.

[30] Many antiquities are currently smuggled by painting them to look like replicas and then reversing the process once imported into the other country.

[31] We study option contracts in detail in an earlier version of the paper (Kremer & Wilkening 2012). Option contracts may also be useful for governments who are credit constrained and want to collateralize antiquities to fund other essential services.

Granting the privately informed individuals a lease is equivalent to a partial amnesty program in which those revealing antiquities are granted temporary use rights. Illegally moved antiquities typically are not in the hands of the highest value collector and the need to keep them secret reduces their value relative to a legal antiquity. By allowing individuals with antiquities of murky provenance to lease their antiquities in exchange for repatriation rights, collectors can be induced to identify antiquities and repatriate them in the future.

Amnesty have both advantages — the repatriation of antiquities moved abroad and the registration of hidden antiquities — and disadvantages such as the destruction of credibility. We don't seek to assess whether amnesties are appropriate, but argue that if amnesties are to be provided, leases offer a good way to structure the transactions, because they offer a way to divide surplus without cash. Lease-based partial-amnesty programs avoid issues of repayment and thus may be more politically feasible than programs in which the government is paid to leave things abroad. A program in which foreign owners pay for amnesty must assign a price to the antiquity which may be seen as "commodifying" the antiquity. As discussed in Benabou & Tirole (2007), the in-kind nature of leases are likely to have smaller behavioral and social effects than programs that use cash. Both the Getty and the Metropolitan Museum of Art recently repatriated portions of their Italian collection back to Italy in exchange for long-term loans of Italian art with similar value. In the case of the Metropolitan Museum of Art, this agreement ended a legal battle which had been fought for almost 30 years (Kennedy & Eakin 2006).

7 Conclusion

Allowing antiquities to be exported only under time-limited leases offers an opportunity to robustly protect antiquities in a range of environments. We have shown that relative to complete export bans, leases could create incentives for those with *de facto* control over antiquities to reveal and maintain them rather than turning to the black market with potentially disastrous consequences for cultural patrimony. Relative to discretionary incentive payments, using leases to generate incentives for individuals to reveal antiquities is less vulnerable to corruption.

Lease markets may also be superior to policies that allow for sales. Antiquities sold may be difficult to recover due to hold-up, tax policies, and political economy constraints. Further, leasing antiquities may generate less repugnance than outright sales.

Leases may also be useful in managing antiquities that are in the hands of the state. Leases give honest officials the discretion to move antiquities abroad when they are more valuable abroad and could also be used to protect portable antiquities in times of instability. However, restricting contracts to leases prevents corrupt officials from expropriating the value of antiquities from future generations and prevents corruption in one generation from destroying cultural heritage in all future generations.

One assumption that we made in the model is that a foreign collector's per-period rental value for an antiquity is the same as their per-period sales value. If foreign collector's are loss averse and anticipate being subject to an endowment effect in which they would experience disutility from losing an antiquity during their lifetime, this assumption may not hold. One alternative in this case might be to provide a lifetime lease. Tying the lease to the lifetime of the lessee would also mitigate concerns about the maintenance of property bequeathed to heirs who do not share the same tastes as

the original collector.

On the other hand, we have also not fully modeled the difficulties of repurchasing antiquities once they have been sold. It is likely that the foreign collector does not know the home country's valuation. Under asymmetric information, it is in the interest of a foreign collector who is offering to sell an antiquity back to the home country to commit to a take-it-or-leave it offer that is above her true valuation. In cases where the take-it-or-leave it offer is above the domestic externality but the domestic externality is greater than the collector's true value, antiquities may stay abroad even when it would be more efficient for them to be repatriated.[32] Leases leave the source country in control of designing future negotiations and mitigate potential hold-up problems.

Institutional features related to taxes and museums may create further barriers to efficient repurchases of antiquities sold by the source country. Most countries actively encourage donation of private collections to domestic museums through preferential tax treatments. Fullerton (1991) estimates that preferential tax breaks can be over 33 percent of the value of an antiquity and are greatest for antiquities that have appreciated in value over time. Such tax treatments may make selling an antiquity to the source country unattractive relative to donating antiquities to domestic museums.

Once donated to museums, antiquities in the foreign collector's country may be difficult to return to their country of origin. Museums are often constrained in selling antiquities in their collection due to restrictions placed on the collection by benefactors, by private charters, and by accreditation requirements to museum associations. For instance, the American Association of Museums allows for sales used only for the "direct care" of a collection (Pogrebin 2010). Museums may also fear that selling donated antiquities may deter future donations.

[32]See an earlier version of this paper, Kremer & Wilkening (2012), for a full formal model of this hold-up problem.

Leases circumvent these issues by having the antiquity automatically return to the home country without the need for renegotiation.

Finally, we have not modeled repugnance, but leases seem less likely to be repugnant than sales due to the restricted time that antiquities leave the country and the positive externality associated with having antiquities revealed and documented. Leases of objects that are already in the hands of the government or leases granted on objects that have been legally excavate by archaeologists are likely to be the least repugnant as there is limited risk that these types of leases could encourage illegal digging and trading these objects could reduce demand for illicit antiquities.[33] By contrast, leases that are used to identify and secure objects that are already outside the country of origin may be the most repugnant as these leases may be seen as rewarding collectors for earlier misdeeds.

The loan program used by the The Menil Collection suggests that in some circumstances repugnance constraints can be reduced when the borrowing party provides in-kind payments rather than cash payments. This may be because relinquishing cultural heritage in exchange for cash could be seen as repugnant or because it might signal something about the characteristics of the relevant government officials.[34] Moreover, cultural officials in the source country may have *de facto* veto rights and may prefer in-kind transactions than cash transactions because the proceeds of cash transactions may go outside of their ministries.

In other contexts, foreign institutions could obtain rights to hold an antiquity for a certain number of years on condition that they assist the home country in developing proper facilities for care of the antiquities after the end of the lease period. For example,

[33]Much like attempts to curtail other repugnant markets such as prostitution, there has been a push to reduce demand for antiquities by making collecting socially unacceptable (Elia 1997, Gustafsson 2010, Renfrew 1993).

[34]See Roth (2007) and Benabou & Tirole (2007).

proceeds from The King Tut exhibit were used by the Egyptian Museum in Cairo for refurbishing.

The analysis done in this paper suggests that leases are likely to be legally, administratively and politically useful. However there remains a number of steps that are necessary in developing practical lease markets. While we have analyzed the economic forces that make leases attractive, understanding all forces that influence the antiquity markets requires a broader range of expertise. We believe an interdisciplinary panel of archeologists, lawyers, economists, and government representatives from source nations is likely necessary to design standardized contracts and develop feasible institutional details. Developing a better understanding of the supply chain supporting the illegal market and how this supply chain would respond to changes in market structure would also be valuable.

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Appendix: Proofs from Main Text

PROPOSITION 2: In order to prove that a lease program can always provide incentives for revelation, we need to show that the maximum information rent that can be generated by a lease program exceeds V^H. This maximum information rent, $\overline{V}^{Lease}$, is:

$$\overline{V}^{Lease} = \lim_{\tau \to \infty} \sum_{t=0}^{\infty} \delta^t [\overline{a}^q - \delta M] = \frac{1}{1-\delta} [\overline{a}^q - \delta M]. \tag{23}$$

Recall that V^H is the maximum of two alternative options: the maintenance cost M and the opportunity cost associated with waiting for a smuggler. Since $\overline{a}^H > M$,

$\overline{V}^{Lease} > M$ and is is always possible to generate information rents that exceed the maintenance cost.

Next note that when $\pi^H(e)\overline{a}^H > (1-\beta(e))v^H$, the outside option is maximized when the chance of meeting a smuggler $\alpha(e) = 1$. In this case $\overline{V}^{Lease} > \pi^H(e)\overline{V}^{Lease} = V^H$. Thus, the maximum information rent can always exceed V^H.

PROPOSITION 3: In order to show that leases dominates the other three contracts, it is sufficient to show that the loss of a lease contract relative to the first best case of recovering all objects for free is greater than the loss under at least one alternative policy at $\delta = 0$ and the loss is less than the other policies as $\delta \to 1$. Proving the first piece is trivial: since lease contracts must always move antiquities away for one period, the surplus in this case is zero. Under export bans, $(1 - \alpha(e))\beta(e)$ antiquities are recovered in the first period.

Looking at the case where $\delta \to 1$, note first that the cost of the lease program in this case converges to V^q. Note second that since $v^q < M$, there exists a $\delta \leq 1$ such that $v^q < \delta M$. it follows that

$$\begin{aligned} Loss_{Leases} &= \lim_{\delta \to 1} \frac{\alpha(e)\pi^q(e)\frac{[\overline{a}^q - \delta M]}{1-\delta} + (1-\alpha(e))(1-\beta(e))(v^q - \delta M)}{1 - \delta[(1-\alpha(e))(1-\beta(e))]} && (24) \\ &\leq \lim_{\delta \to 1} \frac{1}{1-\delta} \frac{\alpha(e)\pi^q(e)[\overline{a}^q - \delta M]}{1 - \delta[(1-\alpha(e))(1-\beta(e))]}. && (25) \end{aligned}$$

The comparison to discretionary incentive payments is straight forward - the program using discretionary incentive payments must also pay V^q on average but has additional rents lost to corruption. The loss under a free trade policy is:

$$Loss_{Free} = \lim_{\delta \to 1} \frac{1}{1-\delta}[\overline{a}^q - \delta M]. \quad (26)$$

It follows that if $\frac{\alpha(e)}{1-\delta[(1-\alpha(e))(1-\beta(e))]} < 1$ the lease contract is superior. This can be shown to be true by taking the first order condition with respect to $\alpha(e)$, noting it is increasing over the domain of $\alpha(e) \in [0, 1]$ and noting that at $\alpha(e) = 1$, the expression is equal to one.

For the export ban, the loss is given by:

$$\begin{aligned} Loss_{Ban} &= \lim_{\delta \to 1} \frac{1}{1-\delta} \frac{(\alpha(e) + (1-\delta)(1-\alpha)(1-\beta))[d^q - \delta M]}{1 - \delta[(1-\alpha(e))(1-\beta(e))]} && (27) \\ &\geq \lim_{\delta \to 1} \frac{1}{1-\delta} \frac{\alpha(e)[d^q - \delta M]}{1 - \delta[(1-\alpha(e))(1-\beta(e))]} && (28) \end{aligned}$$

By assumption it is optimal to keep the antiquity at home and thus $d^q > \overline{a}^q$. Since $\pi^q(e) < 1$, it follows that the loss on the export ban is greater than on the lease auction.

Note that the proof here does not make any assumptions on e and leases dominate

the other contracts even in the case where e is optimally chosen.

PROPOSITION 4: Under free markets, a generation $t > 0$ that is reached without a corrupt official that is served by a benevolent official gets expected value

$$E[\max\{\overline{a}^H, d_t^H\}] - M = [1 - H(\overline{a}^H)][E(d_t^H | d_t^H \geq \overline{a}^H)] + H(\overline{a}^H)\overline{a}^H - M, \tag{29}$$

where H is the cdf of possible home valuations. The NPV of an antiquity with a free market is thus:

$$\frac{1-\epsilon}{1-\delta(1-\epsilon)}\big[[1 - H(\overline{a}^H)][E(d_t^H | d_t^H \geq \overline{a}^H)] + H(\overline{a}^H)\overline{a}^H - M\big]. \tag{30}$$

The NPV of an export ban is

$$\frac{1-\epsilon}{1-\delta}[E(d_t^H) - M]. \tag{31}$$

The home country prefers an export ban if equation (30) is less than equation (31). This condition is equivalent to requiring that

$$\overline{a}^H \leq E(d_t^H | d_t^H \leq \overline{a}^H) + \frac{\delta\epsilon}{1-\delta}\frac{E(d_t^H)}{H(\overline{a}^H)} + \frac{(1-\epsilon)\delta\epsilon M}{(1-\delta)(1-\delta(1-\epsilon))}. \tag{32}$$

At $\epsilon = 0$, the RHS of (32) is $E(d_t^H | d_t^H \leq \overline{a}^H)$ which is less than $\overline{a}^H$ for $H(\overline{a}^H) > 0$. Thus, with no corruption, free trade is optimal. As $\delta \to 1$, for $\epsilon \in (0, 1)$ the right hand side of (32) goes to infinity implying that an export ban is always optimal. Thus, there exists an arbitrarily small $\underline{\epsilon}$ such that an export ban is superior to free trade with no preemption. Intuitively, the more patient a country is, the more it values the losses that occur if an antiquity is stolen. As $\delta \to 1$ the losses that occur if an antiquity is ever stolen weighs heavily in making a decision. This leads to a larger set of ϵ for which an export ban is optimal.

Under free trade, the period zero official also has the option to sell an antiquity in order to preempt future corrupt officials from doing the same. Preemption generates a total surplus of $\frac{\overline{a}^H - M}{1-\delta}$. As $\epsilon \to 1$, the value of an export ban evaluated at the point of contracting converges to $0 < \frac{\overline{a}^H - M}{1-\delta}$. Since $\overline{a}^H < E[d_t^H]$, there also exists a positive ϵ for which an export ban is better than preemption. Thus, as $\delta \to 1$, there exists an $\overline{\epsilon}$ such that for $\epsilon < \overline{\epsilon}$, an export ban is preferred to preemption. Since $\underline{\epsilon}$ is arbitrarily close to zero, $\underline{\epsilon} < \overline{\epsilon}$ and thus there exists a range of corruption levels for which an export ban is preferred.