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WORKING PAPER

SPECULATING AN IVORY FIRE SALE:

OPTIONS FOR CHINESE AUTHORITIES IN IMPLEMENTING A DOMESTIC IVORY TRADE BAN

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ABSTRACT

Africa is losing its elephants at an unsustainable rate to a poaching epidemic, driven predominantly by demand for ivory in East Asia. As a result, both the US and China agreed to implement domestic ivory trade bans in their countries to complement the international trade ban that has been in force since 1990. The US executed this agreement on 6 July 2016. This paper explores the complexity of the global ivory trade ban in the Chinese context, and more specifically sketches a number of scenarios of how ivory speculators, as important interlocutors between supply and final demand, might respond to a domestic trade ban within China, and what the resultant implications for law enforcement institutions might be. It concludes that the optimal policy approach would be for Chinese authorities to announce the ban and its attendant implementation timetables as soon as possible, and before the end of 2016 at the very latest. The ban should then preferably be implemented from the beginning of 2017. In light of the game theoretic analyses described in this paper, the ban should be indefinite. The introduction of any possibility of a future trade on any grounds whatsoever will create a powerful incentive for speculators to bank on elephant extinction and continue to maximise poaching effort in the short run. Once elephant numbers have then declined to unsustainable levels, these speculators will be able to sell scarce ivory at exorbitant prices once a ban is lifted.

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The paper is one of five produced as part of a series that recognises the emergence of a 'new reality' in elephant conservation. The majority of African elephant range states and the two largest ivory markets, the US and China, have decided that to secure a future with elephants across Africa the international ban on ivory trade must continue and all ivory domestic markets must close. Recent research suggests that there is a significant degree of ivory stockpiling occurring in China, given the sheer disparity between the volume of ivory entering the country and actually being sold. This paper uses game theory to understand what impacts the implementation of a domestic trade ban in China might have on speculator activity, and how this will influence elephant poaching dynamics. It concludes that in order to best complement the elephant conservation objective, the ban should be indefinite and implemented as soon as possible. China should also play a regional coordinating role that encourages neighbours such as Vietnam to close its domestic wildlife trades.

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DISCLAIMER

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[1] http://snappartnership.net/groups/the-economics-of-the-chinese-ivory-trade/.

1. INTRODUCTION

In September 2015, the United States and China stated publicly that they would be taking 'significant and timely steps' to impose domestic ivory trade bans (Bale, 2015). The U.S. Fish & Wildlife Service (USFWS) revised the rule for the African elephant promulgated under section 4(d) of the Endangered Species Act of 1973, as amended. The final rule is binding on all U.S. states and 'prohibits import and export of African elephant ivory with limited exceptions' and 'limits the number of sport-hunted African elephant trophies imported into the United States to two per hunter per year'.[2] According to the USFWS, the rule will allow the Service to more strictly regulate trade in African elephant ivory and ensure that the U.S. ivory market is not helping to drive the poaching of elephants in Africa. The ban will do so in large part by making it more difficult to 'launder' illegal elephant ivory through U.S. markets.

The Chinese government has not stated what timetable it is aiming for, nor exactly how it intends to engage with all the relevant stakeholders involved in this complex trade. The Chinese State Forestry Administration (SFA) has stated that the ban will be formally announced by the end of 2016[3], and experts expect that it will take effect sometime before the end of 2017. Manley notes that 'conservationists disagree as to whether a ban is feasible in a country like China, where ivory is intertwined with their economy and their cultural heritage' (2015), but he offers no plausible reason as to why the ban cannot be enacted and enforced in a country that effectively operates by 'rule by law' (as opposed to 'rule of law').

A ban on the international commercial trade in ivory has been in place since a decision taken at the 7th meeting of the Conference of the Parties to CITES in October 1989 – when all African elephant populations were transferred to CITES Appendix I – came into effect in January 1990; however, two one-off sales were subsequently approved. The second of these one-off sales in 2008 sale saw 63 tonnes of ivory being sold to China. In 2004, China's SFA had given 17 companies a license to process raw ivory and 87 outlets the right to sell ivory products. By 2015, there were 34 registered carving factories and 130 retail outlets.[4] One recent report

[2] United States Fish and Wildlife Service, 'Endangered and Threatened Wildlife and Plants; Revision of the Section 4(d) Rule of the African Elephant', https://www.fws.gov/international/pdf/final-rule-african-elephant-4d.pdf, accessed 26 July 2016.
[3] Zhou S, 'China to have timetable by year's end to cease all domestic trade in ivory', *China Daily USA*, 7 June 2016, http://usa.chinadaily.com.cn/epaper/2016-06/07/content_25641286.htm, accessed 31 August 2016.
[4] China, State Forestry Administration, Announcement Number 9 of 2015, http://www.forestry.gov.cn/main/445/content-764563.html, accessed 19 September, 2016.

argues that: 'When the government labelled ivory carving an intangible cultural heritage, it signalled the start of state-backed efforts to preserve and revive the industry. Since the 2008 one-off sale, many of the factories have begun to hire and train new carvers for the first time in decades' (Vira et al., 2014, p. 46). The Chinese government has, since 2008, allowed a quota of 5 tonnes a year of ivory to be officially processed.

The one-off sale, combined with the active promotion of the ivory industry, sent a signal to the market that the ivory trade was legitimate. Therefore, while not solely responsible for the increase in elephant poaching, which has been occurring since 2006 (Maisels et al., 2013; Wittemyer et al., 2014), the sale has been an unhelpful contributing factor to the current ivory crisis. A recent paper published by the National Bureau of Economics (NBER), using a standard econometric 'event study' model, argues that the sale 'corresponds with an abrupt, significant, permanent, robust and geographically widespread increase in the production illegal ivory through elephant poaching, with a corresponding 2009 increase in seizures of raw ivory contraband leaving African countries' (Hsiang and Sekar, 2016). There is considerable controversy around this paper, with Underwood and Burn (2016a), for instance, having issued a strong critique. Hsiang and Sekar responded to the critique[5], but the Underwood (2016b) response to that is particularly strong, and holds that their 'analysis does not properly take account of the properties of the data' (ibid).

Some authors, such as Stiles *et al*. (2015), continue to argue that the poaching crisis has been exacerbated precisely because the 2007 announcement of a 9-year moratorium on submission of proposals to CITES to sell ivory from those countries with elephant populations on Appendix II (preceding the 2008 one-off sale) signalled a future scarcity of supply, which drove prices upwards and therefore incentivised poaching. Stiles *et al*. argue that had the sales been allowed to continue legal ivory would have likely satisfied consumer demand instead of the scarcity of such ivory inadvertently driving it higher. The relationship between the one-off sale and subsequent poaching, as indicated above, is however unclear.

Integrally connected to the question of what impact an international trade ban has on elephant poaching, is how to address the phenomenon of ivory stockpiling for speculative purposes. There is a sizeable disjuncture between the volume of ivory entering China and the volume actually being sold in legal retail outlets. Even if it is granted that a vast quantity is being sold

[5] Hsiang S, 'Applying econometrics to elephant poaching: our response to Underwood and Burn', 3 August 2016, http://www.g-feed.com/2016/08/applying-econometrics-to-elephant.html, accessed 31 August 2016.

illegally, the data suggests a high degree of stockpiling for speculation (Moyle, 2014; Stiles *et al*., 2015; United Nations Office on Drugs and Crime, 2016). Speculation in this respect essentially entails banking on particular policy outcomes in the hope that the ivory price will rise and thereby increase the value of the investment. Also, stockpiling by a small number of players allows them to 'drip-feed' the market, confirming the perception of ivory as a scarce commodity, which serves to keep prices high.

Since at least 2006, demand for ivory in China has increased significantly for a number of reasons, not least of which is the substantial growth in the size of the Chinese middle class with its significant levels of disposable income, which can now afford ivory products that were previously too expensive (Gao and Clark, 2014). Elephant poaching has become a seemingly intractable problem (Chase et al., 2016), partially as a result of this trend, which suggests that ending all domestic trades would complement the international ban and fortify the credibility of demand reduction campaigns. Other factors also account for the poaching pandemic. Increased Chinese economic activity in Africa since the early 2000s appears to be a major part of the problem – Chinese nationals have easier access to poachers directly now, and in many cases are constructing the very infrastructure by which ivory is trafficked (Abernethy et al., 2013; Brennan and Kalsi, 2015). out of range states: 'Ever-growing numbers of Chinese contract workers are going to Africa and buying increasing quantities of illegal ivory to smuggle into China' (Vigne and Martin, 2014, p. 80). Transnational criminal syndicates have also been able to infiltrate law enforcement agencies from parks to ports (UNODC, 2016). This dynamic is compounded by weak governance, corruption and a lack of technical, management and law enforcement capacity in many range states (Bennett, 2014, 2011). And of course demand is not confined to China (Vigne and Martin, 2016), though it clearly remains the largest market. In light of all these factors, then, it appears that near-complete domestic trade bans are the optimal policy response to rampant poaching.

This paper explores the complexity of implementing a domestic ivory trade ban in China. More specifically, it sketches a number of scenarios as to how ivory speculators, as important interlocutors between supply and final demand, might respond to a domestic trade ban within China, and what the resultant implications for law enforcement institutions might be. It takes as its point of departure a study produced by Stiles *et al*. (2015), which argues that the majority of raw ivory entering China is purchased by speculators, as the volume 'produced' (in Africa) greatly exceeds the quantity that has been processed and made available for legal (and illegal) sale to consumers (in China).

2. SPECULATION

Stockpiling for speculative purposes would explain some of the quantitative gap between ivory entering the country (extrapolated from seizure data) and actually being consumed as a final product. If we accept this as a given, then there are a number of points worth making. First, even if speculators are purchasing vast quantities of raw ivory, they would ultimately be looking to sell this ivory to consumers at some stage, as the ultimate exchange value of ivory is derived from retail consumption or the possibility thereof. Stiles suggests that demand reduction campaigns aimed at retail consumers are misdirected, but this seems to be an unwarranted in light of the above point. Nonetheless, and accepting that speculation is extensive, we should recognise that there appear to be a number of different types of consumers (Gao and Clark, 2014; Harvey, 2015). Some of these consumers are investors who, we imagine, would build private stockpiles, some for speculative purposes. It therefore seems worthwhile for policy analysis purposes to postulate that there are different kinds of speculators. For the purposes of scenario analysis, we postulate that there at least two types, as explained in the methods section below.

3. METHODS

The paper presents a number of scenarios underpinned by different, explicit assumptions. In the absence of hard data on the supply and demand sides of the ivory trade, and about the illegal trade in general, it employs game-theoretic reasoning to demonstrate whether elephant poaching is likely to increase or decrease under each policy scenario in the future. .

First, we assume that there are ‘wholesale’ speculators, who derive a level of market power from the sheer scale of their ivory stock. These are likely to be relatively few in number, but they would essentially be price-setters. Some of these players – mostly sophisticated criminal syndicates (type I) – have far-reaching vertical integration into both the supply side and the demand sides of the ivory chain: ‘There are growing suggestions and anecdotal evidence that some syndicates are stockpiling and warehousing ivory to release gradually into the market’ (Vira et al., 2014, p. 17). Some of these syndicates also presumably control final retail distribution through setting up their own illegal, unregistered carving factories.

Second, there may be private speculators (type II), who either dabble in speculation themselves or are holding ivory stocks as an ‘inflation-proof’ investment vehicle (Gao and Clark, 2014). We assume that there are likely to be more type II speculators, but they do not

have the volume of stock, and therefore the market power, that the type I speculators have. However, they are integrally connected because the behaviour of type II speculators will likely have a strong effect on the strategies of type I speculators.

In considering these factors, we accept that the links between the legal and illegal trades in China are almost inextricable (Fischer, 2009; Vira et al., 2014). The legal market provides a cover for the illegal trade. An International Fund for Animal Welfare (IFAW) investigation in 2011 found that only 57 retailers and factories possessed ivory trade licenses. Of those, the study estimates that at least 34 laundered illegal ivory (Gabriel et al., 2011). A 2013 *New York Times* article cites the Environmental Investigation Agency (EIA) as estimating that up to 90 per cent of the ivory circulating in China is illegal (Levin, 2013). A 2014 report that maps the illegal trade in ivory quotes a number of Chinese media sources and alleges that the "Xiamen Network" is one significant example of licensed trades trafficking large volumes of illegal ivory. This network was apparently responsible for at least five different consignments seized between August and November 2011, totalling 8,507kg of ivory. A buyer identified only as "Chen" (later convicted and sentenced to a prison term) had contracted the purchase of 7.68 tonnes of ivory from this trafficking network. Chen owned a formal licence to trade in ivory products and owned a retail store in Putian (Vira et al., 2014, pp. 53–54). If this inextricable link between legal and illegal markets does indeed exist, then the proposed domestic ivory trade ban in China will serve its primary purpose of preventing the 'laundering' of illegal ivory through legal outlets.

The scenarios below detail how each set of speculators might behave if they:

i) believe that a domestic ivory trade ban actually will be implemented in China, and

ii) how they will respond strategically to a belief that the ban will be in operation:

   a. indefinitely

   b. for a limited time period of ten years

For both of the above scenarios, we consider the impact that a continued legal trade in mammoth ivory might have, and why it may be useful for countries to consider the adoption of voluntary bans on mammoth ivory.

The primary focus is on the wholesale speculators, assumed to be a small number of syndicates predominantly. Their behaviour is likely to have the most significant effect on elephant poaching rates.

4. SCENARIOS

4.1. Type I speculators with an oligopoly market structure

Extrapolating from reports such as those produced by C4ADS and Born Free (Miller et al., 2015; Vira et al., 2014), we assume that there are a relatively small number of syndicates operating in China. Moreover, the logistical proficiency required to smuggle and sell illegal ivory in vast quantities suggests that no more than a handful of players would be able to breach these barriers to entry. It is reasonable to assume, given the volume of the illicit trade, that these syndicates would have to foster connections with key state officials, as suggested by Vira et al (2014, pp. 50–55). We assume further that there is some level of collusion between these syndicates, and that they possess good information about what the Chinese Government plans to do in terms of implementing an ivory trade ban (and for how long). Also, we assume, with C4ADS, an emerging trend of 'the growth of illicit, unregistered carving factories that allow traffickers to control final retail distribution and earn even higher profit margins' (Vira et al., 2014, p. 52). This kind of behaviour reflects a possible oligopolistic market structure, normally characterised by a small number of firms that dominate a particular industry (Shapiro, 1989). They can, and normally do, collude, with political help, to control supply and thus to set the price. Essentially, they control the perception of scarcity. The most obvious and successful oligopoly, until recently, is the OPEC cartel. By having a credible watchman, Saudi Arabia, who was able to punish defectors – countries who tried to sell more than their quota to earn higher revenues – the cartel was relatively successful. OPEC's success was disrupted by new suppliers to the market who undermined the rationale for cartel behaviour. The cartel – if it exists – of ivory speculators would theoretically not be much different in structure from OPEC. However, it will not be as easily disrupted, as, contrary to oil, no sources of renewable ivory exist outside Africa. Theoretically, there would be little difference between an ivory speculator cartel and a legal cartel like OPEC, and even oil and ivory may be similar insofar as price-elasticity of demand is concerned. Unlike a legal cartel, though, a cartel of ivory speculators would be free from the scrutiny of legal oversight. The supply and sale of mammoth ivory is of course relevant here too and will also be addressed.

Under an indefinite ban

If these syndicates believe that the ban will be in place indefinitely, and that the Chinese government will credibly enforce the ban, they are likely to attempt to sell their ivory, including into countries where they can earn the highest possible price. A recent report by Vigne and

Martin, for instance, shows that Vietnam now hosts one of the world's largest illegal ivory trades. 'Wholesale prices for raw tusks in Vietnam were about the same in 2015 as in mainland China, around USD 1,100/kg for a 1-3 kg tusk' (Vigne and Martin, 2016, p. 7). Caution is always advised in drawing inferences from reports like these (Stiles, Martin, & Vigne, 2011), but this study is the most recent and robust available in the public domain, and its authors are two of the very people who offered the 2011 caution.

Economic logic would have predicted that the price would rise (and therefore supply increase) in neighbouring countries because consumers knew – after the Chinese government said it would ban domestic sales of elephant ivory in May 2015 – that the product would no longer be easily available in China. That the price in Vietnam appears to be reflecting Chinese prices (which fell by half in the 18 months leading up to late 2015) is an interesting conundrum. It could be that the price may still rise in Vietnam as trade shuts down in China. By way of example, the illegal wildlife trade appears to be thriving in Asia's 'Golden Triangle' (EIA, 2015).[6] Law enforcement along the Vietnam/China border is apparently improving, but it still seems that ivory can move relatively easily between the two countries: 'The chances of Chinese being arrested for carrying illegal ivory into China are extremely small due to ineffective law enforcement' (Vigne and Martin, 2016).

Syndicates may therefore move their stockpiles from China into countries like Vietnam, Myanmar, Cambodia and the Lao PDR (already known transit countries for trafficked ivory). This scenario may well be realised, and should suggest to the Chinese authorities that collective action in the region is crucial to avoid a price spike that will lead to an increase in elephant poaching despite their best internal efforts. Speculators could move current stockpiles into Vietnam and other neighbouring countries relatively easily, and new contraband could be moved straight there without having to enter China at scale at all.[7]

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[6] See also Pinnock D, 'Markets of Death, Part One: The Asian end of a grisly business', http://www.dailymaverick.co.za/article/2016-02-26-markets-of-death-part-two-blood-permits-how-cheating-officials-undermine-wildlife-regulations/#.V5fFQ2Wzt3Y, accessed 26 July 2016; Part Two: 'Blood permits: How cheating officials undermine wildlife regulations', http://www.dailymaverick.co.za/article/2016-02-26-markets-of-death-part-two-blood-permits-how-cheating-officials-undermine-wildlife-regulations/#.V5fFQ2Wzt3Y, accessed 26 July 2016; Part Three: 'How China's taste for wildlife feeds a killing frenzy', http://www.dailymaverick.co.za/article/2016-03-03-markets-of-death-part-three-how-chinas-taste-for-wildlife-feeds-a-killing-frenzy/, accessed 26 July 2016.

[7] The objection to this argument is that Chinese consumers would have to risk a border crossing with contraband. If border-patrol efforts are improved in the wake of a formal domestic ban being implemented,

Moreover, regional trade hubs (such as Hong Kong SAR) have historically redistributed illegal wildlife into the region. This is why it is good news for elephants that Hong Kong has also stated that it will ban the domestic trade in ivory. However, its recently announced timeline of 5 years (with the ban to be implemented by 2021) is too long. Ultimately, an indefinite ban, implemented in the very near future, should induce a type of dumping strategy, which would lower prices and reduce the incentive to poach elephants. However, syndicates would only offload an entire stockpile at once if the 'price rises too slowly to make holding the stockpile a worthwhile investment' (Mason et al., 2012, p. 185). In the event that they could fetch high prices in neighbouring countries, it makes sense to follow this strategy. And despite the price of raw ivory having halved in the 18 months from mid 2014 to late 2015, down to $1,100/kg (Martin and Vigne, 2015), the profit margins are still formidable, given low shipping costs since the global financial crisis struck in 2008 (Moyle, 2014) and the low costs of poaching.

Whether syndicates choose a dumping strategy also depends on their beliefs about future consumer behaviour. If they believe that the ban is credible, and that private investors, who have significant personal stockpiles, will sell because of the ban, then it may be rational to divest stocks now to avoid future losses. This scenario will be expanded below where we model private speculator behaviour under the assumption of a competitive market structure.

Under a 10-year ban (or a finite time horizon)

Though it is highly unlikely that elephants as a species would be driven to extinction (notwithstanding the serious, ongoing and persistent threat to the African forest elephant), the strong incentive that vertically integrated criminal syndicates have to drive the species to very low numbers (so as to benefit from scarcity) should be seriously considered. The logic is as follows: 'As species become rarer, supplies from the wild dwindle and prices go up, which can invite additional pressure on extant populations… These forces are exacerbated when a significant market player holds significant stockpiles of wildlife commodities' (Mason et al., 2012, p. 181). Under a finite time horizon, with the probability of a ban being lifted at some predictable point in the medium term, syndicates would have every incentive to keep their current stockpiles and indeed to enlarge them. When a small number of players hold market power, they have a relatively low discount rate, which means that they can wait until the ban is lifted, selling into neighbouring countries in the meanwhile if necessary, or continuing to

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the risk may be perceived as being too high, which would reduce demand and drive down prices. This would negate the need for regional intervention in Vietnam by Chinese authorities.

pursue opportunities in the illegal market within China. The ultimate objective is to earn monopoly rents[8], which are distributed (if unevenly) across the main players.

The model for this game, called 'banking on extinction', is drawn from Mason, Bulte & Horan (2012). There are two agents – the speculator and the poacher. In reality, there are a number of heterogeneous players within each set of agents. However, for the sake of understanding the behaviour of both, the model is parsimonious and instructive because the incentives of each – given current market structures – can be reduced to the ones captured by the model:

$$R = -y$$

R represents the current stockpile held by large syndicates, who have no incentive to compete with each other, because price wars would undermine the collective rents available. The rate of net sales is represented by *y.*

$$Q = X + y$$

Q is the aggregate supply delivered to market, and is the sum of ivory produced by poaching harvest, *X*, and the net sales from the existing stockpile. If $y < 0$, the speculator demands more poaching while increasing the size of the stockpile. Poachers' revenues are determined by $p(Q)$. Poaching costs are denoted by $c_a(S)$, with $c_a(S) < 0$. For further details, see footnotes 3 and 4 in Mason et al., (2012). The equilibrium condition for poachers is:

$$p(Q) = p(X^* + y) = c_a(S)$$

Mason *et al*. assume myopic behaviour by poachers – intense over-harvesting with no thought to the future. However, this assumption is arguably unnecessary in the way that they have formulated it. If it is the case that syndicates are increasingly controlling poaching operations, then it is more economical for them to increase their stock of poached ivory than to risk it being poached by potential competitors if the ivory were to be left on living elephants. Nonetheless,

[8] 'Rents refer to 'excess incomes' where 'a person gets a rent if he or she earns an income higher than the minimum that person would [otherwise] have accepted, the minimum being usually defined as the income in his or her next-best opportunity' (Khan, 2000). Monopoly rents accrue in the absence of competition, and monopolists therefore have an interest in maintaining high barriers to entry so that the marginal price earned for selling a product is always far in excess of the marginal cost to produce it. Not all monopoly rents are necessarily inefficient, however, but almost always are if they accrue through criminal activity or patronage.

the important thing is they do not have to assume a literal monopoly, they only have to assume that the speculator in question has some level of market power. As such, syndicate speculators face an optimization problem. They need to 'maximise the present net value of net benefits [PVNB] over time by choice of sales and purchase rates' (Mason et al., 2012, p. 185):

$$Max\ PVNB = \int_0^{\infty} [p\ (X^* + y)y]\ e^{-rt} dt$$

$$s.t\ S = g(s) - X^*\ ;$$

$$R = -y;$$

$$c_a(S) - p(X^* + y) \geq 0; X^* \geq 0$$

The speculator essentially has two game-theoretic options. He can bank on extinction or she can choose to dump her current stock. The choice is ultimately numerical. He or she must compare the present value of net benefits that will accrue under each scenario. Banking on extinction entails driving up consumer prices through increasing stocks while releasing them slowly onto the market (essentially creating an artificial sense of scarcity). It has to be supported by increased poaching efforts so as to avoid future competition with poachers who are not supplying to her. The intensive poaching of South African rhinoceros populations bears this point out (Crookes and Blignaut, 2015).

Banking on extinction and ensuring that all poachers supply to the cartel increases the probability of attaining monopoly rents, as increasing the size of the stockpile (and reducing the amount of living stock available in the wild) constitutes a formidable barrier to entry for potential competitors. Dumping stock onto the market in an effort to maximise profits in the short run is the other option. In order for this to be optimal, he would have to dump all stock at once to prevent poaching, the continuation of which would threaten his profits from dumping. But this is not a viable long-term strategy.

Monopoly rents would be maximised if elephants were driven to extinction, as syndicates' market power would generate sufficient revenue for them to suppress competitors, and competitors would not be able to access stock in any event except through theft, as there would be no elephants left to poach. Of course, this means that the rent stream evaporates when the last stockpiled tusk is sold. But the model suggests that monopolists would not be willing to incur the risk that competitors would emerge and poach living stock for themselves.

As the chain-store paradox game (Bates et al., 1998) shows, speculators would attempt to avoid the possibility of new players entering the market (a distinct probability if living elephant stocks remained at a renewable level). Thus it seems clear that syndicates (under a cartel/oligopoly structure) would prefer to avoid the possibility of living stock remaining, and accumulate as much of it as possible in the form of sellable ivory now.

A word of caution

Under both scenarios, however, one should bear in mind that the strategies are not simple. Speculators have invested significant sunk costs, which may lead to 'irrational' behaviour, or nonconformity to the models (Mcafee et al., 2010). This could however pose significant threats to the efficacy of a ban. For instance, 'illicit ivory networks may be establishing a parallel carving industry and setting up their own factories to avoid the complexity of laundering through the licit system, and to increase profit margins' (Vira et al., 2014, p. 55). These points are further enhanced by Stiles *et al* (2015) who acknowledge that 'because online and person-to-person illegal sales are concealed, there is a large gap in knowledge of the actual quantitative disparity' (between imported raw and processed ivory (or raw ivory) known or suspected to be on sale). Online ivory sales (where most illegal ivory is sold) are very difficult to trace because sellers stay online for short periods of time, use many different code words rather than 'ivory', sell to member-only forums, and change their identities often. If a larger volume of syndicates' stocks is being sold illegally than we suspect is currently kept for speculative purposes, the usefulness of the above model may be limited.

A mammoth problem

To complicate the picture even further, the growing trade in mammoth ivory is unregulated and poses a long-term threat to the efficacy of a domestic elephant ivory trade ban. Hundreds of tonnes of mammoth ivory are becoming available through the melting of the Siberian permafrost, thanks largely to climate change. If the trade in mammoth ivory remains legal, there is good reason to believe that it will be used as a cover under which to 'launder' illegal elephant ivory in exactly the same way that the legal trade in elephant ivory currently provides a cover for the illegal trade. The quality of mammoth ivory does however render it less suitable for carving than ivory from forest elephants, though the skill required may increase the value of such pieces where they do exist. At scale, it is therefore unlikely to substitute for the higher end of the ivory consumption market, where carved products are sought after and the demand function remains relatively price-insensitive. However, a recent paper by Farah and Boyce (2015) argues that the extinction of elephants may be avoided because mammoth ivory is a close substitute for elephant ivory, and now accounts for perhaps 20% of all ivory production. Though supply is finite, estimates suggest that currently available reserves amount to

hundreds of years' worth of production. Farah and Boyce estimate that a 1-tonne increase in Russian mammoth ivory exports results in seizure rates of African elephant ivory decreasing by as much as 0.8 tonnes. Based on an assumption of one elephant producing 10 kg of ivory, and that less than 12% of this ivory is actually seized, 'the 84 tonnes of Russian mammoth ivory exports produced on average per annum between 2010-2012 may have reduced elephant ivory harvesting by over 500 tonnes per year'. Even though elephant poaching rates were escalating during those years, these authors reckon that had it not been for the presence of mammoth ivory, 85,000 elephants would have been poached per year (about 50,000 more than are being poached annually at present).[9] They also estimate that elephant ivory prices may have been reduced by $80 to $120/kg as a result of the trade in mammoth ivory. Other potential contributing factors to the recent price decline will be discussed below. To bolster the Farah and Boyce paper, and Martin similarly argued, in 2010, that there was no evidence that the worldwide mammoth ivory trade is adversely affecting the African or Asian elephant. They therefore caution against banning commerce in mammoth ivory (Martin and Martin, 2010). However, a 2014 report by Vigne and Martin (2014) found extensive evidence of elephant ivory being sold as mammoth ivory, though they still did not suggest a ban.

Given the evident levels of substitutability[10] between elephant and mammoth ivory, a precautionary approach strongly suggests that the Chinese government should consider regulating the trade in mammoth ivory. In the space of fifteen years (from 1997 to 2012), mammoth ivory imports into China rose from 17.3 tonnes to 95 tonnes, a five-fold increase. Hong Kong showed a similar trend (Cites, 2014, p. 21).

Discussion

Speculators appear to account for a large part of consumer demand (both at a wholesale and retail level). We postulate that sophisticated syndicate networks account for the former, and their options have been discussed above. Our view is supported by Moyle, who writes that 'the level of illegal traffic in raw ivory is also an indicator that ivory is being largely stockpiled by criminal organisations' (Moyle, 2014). At a retail level, a significant volume of ivory entering China since 2008 has been purchased by a segment of the market that sees ivory as an

[9] While interesting, this is essentially conjecture, as confounding variables are exceedingly difficult to control for.

[10] Well-trained law enforcement officials should however be able to tell the difference between mammoth and elephant ivory. Either way, proper identification cards, indicating place of origin (using some kind of credible technology that can verify this) should be required as part of new regulations.

inflation-proof investment (’t Sas-Rolfes et al., 2014; Brennan and Kalsi, 2015; Gabriel et al., 2011; Gao and Clark, 2014; Moyle, 2014). *The options available to criminal syndicates have been reduced in the light of the recently announced pledge to implement a domestic ivory trade ban.* It would appear rational from the above arguments for them to try and sell this ivory before the ban is imposed, unless they believe:

i) that the statements about a forthcoming domestic trade ban are not credible and will not result in an enforced ban;

ii) there will always be other loopholes (like a legal trade in ‘indistinguishable’ mammoth ivory as a laundering cover for illegal elephant ivory or Hong Kong being a very convenient cover for illegal ivory if it only implements a ban five years from now). It seems highly unlikely that any government would be willing to ban the commerce in mammoth ivory, but the government might be willing to regulate and monitor it;

iii) that the ban will only be enforced for a finite period of time such as ten years.

Their decisions are also subject to how they believe retail-end consumers will behave (including the private speculators among them). At the same time, it cannot be assumed that all speculators operate under the same logic or hold the same information at the same time. Rather, in a complex market, there is the possibility of a mixture of speculator responses occurring at the same time. Clearly there is a need for more research on the subject, especially to understand the nature of the relationship between different speculators and the quality and reliability of market information available to them at any given time. In fact, an examination of preference-formation and decision-making highlights the necessity of understanding the culturally distinct role of values between and within societies in this whole process. It manifests itself in several ways. For instance, it is present in how a Chinese consumer attributes value to ivory in relation to other materials and the opportunity costs of pursuing different strategies of extracting that value. It also feeds into the conceptualisation by Chinese government officials that in reversing their 2008 promotion of the trade that they would be losing ‘face’ (or be perceived as indecisive) at the domestic level - and as a consequence need to find a nationally acceptable way of implementing this policy shift.

4.2. Type II speculators with a competitive market structure

These speculators are private retail consumers who stockpile their own ivory in much the same way as other investors collect stamps or invest in shares (of course, they may also invest in shares and stamps themselves). Stiles *et al*. argue that the price of ivory escalated between 2008 and 2014 in close correlation with the rise in value of other commodities such as gold. He argues that the global financial crisis (GFC), from late 2007 onwards, incentivised investors to offload their assets in falling stock and property markets and transfer them to the commodities such as ivory: 'Ivory, along with other luxury commodities, offered a much more attractive investment prospect than bank interest, stocks, bonds and property. The legal ivory sale moratorium voted by CITES in 2007 guaranteed future scarcity, which provided an additional incentive to speculators to buy poached ivory' (Stiles *et al*., 2015, p. 4). There are a number of problems with this line of reasoning in addition to the fact that the moratorium was only for nine years, which does not exactly constitute 'future scarcity'.

We cannot find any econometric evidence that isolates and specifies the GFC as a causal variable for the commodity price boom (which actually started around 2001). The commodity boom was predominantly a function of Chinese demand for commodities to satisfy the material aspirations of a growing Chinese spending class. More importantly, natural resources were being rapidly acquired by Chinese SOEs to support the 11th 5-year plan of the CCP that sought to complete China's industrialisation growth phase by 2020 (Roach, 2011). In addition, the exit from stocks and property is likely to be a response to extensive bubbles in those markets. The bubbles are manifested, for instance, in excess supply capacity in steel production, and large property developments that remain uninhabited. The commodity price bubble continued after 2008 as the Chinese economy remained relatively unaffected by the GFC. By 2014, however, slowing demand in the rest of the world for Chinese exports had an impact in China's ability to continue investing in export-led manufacturing capacity, which meant that China required fewer natural resources. That ivory prices follow other commodity prices is therefore likely to be a spurious correlation at best. Also, ivory is quite dissimilar to the other commodities that Stiles and colleagues mention. For instance, ivory differs markedly from gold in that the market for gold is generally well regulated, and gold has been a trusted investment store of value for centuries, whereas the same is simply not true of ivory. Therefore, the price decline in ivory is unlikely to be attributable to the fall in other commodity prices since 2014. Retail speculators have two options in response to the announcement of a ban.

Under an indefinite ban

In 1936, John Maynard Keynes wrote the following: 'It might have been supposed that competition between expert professionals, possessing judgement and knowledge beyond that of the average private investor, would correct the vagaries of the ignorant individual left to himself. It happens, however, that the energies and skill of the professional investor and speculator are mainly occupied otherwise. For most of these persons are, in fact, largely concerned, not with making superior long-term forecasts of the probable yield of an investment over its whole life, but with foreseeing changes in the conventional basis of valuation a short time ahead of the general public' (quoted in Duffy and Nagel, 1997, p. 1684).

The behaviour of consumers who hold ivory as an inflation-beating investment vehicle can be modelled as a 'beauty contest' game, as what matters for the value of the ivory is not so much its inherent value, but the value bestowed on it through market perceptions and other investors' behaviour.

'Keynes likened professional investment activity to newspaper beauty contests where readers were asked to choose the six prettiest faces from among 100 photographs with the winner being the person whose preferences were closest to the average preferences' (footnote 1 in Duffy and Nagel, 1997). In experimental games of this nature, groups of subjects are repeatedly asked to simultaneously guess a real integer in the range $[0,100]$ that will be some value $(0 < p < 1)$ times the average number that they think every other contestant will pick. The value of p is pre-announced and known to all contestants. For instance, one might expect the average number to be 50. If the pre-announced p is 0.66, then the smart investor should pick $(V = 0.66X50)$, which is 33.33. She should then reason that every other investor will do the same, and so regress *ad infinitum* to pick a value of 1. Even if players do not understand this at first, the experimental results suggest that learning happens over time in that 'the mean of all chosen numbers is consistently and significantly greater than zero, though there is some tendency for the mean to decline over time' (Duffy and Nagel, 1997, p. 1685). Duffy and Nagel run a number of experiments in which they changed the order statistic to include median and maximum games. They found that behaviour in the mean and median games was similar with regard to first-round choices, depth of reasoning (why players picked the number they did) and the direction of learning (whether the number tended towards 0 over time).

Evidence from game theory experiments helps us to understand speculator behaviour among those consumers who treat ivory as a long-term investment, a group for whose existence there appears to be a fair amount of evidence ('t Sas-Rolfes et al., 2014; Gabriel et al., 2011; Gao and Clark, 2014; Harvey, 2015; Mason et al., 2012; Vira et al., 2014). These players invest in

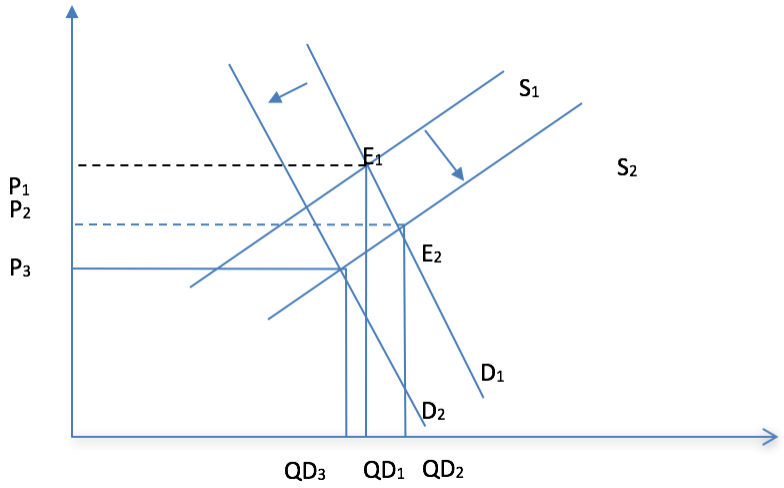
ivory as if it were a tradable share on a securities exchange. The objective of the game is to anticipate the moves of the other players with whom one is competing. Therefore, if private speculators expect prices to continue rising in the future, for instance, because other players are also investing, they will continue to purchase stock, or at least maintain their current stocks. However, if they believe that the promise of a ban is credible, and that a formal announcement is impending that will stipulate the date of implementation, they are likely to believe that other players will move to offload their stock. This of course depends on the extent to which these speculators care about whether they are trading in illegal stock. We assume that they care, as the enforcement of a ban would drive the value of their stock to zero if other players were not prepared to take the risk of being caught selling contraband. This assumption is not restrictive, as it only requires that a player believes that other players care, which is highly plausible. If players believe that other players will sell their stock, perhaps because they have better information about the market or do not want the stigma associated with possessing illicit stock, then, desiring not to be the last to sell, they all start selling simultaneously. This would result in what is called a fire sale (cf Caballero and Simsek, 2013) – a domino effect of stock price collapse due to uncertainty generated by complexity and all players selling off their stock to avoid being the last to sell.

'Fire sales can arise even when financial markets are deep and the shock is small relative to the wealth in the financial network' (Caballero and Simsek, 2013, p. 2576). If ivory speculators feel exposed because of the uncertainty generated by the promises of a forthcoming trade ban, and dwindling future markets because of demand reduction campaign induced stigma effects, a fire sale could result. This is essentially a problem of contagion, and it bodes well for elephants. Is there empirical evidence for a fire sale effect in the trade in elephant ivory?

Without robust econometric testing, it is impossible to evaluate reliably, but such fire sales may partially explain the recent 50% decline in wholesale price of raw ivory. Stiles *et al*. do, however, show that the price started falling before the May 2015 statement about an impending ban. This pre-May 2015 fall in prices for raw ivory may be due to insider information available to speculators, general declining consumer confidence, the efficacy of demand reduction campaigns, the Chinese government's own commitment to burn a large portion of its stockpile, or some combination of these potential drivers. Either way, in light of specific ivory market uncertainty and the general economic evidence we have that investors respond to beliefs about what other players will do, it is plausible to believe that private speculators will sell their stocks in an attempt to minimise losses. For some speculators, selling now at

$1,100/kg may represent a significant opportunity cost.[11] But if his/her share portfolio is sufficiently diversified, it would nonetheless make sense to sense to sell now while profits are still attainable, even though these are lower than what they could otherwise have been. A declining price, would however, lead to an increase in quantity demanded by other consumers, and perhaps carvers. The dynamics of these price changes are illustrated below. Bear in mind that proponents of lifting the international ban on ivory sales would have expected to see a spike in demand, and therefore prices, in the wake of the statements about a forthcoming ban. Certainly Stiles *et al*. argue that the 2007 announcement of a 9-year moratorium on future sales from countries with Appendix II elephant populations precipitated an outward shift in demand because of the signal of future supply scarcity.[12]

Figure 1: Partial equilibrium supply and demand dynamics of the ivory market in China



[11] Speculators would presumably hold stock in anticipation of prices recovering to heights of $2,200/kg for raw ivory around early 2014. Given the low cost of acquiring illegal ivory, $1,100/kg may still represent a significant profit, however, and so the logic of selling now holds even more firmly.

[12] The argument made by Stiles and his colleagues is weak. First, nine years is not a long time and therefore unlikely to have had a significant impact on consumer sentiment. This is not to argue that it would have had no impact on price, but prices only influence *slides along* existing curves; they do not result in *shifts* in the curves. Consumer sentiment, income changes, and the adoption of new technology may influence complete *shifts* in the demand curve, regardless of price movements. Consumers with a long time horizon would however likely not be influenced by a nine-year moratorium – it would be unlikely to affect their sentiment about the future reliability of supply. Second, and related, is the fact that the moratorium only applied to the four range countries with elephant populations on Appendix II. Given the volume of illegal ivory movements from countries with elephant populations on Appendix I during the time in question, prices are unlikely to have risen because of expectations of future scarcity *per se*.

It is always dangerous to reduce a complex set of factors into a partial equilibrium framework with assumptions of perfect information and perfect competition, but the graph above is useful for illustrating potential dynamics that may be occurring at present. If prices are falling due to an increase in available stock (S_1 to S_2) (speculators and legal retail outlets offloading into the market in fire sale conditions), we will see an increase in quantity demanded from QD_1 to QD_2. Such an increase in quantity demanded has no impact on the price, as it is a *slide along* the curve rather than a *shift of* the curve itself. For a number of reasons – declining consumer confidence and/or incomes, and presumed stigma effects from demand reduction campaigns – the entire demand curve may be shifting from D_1 to D_2. This would result in a 3rd equilibrium position with both a lower price and a lower level of quantity demanded. In this story, the lower price (P_3) will result in lower rates of poaching, as the risk to reward ratio for poaching is increasing as returns become lower.

In this case, the assumption of competition between speculators is crucial. An oligopoly (cartel) would have very different results because all players would agree to fix prices at a level that no one player would have an incentive to undercut, as the benefit of collusion would outweigh the costs of undermining the rent pool.[13] However, it seems unlikely that private speculators would collude, as they aim to maximize their individual gains. Fire sale conditions therefore seem plausible. Moreover, private speculators - as one important type of consumer - are important for syndicate networks (wholesale speculators discussed above), as they send signals to the syndicates that the consumer market for ivory is diminishing. If this is the case, the dual effect of the impending ban (provided speculators view the pledge as credible) and effective demand reduction campaigns, would create strong risks of a fire sale. Whether the resultant lower prices are sufficiently low to deter poaching will be an empirical question that can only be answered in time. It does seem probable, however, that an indefinite ban, combined with effective demand reduction and law enforcement, would reduce prices to the point where elephants would be valued more highly alive than dead.

[13] This is of course not a given. Many cartels fail precisely because each player has an incentive to undercut prices or increase sales volumes, especially if future cooperation is not required and the probability of detection is low. In the ivory game, it would be very difficult for private players to police each other and gain reliable information about other players' behaviour. For wholesale speculators (syndicates) the scenario is obviously different, hence the assumption of collusion at that level.

Under a finite ban

Private speculators would presumably behave in the same way as oligopolistic syndicate networks if they believed that the ban would be lifted in the medium term. The two types of players' behaviour would be mutually reinforcing and drive elephant numbers down. There may not be outright collusion, but private speculators would recognise that a medium-term, finite length ban (say, 10 years) would probably drive prices higher in the long run – trade would again be legitimate after the ban and elephants would be just as scarce, if not more so. Speculators would therefore attempt to acquire more ivory in the short-run to gain a first-mover advantage to sell in a post-ban world. This would ironically push the price up, exacerbating poaching even in the short term. A long-term, indefinite ban is therefore far preferable from a policy perspective, as private and wholesale speculators would be rational to be the first to sell now, creating the fire sale that would help elephant populations to recover as the price of ivory goes into freefall.

5. OPTIONS AVAILABLE TO THE CHINESE AUTHORITIES

5.1. What to do with its own official stockpile?

If China stores and keeps its legal ivory stockpile, it risks sending a signal to the market that it is either not serious about shutting down the domestic trade, or that it intends to lift the ban at some point in the future. Storing ivory is expensive, and a potential liability in that 'Ivory has gone missing from government stockpiles in the past … [and] leaks from these stocks could be a significant source of illicit trade' (UNODC, 2016, p. 42). The Environmental Investigation Agency acquired an internal memorandum from 2002 that claimed the loss of 110 tonnes of ivory, 'equivalent to the tusks of 11,000 elephants' from government stockpiles (Rice, 2008). Powerful commercial interests are able to bribe officials relatively easily to leak ivory from the stockpiles. 'Corruption is essential to many contraband flows, and seizures are not made where the relevant officials are complicit' (UNODC, 2016, p. 28); there is little reason to expect that China is exempt from this general observation. Moreover, keeping its ivory would certainly undermine the credibility accorded China's apparent commitment to truly ending the trade in ivory, and would send the wrong signal to speculators.

The Chinese government is in a difficult political situation here, as it is having to reverse its post-2008 efforts to promote (and fully legitimise) the commercial ivory trade (and it had made a promise to continue supplying traders until the end of 2016). Losing face in that way is delicate, so one should understand the ambiguity in its statements. But there are ways for the

Chinese government to explain this issue in a way that they are not seen as losing face. However, there are two strategic and inter-related options here for the CCP. First, it could link the crackdown on illegal ivory sales to the ongoing national anti-corruption drive. This would entail acknowledging that the presence of an encouraged legal trade has facilitated the parallel growth of an illegal trade. Second, China is, in terms of its 'Going Out' international relations strategy (Harvey, 2013), adopting a pragmatic foreign policy (the understanding that it cannot remain isolated from the world and global issues, if it wishes to continue its national modernization), thus increasingly seeking to portray itself as a responsible global player. It is the need to balance such domestic and global ambitions that are a pretext on which decisions are executed. Third, the poaching threat is now substantively different to what it was in 2008. The extensive involvement of transnational criminal syndicates and the resultant corruption all along the supply chain provides China with an opportunity to take its place in addressing this new global scourge. Enacting a ban hereby demonstrates to the world that the Chinese authorities are serious about being a world leader in conservation.

If China puts its stockpile beyond commercial use, it will send as unequivocal and credible a signal as possible that the trade in ivory is over. There is however a collective action problem associated with this in terms of ultimate impact. If China destroys its stockpile, other countries' stockpiles may be 'raided' by syndicates, but only if those syndicates believe that the Chinese ban will be finite in length or that there will be lucrative markets in other countries. The speculators may sense, for instance, that the time horizons for being able to stockpile their own ivory (assuming they are banking on elephant extinction) are shortening. Either way, potential impacts such as these do not constitute arguments against China banning its domestic trade or putting its stockpiles beyond commercial use.

There is arguably an incentive for China to dump its legal ivory stockpile on the market before the ban is implemented. But this is a bit like Goldman Sachs selling toxic assets to its clients while actively betting against those same assets. As such, given the risk of public exposure to such activity in the international media, and the resultant loss of face, the Chinese authorities are unlikely to do this. Moreover, it would make the job of policing the ban that much more difficult by raising the transaction costs thereof. Perhaps the greatest risk is that the majority of ivory available in China is in the illegal markets, not in official stockpiles.

5.2. Ban Implementation timetables

The statements:

Though price depreciation (for raw ivory at least) started to occur before the May 2015 statement that a ban would be implemented, the statement is also likely to have had an effect

on further price deterioration because it was treated credibly, and if sellers knew that the statement was impending. For many countries, a government's statements on any given matter are often perceived as lacking credibility. However, the Chinese government is different – the country is ruled *by* law (as opposed to characterised by the 'rule *of* law). Statements about future plans can therefore be treated as credible, especially when made at such a high global level, where a good international reputation is critical to uphold. The expected utility from ignoring the impending ban is limited, thus incentivising private and wholesale speculators to sell their raw stockpiled ivory as soon as possible. As mentioned above, the possible risk of a fire sale is high if the statements about a forthcoming ban are deemed credible, which has likely led to a number of speculators selling off ivory already, either into the illegal market or into neighbouring countries. This is likely to lead to further price depreciation, which would constitute a disincentive to poaching. A lower ivory price might lead to an increase in quantity demanded (for consumers who are willing to take the risk of being caught actively procuring illegal ivory), but this would not shift the demand curve out by any means. And as the graph indicated above, demand reduction campaigns would shift the demand curve inwards, thus suppressing the price further.

Where to start:

On the surface, shutting down illegal online sales is hugely challenging. The Stiles *et al*. report suggests that physical outlets sell a relatively small proportion of total ivory entering the country. It would make strategic sense for the Chinese authorities to compensate legal traders and carvers, as they represent a small proportion of the total trade (Zhang, 2015). There are various ways in which this can be done.[14] In terms of having finite law enforcement capacity, it makes sense to find ways to relocate employment provided by the carving/traditional art industry and shut down the most easily identifiable outlets first. This sends a signal to other consumers that shutdown is imminent. Online suppliers are however nimble and adept at avoiding detection. Resources would therefore be most efficiently allocated towards understanding the nature of and identifying online outlets that sell the highest volumes of ivory, and aiming to shut those down first. Criminalising the *purchase, sale,* and the *offering for sale*

[14]For instance, setting up carving galleries or "living museum displays" for which artists are paid could be an excellent use of a small proportion of the state stockpile – just as tourist consumers pay to visit the Louvre in Paris, so consumers are likely to be willing to pay to see official carvings. The rest should be destroyed and/or turned into statues and other public art, especially given the security and maintenance costs of operating a stockpile and the unintended negative consequences associated with maintaining one, especially the sending of a signal to the market that China expects to re-open its domestic ivory trade at some point in the future.

of ivory may also help to strengthen the efficacy of the ban. Either way, the strategy point stands that physical retail outlets should be targeted first, and resources then directed towards shutting down illegal online selling.

Implementation timetables:

Invariably, as mentioned above, a political statement without detail would be treated as lacking credibility by players in the ivory game. However, statements by the Chinese government are different as they tend to be treated as inherently credible, which buys the luxury of some time. Speculators, for instance, would be taking a serious risk in believing that the statement was made without any intention of follow-up. Had concomitant commitment from the U.S. not been forthcoming, speculators may have had good reason to take a 'wait and see' approach, as Chinese authorities could presumably have reneged on the premise that the domestic ban would be unwarranted unless also implemented by the U.S., especially given that the U.S. had promised such a commitment in September 2015. However, U.S. commitment has been realized, as evidenced by the Federal level ban on almost all ivory sales across the U.S. enacted by the USFWS, which was referenced above, as well as by a number of state-level bans on the sale of ivory. China's options to renege without serious embarrassment are now severely limited. The U.S. has signalled as credible a commitment to enforcing the ban (already in effect at the time of writing) as one could expect. If China did renege, which would be a poor strategic international diplomatic move, speculators who chose not to sell under current conditions, or even went about buying now, would stand to make a significant profit, and elephants would continue to be poached.

The concluding point regarding implementation is that a phased timetable should be released as soon as possible with clear dates and deadlines. In this respect, China has decided to 'publish a timetable by the end of 2016 to halt its domestic commercial trade of ivory.'[15] More importantly than anything else, though, the announcement, when it is made, should indicate that the ban will be indefinite. No possibility of the ban being lifted should be introduced, as this would provide a potential finite horizon. A finite time horizon, all else being equal, will induce intense stockpiling in anticipation of a future trade, and therefore do relatively little to alleviate elephant poaching now, if not exacerbate it. The date of implementation should be as close to the announcement day as possible. Doing so would send a swift and credible

[15] Office of the Spokesperson, Washington, DC, 'U.S.-China Strategic & Economic Dialogue Outcomes of the Strategic Track', http://www.state.gov/r/pa/prs/ps/2016/06/258146.htm, accessed 5 September 2016.

signal to speculators, traders and carvers that the trade is over.[16] Concomitant to this could be an amnesty offer to those willing to hand over their illegal supplies or purchases. This is obviously difficult, but it would avoid the danger of speculators and other traders attempting to sell their ivory into nearby national markets that still allow domestic trade. As indicated earlier, for instance, a growing Vietnamese market provides such a channel for speculators to offload stock. The market in Vietnam may not be nearly as large as the Chinese market at present, but the spending classes in other countries in the region are growing and the increased availability of ivory there may spark consumer demand that had remained dormant until now.

Law enforcement costs:

The transaction costs of attempting to shut down illegal ivory outlets are high in the context of a legally permitted domestic trade. Implementing and enforcing a domestic ban would probably lower these transaction costs for local authorities. Law enforcement officials would no longer have to attempt to distinguish between legal and illegal ivory unless there are complex exceptions to the ban. They would, however, if the trade in mammoth ivory continued, have to distinguish between illegal elephant and legal mammoth ivory. Technological innovations for certifying all ivory origins could help, and the costs could be offloaded on to ivory sellers themselves. Adopting these technologies is also critical to limiting opportunities for laundering illegal elephant ivory through legal mammoth ivory outlets. A key rationale for enacting a domestic ban is to reduce laundering, given the extent to which the illegal and legal elephant ivory markets have become intertwined. Given that the presence of a growing trade in mammoth ivory threatens to create similar problems of intertwining, adopting a voluntary ban on trade in mammoth ivory may be optimal. The only remaining costs would then be to shut down illegal outlets (and regulate mammoth trade if it continued to be legal), but these should already be budgeted for.[17]

In any event, there should be more political will and capital available to execute the law following the statements already made and after the announcement of an official timetable

[16]While the expected spike in price (because of expected future scarcity signalled by the statements that a ban was forthcoming) has not occurred following statements made until now about the impending ban, another statement unaccompanied by swift and decisive action risks creating a price spike. This risk is not necessarily because consumers expect future scarcity and therefore want to acquire stock now, it is more likely to be a result of not believing the promise of a ban to be credible, and therefore continuing to trade as though the ban will never be enacted or enforced.

[17] Some Chinese experts opined, at two respective Beijing workshops in February and August 2016, that enforcement costs may rise in the very short run in response to an expectation that the domestic ban might precipitate the movement of ivory across the Chinese border into neighbouring markets.

towards the end of 2016. We do however note that there may be initial *implementation* (rather than *enforcement*) costs associated with communicating the ban and how it will be enforced. Authorities will also likely incur 'start-up' costs for establishing 'living museums' (see footnote 5 above) as a means both of compensation for likely economic 'losers' from the ban and retaining ivory carving as a valuable cultural heritage.

Being caught purchasing and selling illegal elephant ivory should entail punishments that act as a sufficient deterrent to smugglers, speculators and consumers alike. Implementing these penalties is unlikely to generate higher law enforcement costs, though, as those organisations involved in the illegal dimensions of the ivory trade are likely to be involved in other illegal forms of trafficking too, so expanding provisions for enforcement would build upon existing processes rather than necessitating the pursuit of an entirely new area of law enforcement.

Ultimately, from a strategic perspective, what matters is not being able to shut down every single outlet *per se*, but implementing the ban effectively enough that a critical mass of both high-end consumers and speculators move out of the market. The resultant significant price crash (a continuation of the current trend) will reduce the incentive to poach elephants and traffic ivory. Elephant numbers are likely to recover as a result, provided the market does not simply shift elsewhere. In all of these discussions, while China (including Hong Kong SAR) is hugely important, the role of the U.S. and regional players in Asia must also be strongly considered.

6. CONCLUSION

In light of the above discussion, it appears that the optimal plan of action is for the Chinese government to announce a trade ban as soon as possible, preferably ahead of the September 2016 meeting of the Parties to CITES (CoP17), or failing that, before the end of 2016, and for that ban to be indefinite. What will happen to ivory prices is likely to be a function of the market structure and relationship between stockpiling speculators, in addition to exogenous factors such as the efficacy of demand reduction campaigns, effective transnational crime prevention, and improved anti-poaching and anti-trafficking efforts across Africa. To best serve elephant conservation efforts, policy initiatives need to be carefully crafted to complement ivory demand reduction efforts so as to keep prices sufficiently low to disincentivise poaching altogether.

De-valuation for speculators (both wholesale and private) is arguably best achieved through simultaneous demand-reduction campaigns and implementing a domestic ivory trade ban.

Targeting consumers is ultimately the best way to target speculators since speculators ultimately sell to consumers (if indirectly through traders, etc.). Speculators will quickly assess whether a future market remains likely. Moreover, depending on the extent to which there is shared information among speculators, the policy hope is that the combination of demand reduction and a trade ban will lead to a fire sale externality – no speculator wants to be the last to sell, and so everyone sells as quickly as possible. This would lead to further price drops and hopefully remove the incentive for poaching and trafficking altogether.

The impact of the ban on the ivory trade hits home in three distinctive ways. At the *domestic level* China needs to continue promoting policies that link the fostering of consumer-led growth and modernization to an improvement in people's livelihoods. It also faces the challenge of integrating the traditional and 'globalised' aspects of its economy, both of which are defined by a gap between spatial (rural-urban, interior and coastal provinces) and cultural dimensions of the consumer market. Finally, the ban would impact upon China's economic relations with countries in its immediate region (such as ASEAN), posing the dilemma of how to manage increasingly borderless transactions in the illegal ivory trade.

Yet at the international level China also understands that its support for the ban on illegal wildlife is important in demonstrating its conduct as a responsible global player. For example, there was specific mention of fighting illegal wildlife in the December 2015 Forum on China-Africa Cooperation (FOCAC) Johannesburg declaration. The Chinese ambassador to Namibia further pledged equipment to fight the illegal trade in the country in January 2016. Combatting the image of China as a 'rogue consumer' of African elephants will, it is hoped, do much to allay concerns of the country's impact on Africa's natural heritage.

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