A Touching Belief in the Market: Comment on "A Derivative Approach to Endangered Species Conservation"

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Abstract

In a recent paper in this journal, Mandel, Donlan and Armstrong (2009) proposed a derivative intended to incentivise private enterprise to improve populations of selected species. Government would issue a bond to investors, who would receive interest on the bond, depending on the species population. Should the population fall below a threshold, the investors would lose the principal to government, which could use the money for restoring the species.

We commend the authors on their creativity, and we support the intent to use markets on behalf of the environment. Unfortunately, we find a range of difficulties in their proposal, including confusion with the nature of the contract, problems of market design, excessive cost, and perverse incentives.

The nature of the proposed contract

In the authors' words, "FWS could argue that issuing biodiversity derivatives is the procurement of third party services to assist in recovery efforts for threatened or endangered species…" This is correct. The true nature of the authors' proposal is for an investor to put up a high collateral – ten or twenty times the annual cost of the recovery work – against non-performance of a poorly specified ecology-enhancing contract.

The contract has two functions, to incentivize protection of the specie and insure the issuer against risk of specie decline.

As an incentive, the bond must target the capability of the bond-holder. This will differ from person to person and in most cases, to be effective, will be quite specific. For example, the contract with an owner of land with the targeted specie will incentivize that owner to protect it on that land. That is the primary area of influence of that bond-holder. Contracts with such direct relationships are likely to be the most effective.

As a risk mitigation, the proposed financial instrument protects against risk, but that risk is not to the species. The U.S. government guarantees species protection by law. A species becomes endangered, finds its way to the endangered species list, and the government initiates recovery. The proposed bond insures the U.S. government in case the cost of protecting the species is surprisingly high. "…it transfers the risk of listing a species to the market, thereby stabilizing its costs for listing and protecting species over a set time period." This is true. The government stabilizes but increases its cost on average. However, the U.S. government has no trouble raising funds, does so at lower cost, and has deeper pockets for risky ventures, than any other institution. Hence, the government should be minimizing expected cost, not avoiding risk.

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Problems of market design

The proposed bond will cannot be easily valued by investors for several reasons.

First, no underlying market in the endangered species exists. By contrast, a hedge on electricity prices relies on the underlying electricity market. The contract is insurance for the holder in case the price moves the wrong direction. But the U.S. has no underlying market in species recovery, and hence nothing to inform bond valuations, especially for secondary trading of the bond. ("Intrinsic value" is not necessarily a good indicator of market value.)

Second, the authors add conditions that would prevent the market form working, such as forbidding short sales and re-selling the contract (Keim 2009). Despite common wisdom, short selling reduces volatility (Ho 1996, Jones & Lamont 2002, Taulli 2008). Not allowing on-selling of the contract would reduce liquidity considerably. An investor in financial trouble for reasons other than the contract would have no ability to sell the contract to another, greatly increasing the investor's risk. The above flaws may be repaired by allowing full tradability.

Third, we expect that the market for the proposed bonds will be quite thin. Bonds that are location-specific will be virtually untradeable. It is difficult to imagine who would buy a bond written for a specific land-owner.

Other mechanisms

The parties that might be interested in the bond will prefer a different mechanism.

Farmers that might invest because they have control over their own property are not likely to put up capital in order to get paid to protect species on their property. They would rather simply take the payments directly, as they do now under various conservation programs. As already noted, a farmer could not easily re-sell the contract (if re-selling were allowed), because the buyer would still need access and control over the farmer's property. So this is the wrong type of contract for such a simple problem.

The contract may be purchased by pure speculators, who simply enjoy betting. Lacking connections to farmers or land owners, such speculators would have no impact on the species, and would therefore demand a higher return. Given the speculators' lack of control, they might prefer a game of pure chance, which would be simpler to play.

The contract may be purchased by philanthropic environmental groups, which have personal interest in any endangered species, and may have a network of people who could knock on farmers' doors and try to bargain with them. The proposed bond does nothing to reduce these transaction costs (as with wetlands markets mentioned in the article). The investor would have to find trading partners and verify their behavior. But why not just donate the money directly toward conservation work?

Excessive cost

The authors state, "…the cost of issuing derivatives should not increase the total amount FWS spends on recovery initiatives." But this must be false, because government is paying extra to avoid risk. "…FWS would roughly break even on the derivatives over time, because the amount of principal that investors forfeit will be roughly equal to the amount of interest paid by FWS." This means that investors net zero, so that statement must be false, too.

Let us carry forward on the hope that philanthropists will buy the bonds. How much will they cost? First, the government must estimate the cost to restore the species, if the species population were to fall below, say, P=10,000 animals[2]. Suppose this restoration cost were $2,000,000 per year for 10 years. The

[2] We could not understand the authors' example in their Panel 1.

government then offers a deal to the market, "We, the U.S. government, will create a contract with you as follows. First, you pay us $20,000,000. Second, we watch the population of the endangered species. Third, if the population falls below P = 10,000 animals, the contract ends and we keep your $20,000,000. If instead the population stabilizes or rises, we will pay you $20,000,000*$Y$% interest for the next 10 years, when we will return the $20,000,000 to you. Now, let's bargain for the value of Y%."

The investor would demand an interest rate sufficient to cover:

(1) $2,000,000/year, the cost of restoring the species, which the investor now doesn't have the capital to do, plus

(2) 5%*$20,000,000/year, the opportunity cost of the money, which is at least the U.S. government bond rate, plus

(3) 5%*$20,000,000/year, compensation for the risk of losing the principal if restoring the species proves excessive, plus

(4) some positive number, a profit margin for taking on all this trouble.

So the investor puts $20,000,000 up front, and needs some Y% to cover the $4 million/year. The value of Y% would have to be at least 20%. The total is much higher than the cost of recovery. The insurance of part (3) and the investor's profit of (4) are unnecessary losses to government.

Perverse incentives

In the proposed contract, the investor would have the right *not* to protect the species, which raises serious incentive problems. Suppose the investor decides that the population is too expensive to save. A rational government agent would realize that the cost to save the population is now strictly increasing. The government would want to declare the contract failed, and take the investor's money. At this point, to maintain interest payments, the investor could claim that the restoration simply needed more time. If the government concedes and waits, the species faces much higher risk. Other parties, state governments or NGOs, may try to step in to save the species. This would improve the investor's returns, but the incentives would be misplaced, as investors are tempted to sit on their heels doing nothing, knowing that someone else will pay the recovery cost. This moral hazard is similar to that faced by government when financial institutions make bad bets – the bankers can rely on government bailouts.

A simpler and cheaper alternative

Government can offer a simpler contract at lower cost. "We, the U.S. government, will create a contract with you as follows: we watch the population of the endangered species. If the population P stabilizes or rises, we will pay you $$Z$ (or perhaps $$P*Z$) per year. Now, let's bargain for the value of Z." This simpler contract does not require an investor to put up capital, so the transaction cost will be lower, and contractors will be easier to find. The expected cost of ecological improvement is the same as under the authors' proposal, but total cost to government is lower because the contractor has far less risk. Such instruments would be readily tradable.

Conclusion

"Because derivatives are zero-sum instruments, ie [sic] one party's gain is necessarily the other party's loss…" "Despite structural precautions and regulation, the market is likely to be volatile: there are winners and losers in any market." Such statements may tempt some readers to discredit the authors entirely. People buy insurance because they cannot afford catastrophe. Insurance companies spread the costs of catastrophe among many people, and make money doing so. When we buy insurance, we have an increase in utility, and that utility has economic value. Derivatives therefore cannot be zero-sum instruments.

Rational people trade because both sides are better off, and do not trade when they will not be better off. We can not see why either the American people or any endangered species will be better off with implementation of the authors' proposal.

Again, we think the authors deserve credit for attempting some creativity in market methods to improve the environment. We hope they continue in their pursuits.

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