

Sustainable management with environmental derivatives

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Abstract:

Environmental management agencies often try to keep natural assets within specific limits, and when they fail, recovery efforts must be implemented. Unfortunately, recovery efforts can be expensive. Environmental derivatives offer a solution. An environmental derivative is a contract where one party assumes the financial risk of recovery efforts in exchange for an upfront payment. The biggest challenge to using environmental derivatives in this manner is determining the payment price. We show payment prices for two natural assets in Australia (fish stocks) calculated using population dynamics forecast models. Prices reflect the risk associated with the contractual payout. Depending on how the asset is managed, a 20-year American-type derivative contract for a healthy school whiting fish stock in southeast Australia ranges between \$0.01 and \$32, for each \$100 promised in recovery pay-off, if it is needed. The price of a similar contract for the more depleted tiger flathead fish stock is between \$0.71 and \$42. The results demonstrate that environmental derivatives can 1. finance recovery efforts when they are needed; 2. provide incentive to formally adopt and compare 'rules-based' management strategies; and 3. signal the underlying 'health' of natural assets through the transparent derivative price. This work represents an essential first step towards developing a market for risk management of natural assets. Such markets would require independent regulatory institutions, with a scientific directive to address key uncertainties affecting the asset risk and thus market price.