Buybacks in Fisheries

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Paper given at a workshop at the Institute of the Americas, University of California San Diego organized by the Department of Economics, University of California San Diego and the Inter-American Tropical Tuna Commission, October 10-12, 2006.

Abstract

Buybacks of fishing vessels, licenses or access and other use rights, and gear can be key management tools to address overcapacity, overexploitation of fish stocks, and distributional issues. Buybacks can also contribute to a transition from an open-access fishery to a more rationalized one. As a strategic policy tool, buybacks can help restructure relations among participants in a fishery, creating positive incentives that reinforce conservation and management objectives. Buybacks, by reducing vessel numbers, increasing profitability, strengthening positive incentives, improving attitudes, and lowering exploitation pressures on fish stocks, can also help in the establishment of self-enforcing voluntary agreements among industry participants. Selectively targeted buybacks can also help conserve ecological public goods, such as the incidental bycatch of species other than tunas when sets are made on dolphins or floating objects.

1. Introduction[i]

Buybacks of fishing vessels, licenses, access and other rights, and gear can be key management tools to address overcapacity, overexploitation of fish stocks, and distributional issues. Buybacks can also contribute to a transition from an open-access fishery to a more rationalized one built on rights-based management.

The customary right of any state to fish on the high seas, national sovereignty, rudimentary or no property rights, and jurisdictional issues may well preclude immediate adoption of individual user rights protected by a strong international agreement. In their absence, vessels face incentives to expand fishing capacity and the race to fish, creating the well-known “Tragedy of the Commons”.

Under these circumstances, buybacks may play a special role in transnational tuna and other highly migratory species fisheries as one of the few ways to reduce fishing capacity and improve economic conditions -- but only if entry into the fishery is deterred through a limited entry program. Otherwise, potential free-riders will enjoy the benefits of reduced capacity by subsequently entering the fishery or even by fishing outside of the agreement. In the absence of individual user rights protected by a strong international agreement, and because buybacks don’t change the underlying property or use rights, buybacks in and of themselves don’t address the long-run incentives to over-invest in an open or limited access fishery. In fact, buybacks ironically can even aggravate this problem over the long run by strengthening investment incentives through growing profits.

Nevertheless, an on-going buyback program coupled with limits on individual vessel capacity and limited entry are one of the few policy tools available to reduce fishing capacity in transnational fisheries. Critically, buybacks may form part of a transitional strategy to a more rationalized fishery based on individual user rights back by a strong international agreement that fends off potential free-riders.

As a strategic policy tool, buybacks can help restructure relations among participants in a fishery, creating positive incentives that reinforce conservation and management objectives. Buybacks, by reducing vessel

numbers, increasing profitability, strengthening positive incentives, improving attitudes, and lowering exploitation pressures on fish stocks, can also help in the establishment of self-enforcing voluntary agreements among industry participants. Selectively targeted buybacks can also help conserve ecological public goods, such as the incidental bycatch of species other than tunas when sets are made on dolphins or floating objects.

Buybacks of vessels and licenses are widely applied in domestic fisheries, but have only been applied twice in transnational fisheries: the Italian Mediterranean drift gillnet swordfish fishery and the high-seas longline tuna fisheries conducted by Japan and the Organization for the Promotion of Responsible Tuna Fishing (OPRT)(Curtis and Squires in press). The unilateral Italian buyback simply allowed expansion by other states. The multilateral longline buyback was more successful, and would have benefited even more by broader participation.

2. Buybacks to Address Overcapacity and Overfishing

By directly reducing fishing capacity through removing vessels and relieving pressures on resource stocks, vessel profits and resource rents can potentially rebound, fish stocks recover, and income and wealth distribution change through redistribution of access and compensation and transfer payments. The objectives of most buyback programs often include a mixture of all goals, and simultaneous pursuit of these objectives is possible.

A successful buyback can raise profits in the short run. Fewer vessels mean that rent is shared among these fewer vessels. Lower fishing capacity can lead to higher catch rates for the remaining vessels, possibly allow gains in economies of scale and scope for the remaining vessels, and reduce overall industry costs (especially capital) and vessel costs.[ii] To the extent that the volume or timing of landings is not substantially altered, fish processors are likely to be unaffected in the short run and to gain in the long run through more sustainable supply.

Buybacks do not, by themselves, necessarily sustain profits to vessels and rents to the fisheries over the long run. Long-run rent gains depend on the ability to limit replacing or even expanding fishing capital. Economic welfare can fall with additional investment in the post-

buyback fishery if the use right conditions underlying the “Tragedy of the Commons” are not eliminated, so that further investments are redundant from the perspective of society. In the absence of property rights or taxes, increased resource rent can reinforce the very investment incentives that lead to the initial overcapacity.

3. Buybacks as a Transitional Strategy

Buybacks may form part of a transitional strategy to a more rationalized fishery. As long as management is based on input controls or TACs and without strengthened property rights, buybacks may not be the long-term answer, since vessels can expand fishing capacity by increasing investments and use of uncontrolled inputs (Wilen 1979, 1988, Townsend 1992) and technical progress (Squires 1992). Moreover, when fisheries are mired in debt and an absence of vessel profits and resource rent, cooperation is difficult to achieve among fishers. As a transitional strategy, buybacks can help counter these adverse forces.

After a successful buyback, when a fishery resumes profitability, increased cooperation can follow. The smaller number of fishers also contributes to increased cooperation, and the remaining fishers tend to be those most committed to the long-term economic viability of the fishery.

Autonomous adjustment following a management change may be relatively slow. A key factor influencing the rate of change is the alternative uses for retired capital. If there is not another fishery in which a vessel can be used it may be rational for an operator to delay exiting the fishery until the vessel is at or near the end of its economic life.

4. Features of Buyback Programs

This section examines some of the most important features of buyback programs based on the global experience. Papers in Curtis and Squires (forthcoming) more extensively discuss these and additional facets of buyback programs.

4.1. Critical Preconditions

There are several critical preconditions for a buyback of licenses or vessels. One of the first steps starts with

proper registration of license and vessels to create a well-defined group of eligible owners and to provide well-defined boundaries to the fishery and program. Because of the prevalence of eligibility requirements and different buyback pricing formulae, the registration typically includes some combination of measures of the heterogeneous capital stock, such as vessel size (GRT, GT, length, well capacity) and/or engine power, plus catch history, revenue, home port, gear type, methods of fishing, vessel age, crew size, area fished, and so forth. In some instances, a time series of some of these measures, such as catch history, is required for each vessel, such as when a window of multiple years is used to establish eligibility.

A second critical precondition of buybacks is *in situ* measures to prevent new boats from entering the fishery in place of the ones that have been removed. Without a pre-existing program of limited entry, ITQs, or some form of common or private property or use rights that strengthen exclusive use, funds from purchased vessels or licenses can be used to purchase an upgraded or new vessel for the fishery or new participants may enter the fishery as it becomes profitable.

A related issue is funds received from the buyback used to finance further investment in existing vessels held by the same owner, or to reenter the fishery by selling a vessel or license and using the proceeds to purchase an existing vessel or license. If there are permit holders which are not actively fishing but eligible to enter the fishery, one of these permits could be purchased for far less than the funds received to exit the fishery and fishing effort potentially expand. Public funding of buybacks can exacerbate this problem of fishing capacity expansions through investment and technical progress for the remaining vessels, since additional funds from outside of the sector are now potentially available for owners of exiting vessels, permits, or gear.

4.2. Who Pays for Buybacks?

Buyback schemes are most often funded by governments. The World Bank (2004) observes that public funding may be appropriate initially in terms of correcting past policy errors and that buyback schemes are effectively government subsidies for the improved performance of the fishery.

Mixtures of funding have been used. Commercial and recreational fishing interests may finance all or part of the buyback, usually in conjunction with public funds. Financing includes government grants, annual payments from license fees, and commercial or government loans.

A commercial fishery-financed buyback finances the program from the proceeds that are expected to arise following the expected recovery. Such a buyback can be initially funded by a public loan, which is paid back by the commercial fishery based on landings fees. In this case, the public bears a substantial portion of the risk of the loan. NGOs can finance through purchases of licenses or vessels. The World Bank, Asian Development Bank, Inter-American Development Bank, and other such institutions may have an important role providing initial funding for industry-financed buybacks in transnational fisheries.

When a buyback is financed by commercial or recreational fishers, the buyback's debt obligation becomes collective rather than individual. Collective borrowing rather than by individuals also spreads the risk among remaining fishers.

4.3. Purchase Vessels or Licenses (Permits)?

Should the buyback program purchase the vessel, license, or both? Purchasing only the license tends to be cheaper than purchasing the vessel, which in turn is generally cheaper than purchasing both the vessel and license. License prices may be set at the market rate (although expectation of increased revenues after capacity reduction may cause license prices to rise sharply) or at the value required to encourage the chosen proportion of fishermen to surrender their licenses (Read and Buck 1997).

Many vessels hold licenses for more than one fishery. If the program buys back only the license, the vessel remains free to fish elsewhere, and in doing so, shifts fishing capacity to another fishery. If the program buys back the vessel but not the license, the license, if allowed to be transferable to another vessel, can be used with another vessel in the fishery. In this instance, pressures on the fish stocks and economic rents may not be abated, and may even increase if the license is used with a vessel that is even more productive than the vessel that was removed.

Purchasing only the license frequently removes vessels from the fishery that are inactive or with low levels of fishing, but which could potentially increase their fishing as the profitability of the fishery improves. Inactive or low activity vessels may have their primary focus of fishing in other fisheries, and be holding licenses more as options to fish, and the license price may fundamentally reflect option value. Purchasing the lowest priced licenses tends to remove the least active vessels, such as vessels fishing part time or in multiple fisheries, or which are the most marginal in some other sense.

Purchasing inactive licenses affects the longer-term effectiveness of the buyback. The long-term effectiveness of buyback program can depend upon whether previously inactive vessels or buyback beneficiaries return to the fishery (GAO 1997

The license can be attached and locked to the vessel, so that a separate market for licenses does not emerge. The buyback would make no distinction between the vessel and license, and the buyback price would include the values of two assets. Fishing capacity would not be allowed to shift to another fishery. If a bought-out vessel also held licenses for other fisheries, and these licenses were also attached to the vessel, the buyback price could include the license values from the other fisheries and reflect the expected profitability of the other fisheries.

Other considerations arise when deciding whether to buy back vessels or licenses. There is a trade-off with affordability, since it is less expensive to buy permits. Another factor is whether or not strong spillover affects onto other fisheries. Also, if the permit is removed from the vessel through the buyback, can the vessel still participate in other fisheries? Part of the answer relates to the scope of the program.

4.4. Voluntary versus Mandatory Participation

Virtually all license and vessel buyback programs have been designed on the basis of voluntary participation. One of the few buyback programs with mandatory participation was the Northern Australian prawn fishery, which was extensively discussed by Holland *et al.* (1999). In this fishery, fractional licensing (Townsend and Pooley 1995) was used, in which vessels were required to purchase thirty

percent of their vessel units from other vessels to remain in the fishery. The Japanese longline buyback made provisions for mandatory participation should a sufficient number of voluntary participants fail to materialize, but this provision was never required (Kuronuma 1997).

4.5. Conditions on Reuse of Vessel, Gear, or License

Buyback programs may place conditions on the reuse of the purchased vessel, gear, or license. One of the most important conditions for vessel buybacks is whether or not the purchased vessel is required to be scrapped or not. If a purchased vessel is not scrapped or sold quickly, then the government incurs maintenance costs as well as losses from vessels both sinking and depreciating in value. Vessels which are not scrapped (and not committed to a non-fishery use) may be used in another fishery, which itself may face overcapacity and overfishing, thereby simply transferring the problems from one fishery to another while providing windfall gains to those vessel owners whose vessel was purchased and subsequently transferred. Even if a vessel is not transferred, funds from the buyout might be used to purchase vessel in other fisheries.

Some buyback programs allow construction of new vessels if the previous vessel is scrapped. There may also be a requirement that the scrapped vessel be no larger in terms of GRT or length or some similar measure of vessel size than the newly constructed vessel and may even require removing a greater amount of tonnage or engine power than the newly constructed vessel in an attempt to limit the growth in fishing capacity. Some buyback programs restrict the use of the vessel or license in another fishery in that country. Under the conditions of some buyback programs, vessels can convert to another activity or gear. Some buyback programs allow the vessel to be exported to another country. If purchased vessels are sold abroad, then there may be simply an export of the overfishing and overcapacity problems if the vessel is used in a fishery with the same problems. Vessels might be sold to help finance the buyback program, as in the British Columbia salmon troll buyback. The question remains as to the alternative use of the vessels that were sold.

A program that does not require scrapping may have an impact on the price of the vessel that is to be bought out and the prices of second-hand vessels may fall. A buyback

program that purchase only the license does not have to explicitly deal with a bought-back vessel; instead, the decision is retained by the vessel owner.

4.6. Conditions on Reinvestment

Conditions might be placed on reinvestment of funds received by vessel or permit owners, with an eye on limiting expansions in the capital stock and adoption of new technology that is either embodied in the capital stock or is disembodied, such as new ways of fishing. The British Columbia salmon troll buyback required that vessel owners replacing an existing vessel with a larger one were required to purchase another licensed vessel such that the gross tonnage of the two existing vessels was greater than or equal to the replacement vessel.

4.7. Buyback Price Formation Process

An important program design issue is the price formation process for the vessels, licenses, fishing rights, or gear to be purchased. There are many different ways to design this process, but in all instances a cost-effective process more efficiently removes fishing capacity. Some of the key issues include the program seeking bids or making offers, single price or reverse auctions, single or multiple rounds of bidding, sealed or open bidding, irrevocable bids, whether bids are responsive or non-responsive to the criteria and conditions established, the length of the bidding process and buyback program, and how much bids must be beaten by. The program designers have to decide which approach mobilizes support for the program, is more cost-effective, and fits the budget.

There are several different price formation processes. Consider first reverse auctions, in which operators submit confidential bids to the scheme, the lowest bid wins, and that operator is paid that lowest bid. Additional information may be required to help discriminate between the bids and achieve the greatest impact for least cost, such as different metrics as discussed below. Second, the buyback program may establish an offer price, which vessel, license, or gear owners are free to accept or reject. Third, in sealed bid auctions, the bidder with the highest sealed bid wins and pays that bid. Vickrey auctions have a second price, sealed bid format. The bidder making the highest bid wins and pays the next highest bid.

A reverse auction is the most widely used process to form prices. This process is called a reverse auction because a standard auction features a single seller receiving bids from would-be buyers. Bids are usually sealed. The buyback program may calculate and offer single-round prices, which asset owners are free to accept or reject. The program's offered buyback price may not equilibrate supply and demand, and the number of applicants can exceed or fall short of the funds available.

Price and distribution can be affected by eligibility requirements, bid ranking systems, and direct allocation of funds among groups. The scoring or ranking of bids affects who stays and who exits, i.e. the composition of the remaining fleet, and the amount of capacity that is reduced. A problem with most bid systems involving the sale of a vessel is that everyone offers a different product – there is not a homogeneous metric. However, the use of units of meters, tonnage, well capacity, revenue, or fishing capacity militates this problem. If licenses are for a given category, then the licenses are closer in equivalence than simply vessels, and hence easier to judge and require less information.

Buybacks can occur all in one round – the "Big Bang" option – or in multiple rounds. There are advantages and disadvantages to multiple and single round buybacks, and in practice, the availability and timing of funding often determines which approach is adopted.

5. Vessel Buybacks in Transnational Fisheries[iii]

5.1. Introduction

Unilateral buybacks in fisheries exploiting trans-national resources simply remove fishing capacity from one country, thereby reduce pressures on profits and resource stocks, which in turn allows free-riding through growth in another country's fishing capacity. The Italian buyback of fishing capacity in the drift gillnet fishery for swordfish simply allowed expansions of fishing capacity by other nations fishing swordfish in the Mediterranean (Spagnolo and Sabatella forthcoming).

The OPRT buyback of high seas tuna longline vessels in the Pacific is a second example of a buyback in a trans-

national fishery. Nonetheless, there was some free-riding through expansion of longline vessels by non-cooperating parties in this fishery, which in turn mitigated against some of the gains from the buyback.[iv] A key factor contributing to potential success is that Japan is the primary market for sashimi-grade fish, and if that market were denied to a longline vessel, that vessel would face difficulty in turning a profit (Joseph *et al.* 2006).

Gains to international cooperation through gains from participation and compliance and deterring entry and expansion by non-parties are perhaps the biggest challenges to a buyback on shared resource stocks such as tunas. Gains to multilateral cooperation from reducing fishing capacity due to a buyback come from saving on losses due to overcapacity and excessive exploitation of common resources, i.e. from lowering the losses due to the "Tragedy of the Commons."

Success requires that a buyback ensures that every party is better off with the program than without it, but to succeed the program also needs to ensure that each party would lose by not participating. That is, free-riding through non-participation must be addressed by some credible means, such as a credible trade restriction, as noted above. A positive incentive for participation comes to the remaining vessels through the aggregate gain from participating, in the form of increased profits, and to sellers of vessels and/or rights through compensation in the form of the buyback payment.

5.2. National Sovereignty: Individual Vessels or Flag States?

National sovereignty complicates buybacks in transnational fisheries. Buybacks and the critical preconditions of limited access and vessel registry can be defined either in terms of the individual vessel or the flag state. That is, what is the basic unit in the program, flag states or vessels and their associated measures of fishing capacity (potential output, GRT, well capacity, length, etc.)? Can vessels and their associated measure of capacity freely transfer among flag states, or are vessels and their associated capacity directly tied to the flag state? IATTC developed their Regional Vessel Registry incorporating the concept of transferability, but there has been reluctance on the part of some states to recognize

this provision of the program. Strictly on the grounds of economic efficiency, a limited access and vessel buyback program defined solely in terms of vessels rather than flag states can be expected to lead to greater economic rents and overall healthier profits in the fishery, since there can be greater gains from trade (arbitrage efficiency) as capacity and the right to fish shift to lower-cost vessels.

5.3. Coastal and Distant-Water States

An additional issue that arises is the distribution of vessels and fishing capacity among coastal and distant-water states, and more generally, the unique nature of the required multilateral cooperation to manage fishing capacity when there is asymmetry among states. This issue is not unique to fisheries. Major international environmental agreements, such as the Montreal and Kyoto Protocols, addressed similar asymmetries between developed and developing nations with global atmospheric public goods. Coastal states control entry into their EEZs and special privileges are enshrined in international law. Potentially viable limited entry and buybacks have to allow for the expansion of vessels and fishing capacity by coastal states.

Fractional licensing is an alternative to vessel buybacks. Vessels are allocated only some fraction (not the entire amount) of the access right required for the fishery and must purchase the remaining amount from other, existing vessels (Townsend and Pooley 1995, Joseph 2005).

IUU (illegal, unregulated, and unreported) fishing can also undermine the effectiveness of any buyback program established under the auspices of regional fishery management organizations. Cooperating parties may be deterred when non-cooperative nations reap the external benefits flowing from the sacrifices of cooperating parties, i.e. there is free-riding.

5.4. Limited Access: A Critical Precondition for Buybacks

The ability to legally deter free entry into the fishery by new vessels under existing international law is a critical precondition for a buyback. Evolving customary law may be reshaping conditions to deter free entry through the formation of regional vessel registries in the IATTC, IOTC, ICCAT, and CCSBT. Hallman *et al.* (2006) provide further

discussion on limited entry in transnational tuna fisheries.

5.5. Financing the Buyback

Buybacks within regional vessel registries that limit entry can be financed, in part, by industry participants, perhaps seeded by an initial low-interest loan by a development bank or consortium of governments. In fact, the World Bank observes that in view of the high level of funding required, and the policy nature of those schemes, the World Bank and other major international financial institutions could support buyback of surplus vessels through broad sector instruments, such as Sector-Wide Approach programs (SWAPs) or Poverty Reduction Support Credits (PRSCs) or perhaps even the Global Environmental Facility (GEF) (World Bank 2004).

Buybacks aimed at protecting ecosystem health can, in principle, be legitimately financed by governments and international public institutions to the extent that these funds reflect the public's willingness to pay for the "existence value" of the ecosystem's health. In principle, buybacks financed by governments solely for capacity reduction without loan repayment constitutes a subsidy, but since government subsidies contributed to the overcapacity problem, government subsidies may be called for, in part, to correct this problem. As the fleet was reduced toward the target size, the average catch per vessel would increase and profits rise, so that the industry can better fund the buyback. Thus the initial loan and on-going payments for buybacks could be funded by an assessment on each vessel; a landings tax would raise funds proportional to the amount of fishing. Increased profitability with success of the buyback would provide the fundamental pool of funds. Alternatively, as Joseph (2005) notes, all or part of the tax or assessment could be applied to the processed product, since the processors would reap the benefits of a well-managed fishery. Ultimately, the relative price elasticities of producers, processors, and consumers would determine the incidence of the tax among these groups. The assessments and development of a pool of buy-back funds would be region-and gear-specific.

Recreational fishers can also be expected to contribute to financing the buyback, thereby reflecting their share of the resource's exploitation. Such co-

financing of a buyback occurred in the Texas shrimp fishery (Riechers, Griffin, and Woodward forthcoming).

6. Buybacks to Address Ecological Issues

Reductions in the total level of fishing capacity through general buybacks can directly reduce catches of non-target species (as well as the targeted tunas) and thereby help strengthen ecosystem health, but the amount of reduced overall fishing capacity may be insufficient to fully address this ecological issue. Buybacks of vessels and/or use rights – the carrot approach -- can instead specifically target vessels harvesting in ways or with gear that have the most detrimental ecological impacts in sectors of the fishery facing the greatest ecological issues. Historically, economic incentives to address ecological issues, such as incidental takes of dolphins or sea turtles taken when shrimp trawling, have generally relied upon negative economic incentives through trade measures and boycotts (cf. Joseph 1994).

Further discussion on the use of buybacks to address bycatch and other ecological issues is provided by Gjertsen, Hall, and Squires (2006).

7. Issues from an Industry Perspective

Whatever program is put together has to make sense to participants. This is a particularly important issue if the buyback program is industry initiated and financed. Participants have to buy in and understand that a buyback program has to take place. Industry support is critical for success.

Industry support requires finding a champion, because leadership is required to bring a buyback program to fruition, particularly if the program is industry financed. Such a focal person helps to insure that the necessary steps occur throughout the process.

Dealing with non-supporters throughout the process is an important leadership element in any buyback program, since not everyone will buy into the buyback need and program. Some non-supporters will become deterrents. Non-supporters can come from the fishery in question or from people outside of the industry who sincerely do not want such an approach.

Flexibility is required throughout the process, since the unexpected arises. This flexibility may even requiring retracing steps or even starting over. Fishers and governments have to support the buyback, to realize that change has to occur, and that the process is not arbitrary.

8. What Are The Main Lessons to Be Learned From The International Experience?

First, and one of the most important lessons, is that it is much easier and less expensive to *ex ante* prevent overcapacity, overfishing, and ecosystem degradation than an *ex-post* reduction.

Second, buybacks are a strategic choice that affects incentives and thereby can play a strategic role in a transition to a more rationalized fishery based on user rights and restructure incentives and relations among participants through improving the economic conditions during a window of opportunity following a buyback. If buybacks sufficiently reduce the number of participants and profits sufficiently rebound, the remaining participants are likely to be the most committed and to enjoy growing cooperation and more favorable attitudes toward more complete individual or common rights.

Ultimately, because buybacks don’t change the underlying property or use rights, the long-run incentives remain to over-invest in an open or limited access fishery. In fact, buybacks with ill-structured rights ironically even aggravate this problem over the long run by strengthening investment incentives through growing profits, that eventually overwhelm the positive but temporary economic incentives created by the buyback. In a nutshell, buybacks create a window of opportunity to rationalize a fishery that erodes over time.

Buybacks viewed as a strategic opportunity have a number of different ways to induce changes in behavior through the choices that are made for the design of the buyback program. Every substantive choice can affect incentives and thereby behavior of the remaining participants, and even the decision of who chooses to stay and who chooses to leave the fishery through participation in the buyback.

Linkages of program design features can also be a strategic choice. For example, requiring purchased vessels to also be scrapped or preventing owners of purchased vessels from using the proceeds to reinvest in the fishery affect not only the level and growth of fishing capacity, but can also affect who elects to participate, the purchase prices, and fishing capacity and profits. A buyback can be linked with requirements for conservation of biodiversity and ecosystem health or with time-area restrictions on fishing.

Third, all other things equal, buybacks are more likely to be effective at reducing fishing capacity when fleets are smaller in numbers and when there are fewer vessels and fewer permits that are largely inactive or active at low levels. Similarly, all other things equal, larger budgets allow greater reductions in any given number of vessel and licenses. Buybacks can become expensive, and there is risk that their cost can exceed the benefits gained.

Fourth, buybacks can vary by their extent of inclusiveness, or equivalently, their focus on groups of vessels. The focus of buybacks can vary depending on the gear, methods of fishing with a gear, species fished, the amount of time fished (“active” versus “inactive” vessels), and recreational or commercial fishing. In this regard, the buyback can be broad but shallow, with all vessels and fishers eligible to participate, or more narrow but deeper, focusing on a particular group or segment of the fishery. Every one of these choices is a strategic choice that affects incentives and hence behavior and which shapes the type and structure of the post-buyback fishery.

Fifth, the design of the buyback program has distributional implications. Different designs and program features, such as bidding metrics, create different sets of gainers and even losers. Moreover, crewmembers seldom directly gain from a buyback, although supplementary programs, such as job retraining or educational grants, can address this issue.

Sixth, several preconditions are critical for buyback programs to be effective. Proper registration of licenses and vessels creates a well-defined group of eligible owners and provides well-defined boundaries to the fishery and program. Establishing broad participation is critical in

transnational fisheries. Limited access is another critical precondition in both domestic and transnational fisheries. Without limited entry, vessels enter the fishery as profits rebound following the capacity reduction induced by buybacks, and fishing capacity increases; the conditions for free-riding are established.

Seventh, buybacks work best through co-management, i.e. through cooperation between the public and private sectors and other interested parties. Co-management can affect the strategic choice of the buyback program design and the incentives for industry participants. Strong industry participation in all phases of the program strengthens the chances for success. Consultations and workshops with user groups help design better programs, prepare the user groups for the buyback, and critically, help build and enlist support from user groups.

Eighth, moral hazard issues may arise. The purchased vessels are frequently older and less productive than the remaining vessels. The buyback may merely accelerate the departure of vessels marginal to the fishery that would have departed in any case, but the buyback facilitates and accelerates their exit and at a higher vessel purchase price than would otherwise occur. Purchased vessels or licenses may also be among the least active, so that buybacks may have little effect in improving economic performance and helping resource stocks to recover. By absorbing risk and establishing a vessel or license price floor, buybacks may also strengthen investment incentives for the remaining vessels.

Ninth, there is often no single, best answer to many program design issues. Nonetheless, clear objectives and a clearly defined scope of the program are critical. A pilot program can also be helpful. One or more champions, whether individuals, organizations, or public agencies, can play an important galvanizing force.

Tenth, decisions must be made to first purchase active or inactive vessels and vessels or permits or both. Purchasing inactive vessels and/or permits has the advantage in that it is cheaper and it can allow ready expansion of fishing capacity as profits rebound and fish stocks bounce back. In most instances, vessels and their permits are purchased together rather than simply the

permits, since removing the vessel eliminates capacity plus any spillover effects on other fisheries.

Eleventh, beneficiaries of a buyback program can contribute to the funding of the program in all or in part. Commercial fishers can enjoy increased profits, recreational anglers can benefit from higher catch rates, and the general public and NGOs gain strengthened ecosystem health. The initial funding for a buyback, especially when the fishery is unprofitable, may have to be a loan from a national or state (regional or provincial) government or, in the case of transnational fisheries, from an international organization. To some extent, public funding can be viewed as compensation for past policy errors. Public loans to user groups mean that the public bears the risk of the loan. Public or industry financing creates a debt that is a collective rather than individual responsibility. Public or private outlays can be recovered through user fees, such as licenses or entrance fees to marine parks, and landings taxes, so that those enjoying the most revenue and revenue increases bear the most financial responsibility. Public funding without repayment from rent increases is ultimately a transfer payment, which can be capitalized into license or vessel values and raises prices and the cost of the buyback.

Twelfth, the net economic benefits of a buyback, particularly a public-funded program, depend on the benefits that could be generated by these funds in their next best use elsewhere in the economy and the size of the overall benefits from the buyback in comparison to the program expenditures.

Thirteenth, partial or completely private-financed buybacks may be preferred to full public-financed buybacks because the tax for a private-funded buyback is a double dividend tax that helps to correct the resource stock externality both as a tax and through funding the buyback. The tax compels firms to confront some of the external costs for the resource stock and the ecosystem due to ill-structured property rights. Depending on the incidence of the tax between fishing firms, processors, and consumers, there may be incentives to curtail fish consumption, since consumers do not bear the full costs of fish consumption. Private-financed buybacks also force industry rather than the public to bear any potential moral hazard, i.e. risk and costs from expectations of future bailouts.

Fourteenth, the administration of payments and the bidding process are critical program design issues. Should buybacks proceed on the basis of bids by vessel or permit owners or offer prices determined by the program? Capacity is usually purchased through vessel, license, or gear bids and reverse auctions and often on the basis of some metric of fishing capacity, such as dollar bid offered per GRT, HP, revenue, catch, cubic meters of well capacity, meters of length, and so forth. Bids can be in a single round or multiple rounds. Multiple rounds of buybacks increase administrative costs, but may also reduce strategic behavior in offers. Multiple rounds also allow adjusting payments to target particular groups of fishers by adjusting the criteria for bid acceptance and allowing fishers to reformulate their bids. Pilot programs can help. Bids are typically sealed. Irrevocable bids prevent “stink bids,” in which speculators bind up a large proportion of the available funds. The program administrator can help owners form price expectations and markets to form by working to lower transactions costs and providing market information through releasing average price per unit of capacity, total available funds, etc.

Fifteenth, selective buybacks can help achieve social objectives other than efficiency and resource conservation goals, including accommodation of new entrants or coastal states, and shifting capacity regionally, by gear type, or set type. Buybacks compensate those in the industry that would otherwise lose out from rebuilding fish stocks and restructuring the industry. Buybacks have a differential impact on gear types or regions, but maintaining an equitable allocation of harvests among gear types or regions helps ensure political support.

Sixteenth, buybacks have largely focused on overcapacity, overfishing, raising profitability, and disaster relief, and have seldom been intended to address goals of ecosystem management and conservation.

General buybacks are a blunt instrument, but to the extent they can target selective areas or times fished, gear types, or modes of fishing, buybacks can provide a tool toward restoring ecosystem health. Buybacks targeted at methods of fishing, such as sets on floating objects, can reduce bycatch.

Seventeenth, buybacks for transnational fisheries exploiting shared resource stocks are unlikely to be effective without a multilateral program among those countries contributing the bulk of the fishing capacity on the common resource stock. Simply put, unilateral rather than multilateral buybacks face failure. The participation issue must be addressed. Buybacks in transnational fisheries must also be predicated upon deterrence of new entrants (other than through purchase of licenses), which requires changes in, at a minimum, customary international law. Negative economic incentives, such as credible trade measures, may be necessary to deter entry and to insure compliance by participating parties. Allowing capacity to transfer among individual owners, rather than restricting to flag states, allows more efficient capacity reduction. Coastal states, when resource stocks span both EEZs and high seas, are typically afforded special accommodation for growth, which can represent a side payment.

Eighteenth, buybacks alone are not the long-term solution to the overcapacity and overfishing problem in the open-access or limited access fishery, although they may be the best option available in the foreseeable future for transnational fisheries given the limitations of international law pertaining to individual user rights protected by a strong international treaty.

Nineteenth, buybacks, essentially an input control, primarily addresses the capital stock and only indirectly the relationship between inputs and catches. Under command-and-control input controls, uncontrolled inputs can be substituted for controlled inputs, such as investment in additional capital in the remaining vessels, the capital stock of the remaining vessels may be more fully utilized and fishing capacity increased by fishing longer, or technology may progress, such as the addition of vessel electronics. Vessel buybacks unaccompanied by a comprehensive use right thus have the same shortcomings as limited entry in that the underlying ill-structured property rights continue to generate incentives for continued investment, and incentives spawning overcapacity and over-fishing remain.

Twentieth, the long-run success of a buyback program in reducing fishing capacity and mortality without a strengthening of the use or property rights requires controlling future growth in fishing capacity through

restrictions on investment and increased fishing time, ideally through positive incentives. Additional rounds of buybacks may be necessary.

Twenty-first, buyback programs need to be evaluated to identify lessons learned that might help improve future programs.[v] Planning for such evaluations, including developing measures to evaluate program results, should be an important part of the design of future programs. In addition, develop performance measures for buybacks that relate to program goals and broader legislative goals, such as the need to better manage fishing capacity and sustain fish stocks.

9. Concluding Remarks

Buybacks of vessels, licenses, access and other use rights, or gear have been demonstrated to be a useful policy tool under a certain set of conditions and for a limited period of time before the benefits erode. Buybacks are not a panacea or a long-term answer by themselves to overcapacity, overfishing, and ecosystem degradation, but they may be the only feasible option for a transnational fishery to reduce fishing capacity.

Buybacks can accelerate the transition to a rationalized fishery and enhanced ecosystem health when coupled with limited entry, scrapping of bought-out vessels, limits on reentry into the fishery through purchases of formerly inactive licenses by owners who have just sold an active license, and comanagement through partnership with the industry. Financing the buyback may be a mixture of public and industry financing with initial loans or grants by an international institution.

Buybacks in a transnational fishery are not a replacement for a system involving individual user rights that is protected by a strong international agreement. Nonetheless, an on-going multilateral buyback of vessels, licenses, other use rights, or gear, coupled with vessel capacity limits and limited entry, may be the only tractable approach to reduce capacity until a system of individual user rights protected by a strong international treaty is instituted.

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Endnotes

[i] This paper draws heavily from the papers in Curtis and Squires (forthcoming), and especially Groves and Squires (forthcoming) and Hannesson (forthcoming). The paper also draws from Barrett *et al.* (2004), FAO (1998, 2000), GAO (1999, 2000), Holland *et al*. (1996), Joseph and Greenough (1978), Joseph (2003, 2005), Joseph *et al*. (2006), Weninger and McConnell 2000, and World Bank (2004).

[ii] Economies of scale are reductions in unit harvesting costs when costs, especially fixed costs, are spread out among higher levels of output or catch. Economies of scope are cost savings from joint production of multiple outputs or species.

[iii] This section largely draws from Barrett (2003, 2005), Curtis and Squires (in press), Joseph and Greenough (1978), Joseph (2003, 2005), Barrett *et al.* (2004), Joseph *et al*. (2006), Groves and Squires (forthcoming), Hannesson (forthcoming).

[iv] Joseph *et al.* (2006) observes Japan has targeted 130 vessels for removal from its fleet, and Taiwan has agreed to limit its fleet to 600 vessels. Taiwan will require that Taiwanese-owned vessels under flags of convenience be transferred to its registry. Some of the recalled vessels will be bought back and scrapped along with the 130 Japanese vessels. Moreover, funds were loaned to the industry groups by the Japanese government on a 20-year payback schedule. This buyback was partly in response to the reduction of fishing areas when national waters were extended into what had been international fishing grounds (Holland *et al.*).

[v] This recommendation draws almost verbatim from GAO (2001, pages 5-6). Kitts and Thunberg (nd) and Kitts *et al*. (1998, 2001) are extremely useful for practical design and evaluation.