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Summaries

On the redistributive impact of privatizing a resource under imperfect enforcement

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The establishment of clearer property rights over resources is often proposed as a solution to the problem of the 'tragedy of the commons'. This solution is generally based on the premise that property rights can be perfectly and costlessly defined and enforced. Costless enforcement is a strong requirement in most settings, and especially so in the case of diffuse resources such as forests, fisheries, or game. In the present study, we introduce costly enforcement of property rights in order to analyze the redistributive effects of privatizing a natural resource when exclusion is imperfect. We are also concerned about the political feasibility of the newly created private ownership regime. We thus consider its impact among heterogeneous individuals living in the vicinity of the resource.

The setting in our model is that of a village located next to a natural resource, such as a forest or fishery. A villager can earn a living by either exploiting the resource, or by some other 'outside' occupation not related to the resource. Villagers differ with respect to the income that each one can derive from his or her outside opportunity.

Initially, the resource is subject to a regime of free access. The local, or national, authorities privatize the resource by allowing an outside firm to access the resource, while declaring illegal its access to villagers. This implies that the authorities must enforce that limited access. The physical nature of such resources as forests and fisheries, however, makes exclusion difficult to enforce and often results in imperfect enforcement. Hence, members of the local community may decide to extract the resource illegally.

The main feature of our analysis resides in the combination of imperfect enforcement and heterogeneous villagers. Since villagers have different outside income opportunities, the severity of punishment for those who get caught encroaching on the resource will differ across individuals. We show that individuals with low outside opportunities may gain from the privatization of the resource, even though they now exploit the resource illegally. This is because once some villagers are excluded from exploiting the resource, its average productivity may increase in such a way as to make the poorest villagers better off.

We find that the authorities can affect the degree of political feasibility of the regime change through the enforcement level, which we express as the expected severity of punishment of an encroacher. A high enforcement

level has the advantage of leading to a more conservative use of the resource as well as to higher rents for its owner (which often partly accrue to the local or national authorities in the form of royalties or bribes), but carries the political cost of being too severe in its exclusion of the poorest villagers. Our contention is that the authorities might prefer to choose an intermediate level of enforcement in order secure the political survival of the new exploitation regime.

A note on 'the simple analytics of the Environmental Kuznets Curve'

FLORENZ PLASSMANN and NEHA KHANNA

Andreoni and Levinson (2001) argue that, under very mild restrictions on preferences, increasing returns to scale in pollution abatement are a sufficient condition for pollution to ultimately fall to zero with income growth. Their paper has received considerable attention in the environmental economics literature; as of July 2006, the *Social Science Citation Index* shows 27 publications that cite this paper. They suggest (p. 284) that 'simple explanations regarding the technology of production and abatement could be central to understanding the phenomenon' of the Environmental Kuznets Curve (EKC). We show that their result is driven by their particular choice of the functional relationship between consumption and gross pollution, and that abatement technology is much less important in a generalized model. The impact of the technology of production and abatement on the existence of an EKC is therefore likely to be smaller than suggested, and an increased focus on technology may not add as much to our understanding of the EKC as Andreoni and Levinson envisage.

Andreoni and Levinson derive their main theorem under the assumption that consumption and gross pollution are directly proportional. However, even if the relationship between consumption and gross pollution is indeed linear, such a one-to-one correspondence depends on the units in which consumption and pollution are measured. It is also possible that the true relationship is non-linear.

We extend Andreoni and Levinson's model by permitting a general relationship between consumption and gross pollution. We show that increasing returns to scale in abatement by themselves are not sufficient for pollution to fall with income, and that the existence of an EKC depends on the relative magnitudes of the returns to scale in abatement and in gross pollution, rather than on their absolute values. Our analysis indicates that there is nothing special about increasing returns to scale in abatement, and that, even under decreasing returns to scale in abatement, pollution will eventually decline to zero, as income increases as long as the returns to scale in gross pollution are less than the returns to scale in abatement.

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Our result suggests that pollution reduction at source (generation) is just as important as end-of-pipe type abatement efforts, and that empirical evidence of increasing returns to scale in abatement does not imply anything about the income–pollution path.

Regional economic impacts of limited entry fishery management: an application of dynamic input–output model

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In response to the overexploitation of commercial fisheries, many countries have adopted policies that restrict the numbers and size of fishing vessels. However, limiting the fishing effort or capacity has been a controversial subject, as this policy appears to cause unemployment in fishing communities. Fishery agencies are grappling with a policy dilemma: while effort-reduction policies could increase biological stocks and fishery profits, the same could jeopardize the fishery labor community as well as other sections of a regional economy. The adverse impacts that fishery policies inflict on the regional economy have received very little attention by economists. The primary objective of this paper is to check whether the additional profits generated by entry policies are large enough to offset the economic losses that occur within and outside fishery sectors. Focusing on a representative marine fishery in India, the paper attempts to shed light on policy instruments that help balance this economic tradeoff.

We develop an integrated analytical framework that combines a bioeconomic fishery model and a dynamic input–output (DIO) model. The multi-species, multi-year harvesting model is used to measure the effect of reducing fishing effort (inputs) on the total fish catch over time. The production of certain species could go up while others down. These production changes are further introduced into the DIO model to estimate the sector-wise changes in output, wage income, and fishery profits. The DIO model is cast on a simple Excel spreadsheet. Two management scenarios are analyzed to estimate the effects of access restrictions: (a) an open-access harvesting situation where firms freely enter and exit a fishery in response to previous year's profits; and (b) a restricted-access situation where effort levels of profit-making harvesting sectors (deep trawlers and purse seines) are frozen at their 1998 level and the efforts of the remaining vessels are reduced by 20 per cent. We find that after certain years of sustained effort restriction, the annual profit gains of fishery policy will start exceeding the total wage income losses of fishery primary, backward and forward-linked industries. However, depending on the interplay of biological and economic factors, primary fishery sectors

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undergo a transition period of sizable economic losses before they register profit gains. Further, the amount of losses in the fishery sector's wage is negligible compared to the size of profit gains. Non-fishery sectors experience sizable losses throughout the policy period. In our case study, however, these losses constitute a small portion of the industry's output, income, and wages.

Appropriate complementary policies are necessary in order to alleviate the economic hardships inflicted on fishery and non-fishery sectors by effort reduction. Coastal cities in many developing countries, including India, have experienced industrial growth and new non-fishery employment opportunities. Sufficient management effort is needed to re-train fishery laborers for jobs in non-fishery sectors. A portion of the policy-induced income gains may be recovered through suitable tax or entry-fee policy on operating vessels for financing training and employment promotion programs. Also, when certain fishing vessels are decommissioned, fishers may lose money that is invested in fishing gears as sunk costs. Money recovered in the form of new taxes from the remaining fishers might be utilized to compensate such sunk costs.

Combining averting behavior and contingent valuation data: an application to drinking water treatment in Brazil

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This paper estimates willingness to pay (WTP) for drinking water quality in Brazil by combining averting behavior with contingent valuation data. The novel combination of averting behavior and contingent valuation data contributes to the growing literature on joint estimation. Using bivariate probit models, alternative structures allowing for heteroscedasticity between and within data sources are incorporated by taking advantage of the different information content that characterizes each data source. We look at two covariates, not yet examined in the literature when combining stated preferred (SP) and revealed preferred (RP) data, to explain the variance in the models: income (*INC*) and the bid in the contingent valuation questionnaire (*C*). Tests for parameter equality across data sets are performed.

When all the parameters are constrained to be the same in the joint estimation it is not possible to accept the hypothesis that the two data sets have a common underlying preference structure.

Moreover, the different specifications for heteroscedasticity are not without consequences to the unconstrained models, as the WTP estimates

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are sensitive to them. While income has more impact in WTP^r , the impact of the bid is more significant in WTP^s.

Also, we conclude that the specification of heteroscedasticity is crucial in our sample to determine the existence of a common preference structure between RP and SP data. When *C* was incorporated as a source of variance, the hypothesis of taste parameter equality across data sets, except for the parameters on *HSORMORE* and *CONNEC*, could not be rejected. Thus, with this specification for heteroscedasticity, the performed test points to the existence of a common underlying preference structure behind the SP and the RP data sets when a linear utility function is used. We were no longer able to accept the hypothesis of taste parameter equality when the variance was modeled as a function of income. Thus, when pooling data sets several specifications for heteroscedasticity should be attempted.

Significant differences between the WTP estimates for the two data sources were found. Different reasons may explain these results and are related to the specific socio-economic characteristics of the population surveyed. In general, these are common phenomena found in developing countries, where institutions are very often not perceived as credible.

Price linkages in Pacific tuna markets: implications for the South Pacific Tuna Treaty and the Western and Central Pacific region

DALE SQUIRES, TAEKWON KIM, YONGIL JEON, and RAYMOND CLARKE

A revenue-sharing arrangement is under consideration between the USA and Western and Central Pacific Island Parties. When the ex-vessel price for cannery-grade skipjack tuna is above a minimum price, Pacific Island Parties would share in the increased revenue. This arrangement would provide economic incentives to these island nations to control fishing capacity and thereby increase revenues and economic rents. This potential arrangement raises the issue of which market and species prices to use as a benchmark, Bangkok or Pago-Pago; American Samoa and skipjack or yellowfin tuna.

This paper, through a time series analysis of spatial price linkages, finds price leadership for skipjack in Bangkok and a weaker feedback effect from Pago-Pago to Bangkok; that is, ex-vessel prices for skipjack are first established in Bangkok and are then transmitted to the Pago-Pago ex-vessel market for cannery grade skipjack tuna, but with a weaker feedback effect from the Pago-Pago to Bangkok skipjack prices. In addition, these prices move together over the long run in the sense that even if over the short run the two prices diverge from one another, they eventually converge to

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a common trend with a stable difference and common movement together over the long run. Such a long-run relationship is not found between skipjack and yellowfin prices in the Bangkok and Pago-Pago markets.

These price linkage relationships indicate that the selection of a benchmark price for any revenue sharing can rest upon skipjack prices with the understanding that the Bangkok and Pago-Pago skipjack markets are linked by price, that neither of the skipjack market prices is solely set by local conditions, price formation in either market affects the other market's price formation for skipjack, but that Bangkok exerts price leadership for skipjack. Establishing the benchmark price for the revenue-sharing agreement to provide economic incentives to manage fishing capacity on the Pago-Pago skipjack price means that increased volumes of landings in Bangkok from increased fishing capacity outside of the US fleet will affect the Pago-Pago price, even if the pertinent fishing capacity affecting landings in Pago-Pago is tightly controlled.

The revenue-sharing arrangement through control of tuna purse seine fishing capacity, especially if extended to all flag fleets, can potentially contribute to strengthened Pacific Island Party economies. Higher tuna revenues and resource rents increase the potential for higher rents collected by Pacific Island Parties through access licenses and fees. The higher government receipts and greater price stability can increase macroeconomic growth and employment by island economies.

Measuring the socioeconomic impacts of China's Natural Forest Protection Program

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China has been implementing one of the world's largest ecological rehabilitation projects, the Natural Forest Protection Program (NFPP), to improve its fragile and precarious ecosystem conditions. While the NFPP has drawn broad attention, little has been done to measure its potential socioeconomic impacts. The goal of this paper is to tackle this important issue using an input–output analysis based on the recent Chinese national statistics. The socioeconomic impacts of the NFPP on a specific sector or the whole economy come from two sources – the increased investments in forest protection and management, and the logging bans and harvest reductions. Further, these impacts can be measured in terms of total output, employment, wages and salaries, and value-added.

We found that compared with the 1997 base case, the total output of the forest sectors (forest management, logging and hauling, sawmilling and panel production, furniture and solid wood products, and paper and paperboard making) was reduced by 1.3 billion Yuan in 1998 due to the logging bans and harvest reductions. However, the government

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investments led to an output increase in these sectors by 2.4 billion Yuan in the same year. By 2010, the annual output of the forest sectors will expand by 5.8 billion Yuan and that of the overall economy will increase by 8.9 billion Yuan. There were 0.04 million laid-off employees in the forest sectors in 1998, while the government investments added 0.34 million jobs. The total employment of the forest sectors and the whole economy by 2010 is projected to increase by 0.84 million and 0.93 million, respectively. The reduced log production caused a loss of value-added in the forest sectors by 0.8 billion Yuan in 1998, but the increased investments in forest management resulted in a value-added gain of 1.7 billion Yuan. The annual value-added in the forest sectors will increase by 4.2 billion Yuan in 2010, of which wages and salaries will account for 3.7 billion Yuan. As a whole, the NFPP will augment the annual value-added of the economy by 5.4 billion Yuan, of which wages and salaries will gain 4.3 billion Yuan.

In short, implementing the NFPP will greatly benefit the forest sectors from the increased governmental investments, although the benefits come with a significant cost to the logging and hauling sector. If properly implemented, the positive impacts of the NFPP would much more than offset the negative consequences of the logging bans. Also, potentially tremendous contributions to mitigating the problems of water runoff, soil erosion, flooding, and biodiversity loss are associated with the enormous expansion of forest protection and management. Therefore, the NFPP can be a great environmental and economic policy. However, the challenges are to truly transform the loggers into tree planters and forest managers, to ensure the financial and institutional commitments made by the central and regional governments are materialized, and to complete the necessary structural adjustments in an efficient and coherent fashion.