

Summaries

Environmental policy, comparative advantage, and welfare for a developing economy

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The relation between trade liberalization and environmental quality has been extensively studied in the literature. The pollution haven hypothesis asserts that due to strict environmental protection in developed economies, pollution-intensive industries tend to move to developing countries. This hypothesis leads to a prediction on the pattern of trade: developed economies will have a comparative advantage in less polluting goods and developing economies in more polluting goods. Furthermore, the hypothesis implies that more trade will cause environmental degradation and pollution in developing economies.

In this paper, we consider a dual developing economy, in which both the urban and rural goods generate pollution emissions in the process of production. Final-goods producers can buy abatement services to lower pollution emissions or simply pay taxes for emitting pollution. We investigate how pollution taxes on both goods can affect factor returns, goods' prices, urban unemployment, and social welfare for the economy. In particular, due to the real urban wage rigidity, pollution taxes increase the effective cost of producing the urban good and hence raise its relative autarky price. Nevertheless, because of the flexible rural wage, the tax has no effect on the effective cost of the rural good. Hence, higher pollution taxes on all polluting goods yields a comparative advantage for developing economies in the rural good, regardless of whether it is more or less polluting than the urban good. This suggests that a developing economy, because of flexible rural wages, may have a comparative advantage in a less polluting rural good. This result would be against the traditional finding that developing countries tend to have comparative advantage in more polluting goods. Moreover, the higher price of the urban good leads to rural–urban migration, thereby raising the urban unemployment ratio.

Another contribution of this paper is to study the optimal pollution tax for this dual developing economy. Due to more pollution abatement and reduction in outputs, we find that the higher pollution tax can actually improve overall environmental quality but at the expense of urban unemployment. The trade-off between jobs and the environment causes the optimal pollution tax to be below the marginal environmental damage (i.e., the Pigouvian rate) for developing economies.

Rate of time preference and the quantity adjusted value of life in India

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Economic development can have significant environmental impacts. This is true of projects in major sectors including power and energy, industry, transportation, sanitation, and sewage. Exposure to environment contaminants may cause risks to human life/health. To regulate these risks, governments undertake various policy proposals. The health benefits of these policy proposals often have quite different time patterns of incidence. The cost-benefit analysis that is used in examining such proposals requires the appropriate social discount rate for comparing the long-term health benefits.

Although the literature provides various suggestions – zero rate, the opportunity cost of public investment, and the real interest rate on low risk bonds – economists generally accept that society's risk less time preference rate can be used for all benefit components if the capital market is perfect. In the presence of capital market imperfections that are common in many developing countries, the issue becomes more complex, particularly since health is not traded explicitly in an intertemporal market.

Therefore various studies have attempted to resolve this issue empirically over the years. They have estimated the time preference rate for health impacts using different methodologies and compared the estimated rate with the interest rate for trading financial resources. Broadly, these studies are grouped as: (i) "experimental studies", which directly ask individuals to evaluate the stylized intertemporal prospects involving real or hypothetical outcomes (health/life years) and (ii) "field studies", which estimate the discount rates by identifying the real-world behaviors that involve trade-offs between the near future and the more distant future. Under the category of "field studies", the discounted expected life years lost approach utilizes labor market data to estimate the implicit time preference rate that workers reveal through their willingness to incur death risks on the job.

This study attempts to estimate the implicit discount rate that the Indian workers themselves place on intertemporal health risks and their quantity-adjusted value of life using the discounted expected life years approach. The worker's earnings equation is specified as a function of the discounted expected number of life years lost due to the job risk and other determinants, such as education and experience. The non-linear least squares method is used to estimate the earnings equation. The discount rate that is used in adjusting life years is directly estimated in the estimation process.

Results indicate that the Indian worker's implicit rate of time preference with respect to future life years ranges between 7.6 and 9.7 per cent, which is closer to the financial market rate for the study period and consistent with earlier studies from developed nations. The estimated implicit value per year of life ranges from Rs.0.97–1.06 (US\$0.054–0.059) million (in 1990 prices). This value is associated with an implicit value of one's future life of about Rs.24.3–26.5 (US\$1.34–1.47) million.

These results can aid policy makers, international agencies, and researchers in evaluating health projects in India and other developing countries. They can also be used to carry out comparisons with values obtained for developed nations.

Evaluating the performance of different willingness to pay question formats for valuing environmental restoration in rural China

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Valuation of environmental effects of development projects has become an increasingly important part of project evaluation. The Contingent Valuation Method (CVM) is a survey method widely used in developed countries to estimate household willingness to pay for environmental improvements. Currently, casting the willingness to pay question as a voter referendum is the recommended format, as compared to a payment card, where households circle a particular monetary amount they will pay. Using a case study of environmental restoration in rural China, we present empirical evidence that in a country without a long tradition of openly democratic elections, the tendency to vote 'Yes' in the referendum format yields what appears to be very high estimates of willingness to pay relative to income. Specifically, the median WTP from the voter referendum formats represent about 8 per cent of income, while the payment card results represent about 1 per cent of income. Thus, the payment card approach may be a more realistic question format in many countries without a long tradition of open elections. Additional question formats for minimizing 'yea-saying' responses are suggested.

The benefits and costs of informal sector pollution control: Mexican brick kilns

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In developing countries, population growth, rural–urban migration, and regulation have spurred the rapid expansion of an urban informal sector comprised of low-technology micro-enterprises largely operating outside the purview of the state. Although this expansion has generated important economic benefits, it has also entailed significant environmental costs. The main reason is that informal firms, although tiny, are exceptionally numerous, and a significant percentage are involved in highly polluting activities such as leather tanning and ceramics.

Nevertheless, policy makers have thus far paid little attention to informal polluters. In part, this bias stems from the perceived difficulty of regulating

numerous small firms. But a second reason may simply be that the problem is not well-understood – policy-makers lack information on the magnitude and incidence of the environmental damages caused by informal firms, and the costs of mitigating these damages.

This paper presents a benefit–cost analysis of four strategies for reducing air pollution from a collection of approximately 330 informal brick kilns in Ciudad Juárez, Mexico. It also compares the net benefits (benefits minus costs) of controlling brick kiln emissions to the net benefits of controlling emissions from two of the city’s leading formal industrial polluters.

In estimating the benefits of controlling air pollution from our sample sources, we confine our attention to one pollutant – particulate matter smaller than 10 microns (PM10) – and to one type of impact – human morbidity and mortality. We use a specially parameterized air dispersion model to estimate each source’s contribution to annual average ambient levels of PM10 at thousands of receptor locations in Ciudad Juárez. Next, we use a health effects model to estimate the number of cases of human mortality and morbidity that result from this pollution each year. Finally, we use a valuation model to calculate the dollar values of these health impacts.

We find that brick kilns emissions are responsible for serious health damages including over a dozen premature mortalities per year. As a result, the net benefits of three of the four emissions control strategies for brick kilns are positive and quite large – in the tens of millions of dollars. We also find that the net benefits of controlling emissions from brick kilns exceed net benefits of controlling emissions from formal factories by a considerable margin, although the size of this margin depends critically on the actual level of pollution abatement in the formal factories. Finally, we find that health damages from brick kiln emissions are spatially concentrated in the poor residential neighborhoods surrounding the largest brickyards.

These results suggest that, in some cases, the conventional allocation of regulatory resources across formal and informal polluters may be suboptimal. The extent to which policy makers should divert scarce regulatory resources to the informal sector will depend partly on the magnitude of ‘implementation costs’ – the costs regulators pay to compel informal firms to abate pollution. Although estimating these costs is quite difficult (and beyond the scope of our paper), recent case studies suggest they are not, in general, prohibitive.

Economic changes and afforestation incentives in rural China

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During the reform period, Chinese forest resources have increased both in coverage and in standing stock. This is mainly the result of constant afforestation efforts that have more than compensated deforestation during the period. The aim of this paper is to examine the forces that shape the

afforestation incentives of rural economic agents, in the context of rapid economic changes since the end of the 1970s. As land resources are scarce compared with the huge population in China, the afforestation activity is analyzed within a framework of land allocation between agriculture and forestry, under the hypothesis that the two sectors compete for land. Several factors can influence activity choices. First, with market developments during the reform period, the choice between agriculture and afforestation is expected to become increasingly sensitive to the relative returns of the two activities; namely, timber prices relative to agricultural prices. Second, as predicted by the portfolio choice theory, abundant risks in a rural economy may induce a diversification strategy by combining agriculture and forestry activities. Third, land-use choice is determined by demographic pressure on land and land quality. Fourth, the changing socio-economic environment in rural China, measured through rural households' wealth and the existence of alternative mechanisms of insurance against risks, such as diversification from agriculture to rural industry, can be expected to have an impact on land allocation choices. Evidence from Chinese provinces during the reform period confirms the important role of economic changes in the agro-forestry land allocation. The empirical results show that an increase of forestry prices relative to agricultural prices and a risk increment in agricultural production and price variability all lead to a higher land ratio for afforestation at the expense of agriculture. Similarly, rural wealth is positively related to afforestation efforts. On the contrary, rural population pressure over land reduces afforestation incentives. However, this negative impact is offset by the improvement of land quality and agricultural productivity, which can relieve demographic pressure on land.

Mixing economic and administrative instruments: the case of shrimp aquaculture in Thailand

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Economic instruments offer the potential to reach pre-determined environmental goals at a lower aggregate cost than less incentive-based measures, but administrative underpinnings crucial to the effective functioning of economic instruments may be lacking in developing countries. For this reason, pragmatic analysts and policymakers often advocate the use of so-called 'mixed' instruments that combine incentive mechanisms with improved administrative arrangements. This paper explores such possibilities with reference to intensive shrimp aquaculture, which dominates shrimp farming and is an important economic sector in Thailand.

This activity has been cited as a major contributor to environmental degradation in Thailand and several other countries through destruction of mangrove forests, salinization of land, sludge disposal, and, in particular, water pollution.

Analytical models of self-interested producers, welfare maximizers, and mixed economic and administrative instruments are presented. It is found that profit-maximizing farmers will ignore the effects of their actions on other farmers and the environment. They therefore have more production pond area than is socially optimal, spend nothing on proper sludge disposal, and have more open production systems than are desirable. Charges and fines linked with standards move farming systems closer to optimal levels, though they do not achieve the first-best. In practice, though, even the instruments in the model would not be sufficient given the realities of the Thai context. Reform and expansion of the permitting system is required, as is increased financing for regulatory activities. Potentially debilitating political opposition could also undermine such efforts, which suggests that a portion of charge revenues should be returned to shrimp farmers. A more complete set of mixed instruments that addresses these issues is therefore proposed.