

系所組別：資源工程學系丙組

考試科目：資源管理問題解析

考試日期：0225 · 節次：2

以下三題請詳讀題目後說明 (1) 是題目之主要重點及 (2) 該題目在資源管理之意涵。(資料來源：Tom Tietenberg and Lynne Lewis (2009), *Environmental & Natural Resource Economics*, 8th Edition, Pearson International Edition.

(一) Research in this area has traditionally been focused on two competing hypotheses.

Ester Boserup, a Danish economist, posited a negative feedback mechanism that has become known as the "induced innovation hypothesis." In her view, increasing populations trigger an increasing demand for agricultural products. As land becomes scarce relative to labor, incentives emerge for agricultural innovation. And this innovation results in the development of more intensive, yet sustainable land-management practices in order to meet the food needs. In this case the environmental degradation is self-limiting because human ingenuity is able to find ways to farm the land more intensively without triggering degradation.

The opposite view, called the "downward spiral hypothesis," envisions a positive feedback mechanism in which the degradation triggers a reinforcing response that only makes the problem worse.

Clearly these very different visions have very different implications for the role of population in environmental degradation. Does the evidence suggest which is right?

Although quite a few studies have been conducted, neither hypothesis always dominates the other. Apparently the nature of the feedback mechanism is very context specific. Grepperud (1996) found that as population pressure rose and exceeded a carrying capacity threshold, land degradation took place in Ethiopia. Tiffen and Mortimore (2002) found that as family farms became smaller under conditions of population growth, some people migrated to new areas or took up new occupations, while others attempted to raise the value of output (crops or livestock) per hectare. They also found that investments in improving land and productivity are constrained by poverty.

Kabubo-Mariara (2007) points to the importance of secure property rights in triggering the Boserup hypothesis in an examination of land conversion and tenure security in Kenya. Using survey data from a cross-section of 1,600 farmers in 1999 and 2000 (73 percent of whom held land under private property), she tested Boserup's hypothesis that suggests a correlation between population density, land conservation, and property rights. She finds that population density is highest for farmers who have adopted land conservation practices. She also finds that tenure security is correlated with high population density and farmers with secure land rights are more likely to adopt soil improvements and plant drought-resistant vegetation, while common-property owners are less likely to invest in any land improvement. It appears, at least for this case, that the externalities associated with common property are exacerbated with increased population densities. (30%)

Sources: Grepperud, Sverre. "Population Pressure and Land Degradation: The Case of Ethiopia," *Journal of Environmental Economics and Management*, 30 (1996): 18-33; Tiffen, M., and M. Mortimore. "Questioning Desertification in Dryland Sub-Saharan Africa," *Natural Resources Forum* 26 (2002): 218-233; Kabubo-Mariara, Jane. "Land Conversion and Tenure Security in Kenya: Boserup's Hypothesis Revisited," *Ecological Economics* 64 (2007): 25-35.

(背面仍有題目,請繼續作答)

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(二) Many contingent valuation studies have found that respondents tend to report much higher values for questions that ask what compensation the respondent would be willing to accept (WTA) to give something up than for questions that ask for the willingness to pay (WTP) for an incremental improvement. Economic theory suggests that differences between WTP and WTA should be small, but experimental findings both in environmental economics and in other microeconomic studies have found large differences. Why?

Some economists have attributed the discrepancy to a psychological endowment effect; the value of something you own is greater than something you do not. In other words, you would require more compensation to be as well off without it than you would be willing to pay to get that same good and as such you would be less willing to give it up ($WTA > WTP$) (Kahneman, Knetsch, and Thaler, 1990). This is a form of loss aversion; the psychological premise that losses are more highly valued than gains.

Others have suggested that the difference is explainable in terms of the market context. In the absence of good substitutes, large differences between WTA and WTP would be the expected outcome. In the presence of close substitutes, WTP and WTA should not be that different, but the divergence between the two measures should increase as the degree of substitution decreases (Hanemann, 1991 and Shogren et al., 1994).

The characteristics of the good may matter as well. In their review of the evidence provided by experimental studies Horowitz and McConnell (2002) find that for "ordinary goods" the difference between WTA and WTP is smaller than the ratio of WTA/WTP for public and nonmarket goods. Their results support the notion that property rights are not neutral.

The moral context of the valuation may matter as well. Croson et al. (draft) show that WTA increases with culpability as long as the party causing the damage is also paying for the repairs. If, however, a third party is paying, WTA is insensitive to culpability. This difference suggests that the valuation includes an amount levied in punishment for the party who caused the damage (the valuation becomes the lost value plus a sanction).

Ultimately, the choice of which concept to use in environmental valuation comes down to how the associated property right is allocated. If someone owns the right to the resource, asking how much compensation they would take is the appropriate question. If the respondent does not have the right, using WTP is the right approach. However, as Horowitz and McConnell point out, since the holders and nonholders of "rights" value them differently, the initial allocation of property rights will have strong influence on valuation decisions for environmental amenities. (35%)

Sources: Croson, R., J. J. Rachlinski, and J. Johnston. "Culpability as an Explanation of the WTA-WTP Discrepancy in Contingent Valuation." (Draft 2005). Hanemann, W. M. "Willingness to Pay and Willingness to Accept: How Much Can They Differ?" *American Economic Review*, 81, 635-647, 1991. Horowitz, J. K., and K. E. McConnell. "A Review of WTA/WTP Studies," *Journal of Environmental Economics and Management*, 44, 426-447, 2002. Kahneman, D., J. Knetsch, and R. Thaler. "Experimental Tests of the Endowment Effect and the Coase Theorem," *Journal of Political Economy*, 98, 1325-1348, 1990. Shogren, J. F., Senung Y. Shin, D. J. Hayes, and J. B. Kliebenstein. "Resolving Differences in Willingness to Pay and Willingness to Accept." *American Economic Review* Vol. 84 (1), 1994: 255-270.

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(三)

Since environmental problems are thought to be caused by a divergence between individual incentives and collective incentives, the belief that centrally planned economies avoid environmental problems seems plausible. Centralizing power in the state, as occurred in the centrally planned economies of Eastern Europe and the former Soviet Union, could potentially allow collective decisions to be made at the outset.

Studies of air and water pollution in the former Soviet Union and other Eastern European countries, however, suggest that the problems found in market economies occur with equal intensity in the Eastern Bloc. Copsa Mica, Romania, for example, is called Europe's most polluted urban area. Weakened by acid rain, monuments in Krakow, Poland, are crumbling. Women with newborn babies in Czechoslovakia have priority access to bottled water because tap water is considered injurious to infant health.

How can this be? Goldman suggests that the centralized planning system creates different, but no less potent, divergences between individual and collective incentives. According to the State of the Environment in Russia report, two-thirds of Russia's population lives in territories where the air pollution level is unhealthy. By the year 2000 more than two billion tons of toxic waste had accumulated in Russia. Preventing this pollution was a low priority because the managers of the polluting factories were rewarded for output, not pollution control. The central plans, which established national priorities, emphasized growth over environmental protection.

In his summary Goldman states:

... not private enterprise but industrialization is the primary cause of environmental disruption. This suggests that state ownership of all the productive resources is no cure-all.

As these formerly centrally planned economies transition to market oriented economies, what has changed? Cornillie and Fankhauser (2004) point to differences in energy intensities (energy use per GDP) as one cause of high levels of pollution in transition economies. Energy intensities of transition economies have traditionally been much higher than other industrialized economies. These have come down significantly since the beginning of the transition away from central planning. The amount of the decrease varies significantly, but what is clear is that declines in energy intensity have brought about both economic and environmental benefits including a 70 to 90 percent change in air pollution and greenhouse gas emission between 1992-1998 (European Bank for Reconstruction and Development (2001).

(35%)

Sources: Marshall I. Goldman, "Economics of Environmental and Renewable Resources in Socialist Systems," in Allen V. Kneese and James L. Sweeney, eds. *Handbook of Natural Resource and Energy Economics*, Vol. II (Amsterdam: North Holland, 1985): 725-745; State of the Environment in Russia (<http://eco.priroda.ru/>); Louis Berney, "Black Town of Transylvania Is Called Europe's Most Polluted," *The Boston Globe* (March 28, 1990): 2; Hilary F. French, "Industrial Wasteland," *Worldwatch* (November/December 1988): 21-30; Vladimir Kotov and Elena Nikitina, "Russia in Transition: Obstacles to Environmental Protection," *Environment* 35 (December 1993): 10-19; Jan Cornillie and Samuel Fankhauser, "The Energy Intensity of Transition Countries," *Energy Economics* 26 (2004).