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JOURNAL ARTICLE

# Measuring Natural Resource Scarcity

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## Abstract

One fundamental index of world social welfare is the availability of natural resources relative to population. In recent years, social, policy, and even physical scientists have been unable to reach consensus on whether natural resources are becoming increasingly scarce. The prevailing pessimistic view of the 1970s has been strongly challenged in the 1980s by resource-population optimists such as Julian Simon. In this paper, we argue that one source of failure to reach consensus is the fundamental ambiguity of available measures of natural resource scarcity. Surveying measures such as unit extraction cost, relative price, and the reserves-to-production ratio, we discuss difficulties of interpretation. Some of the problems identified may yield to further research, but others appear irremediable.

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## MEASURING NATURAL RESOURCE SCARCITY

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**ABSTRACT.** One fundamental index of world social welfare is the availability of natural resources relative to population. In recent years, social, policy, and even physical scientists have been unable to reach consensus on whether natural resources are becoming increasingly scarce. The prevailing pessimistic view of the 1970s has been strongly challenged in the 1980s by resource-population optimists such as Julian Simon. In this paper, we argue that one source of failure to reach consensus is the fundamental ambiguity of available measures of natural resource scarcity. Surveying measures such as unit extraction cost, relative price, and the reserves-to-production ratio, we discuss difficulties of interpretation. Some of the problems identified may yield to further research, but others appear irremediable.

### I. INTRODUCTION

The availability of natural resources relative to population is a fundamental indicator of global social welfare, and whether resources are becoming increasingly scarce is a timeless question (e.g., Malthus, 1798; Jevons, 1865; and Leith, 1935, for erroneous predictions of impending scarcity). The current debate between pro and antigrowth forces (e.g., Simon, 1981a; Ehrlich, 1981) is only the latest manifestation of an ongoing controversy (Pavitt, 1973). Researchers in the scarcity field have not converged on a mainstream view; we have lurched from *Limits to Growth* (Meadows *et al.*, 1974) and *Global 2000* (U.S. Department of State and Council on Environmental Quality, 1980) to *The Resourceful Earth* (Simon and Kahn, 1984). U.S. public policy has veered from activism to *laissez-faire* (Finkle and Crane, 1985; Mackellar and Vining, 1988).

Consensus has been elusive in part because of the lack of unambiguous scarcity indices. There is a small technical literature on economic aspects of this problem (e.g., Brown and Field, 1978; Fisher, 1979; Hall and Hall, 1984); however, little has been written from an interdisciplinary point of view. The following paper aims to fill this gap in the literature. It will highlight problems of interpreting historical trends in

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