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## **Introduction: Environmental Sustainability Symposium**

Cebula, Richard and Payne, James

Jacksonville University, University of New Orleans

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## **Introduction: Environmental Sustainability Symposium**

By RICHARD J. CEBULA\* AND JAMES E. PAYNE†

The issue of environmental sustainability is a controversial and extremely diverse multi-faceted topic that ranges from questions as to how to ensure that adequate investment in energy R&D and infrastructure will be undertaken, to state level renewable portfolio standards, to the impact of pollution havens on legislation that would enhance industrial greenhouse gas emission standards, to economic resilience to hurricane hazards, to EPA policies. This Special Issue of *The American Journal of Economics and Sociology* includes seven studies that are devoted to exploring various aspects of the remarkably complex and diverse dimensions of environmental sustainability.

The study by Cebula and Mixon argues that to sustain the long-term economic growth needed for continued prosperity, the investment levels required for the production of adequate energy as well as the systems needed for delivery thereof are strongly linked to higher levels of both economic freedom and regulatory quality. Based upon the random effects panel least squares estimates in this study, there is strong empirical evidence that higher levels of economic freedom and higher levels of regulatory quality play critical roles in stimulating growth in real GDP per capita and thereby both *directly and indirectly in creating an environment conducive to encouraging needed energy investment* in energy infrastructure and capacity, including transmission facilities as well as energy R&D. Thus, public policies that promote economic freedom and that manifest themselves in the form of higher regulatory quality enhance the

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\* E-mail address: [rcebula@ju.edu](mailto:rcebula@ju.edu). Department of Economics and Finance, Jacksonville University, United States.

† E-mail address: [jepayne@uno.edu](mailto:jepayne@uno.edu). University of New Orleans, United States.

potential for facilitating the energy investments needed to meet the energy needs projected in the future.

The study by Dincer, Payne, and Simkins examines U.S. state-level renewable portfolio standards and the presence of a neighboring state effect. Specifically, the study investigates whether a state's renewable portfolio standard target levels are influenced by those of neighboring states while controlling for state-specific socioeconomic factors. Their results indicate that neighboring states' renewable energy portfolio standard target levels have a positive and statistically significant impact on a state's renewable energy portfolio standard target level. Also, the state's potential for renewable energy sources, transmission capacity within a state and neighboring states, unemployment rate, and educational attainment each have a positive impact on a state's renewable energy portfolio target level, as does a Democratic governor in office.

Sanders, Alakshendra, and Walia provide a theoretical framework to analyze the impact of pollution havens on country-specific legislation that would improve industrial greenhouse gas emission standards. The pollution haven hypothesis suggests that higher environmental standards in a country cause firms to incur marginal production costs, and as a result a profit-maximizing multinational firm will likely shift production to a country with lower environmental standards. Indeed, Sanders, Alakshendra, and Walia show that a unilateral tightening of emission standards in a country will induce a representative multinational firm to increase its emissions from global production. The study also highlights the global implications of unilateral actions on controlling emissions.

Sadorsky explores the role of urbanization and industrialization on energy use for a panel of 18 emerging market economies. As a result of estimating a panel error correction model, Sadorsky finds that increases in income have a positive and statistically significant impact on

energy consumption in both the short run and long run. The long-run dynamics associated with urbanization and industrialization is interesting in that urbanization yields a negative impact on energy consumption, whereas industrialization has a positive impact. In light of these results, policies designed to increase income and further industrialization in these countries may be at odds with sustainable development given that most emerging market economies have historically relied upon fossil fuel-based energy sources. Sadorsky concludes with a discussion of the emergence of renewable energy sources and sustainability efforts.

A 1995 research study examined the political economy of urban heat islands, urban areas that exhibit higher temperatures than do their more rural surroundings, by estimating the probability that a metropolitan statistical area (MSA) receives an EPA citation for a violation of carbon emissions standards. The study found that urban warming is positively related to the probability of an EPA citation, whereas an MSA's lobbying effort reduces the probability of such a citation. In the study by Cebula, Mixon, and Upadhyaya, this debate is revisited by employing data on EPA citations of MSAs concerning *ozone* violations and a more appropriate two-stage probit estimation for testing the economic theory of regulation in the context of the absence/presence of an EPA citation. The probit results indicate that lobbying effort is not significantly related to EPA citations for ozone violations. Interestingly, Cebula, Mixon and Upadhyaya also fail to find a significantly positive relationship between ozone violation citations and urban warming, a result warranting additional research in this area of environmental economics.

Ewing, Liang, and Cui investigate regional economic resilience to hurricane hazards. For those states that have experienced or are prone to hurricanes, such natural disasters disrupt business processes and activities, energy distribution channels, and consumption patterns as well

as infrastructure services, which in turn lead to a reallocation of resources that may have long-term consequences for the sustainable development of economic regions. Ewing, Liang, and Cui utilize a vector error correction model to assess the impact of Hurricanes Ike and Rita on the Houston MSA with respect to broad measures of regional economic and engineering performance. In particular, a three-variable model that includes employment, energy (real gasoline prices), and the built environment (building permits) along with a dummy variable for the occurrence of hurricanes is estimated over the period June 2000 to October 2011. Focusing on the long-run dynamics of the model, Ewing, Liang, and Cui find that building permits and real gasoline prices change in response to deviations from the long-run equilibrium between employment, building permits, and real gasoline prices. Ewing, Liang, and Cui argue this finding is consistent with businesses responding to disruptions by changing employment levels in the short run, but over time the economic system returns to its stable relationship, with adjustments in energy usage and the built environment.

The study by Nie, Sun, and Yang develops a dynamic oligopolistic model to investigate equilibrium outcomes for renewable resource markets under two types of property rights regimes: private property versus common property rights. The study examines the dynamic equilibrium of the renewable resource market from an industrial organization perspective whose underlying assumptions differ from those in previous works in several ways. Their results indicate that different property rights regimes in renewable resource markets yield very different equilibria. The results show that resources tend to deplete under the common property rights regime as compared with the private property rights. Under the private property rights regime, the valve point—the critical value of the discount rate between stability and divergence in the system—increases with the natural growth rate, productivity, number of firms, and marginal

costs. For example, if the discount rate is relatively small, ecological disaster occurs as the number of firms reaches a threshold. Under the common property rights regime, "the tragedy of the commons" inescapably occurs with endogenous pricing in the multiple-firm framework, a finding that extends the outcomes of previous studies. The model suggests how to avoid ecological disaster by implementing public policies that clarify property rights, limit the number of manufacturers, and introduce certain subsidies or taxes.

Clearly, this symposium is by no means exhaustive of the multifaceted and highly complex dimensions of the issue of environmental sustainability. However, the intent of these studies is to provide at least some perspective on the breadth of issues surrounding sustainable development and the environment.

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