
THREE ESSAYS ON ENERGY AND ENVIRONMENTAL ECONOMICS

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RESUMEN

This dissertation considers three empirical essays: two covering the nexus between energy and environmental economics and one addressing economic aspects regarding environmental monitoring, enforcement, and compliance. The first essay explores the consequences of different energy poverty definitions and measures for identifying the energy poor. A Perception-based Multidimensional Energy Poverty Index (PMEPI) is proposed and compares the identification outcomes with the monetary index applying the ten percent rule index (TPRI) for the case of Chile. Coincidentally, both classify 15.5% of the population as energy poor. However, they select different energy-poor households while producing diverging energy-poverty rankings across the territory. Moreover, the TPRI neglects supply-side constraints captured by the PMEPI. These results suggest that both types of measures should not be used as substitutes but rather as complements in the energy policy debate and implementation of energy poverty alleviation actions. The second essay estimates the key private benefits of a program to improve ambient air quality during winter in central Chile by replacing inefficient wood-fired home heating stoves with more efficient pellet stoves. By combining electronic stove surface temperature and air pollution monitoring with household surveys, this work shows that pellet stoves users enjoy 14% lower indoor air pollution concentrations and more stable indoor temperatures than traditional wood-burning stoves users. In addition, lower-income and energy-poor households receive much greater improvements in indoor air pollution than those with higher incomes, indicating that the program is progressive in this dimension. However, these have significantly higher operating costs, and we found that these costs are most salient for low-income and energy-poor households. The results of this work represent an additional value for driving the energy transition. The third essay empirically analyzes the complete sequence of enforcement and compliance in Chile, including inspections, compliance, submission of compliance programs,

size of fines, payment of fines, and delay of payment of fines. These analyses are conducted for the case of facilities that belong to different economic sectors and are regulated by the Chilean Superintendency of Environment. This work demonstrates that monitoring efforts are relatively low, inspections are conducted differently across different sectors and are related to some specific facilities' characteristics. Compliance is also conducted differently across sectors, and it is positively related to the enforcement activities carried out by the regulators. This work also displays that fines increase the probability of compliance, and that is transmitted as a spillover effect to facilities sharing the same firm owner and in facilities that belong to the same sector located in the same commune. Furthermore, this work shows that presenting a compliance program is less likely on the small size facilities, the severity of the violation correlates positively with the size of the fine, and finally, the fine's payment positively correlates with the size of the facility.