

HABILITATION THESIS

STATISTICAL AND ECONOMETRIC ANALYSES APPLIED TO THE
ENERGY MARKET

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Summary

The paper “Statistical and econometric analyses applied to the energy market” addresses the relationships identified on the energy market, with an emphasis on the transition to renewable energy and the impact on the economy in case of the countries in Europe, America and Asia.

The paper presents the main results obtained within ten scientific papers developed within multi- and interdisciplinary research teams, published in various scientific journals after completing the doctoral internship, the theme being the energy market and the transition to renewable energy.

The scientific approach consists in deepening the statistical and econometric analyses, being reflected both in the teaching activity that I carry out and in the research one. Within ASE, I have taught, at different stages of my career, fundamental disciplines for the field: Statistics, Econometrics, Time Series, Macroeconomic Statistics, Nonparametric Statistics, Multidimensional Analysis. Through these disciplines, I have transmitted to students theoretical and practical knowledge and a critical understanding of statistical methods and their applicability in various phenomena.

The coherence between academic training and research concerns has been reflected in contributions to the specialized literature. Over time, I have published scientific articles in national and international journals, in which I have addressed various economic topics, with a special focus on energy, the transition to renewable energy, migration and sustainable development. Within these works, together with various collectives, both at national and international level, we have aimed to answer research questions and to offer benchmarks and solutions for decision-makers and the academic environment.

The scientific activity carried out in the subsequent period of the doctoral thesis is materialized in many scientific papers, and the ten papers designated as representative, and which synthesize the main theoretical and applied contributions, are grouped into three major research directions, as follows:

RESEARCH DIRECTION I – ENERGY EFFICIENCY

Popescu, C., **Apostu, S. A.**, Rădulescu, I. G., Mureșan, J. D., & Brezoi, A. G. (2024). Energizing the now: navigating the critical landscape of today’s energy challenges—an in-depth review. *Energies*, 17(3), 675.

Panait, M., Apostu, S. A., Vasile, V., & Vasile, R. (2022). Is energy efficiency a robust driver for the new normal development model? A Granger causality analysis. *Energy Policy*, 169, 113162.

RESEARCH DIRECTION II – TRANSITION TOWARDS RENEWABLE ENERGY AND SUSTAINABLE DEVELOPMENT

Tiron-Tudor, A., **Apostu, S. A.**, Socol, A., & Ivan, O. R. (2025). Cross-mapping interactions between access to water and sanitation, human and economic development in the least developed countries. *Frontiers in Environmental Science*, 13, 1561945.

Hossain, M. R., Singh, S., Sharma, G. D., Apostu, S. A., & Bansal, P. (2023). Overcoming the shock of energy depletion for energy policy? Tracing the missing link between energy depletion, renewable energy development and decarbonization in the USA. *Energy Policy*, 174, 113469.

Apostu, S. A., Panait, M., Balsalobre-Lorente, D., Ferraz, D., & Rădulescu, I. G. (2022). Energy transition in non-euro countries from central and eastern Europe: evidence from panel vector error correction model. *Energies*, 15(23), 9118.

Boța-Avram, C., Apostu, S. A., Ivan, R., & Achim, M. V. (2024). Exploring the impact of macro-determinant factors on energy resource depletion: Evidence from a worldwide cross-country panel data analysis. *Energy Economics*, 130, 107341.

RESEARCH DIRECTION III – CARBON DIOXIDE NEUTRALITY AND CIRCULAR ECONOMY

Sarwar, S., Waheed, R., Aziz, G., & Apostu, S. A. (2022). The nexus of energy, green economy, blue economy, and carbon neutrality targets. *Energies*, 15(18), 6767

Panait, M., Janjua, L. R., Apostu, S. A., & Mihăescu, C. (2022). Impact factors to reduce carbon emissions. Evidences from Latin America. *Kybernetes*, ahead-of-print (ahead-of-print), 1–18.

Apostu, S. A., Hussain, A., Kijkasiwat, P., & Vasa, L. (2022). A comparative study of the relationship between circular economy, economic growth, and oil price across South Asian countries. *Frontiers in Environmental Science*, 10, 1036889.

Çomuk, P., Akkaya, B., Ercoşkun, S., & Apostu, S. A. (2025). The foreign direct investments, economic growth, renewable energy and carbon (CO₂) emissions nexus: an empirical analysis for Turkey and European Union Countries. *Environment, Development & Sustainability*, 27(12).

The three research directions are presented in detail in the paper, through the analysis of the scientific context, the comparative analysis based on statistical indicators in European countries and the presentation of the scientific contributions made to each direction.

The paper is structured in ten chapters, each addressing a sub-direction of the three major directions presented. This ends with the proposal for the development of the professional career and a vast presentation of the bibliographic sources used.

The proposal for the development of the academic career presents the professional path, highlighting a multidimensional activity that combines teaching, scientific and administrative activity. The professional activity is marked by the active involvement in the training of students and the modernization of university programs, by participating in national and international projects and by relevant scientific contributions in the fields of sustainable development, the transition to renewable energy, energy efficiency, migration, circular economy. In addition, a coherent vision is proposed for the consolidation of university research activity, by developing a scientific school focused on sustainability, innovation and competitiveness, capable of connecting the Romanian academic environment to international research networks.

In conclusion, the paper offers a significant contribution to understanding the processes involved in the transition to renewable energy, energy efficiency and sustainable development.