

# Integrating Markov Systems and Data Envelopment Analysis to Study the Evolution of Population Structures

Andreas C. Georgiou<sup>1</sup>, Emmanuel Thanassoulis<sup>2</sup>, Georgios Tsaples<sup>1</sup> and Konstantinos Kaparis<sup>1</sup>

<sup>1</sup>Quantitative Methods & Decisions Analytics Lab, Department of Business Administration, University of Macedonia, Thessaloniki, Greece

<sup>2</sup>Aston University, Aston Business School, Birmingham, UK

e-mail: [acg@uom.edu.gr](mailto:acg@uom.edu.gr)

**Abstract.** This paper attempts a sophisticated integration of Markovian models and Data Envelopment Analysis (DEA) to manage the advancement of cohorts within various types of organizations or (e.g.) chronic disease patients. By tracking the transitions of these cohorts through various states, the research aspires to guide the system towards desired objectives via strategic interventions. We introduce an innovative modeling framework that elegantly merges the stochastic properties of Markov Chains with the deterministic rigor of DEA. This fusion enables the assessment of policies as Decision Making Units (DMUs) in the pursuit of anticipated outcomes. The models, operable in both single or two-stage configurations across diverse targeting environments, provide insights into the dynamics and efficacy of policy interventions. Our findings highlight the significant advantages as well as limitations of deploying these models to steer organizational systems towards optimal future states, underscoring their potential in enhancing strategic decision-making processes.

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