Chance Constrained Programming and Its Application to Input-Output Analysis

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Input-output analysis is commonly applied in a deterministic manner, absent of uncertainty. Since the 50s, attempts to deal with uncertain technical coefficients have been proposed. The majority of studies were based on the idea that if the technical coefficients are random variables then solutions to the Leontief system and multipliers both have random properties. This work proposes a new way at dealing with uncertainty in input-output modeling. Behind input-output model runs a linear programming problem known as the Diet Problem. On the assumption of randomness of technical coefficients, it can be formulated as Probabilistic Constraint Problem. In this approach one must specify desired properties for random coefficient matrix and use some appropriate algorithms to solve it. The main features that should be observed are: (i) solution is deterministic and (ii) system reliability aspects are present. In addition, highly aggregated data to Brazil 2005 (12 sectors) are used as an example.