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Power Method Tâtonnements for Cobb-Douglas Economies*

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Abstract

We consider an economy with consumers maximizing Cobb-Douglas utilities from the algorithmic perspective. It is known that in this case finding equilibrium prices reduces to the eigenvalue problem for a particularly structured stochastic matrix. We show that the power method for solving this eigenvalue problem can be naturally interpreted as a tâtonnement executed by an auctioneer. Its linear rate of convergence is established under the reasonable assumption of pairwise connectivity w.r.t. commodities within submarkets. We show that the pairwise connectivity remains valid under sufficiently small perturbations of consumers' tastes and endowments. Moreover, the property of pairwise connectivity holds for almost all Cobb-Douglas economies.

Keywords: exchange economy, Cobb-Douglas utility, tâtonnement, power method, stochastic matrix, regular economy

JEL Classification codes: C6, D5

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