[Title]
Condensation phenomena and wealth re-distribution:
Statistical-mechanical analysis of disordered urn models

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[Abstract]

We investigate equilibrium statistical properties of urn models with disorder. Two urn models are proposed; one belongs to the Ehrenfest class, and the other corresponds to the Monkey class. These models are introduced from the view point of the power-law behavior and randomness; it is clarified that quenched random parameters play an important role in generating power-law behavior. We evaluate the occupation probability $P(k)$ with which an urn has k balls by using the concept of statistical physics of disordered systems. In the disordered urn model belonging to the Monkey class, we find that above critical density ρ_c for a given temperature, condensation phenomenon occurs and the occupation probability changes its scaling behavior from an exponential-law to a heavy tailed power-law in large k regime. We also evaluate the Gini index, which is a traditional, a popular and one of the most basic measures for earning differentials in economics. Then, we discuss an interpretation of our results for explaining of macro-economy, in particular, emergence of wealth differentials. The case of the Backgammon model introduced by Ritort will be also discussed.