Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Power-law behavior and condensation phenomena in disordered urn models: Analysis and its application to macro-economics[1] JUN-ICHI INOUE, Hokkaido University, JUN OHKUBO, Institute for Solid State Physics, University of Tokyo — We investigate equilibrium statistical properties of a disordered urn model. New types of urn models are proposed, in which quenched disorder parameters play an important role in generating power-law behavior. By choosing an arbitrary energy function for each urn, one can construct a lot of urn models, and we assume that the energy function contains a disordered parameters. We evaluate the occupation probability $P(k)$ that an arbitrary urn has k balls by using the concept of statistical physics of disordered systems. In our new disordered urn model, we find that above critical density $\rho_{\rm c}$ for a given temperature, condensation phenomenon occurs and most of the balls are condensed into an urn with the lowest energy level. As the result, the occupation probability changes its scaling behavior from an exponential-law to a heavy tailed power-law in large k regime. We also discuss an application of our results for explaining of macro economy, in particular, emergence of wealth differentials.

[1]This study was financially supported by Grant-in-Aid Scientific Research on Priority Areas "Deepening and Expansion of Statistical Mechanical Informatics (DEX-SMI)" of The Ministry of Education, Culture, Sports, Science and Technology (MEXT) No.18079001.

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Date submitted: 19 Nov 2007 Electronic form version 1.4