## Distribution and Fluctuation of Firm Size in the Long-Run

Hideaki Aoyama, Lars Grüne, Willi Semmler, Yoshi Fujiwara<sup>§</sup>, and Wataru Souma<sup>§</sup>

February, 2004

## Abstract

The paper studies empirically and analytically growth and fluctuation of firm size distribution. An empirical analysis is carried out on several data sets on firm size, with emphasis on one-time distribution as well as growth-rate probability distribution. Two well-known scaling laws, Pareto's law and Gibrat's law, are discussed. Some theoretical discussion on their relationship is presented. We also discuss to what extent there may exist economic mechanisms that produce an unequal firm size distribution in the long run. The mechanisms we study have been known in the economic literature since long. Yet, they have not been studied in the context of a dynamic decision problem of the firm. We allow for heterogeneity of firms with respect to certain characteristics. We then show that there are mechanisms at work which may generate a twin-peaked distribution of firm size in the long-run, which will then be tested empirically.

JEL classification: C 61, C 63, L 10, L 11 and L 13

<sup>\*</sup>Graduate School of Science, Kyoto University, Yoshida, Sakyo, Kyoto 606-8501, Japan, e-mail:aoyama@phys.h.kyoto-u.ac.jp

<sup>&</sup>lt;sup>†</sup>Department of Mathematics, University of Frankfurt, Robert–Mayer–Str. 8-10, 60054 Frankfurt, Germany, e-mail:gruene@math.uni-frankfurt.de

<sup>&</sup>lt;sup>‡</sup>Center for Empirical Macroeconomics, Bielefeld and New School University

<sup>&</sup>lt;sup>§</sup>ATR Human Information Science Laboratories, Kyoto 619-0288, Japan