

reviewer report

Manuscript: ReconstructingMacroeconomics_Ishikawa1.pdf

Title: Power-law and log-normal distributions in firm size displacement data

This paper studies the distributions of firm-size (income, sales and profits) and the growth-rates for them, with focus on the Gibrat's law and (quasi) log-normal, power-law distributions, by using three large datasets in Japan.

The original contribution of this paper, as I could tell by looking at the author's previous papers (Refs. [8][9][10]), is as follows. (i) The condition of detailed balance can be solved under the assumption that the distribution for growth-rate takes a special functional form given by Eqs. (14) and (15). The solution is given by Eqs. (21) and (22). (ii) "Displacements" (presumably meaning temporal changes) of temporal change of firm-size variables (so a kind of second-derivative) with heavy tails in the distributions for their growth-rates are examined. It is claimed that the distributions for the "growth-rates" for the temporal changes have no heavy tails as observed. I suggest that several points must be improved for this paper to be published in the present journal, although the topic is relevant to the special issue.

(A) The author rely on statistical tests with little extent. For example, the detailed-balance condition stated in Eq. (3) "is obviously confirmed". I am sure to say that it would not be possible to claim its statistical significance only by taking a look at scatter-plots. Why doesn't one need to take any trends in the average growth of sales, incomes and profits into account?

(B) The author's contribution (i) does not seem to have been published in the author's previous papers, although seemingly related things had already been shown (Refs. [8][9][10]) with some contradiction. I followed the equations in Section 2.2, and could see that the solutions (21) and (22) satisfy the detailed balance in (18). This might not be trivial, because the derivation is based on perturbative argument, that is, by expanding the equation (18) with respect to R around $R = 1$. The author could mention about the fact that the solutions satisfy the equation (18) beyond perturbation under the restricted assumption of Eqs. (14) and (15). In addition, I wonder how the solutions are compatible with the previous results in Refs. [8][9][10].

(C) When one studies the temporal change of increment or decrement of firm-size, one must be careful about the trends in average growth. Such effects might be actually observed in Figure 14, for instance. As mentioned in (A), one would need some kind of careful statistical tests or, at least, some operation that does subtraction of trends. So how much significance in statistical sense do the results in Section 3 (the contribution (ii)) have?

(D) The word “displacement” may not be comprehensible in the title and also in the main body of texts. The author is presumably meaning by it temporal changes of growth, or a kind of “second-derivative” of firm-size. More appropriate word could be employed. The author may want to ask for assistance by a native English speaker.