

# Micro-Macro Relation of Production - The Double Scaling Law for Statistical Physics of Economy -

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We show that an economic system populated by multiple agents generates an equilibrium distribution in the form of multiple scaling laws of conditional PDFs, which are sufficient for characterizing the probability distribution. The existence of the double scaling law is demonstrated empirically for the sales and the labor of one million Japanese firms. Theoretical study of the scaling laws suggests lognormal joint distributions of sales and labor and a scaling law for labor productivity, both of which are confirmed empirically. This framework offers characterization of the equilibrium distribution with a small number of scaling indices, which determine macroscopic quantities, thus setting the stage for an equivalence with statistical physics, bridging micro- and macro-economics.

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