

## Financial Fragility and Power Law Distributions in the Laboratory

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In this paper we present results from a controlled experiment that attempts to test the emergence of scale invariance from direct interactions among human subjects. The experimental design has been derived from the 'financial fragility' model developed in Delli Gatti *et al.* [2001] and Gallegati *et al.* [2002], where heterogeneous firms and a bank interact in the financial markets giving rise to complex dynamics. Agent-based simulations have shown this model is capable to generate a firms size distribution and a GDP growth rates distribution which scale down as a power law. Our aim is that of investigating whether simulations' findings are confirmed once perfectly-rational computerized agents are substituted by less-than-perfectly-rational human decision makers.

Our experimental economy is composed of a population of  $N$  firms (i.e., subjects), each one initially endowed with an equal level of equity and debt, which together constitute its stock of capital. In each period firms must decide how much to invest in the production of a homogeneous good by means of a constant returns to scale technology. Firms can only invest by resorting to debt [see e.g. Greenwald and Stiglitz, 1993]. We run a first treatment in which there is no interaction among firms, and a second treatment in which interactions among firms are introduced by means of a central bank (played by the computer program) who lends credit on the basis of market conditions.

We find that the introduction of interactions sensibly affects the final outcome in terms of the firms size distribution and the aggregate output growth rates distribution. In both cases, the null hypothesis of skewness and power law tails cannot be rejected at standard statistical significance levels.