

# Multivariate Systemic Optimal Risk Transfer Equilibrium

Marco Frittelli<sup>1</sup>

<sup>1</sup> Università degli Studi di Milano

We introduce the concept of Systemic Optimal Risk Transfer Equilibrium, denoted with *SORTE*, that conjugates the classical Buhlmann's notion of an equilibrium risk exchange with capital allocation based on systemic expected utility optimization. The capital allocation and risk sharing equilibrium that we consider can be applied to many contexts, such as: equilibrium among financial institutions, agents, or countries; insurance and reinsurance markets; capital allocation among business units of a single firm; wealth allocation among investors.

We provide sufficient general assumptions that guarantee existence, uniqueness, and Pareto optimality of such a *SORTE*. In both the Buhlmann and the *SORTE* definition, each agent is behaving rationally by maximizing his/her expected utility given a budget constraint. The two approaches differ by the budget constraints. In Buhlmann's definition the vector that assigns the budget constraint is given a priori. On the contrary, in the *SORTE* approach, the vector that assigns the budget constraint is endogenously determined by solving a systemic utility maximization. *SORTE* gives priority to the systemic aspects of the problem, in order to optimize the overall systemic performance, rather than to individual rationality.

In a second paper, joint with A. Doldi, we extend such notion to a multivariate setting. We prove existence, uniqueness, Pareto optimality and a Nash equilibrium property of such a multivariate *SORTE*. Joint with: Francesca Biagini, Alessandro Doldi, Jean-Pierre Fouque, Thilo Meyer-Brandis.