

Coordination Games with Diverse Sources of Information¹

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Abstract: We study Bayesian coordination games where agents rely on diverse types of information: first, information over the game's payoff coefficients. Second, information over the other players' information. Third, information over the other players' actions. For these different types of information, we characterize the equilibria that agents play. In particular, we study the information structures that ensure unique, respectively, multiple equilibria. Our results show that the traditional findings of the global games literature, Rubinstein (1989), Carlsson and van Damme (1993) and Morris and Shin (1998), which considers only information over payoffs, change substantially once agents can draw on diverse sources of information. In particular, the key global games result, namely that agents play unique equilibria when private information is very precise, reverses once agents draw on information over other players' actions.

1 Motivation/Background

I present selected results from a line of my research, which contributes to the extensive literature on multiplicity vs. uniqueness of equilibria in coordination games. Typical examples of such games involve bank runs and currency crises. The distinguishing feature of such games is that agents have a strong incentive to choose mutually consistent strategies.

Historically, coordination games were often studied assuming complete information. That is, it was assumed that players know the model's payoff relevant coefficients and each other's equilibrium actions. Such a modelling choice tends to produce multiple pure strategy equilibria. These equilibria have been criticized on the grounds that players often cannot observe the game's payoff structure with perfect accuracy. Rubinstein (1989), Carlsson and van Damme (1993) and Morris and Shin (1998) argue that agents have to rely on noisy private information over the game's payoff relevant coefficients. One consequence of such private information over the game's payoff is that agents do not know each other's actions: Each

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agent has to use his own signal over the game's payoffs to infer the signals, and thus the actions, of the other agents. Such inference makes it difficult to coordinate on multiple equilibria. In particular, when private information over the game's payoffs is very precise, but not perfect, the global games structure ensures unique equilibria.

In Kuhle (2016), Grafenhofer and Kuhle (2016), Grafenhofer and Kuhle (2018) we emphasize that players usually draw on different sources of information.² That is, in addition to signals over the game's payoff structure, which Rubinstein (1989), Carlsson and van Damme (1993) and Morris and Shin (1998) discuss, there are typically two more sources of information that agents can use: (i) information over other players' actions, and (ii) information over the other players information. Moreover, we argue that many strategic situations are characterized by public disagreement over the game's payoff structure, i.e., players hold heterogeneous priors.

From the technical perspective, we find that such additional types of information allow agents to coordinate on multiple equilibria. We thus provide examples where private information induces multiple rather than unique equilibria. Put differently, we show that the results of Carlsson and van Damme (1993) and Morris and Shin (1998), who argue that "precise private information ensures unique equilibria," depend critically on the specific type of information under consideration.

Interpretation of Signals over Actions: The global games approach is widely used to model bank runs, currency crises, recessions, flights to quality, cartels, or prisoner's dilemmas. We argue that these are environments where players indeed receive noisy information over other players' actions. That is, in the context of a bank-run, depositors can observe the length of a queue, respectively the lack thereof, in front of their local bank branch.³ Similarly, during a currency crises, commercial banks observe their clients' order flow, which helps them decide whether or not it is worth while to join the run. Cartel members examine whether their partners are undercutting the agreed on price. Regarding macroeconomic business-cycle contexts, we note that firms draw on a host of economic indicators before they make their production and investment choices.⁴ These indicators inform them of whether economic "activity" is weak or strong.

²The main focus of the talk will be on Kuhle (2016) and Grafenhofer and Kuhle (2018).

³Indeed, bank lobbies are traditionally rather large to prevent queues extending out to the street.

⁴See the Diamond (1982) type models for macro settings, where agents' production choices are complements.

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