



Notes

Robust comparative statics for non-monotone shocks in large aggregative games [☆]

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Abstract

A policy change that involves a redistribution of income or wealth is typically controversial, affecting some people positively but others negatively. In this paper we extend the “robust comparative statics” result for large aggregative games established by [Acemoglu and Jensen \(2010\)](#) to possibly controversial policy changes. In particular, we show that both the smallest and the largest equilibrium values of an aggregate variable increase in response to a policy change to which individuals’ reactions may be mixed but the overall aggregate response is positive. We provide sufficient conditions for such a policy change in terms of distributional changes in parameters.

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1. Introduction

Recently, [Acemoglu and Jensen \(2010, 2015\)](#) developed new comparative statics techniques for large aggregative games, where there are a continuum of individuals interacting with each other only through an aggregate variable. Rather surprisingly, in such games, one can obtain a “robust comparative statics” result without considering the interaction between the aggregate variable and individuals’ actions. In particular, [Acemoglu and Jensen \(2010\)](#) defined a positive shock as a positive parameter change that positively affects each individual’s action for each value of the aggregate variable. Then they showed that both the smallest and the largest equilibrium values of the aggregate variable increase in response to a positive shock.

Although positive shocks are common in economic models, many important policy changes in reality tend to be controversial, affecting some individuals positively but others negatively. For example, a policy change that involves a redistribution of income necessarily affects some individuals’ income positively but others’ negatively. Such policy changes of practical importance cannot be positive shocks.

The purpose of this paper is to show that [Acemoglu and Jensen’s \(2010, 2015\)](#) analysis can in fact be extended to such policy changes. Using [Acemoglu and Jensen’s \(2010\)](#) static framework, we consider possibly controversial policy changes by defining an “overall positive shock” to be a parameter change to which individuals’ reactions may be mixed but the overall aggregate response is positive for each value of the aggregate variable. We show that both the smallest and the largest equilibrium values of the aggregate variable increase in response to an overall positive shock. Then we provide sufficient conditions for an overall positive shock in terms of distributional changes in parameters.¹ These conditions enable one to deal with various policy changes, including ones that involve a redistribution of income.

This paper is not the first to study comparative statics for distributional changes. In a general dynamic stochastic model with a continuum of individuals, [Acemoglu and Jensen \(2015\)](#) considered robust comparative statics for changes in the stationary distributions of individuals’ idiosyncratic shocks, but their analysis was restricted to positive shocks in the above sense. [Jensen \(2018\)](#) and [Nocetti \(2016\)](#) studied comparative statics for more general distributional changes, but neither of them considered robust comparative statics. This paper bridges the gap between robust comparative statics and distributional comparative statics in large aggregative games.²

Before showing our robust comparative statics results, we establish the existence of the smallest and the largest equilibrium values of the aggregate variable. This result is closely related to the literature on the existence of a Nash equilibrium for games with a continuum of players. The seminal result in this literature is [Schmeidler’s \(1973\)](#) existence theorem. [Mas-Colell \(1984\)](#) reformulated Schmeidler’s model and equilibrium concept in terms of distributions rather than measurable functions, offering an elegant approach to the existence problem. In this paper, while we use measurable functions to obtain our existence result, we consider distributions to develop

¹ The concept of overall positive shocks is related not only to that of positive shocks but also to [Acemoglu and Jensen’s \(2013\)](#) concept of “shocks that hit the aggregator,” which were defined as parameter changes that directly affect the “aggregator” positively along with additional restrictions. Such parameter changes are not considered in this paper, but they can easily be incorporated by slightly extending our framework.

² See [Balbus et al. \(2015\)](#) for robust comparative statics results on distributional Bayesian Nash equilibria with strategic complementarities.

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