# 論文概要書

| 論　　題 | Essays on individual and social choice theories with desirability |
|---|---|

| 執筆者 | 氏名 | 栗原　崇 |
|---|---|---|
| | 指導教員 | 須賀　晃一 |

## ［概要］（日本語 3000 字以内とする）

We have the following three objectives for this thesis, that is, (I) to improve the existing axiomatisation of the anti-plurality and best-worst rules (Chapter 2), (II) to propose a new Borda rule by applying the concept of *desirability* indicating likes and dislikes (Chapter 3), and (III) to define and characterise the lexicographic preference extension rules for individuals to rank sets as final outcomes with desirability (Chapter 4). Since the anti-plurality and best-worst rules are related to the concept of desirability, we study them in this thesis. From the researches of these scoring rules, we found that we can improve the social choice based on the Borda rule by introducing desirability, because the Borda rule does not include the concept of desirability at all. Chapter 4 then applies desirability to the theory of ranking sets as final outcomes.

Chapter 2 proposes a direct characterisation of the anti-plurality rule by anonymity, neutrality, reinforcement, averseness, and bottoms-only with the variable electorate and fixed alternatives. Averseness is a weaker axiom than faithfulness and bottoms-only is the opposite of tops-only. The chapter also shows that reinforcement and top-bottom cancellation imply anonymity and that the basic best-worst rule can be characterised by neutrality, continuity, reinforcement, and top-bottom cancellation. Additionally, we provide another characterisation of the basic best-worst rule by neutrality, reinforcement, top-bottom non-negativity and top-bottom cancellation. Top-bottom non-negativity requires that if the difference between the numbers of individuals whose best and worst alternatives are a certain alternative is strictly negative, the alternative is not included in the social choice. This chapter corresponds to the following two publications:

> Kurihara, T. (2018) A simple characterization of the anti-plurality rule. *Economic Letters*, 168, 110-111.

> Kurihara, T. (2018) Axiomatic characterisations of the basic best-worst rule. *Economic Letters*, 172, 19-22.

Chapter 3 considers the desirability of alternatives when we find the social choice by using the Borda rule. In general, a preference raking of alternatives includes only the relative evaluation for the alternatives, such as 'a is better than b'. We then define a linear order over the set of all alternatives and an empty set (hereafter called the *outside option*) indicating 'choosing nothing'. Each alternative is defined as (un)desirable if and only if it is better (worse) than the outside option. Additionally, we assign the Borda scores to the alternatives and outside option. Thus, there is a gap of one point between desirable and undesirable alternatives. We provide the characterisation of this rule called the *net Borda* rule and show the advantages in using the net Borda rule by comparing with the original Borda, approval preference voting, and fallback voting rules. This chapter corresponds to a working paper with Professor Edith Elkind (University of Oxford). The paper was presented at the 2nd Spain-Japan Meeting of Economic Theory (Tokyo, 2018).

Chapter 4 characterises the leximax and leximin extension rules for ranking sets as final outcomes. To rank any two subsets, we introduce null alternatives. We assume that each null alternative indicates 'choosing not to choose each alternative'. By adding null alternatives into each subset in which existing alternatives are not included, we can frame the cardinality of all transformed subsets. Afterwards, all (null) alternatives in every transformed subset are rearranged in descending order. From these operations, we can rank all subsets lexicographically. Additionally, we discuss properties for a complete preorder over the set of alternatives and null alternatives to avoid non-intuitive raking of subsets. We thus clarify the relationship among the following three properties: *asymmetry of desirability*, c*onsistency of desirability*, and *self-reflecting*. The major result is the axiomatisation of leximax and leximin extension rules with asymmetry of desirability by dominance axioms. Furthermore, we show that self-reflecting implies asymmetry of desirability and consistency of desirability, and the leximax and leximin extension rules are equivalent if the complete preorder over the (null) alternative set satisfies self-reflecting. This chapter also corresponds to a working paper presented at 2016 AMES (Kyoto), SSCW 2016 (Lund), COMSOC-2018 (Troy), and so on.