

Robust Optimization

15. February 2011

Exercise 1:

Let $\mathcal{U}_1 \subseteq \mathcal{U}_2$ be a smaller and a larger uncertainty set and consider the two uncertain optimization problems

$$P(\xi), \xi \in \mathcal{U}_1 \text{ and } P(\xi), \xi \in \mathcal{U}_2$$

Show that the set of strictly robust solutions $\text{SR}(\mathcal{U}_2)$ with respect to \mathcal{U}_2 is contained in the set of strictly robust solutions $\text{SR}(\mathcal{U}_1)$. What about the objective values of the strict robust counterparts?

Exercise 2:

You want to drive from Auckland to let's say Wainui. There are two possible routes:

- Use the motorway. If everything goes smoothly you need 38 minutes. But often there is high traffic, so it can easily take up to 70 minutes.
- Avoid the motorway by going along narrow roads. This will take 55 minutes.

- a) Which route should be chosen if the worst case is to be minimized?
- b) Which route should be chosen if the max regret should be minimized?

Exercise 3:

You want to be on time at an (important) meeting, e.g.,

- on tomorrow's summer school lecture starting at 9:00,
- on your own phd-defense.

When should you leave your house ?

Discuss the different robustness concepts for both settings! Which concept do *you* think is appropriate?

Exercise 4:

Find a typical application for each of the robustness concepts.