

Renewable resource exploitation: the fishery

NRE - Lecture 4

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The dynamic fishery model

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The dynamic fishery model *contd.*

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- ▶ This is the “*fundamental equation of renewable resources*”

Stock growth

- ▶ The simplest biological growth model is the *logistic* model

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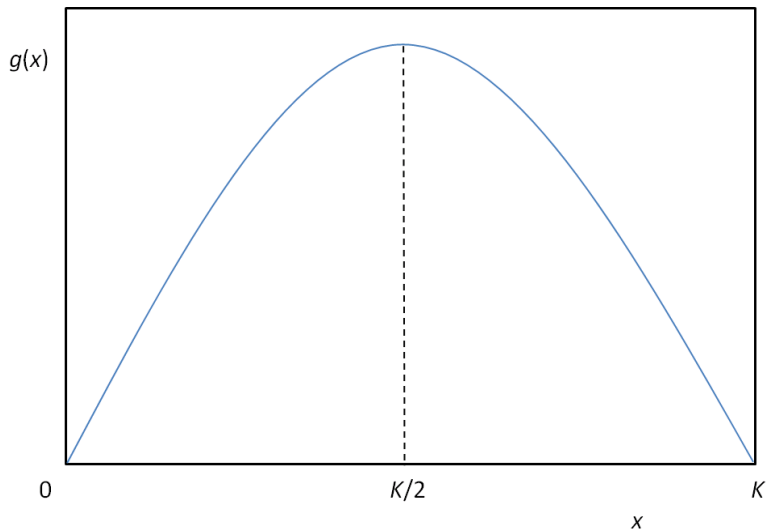
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- ▶ Single species, deterministic model
- ▶ Purely biological model: no *prices*

Logistic growth function



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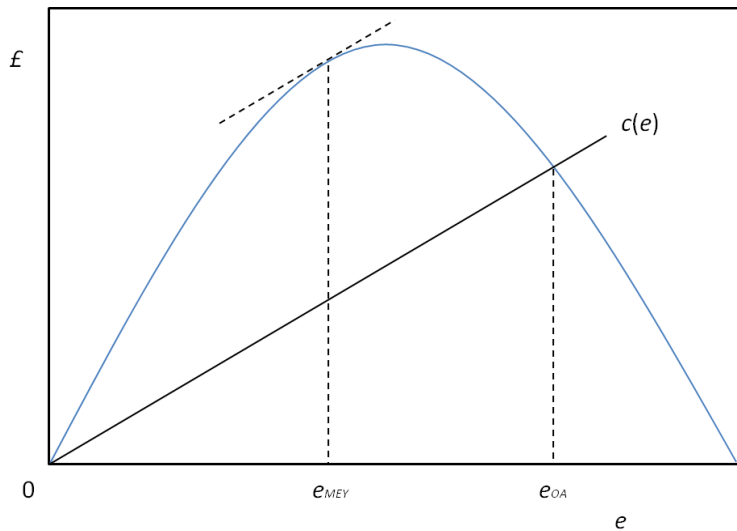
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- ▶ Total fishery profits are given by

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- ▶ For simplicity, assume constant prices

The Gordon-Schaefer model



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- ▶ An example of *market failure* - absence of a resource price
- ▶ Static, long run, model: discount rate implicitly zero

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- ▶ If the MSE is positive, then

$$r > g'(x) \gtrless 0$$

- ▶ A high discount rate could imply that depletion is optimal!

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- ▶ Can be seen as an externality problem
- ▶ The “Tragedy of the Commons”
- ▶ Need for fishery *management* (regulation)