

Quantifizierung von Resilienz auf Bestandes-Ebene

Waldökonomisches Seminar
Münchenwiler, 12.11.2024

Jonathan Fibich

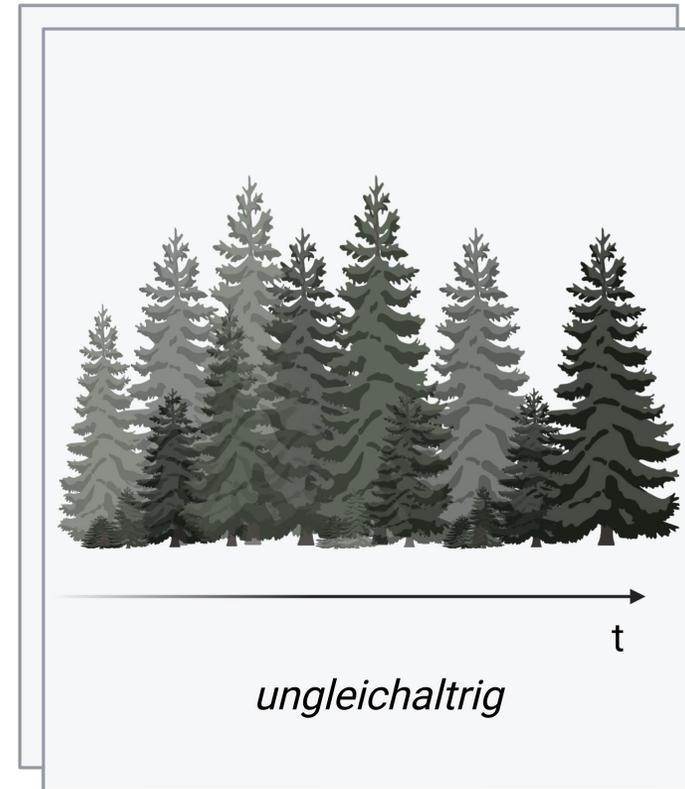
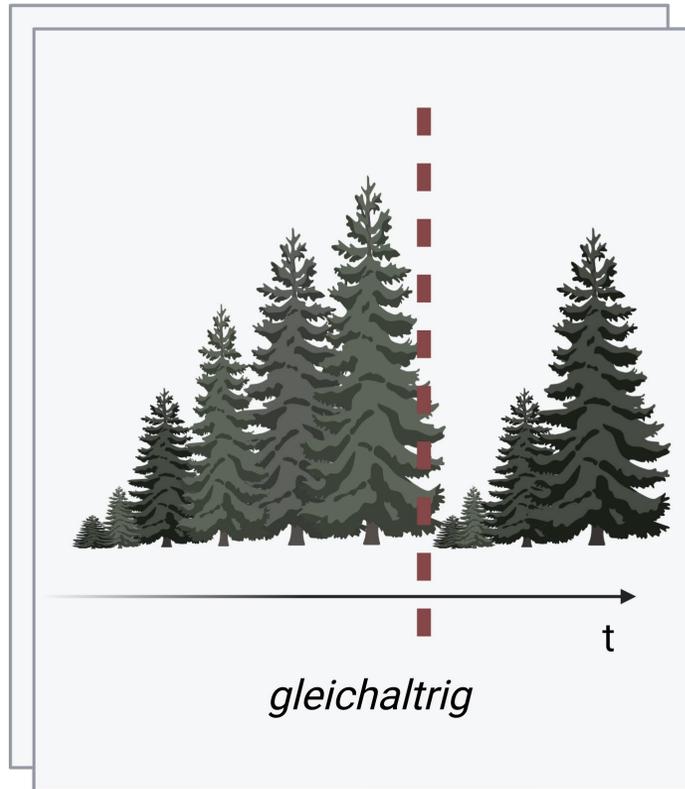
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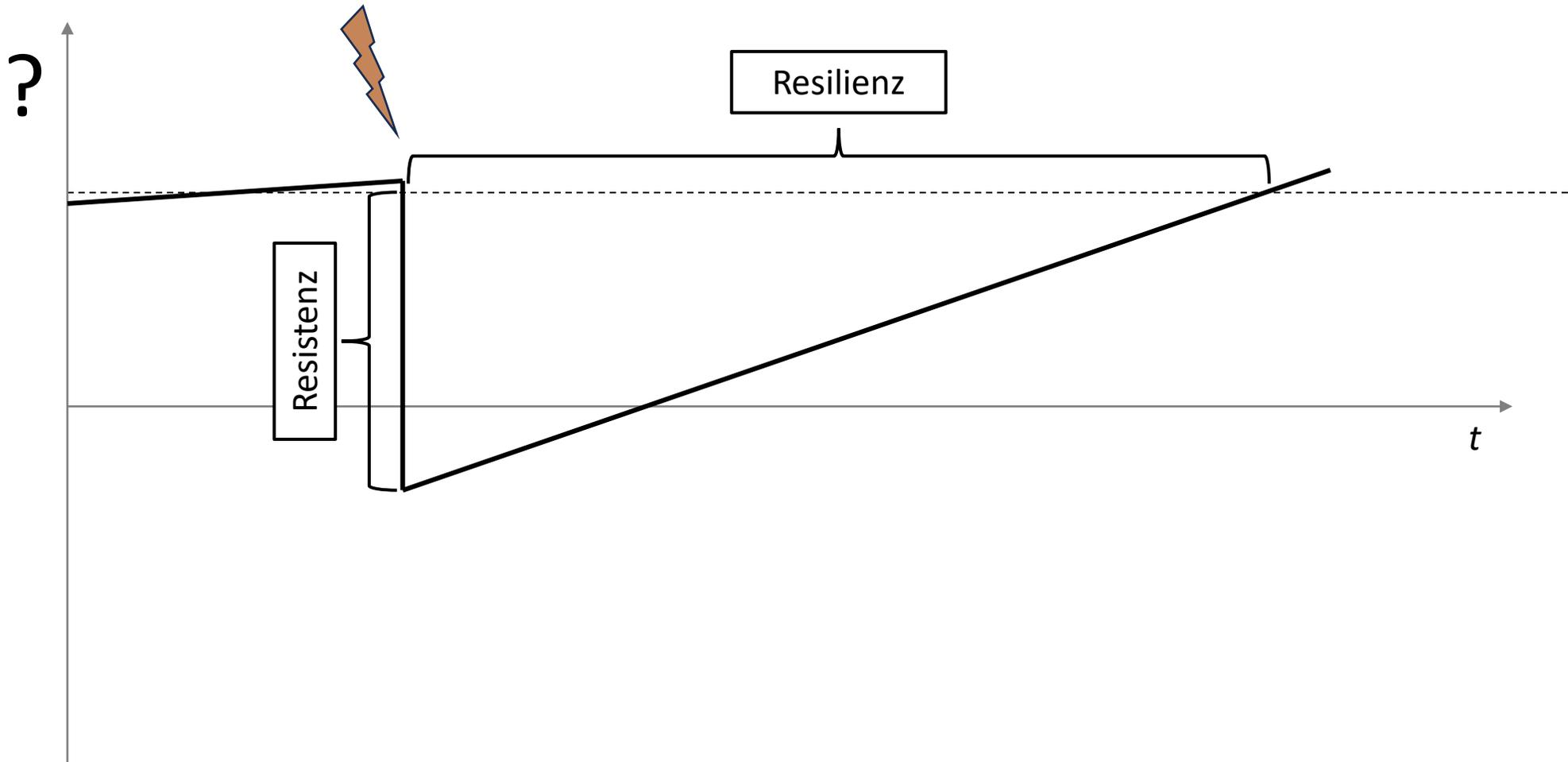


Das Problem:

Wie misst man Resilienz?



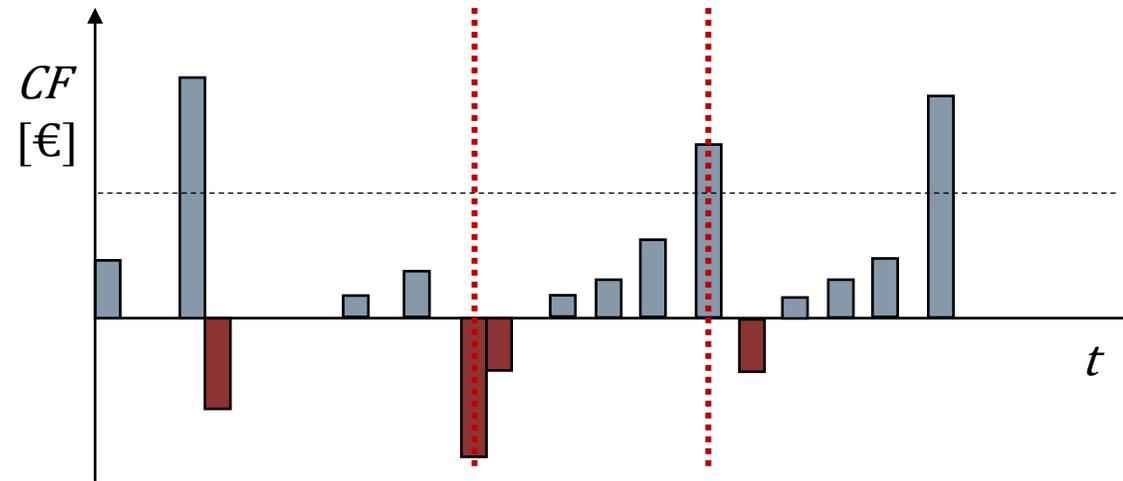
Engineering-Resilience



vgl. z.B. Pimm (1984), Nikinmaa et al. (2022)

Kriterien?

- Geringe Erratik



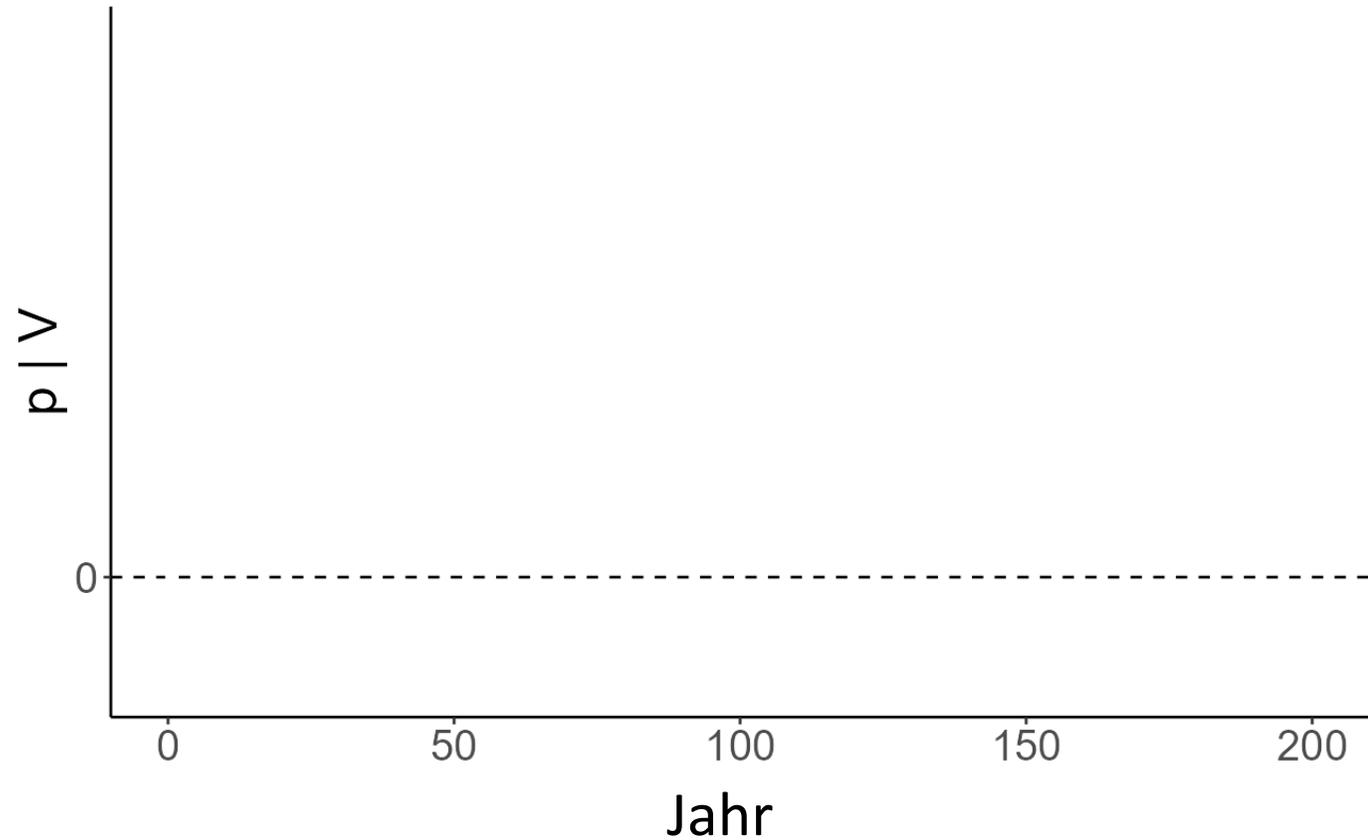
- Repräsentanz des Produktions-Potentials

Der Waldwert

$$V = \sum_{i=0}^{\infty} p_i \frac{1}{(1+r)^i}$$

mit:

V *Waldwert*
 i *Zeitschritt*
 p *Bereitstellung*
 r *Kalkulationszins*

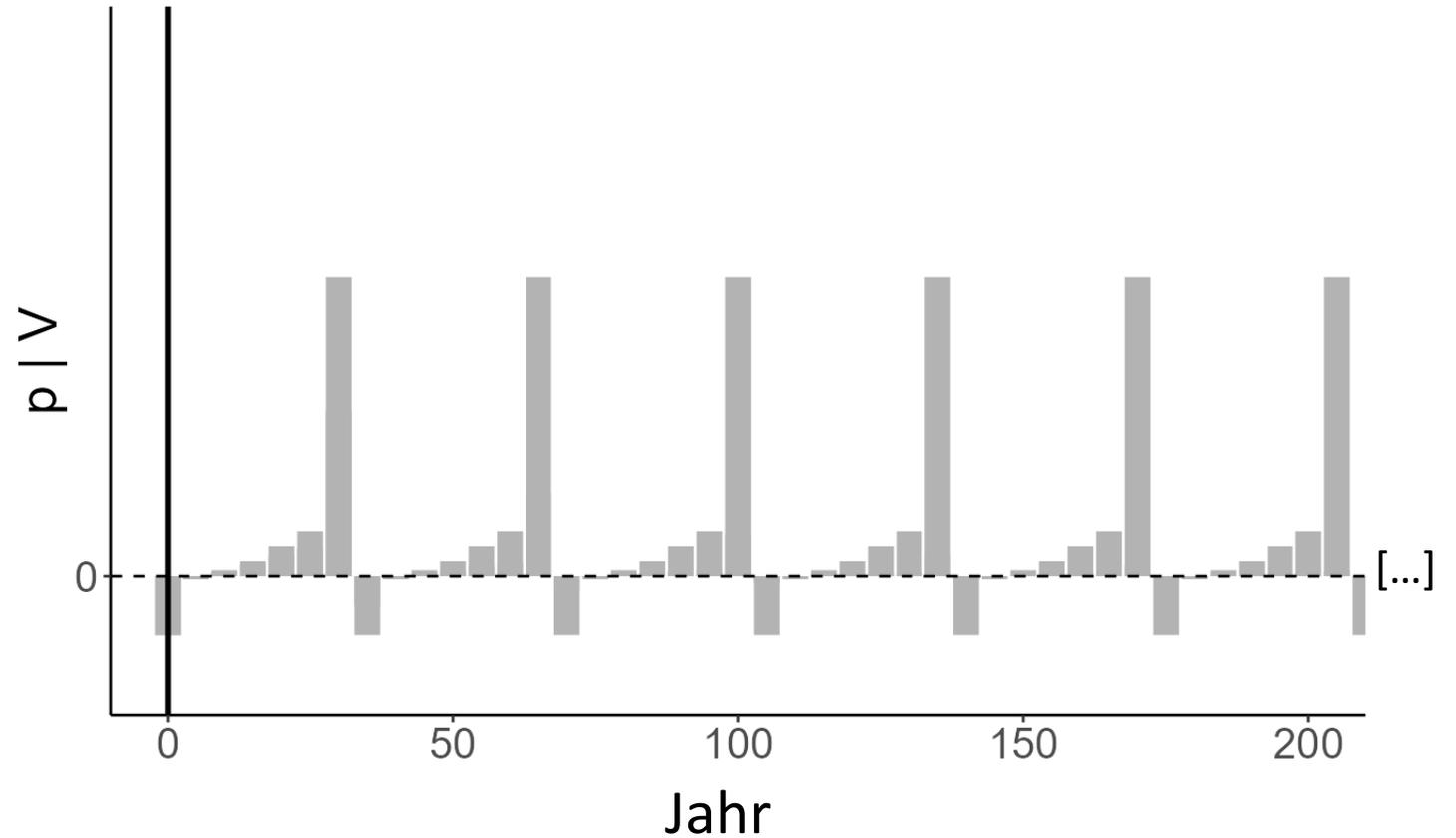


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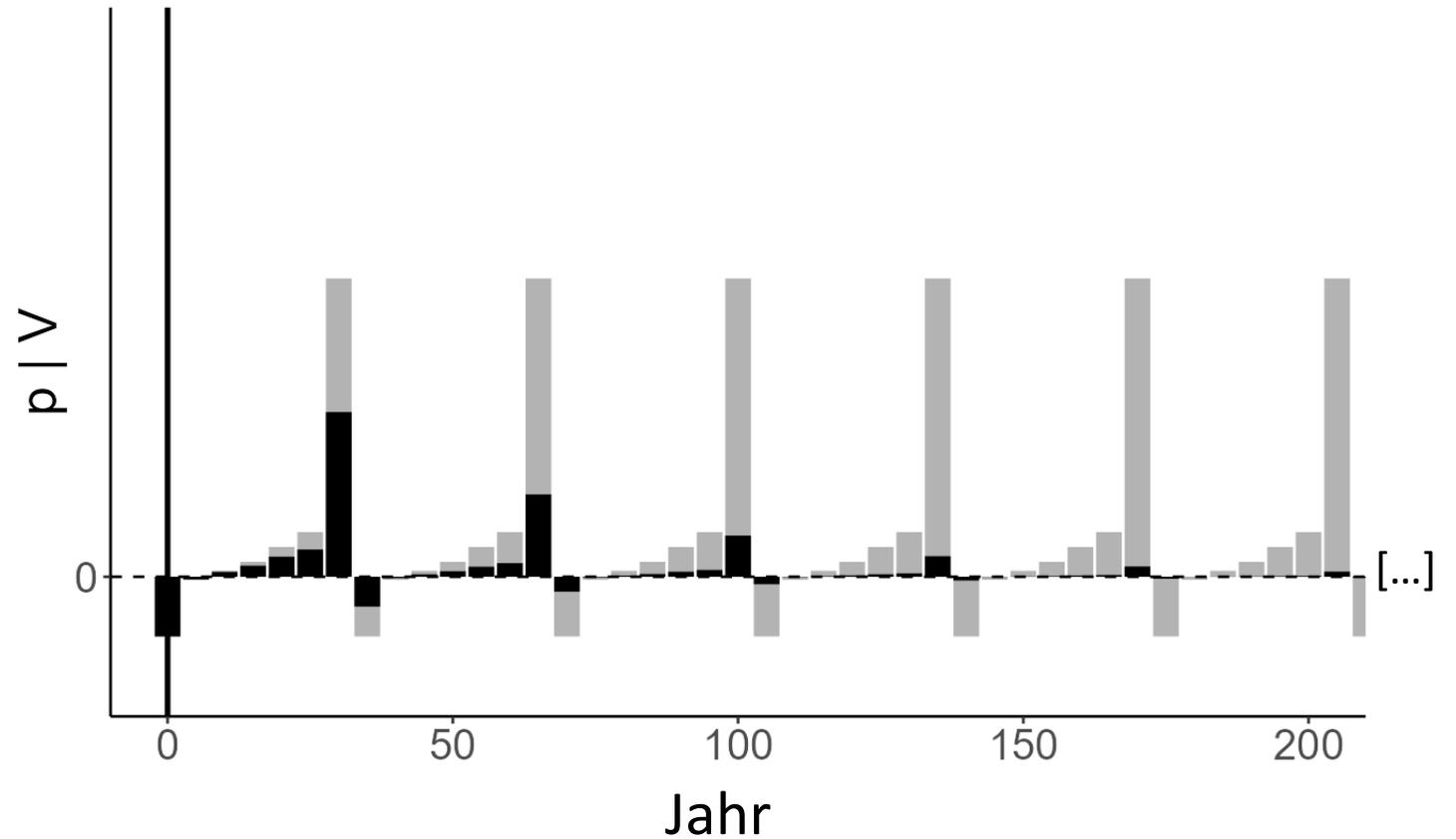


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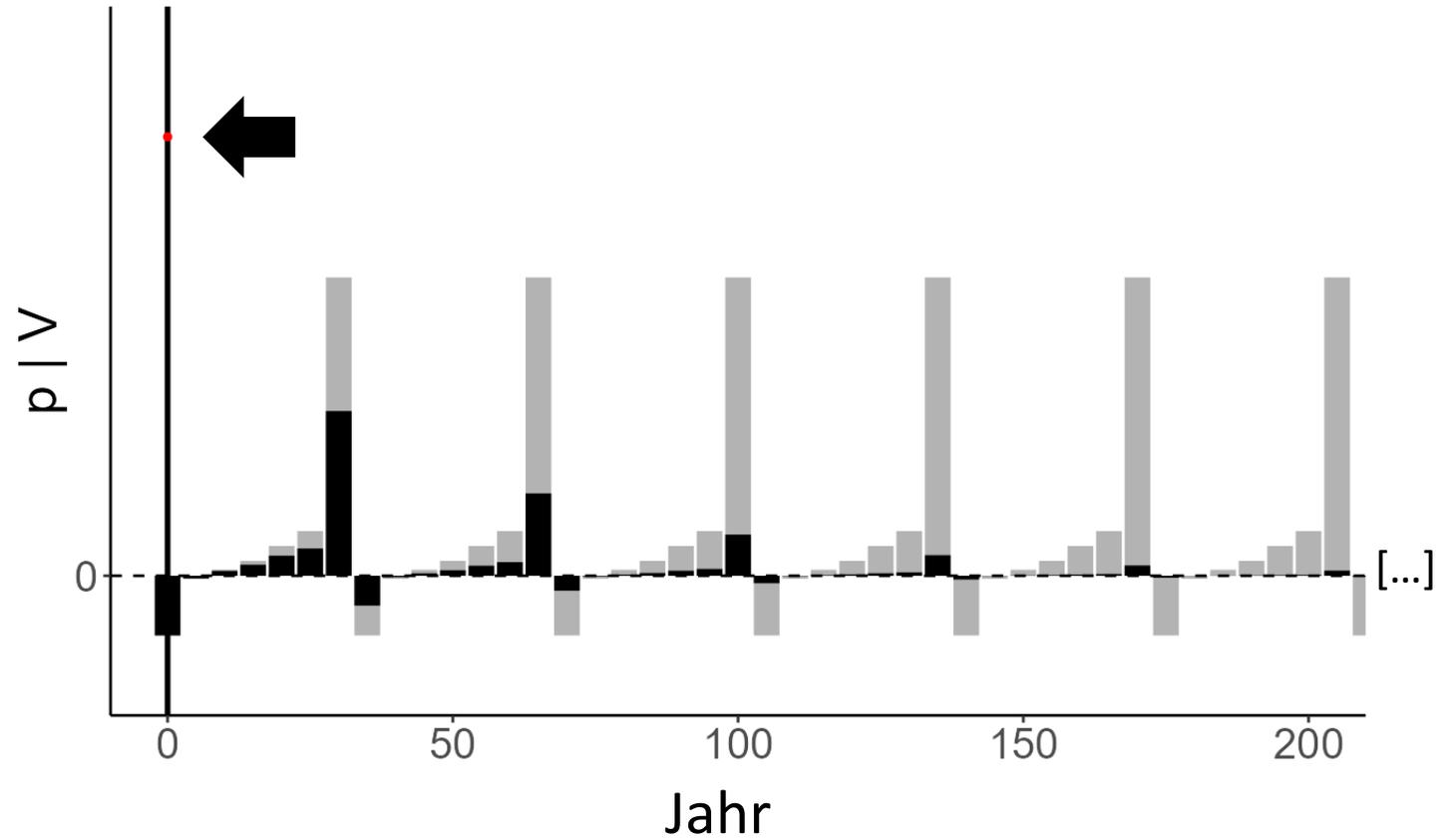


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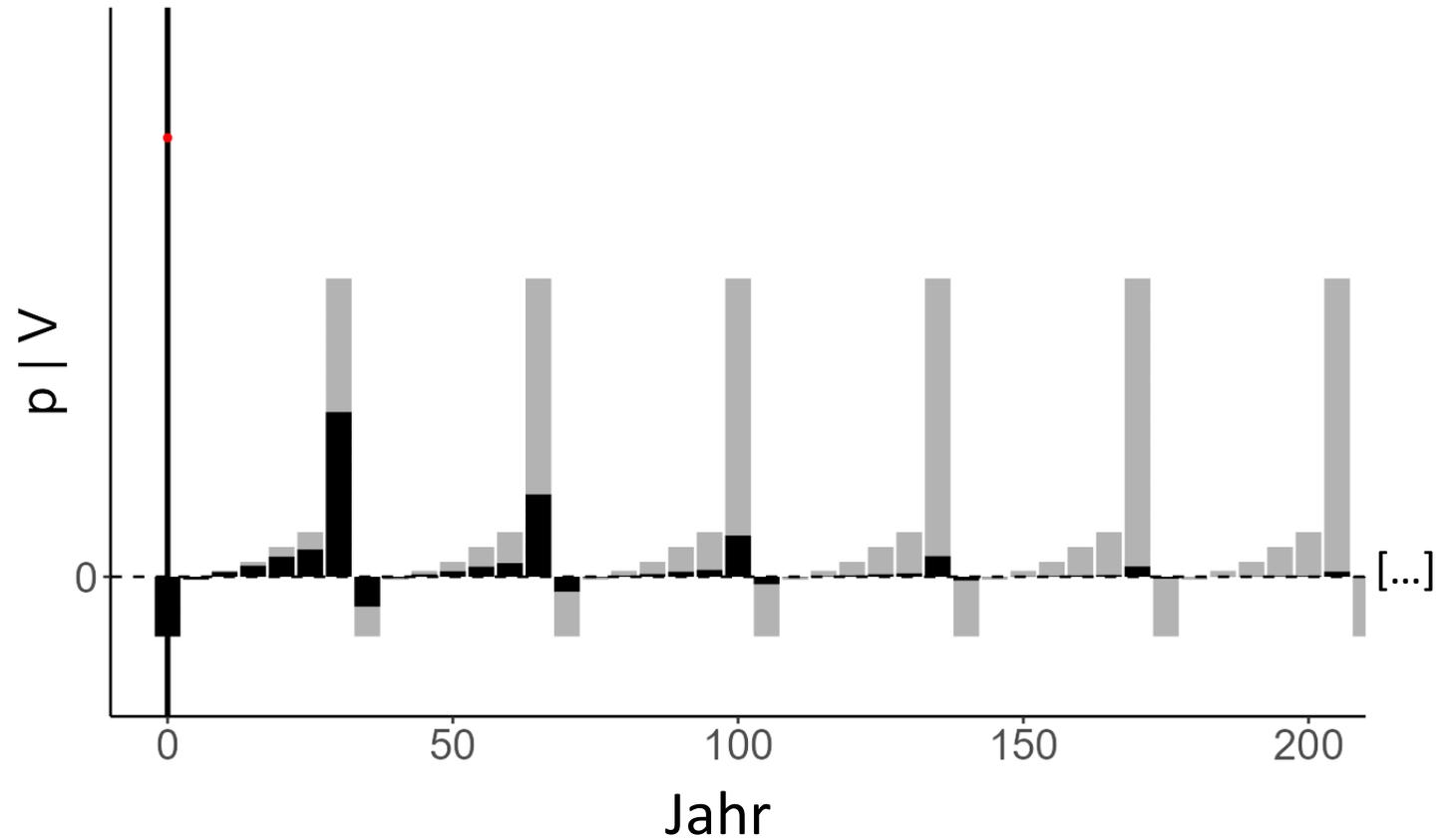


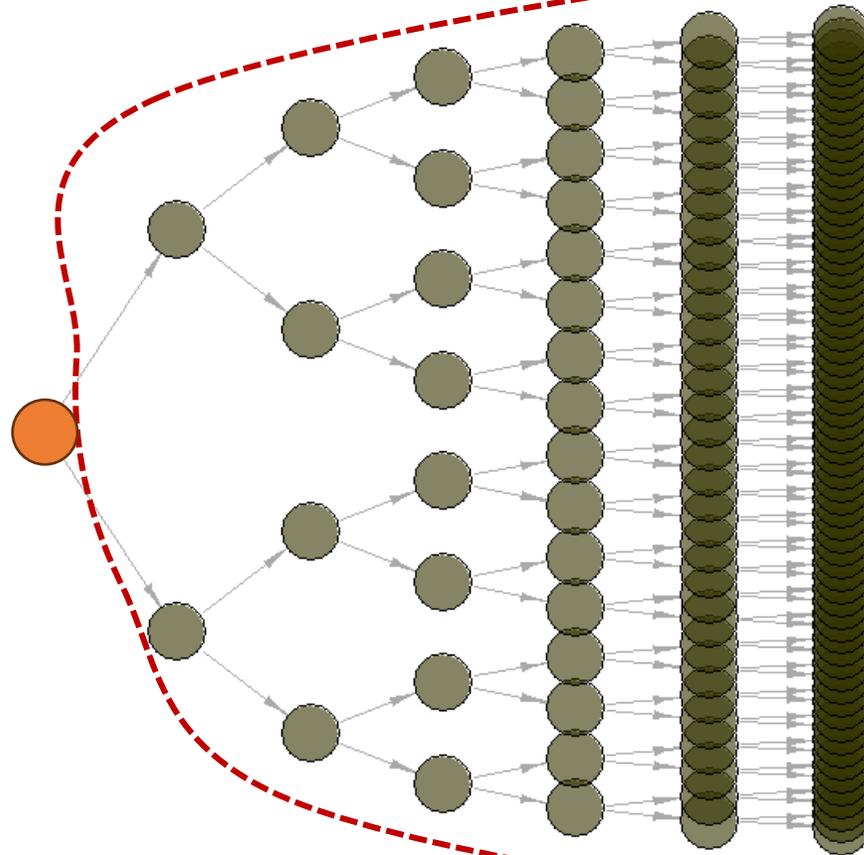
Der Waldwert

$$V = \sum_{i=0}^{\infty} p_i \frac{1}{(1+r)^i}$$

mit:

V Waldwert
 i Zeitschritt
 p Bereitstellung
 r Kalkulationszins





Analytisch:

Knoke, T., Paul, C., Gosling, E. *et al.*

Assessing the Economic Resilience of Different Management Systems to Severe Forest Disturbance. *Environ Resource Econ* **84**, 343–381 (2023).

<https://doi.org/10.1007/s10640-022-00719-5>

Numerisch:

Fibich *et al.*

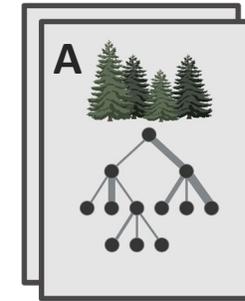
Assessing the Impact of Advance Regeneration on Stand-Level Resilience (Arbeitstitel).

In prep.

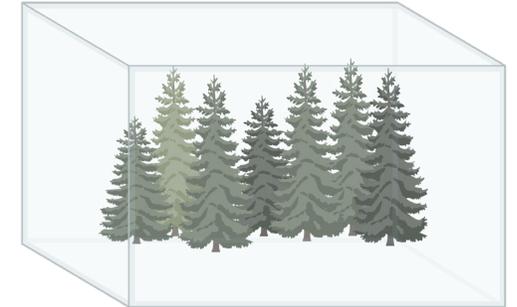
Zeit



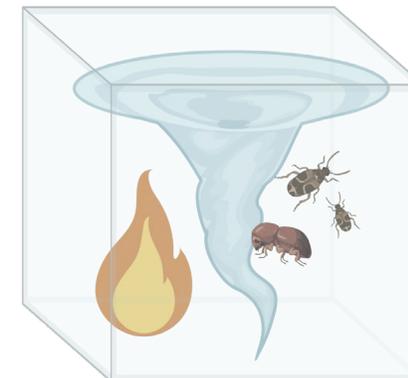
-> *Wie viel resilienter ist ein voraus-verjüngter Bestand?*



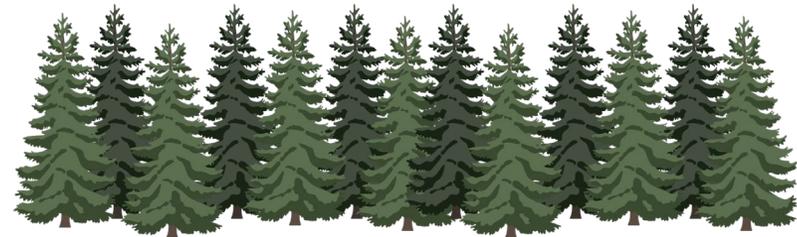
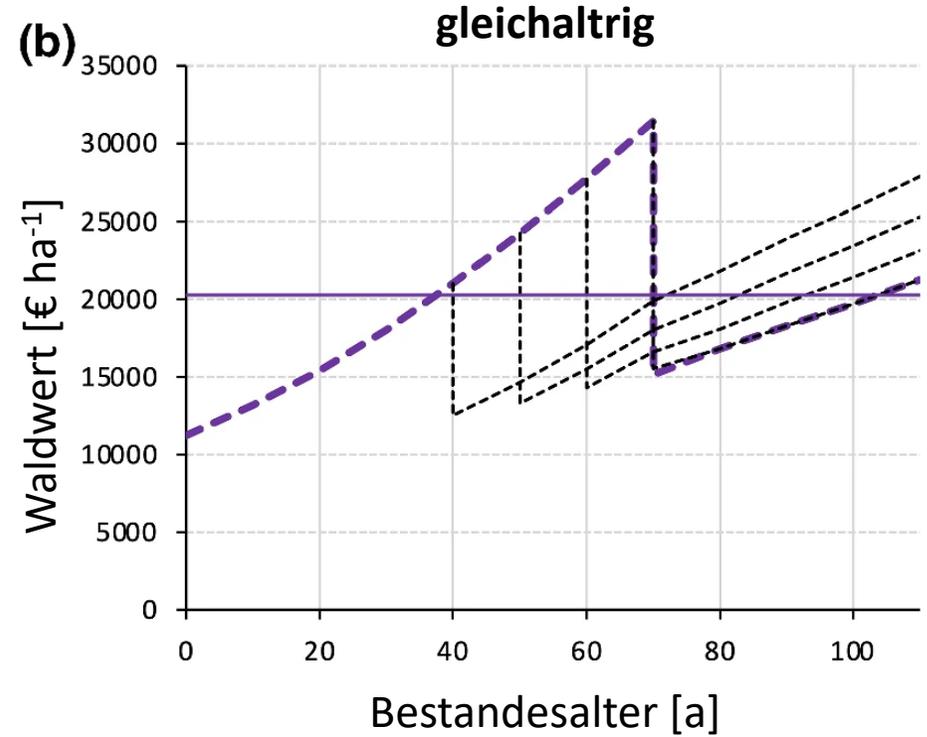
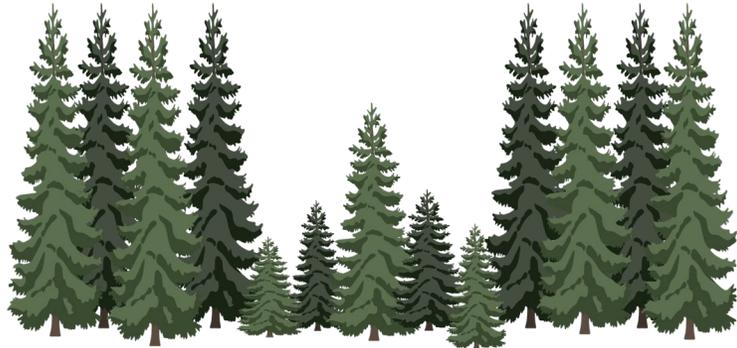
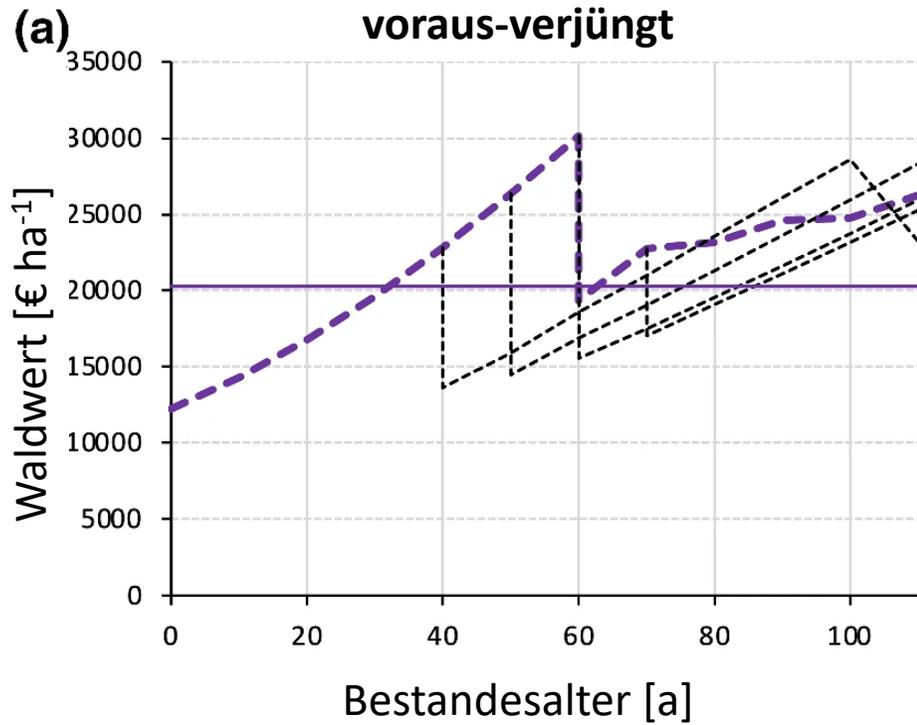
Behandlungskonzept

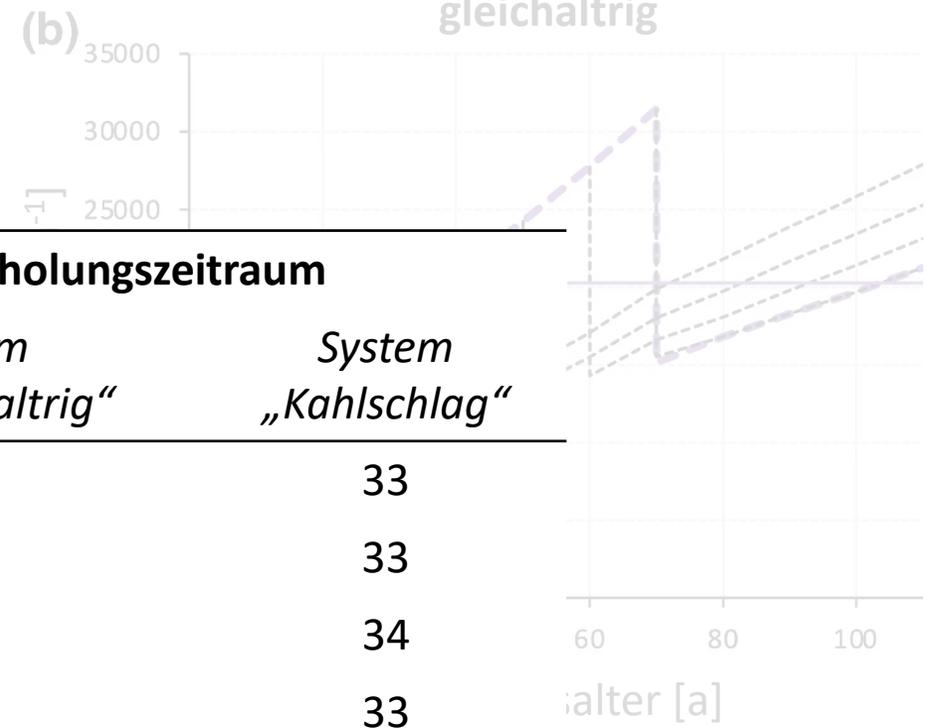
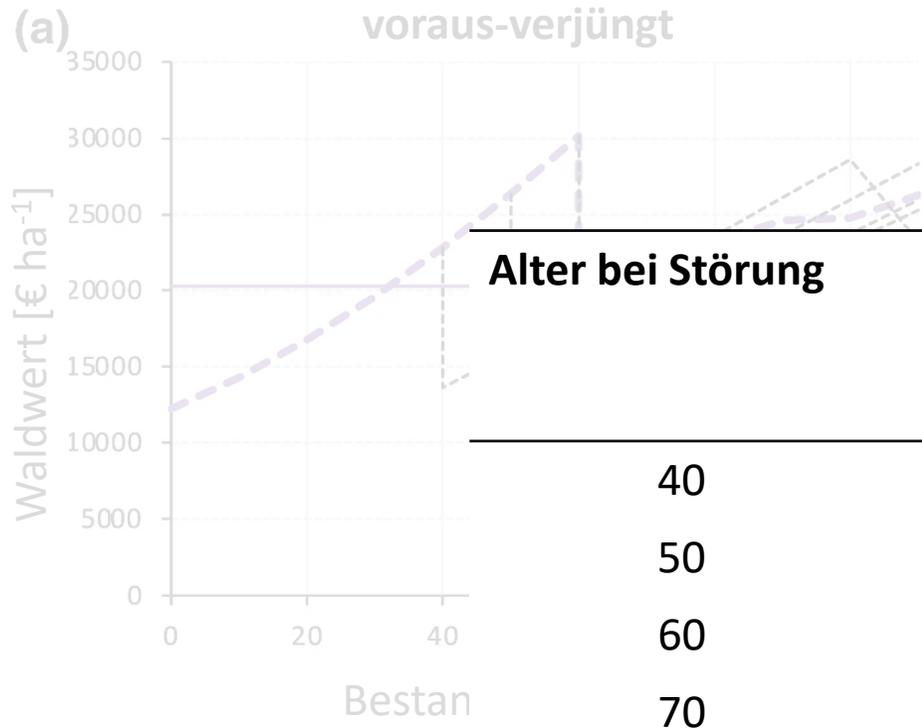


Wachstumsmodell

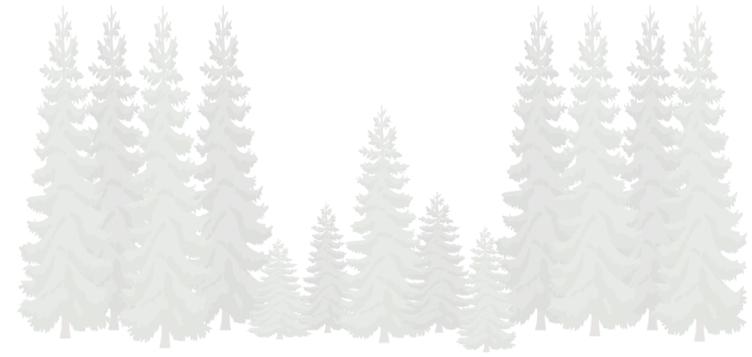


Störungsmodell

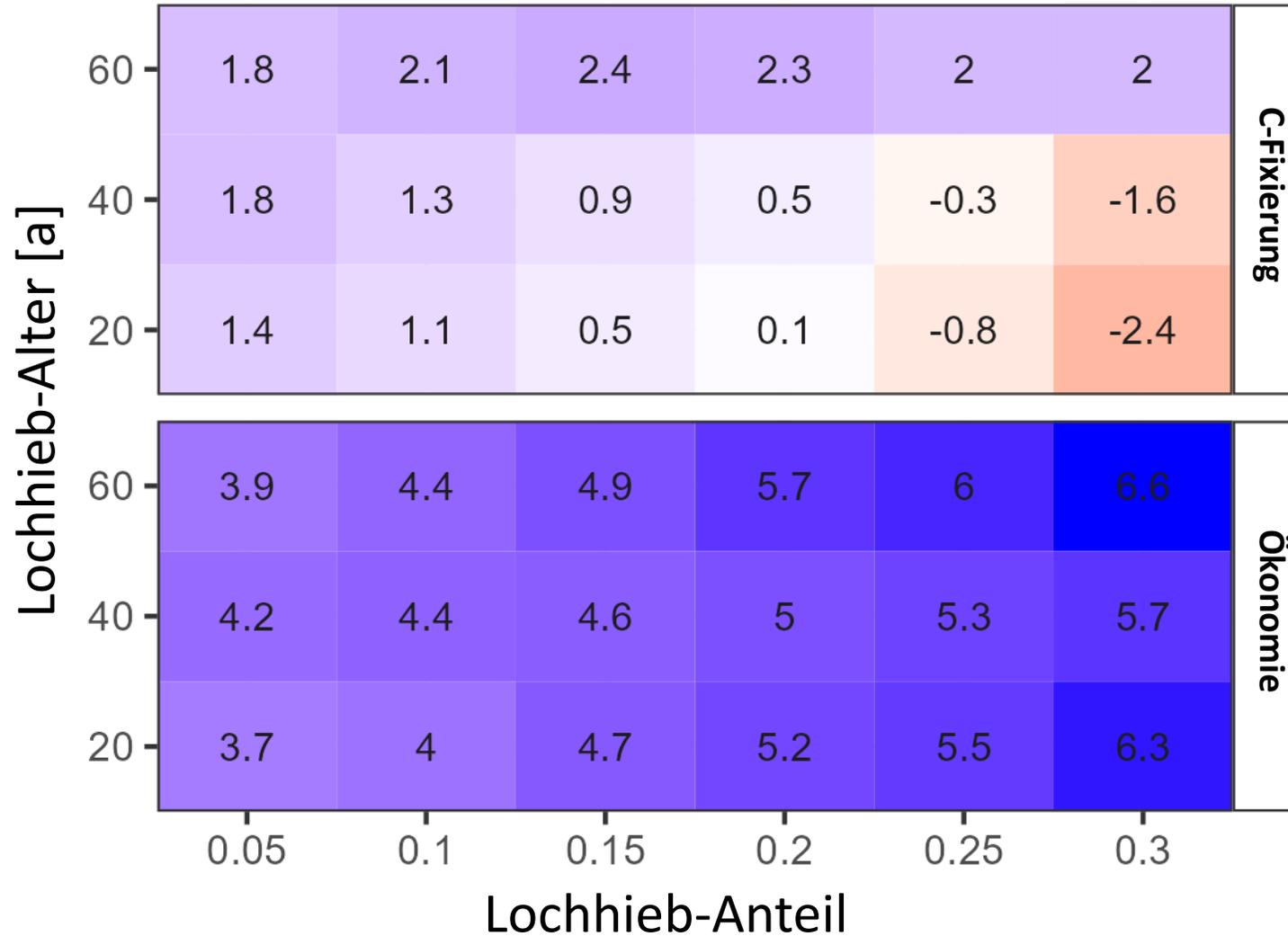


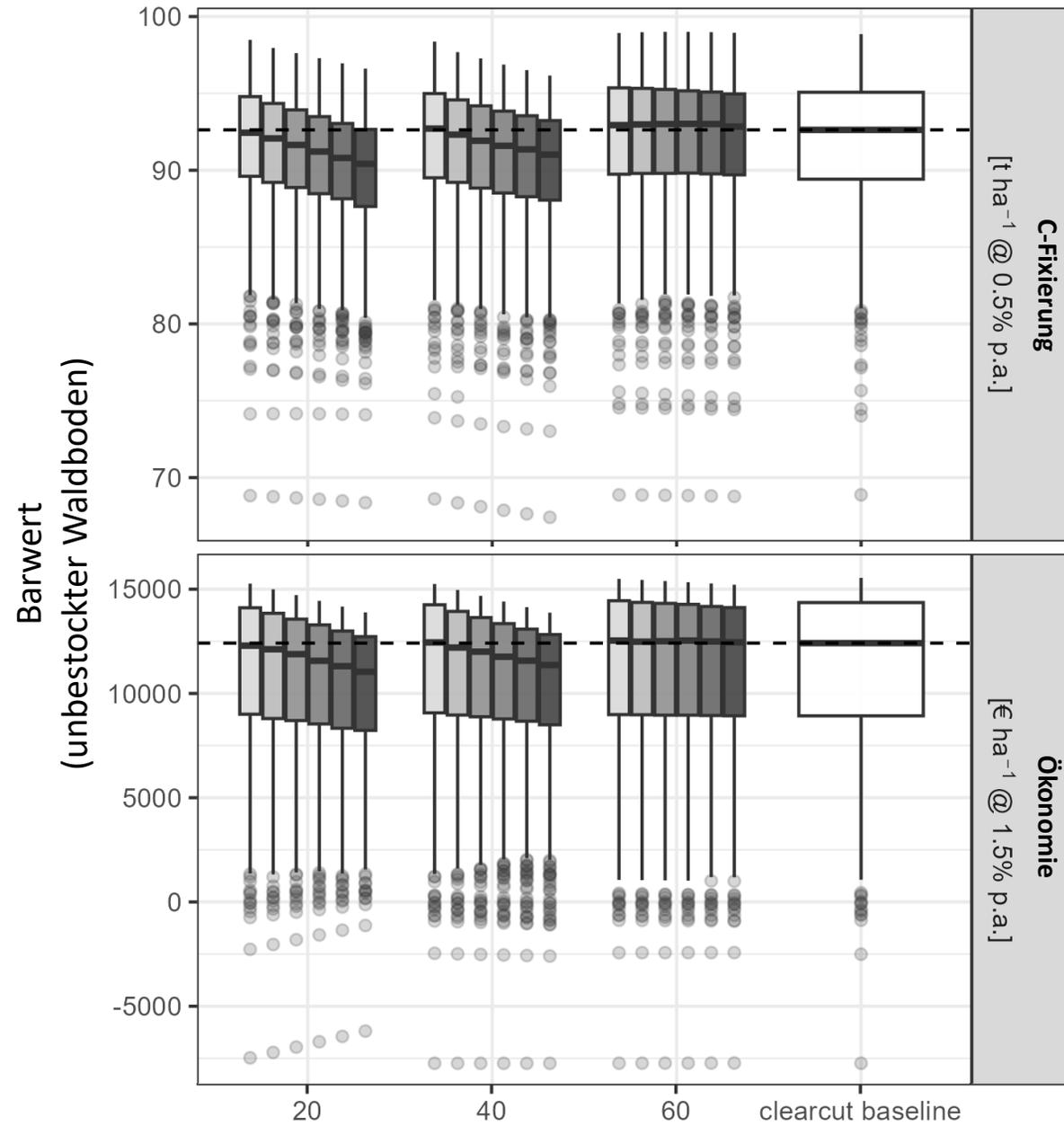


Alter bei Störung	Erholungszeitraum	
	System „ungleichaltrig“	System „Kahlschlag“
40	27	33
50	25	33
60	23	34
70	16	33



Erholungszeit-Gewinne (gegenüber gleichaltrigen Systemen)





Fazit

- Vorschlag: Messung der (ökonomischen) Resilienz über die Erholungszeit des Waldwerts nach Störung
- Innerhalb dieses Frameworks:
 - ... erhöht Voraus-Verjüngung (nicht nur) ökonomische Resilienz,
 - ... ohne die Gesamt-Performance notwendigerweise zu verschlechtern!



Literatur

Fibich et al. Assessing the Influence of Advance Regeneration on Stand Level Resilience. *In prep.*

Knoke T, Paul C, Gosling E, Jarisch I, Mohr J and Seidl R 2023 Assessing the Economic Resilience of Different Management Systems to Severe Forest Disturbance *Environ Resource Econ* **84** 343–81

Nikinmaa L, Lindner M, Cantarello E, Jump A S, Seidl R, Winkel G and Muys B 2020 Reviewing the Use of Resilience Concepts in Forest Sciences *Curr Forestry Rep* **6** 61–80

Pimm S L 1984 The complexity and stability of ecosystems *Nature* **307** 321–6

Fig. 1 The development of the use of the three resilience concepts in forest resilience studies from 2000 to 2018. The figure shows the number of studies using engineering, ecological or social-ecological resilience concepts and the total number of forest resilience studies published per year. The cut-off date for the review was in mid-August 2018, and therefore, not all studies published in 2018 were included in the review

