The economic logic of thinning illustrated by a Sierra mixed-conifer field trial

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University of Washington

John D. Foppert[1], Rob York[2], Emily Cieslewitz[2]

[1]Paul Smith's College Institute of Forestry
[2] UC Berkeley, Rausser College of Natural Resources

PAUL SMITH'S COLLEGE
INSTITUTE OF FORESTRY

Berkeley Rausser
College of Natural Resources

Overview

- Motivation

- Analytical framework (sketch)
    - Preliminaries
    - Alpha concept
    - Thinning analysis

- Comparative analysis
    - Set up
    - Results
    - Interpretation

- Discussion

- Q&A

MOTIVATION

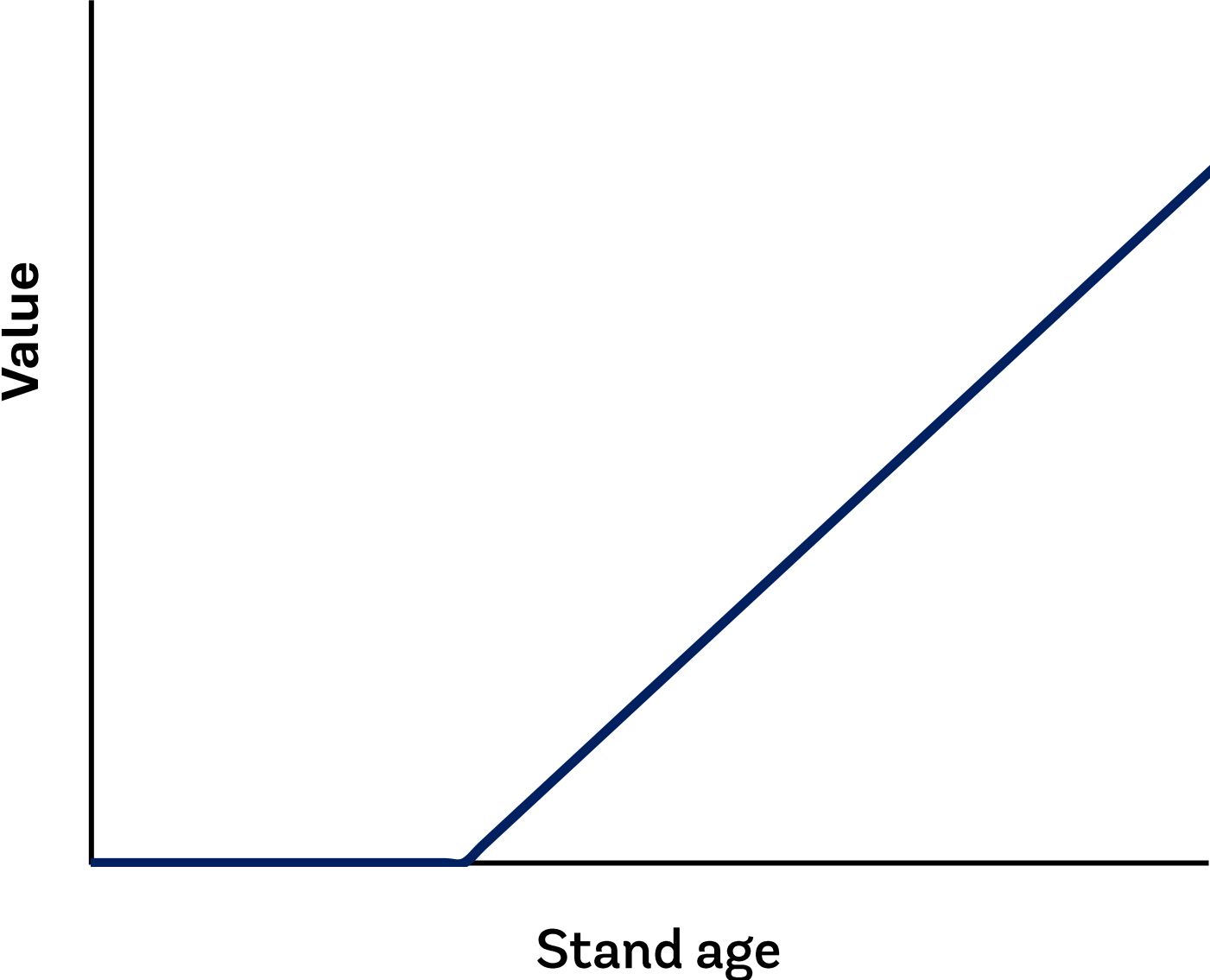A silviculturalist and an industrial forester got into a friendly argument...

Motivation

From above or from below?

- From above: more upfront revenue, delayed final harvest

- From below: sooner final harvest, less upfront revenue
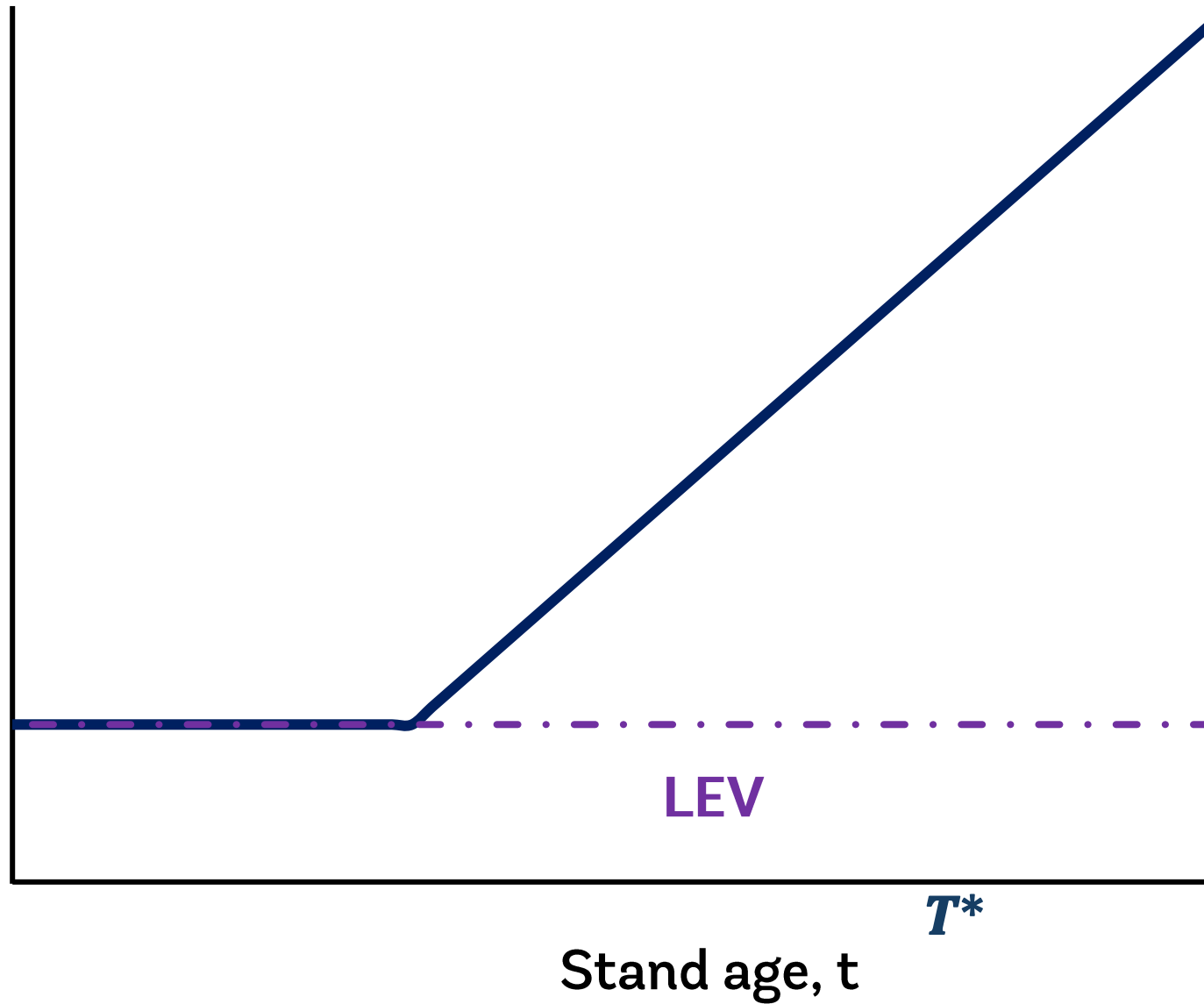
Analytical Framework

Analytical Framework
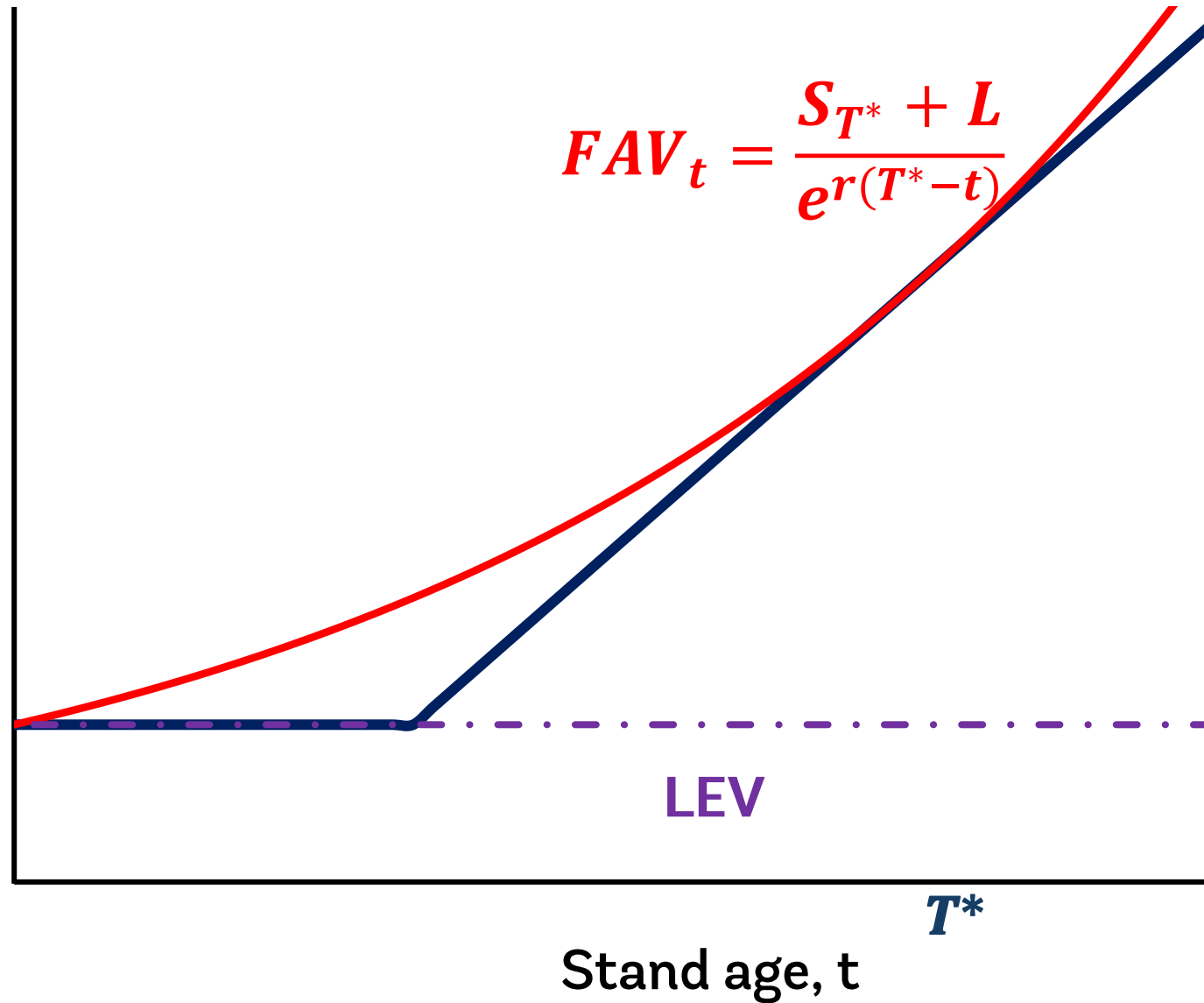
ANALYTICAL FRAMEWORK

Stylized production function:

- Linear 2-phase production function

- No establishment costs

- No mid-rotation expenses or revenue
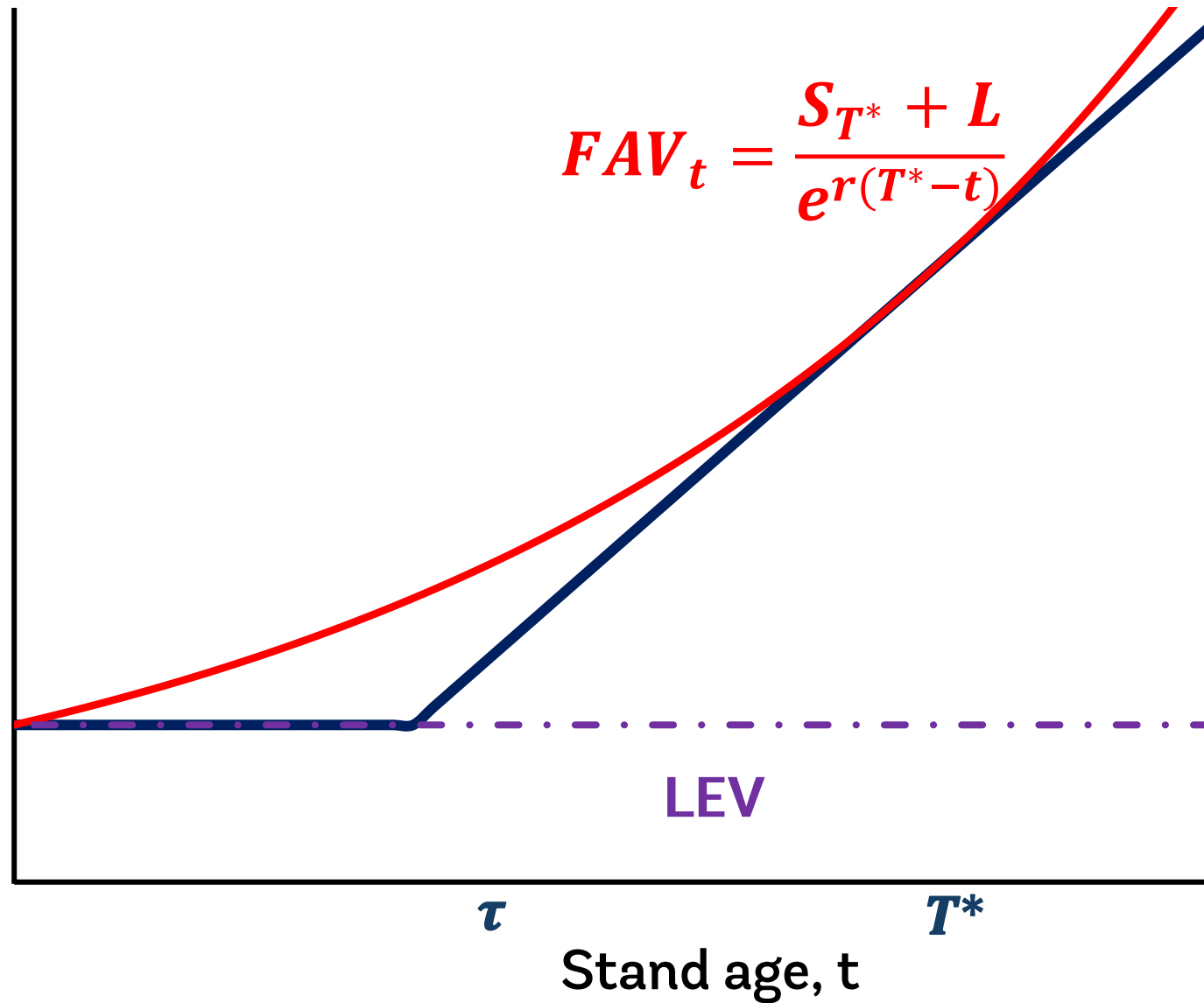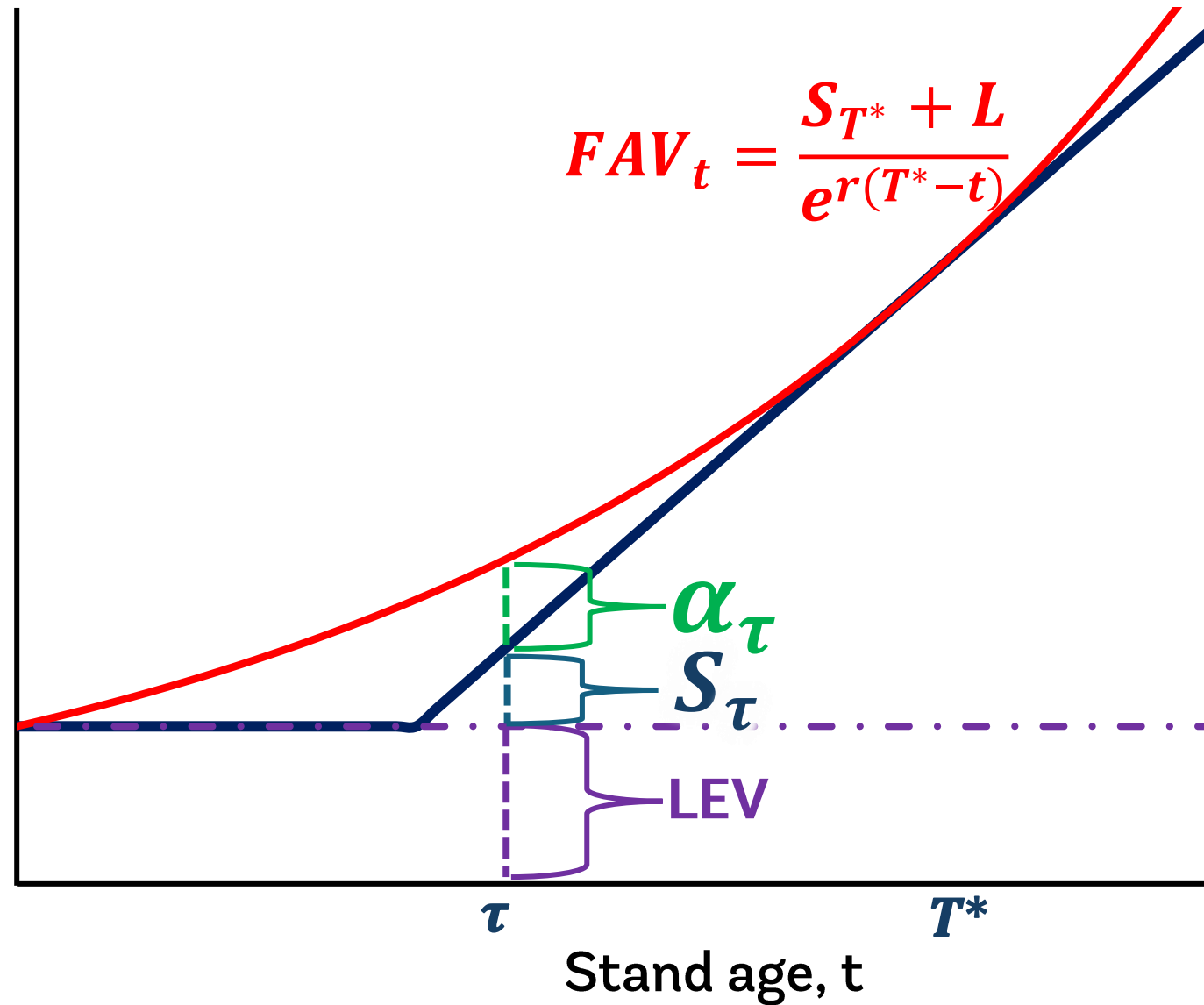
- Exogenous LEV

Analytical Framework

LEV

T^*

Stand age, t

Analytical Framework

$$FAV_t = \frac{S_{T^*} + L}{e^{r(T^*-t)}}$$

LEV

T^*

Stand age, t

ANALYTICAL FRAMEWORK

$$FAV_t = \frac{S_{T^*} + L}{e^{r(T^*-t)}}$$

LEV

τ

T^*

Stand age, t

ANALYTICAL FRAMEWORK

$$FAV_t = \frac{S_{T^*} + L}{e^{r(T^* - t)}}$$

α_τ

S_τ

LEV

τ

T^*

Stand age, t

ANALYTICAL FRAMEWORK

$$FAV_\tau = S_\tau + LEV + \alpha_\tau$$

$$\alpha_\tau = FAV_\tau - (S_\tau + LEV)$$

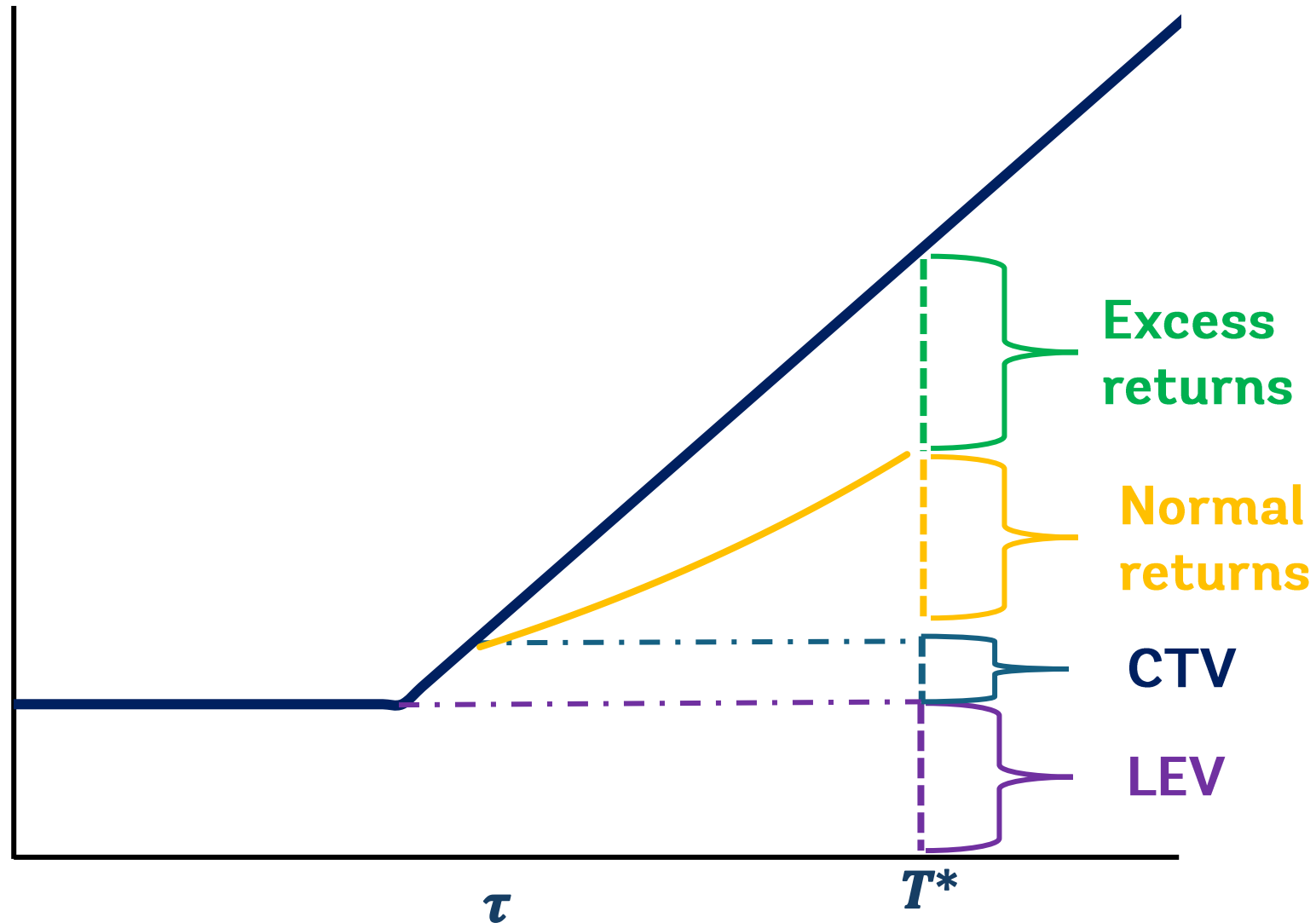$$\alpha_\tau = \frac{S_{T^*} + LEV}{e^{r(T^* - \tau)}} - (S_\tau + LEV)$$

ANALYTICAL FRAMEWORK

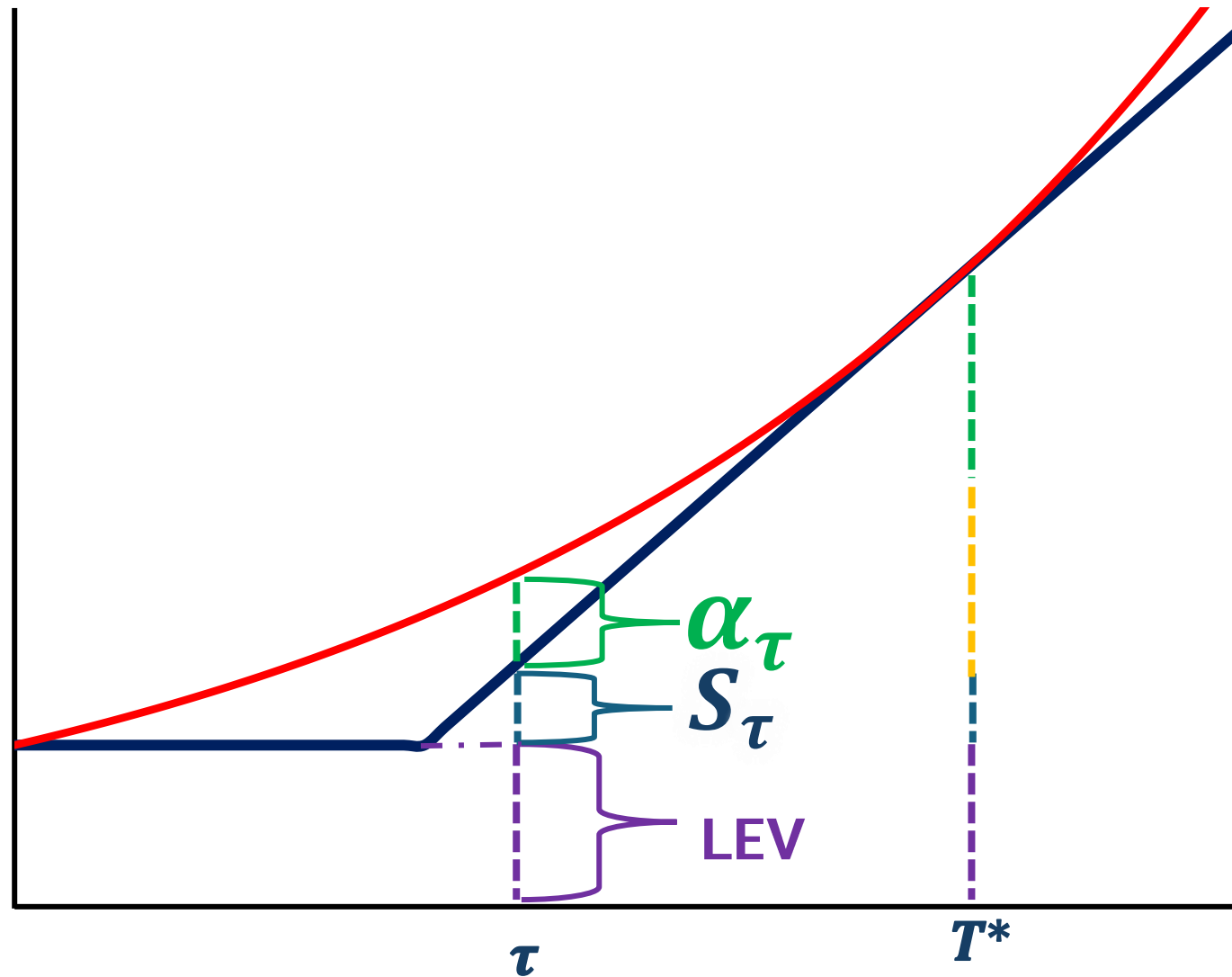$$\alpha_\tau = \frac{S_{T^*} + LEV}{e^{r(T^*-\tau)}} - (S_\tau + LEV)$$

$$\alpha_\tau = \frac{\Delta S_{\tau \to T^*} - (S_\tau + LEV)(e^{r(T^*-\tau)} - 1)}{e^{r(T^*-\tau)}}$$

Analytical Framework

ANALYTICAL FRAMEWORK

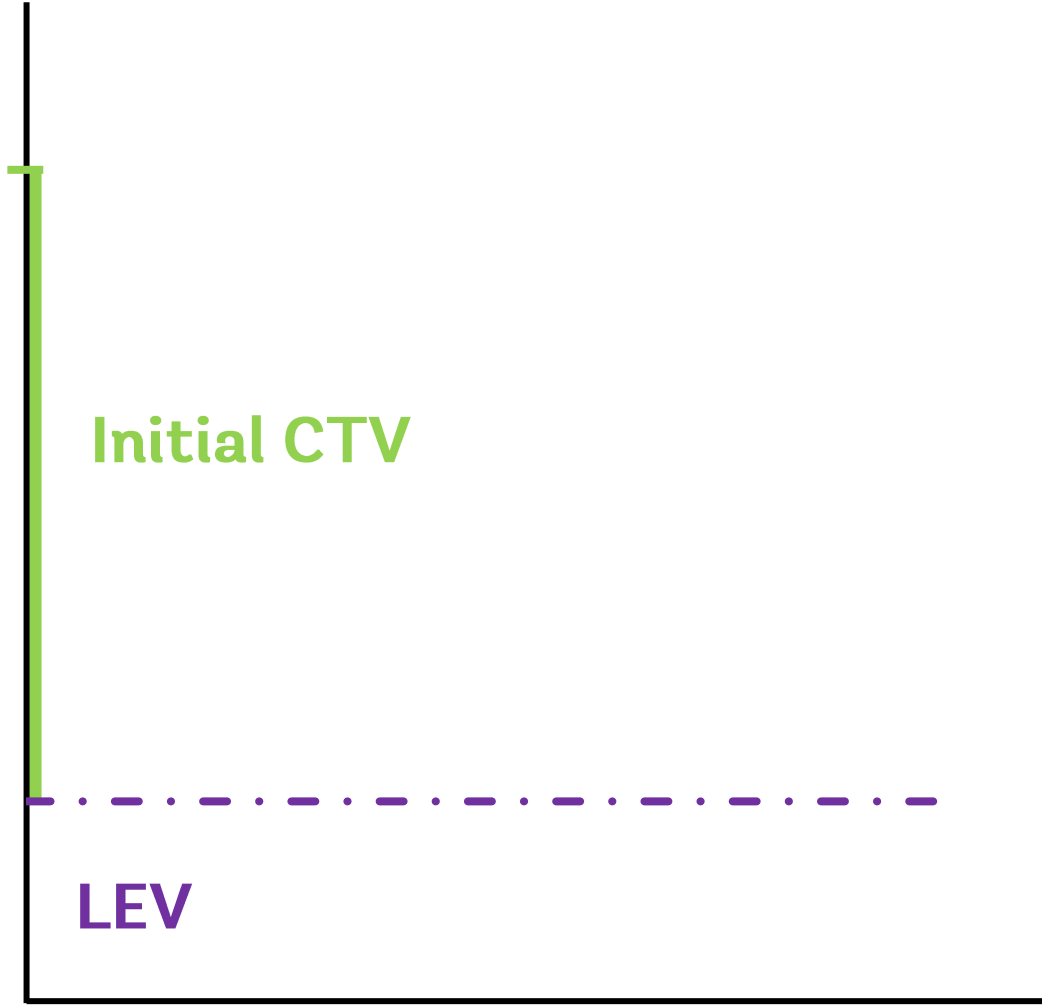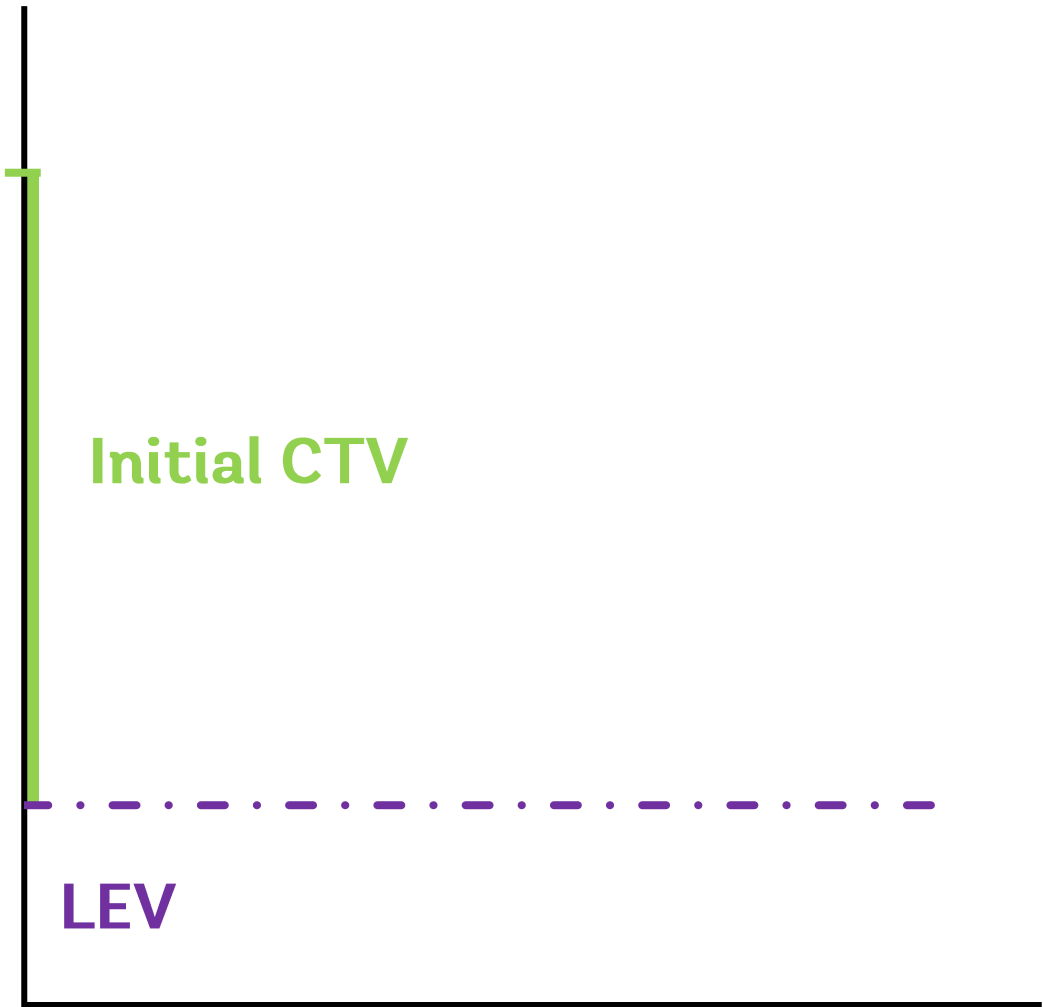# ANALYTICAL FRAMEWORK

Thinning analysis:

Thin if…

$$(S_\tau + \alpha_\emptyset) + (S_\tau + \alpha_\emptyset) < S_\tau + (S_\tau + \alpha_\chi)$$

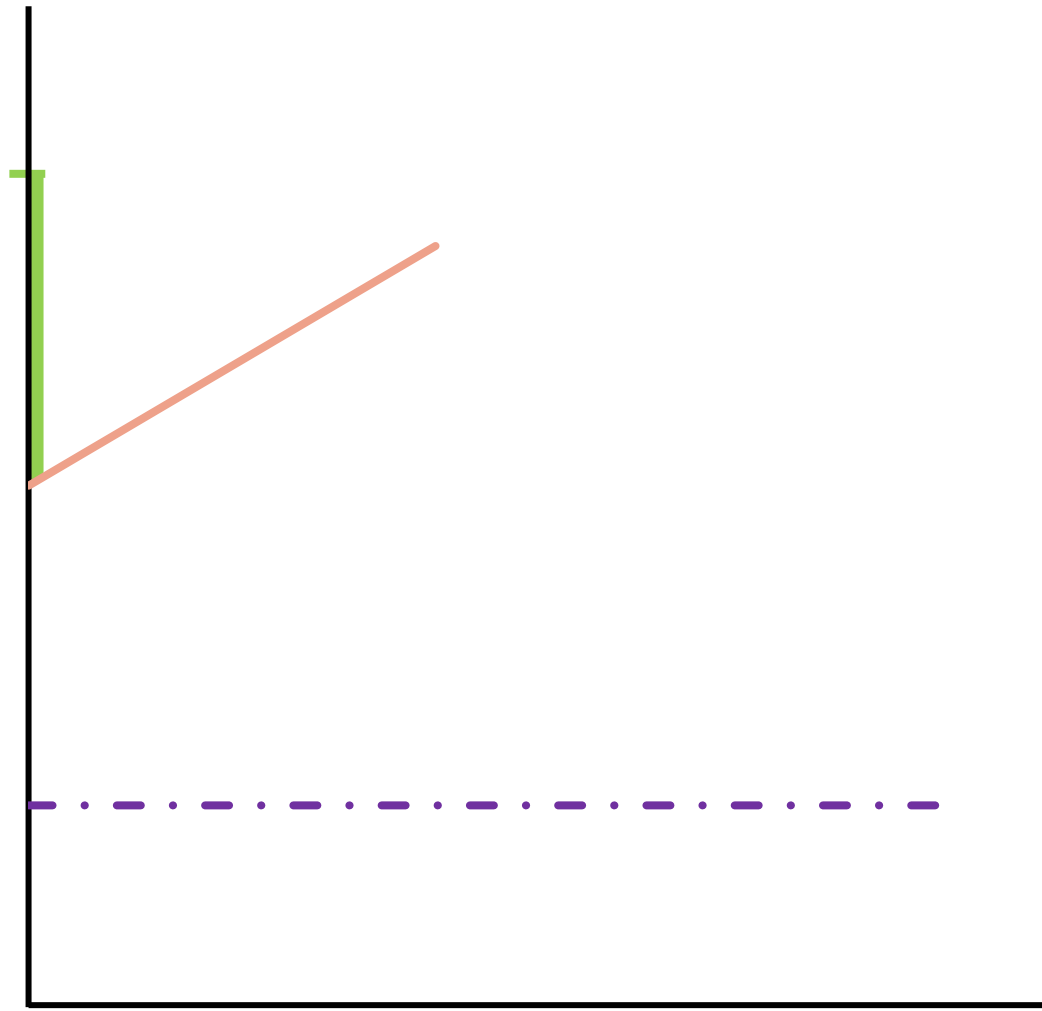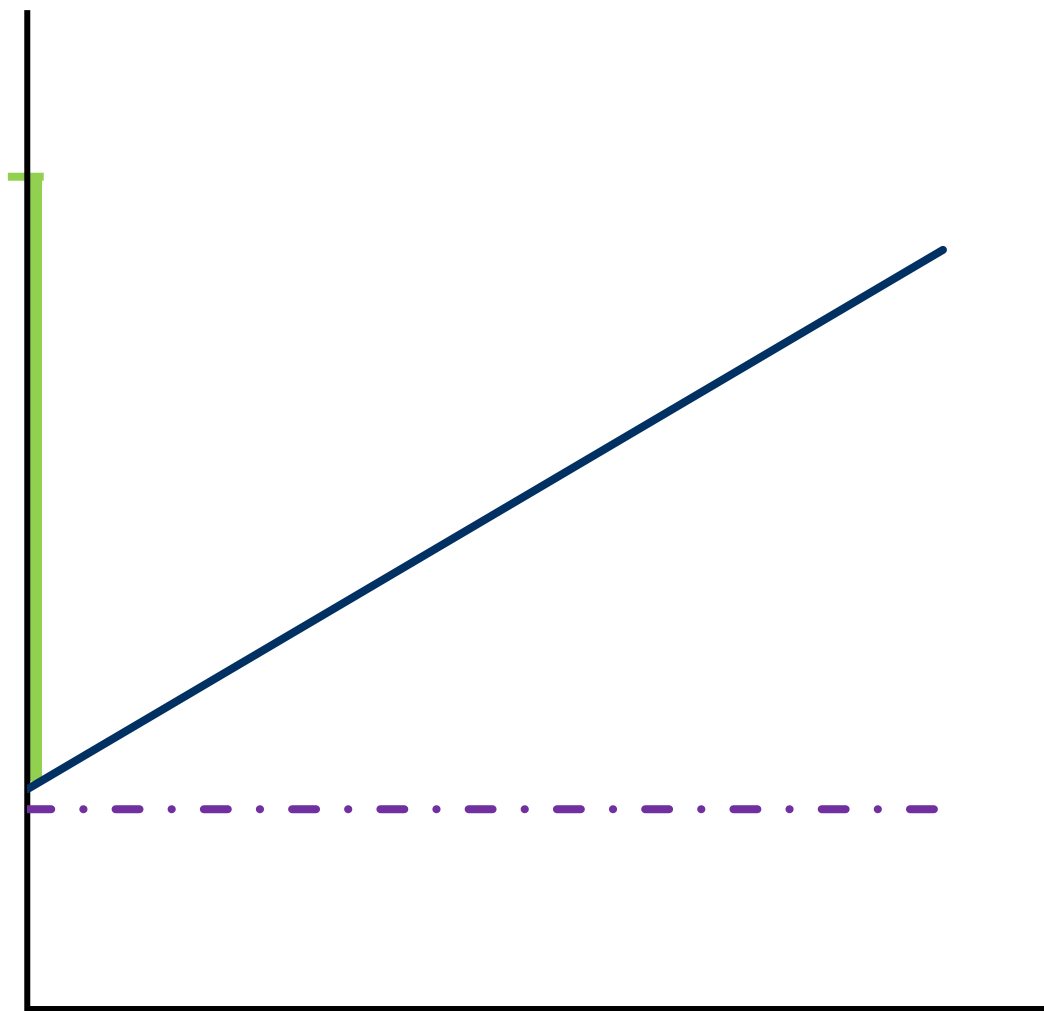$$n.\, b. \quad \alpha_\chi = \alpha_\emptyset + \Delta\alpha_{\emptyset \to \chi}$$

$$\alpha_\emptyset < \Delta\alpha_{\emptyset \to \chi}$$

Comparative Analysis

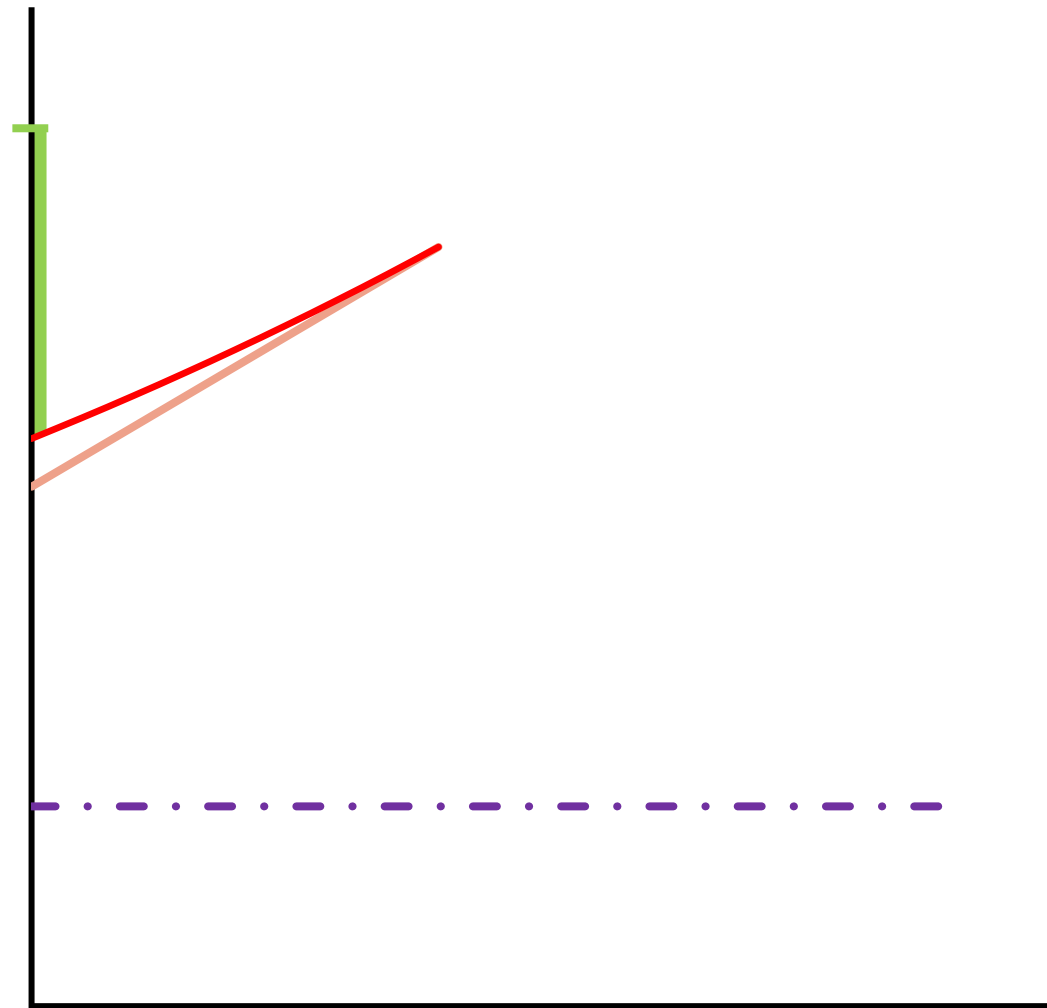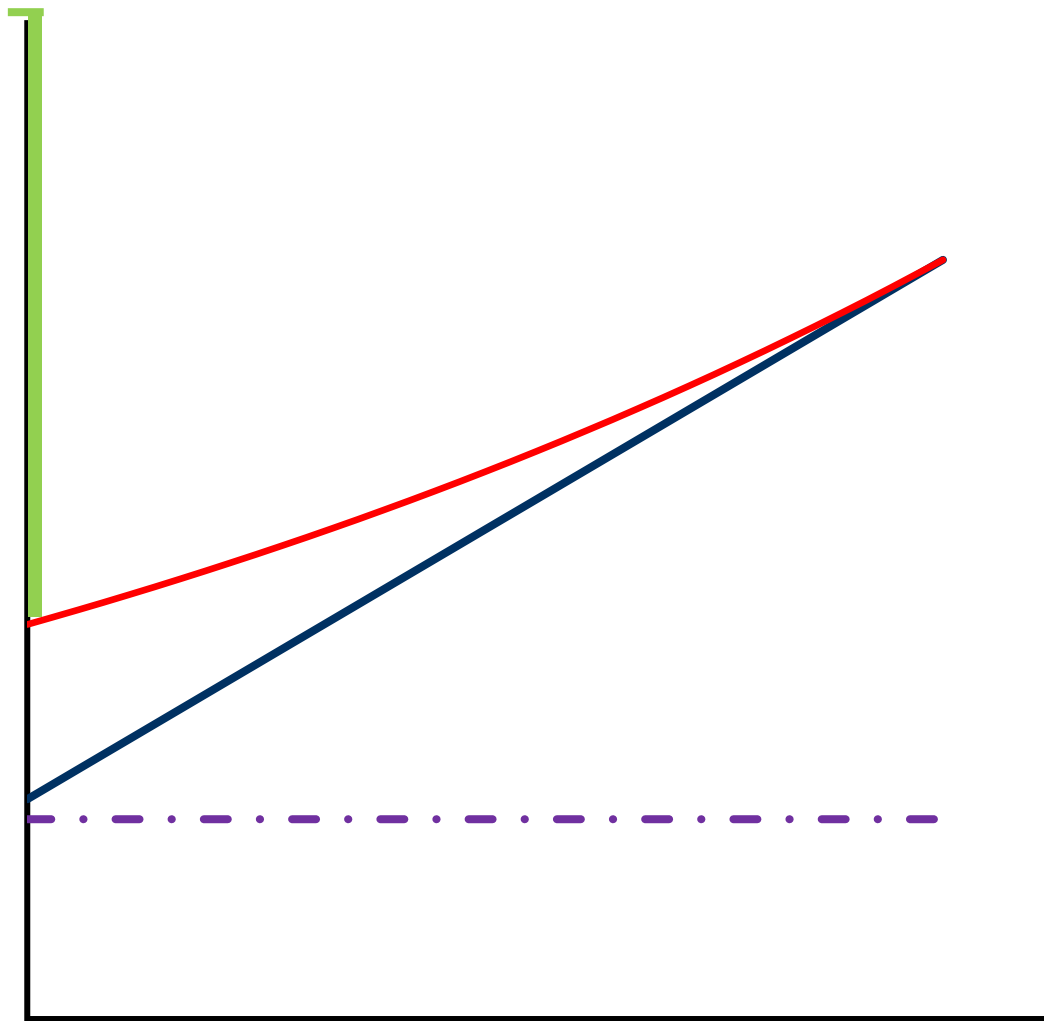# Comparative Analysis

Initial CTV

LEV

Initial CTV

LEV

Comparative Analysis

Comparative Analysis

Discussion

Discussion

A <u>plausible</u> basis in theory for thinning from above

Discussion

A plausible basis in theory for thinning from above

Complicating factors:

- Differences in thinning response - magnitude & persistence
- Size-class differentiated quality
- Stratified composition
- Flexible entry timing; multi-entry thinning schedules

Discussion

A <u>plausible</u> basis in theory for thinning from above

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Next steps…

Questions?