



MAX PLANCK INSTITUTE
FOR DEMOGRAPHIC
RESEARCH

Time spent and left of transient states in stationary populations

Tim Riffe & Francisco Villavicencio & Nicolas Brouard

Brouard-Carey equality

Under stationarity, the population aged x equals the population with x life left to live.

(Brouard, 1989; Vaupel, 2009; Villavicencio & Riffe, 2016)

Transient equality

Under multistate stationarity, the probability that a randomly selected individual is in state s and entered s x years ago is equal to the probability of being in state s and exiting in x years.

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Requisites:

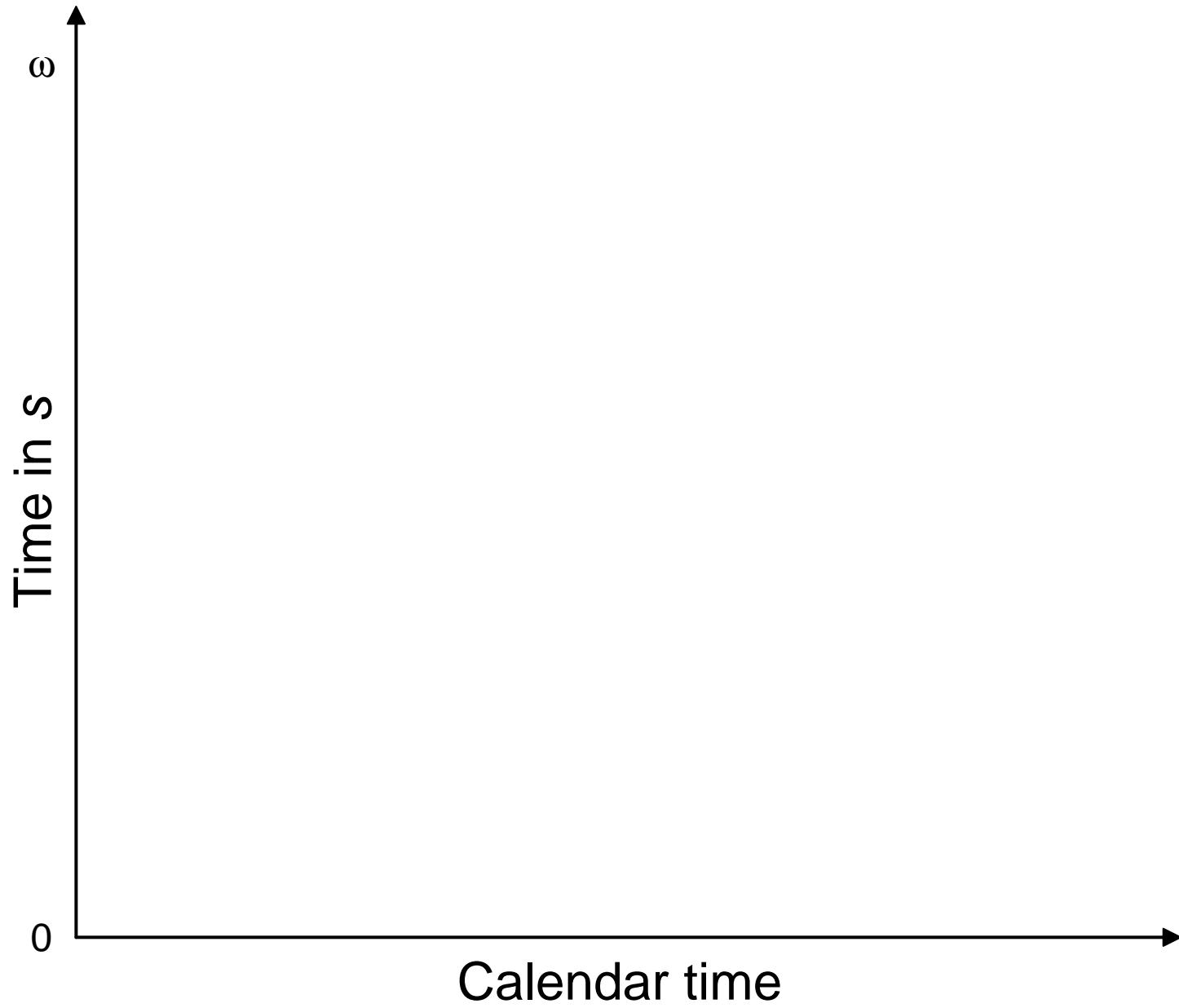
- All vital and state transition schedules fixed.
- No growth (births = deaths).
- Result: The expected age-state structure is frozen.

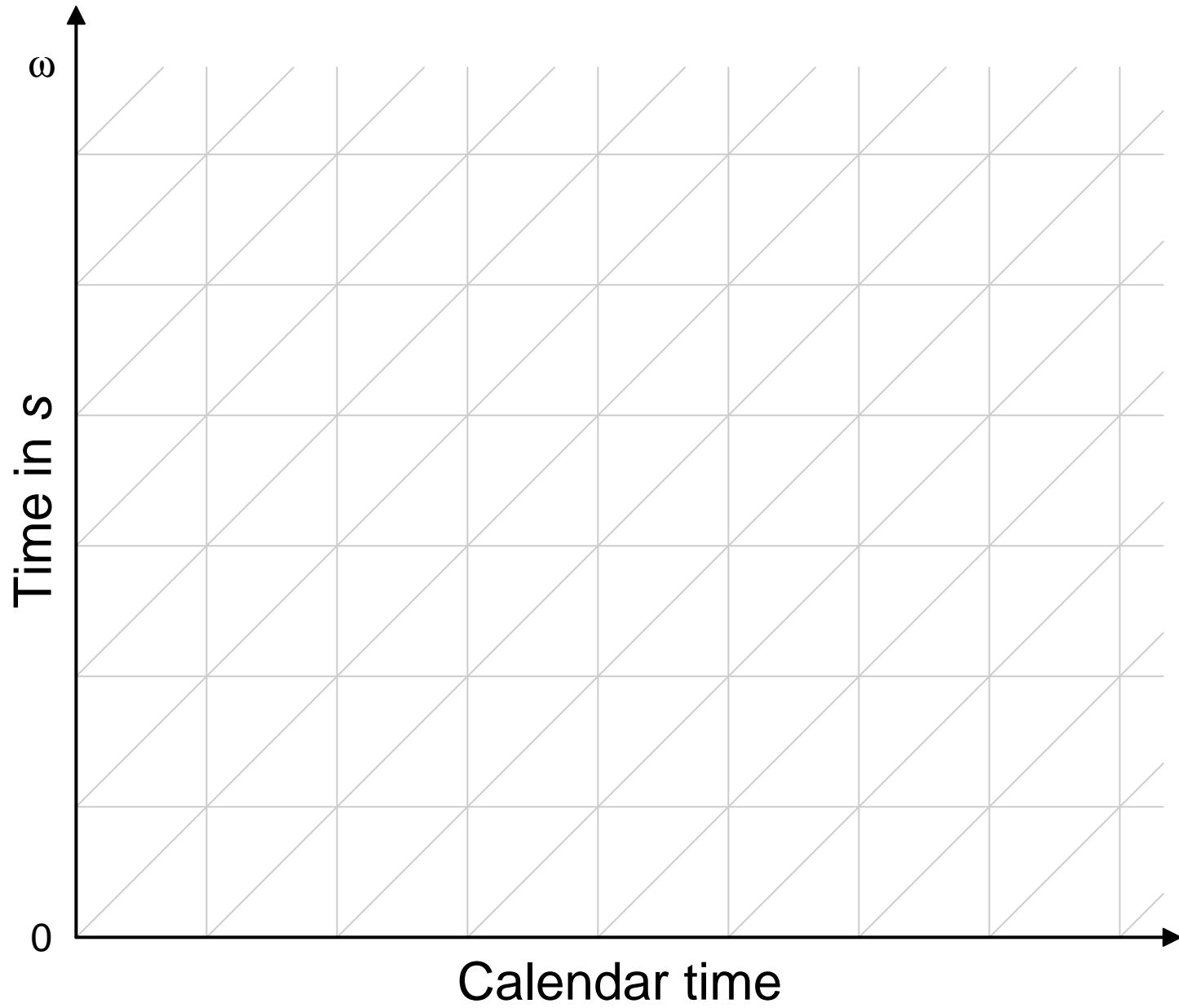
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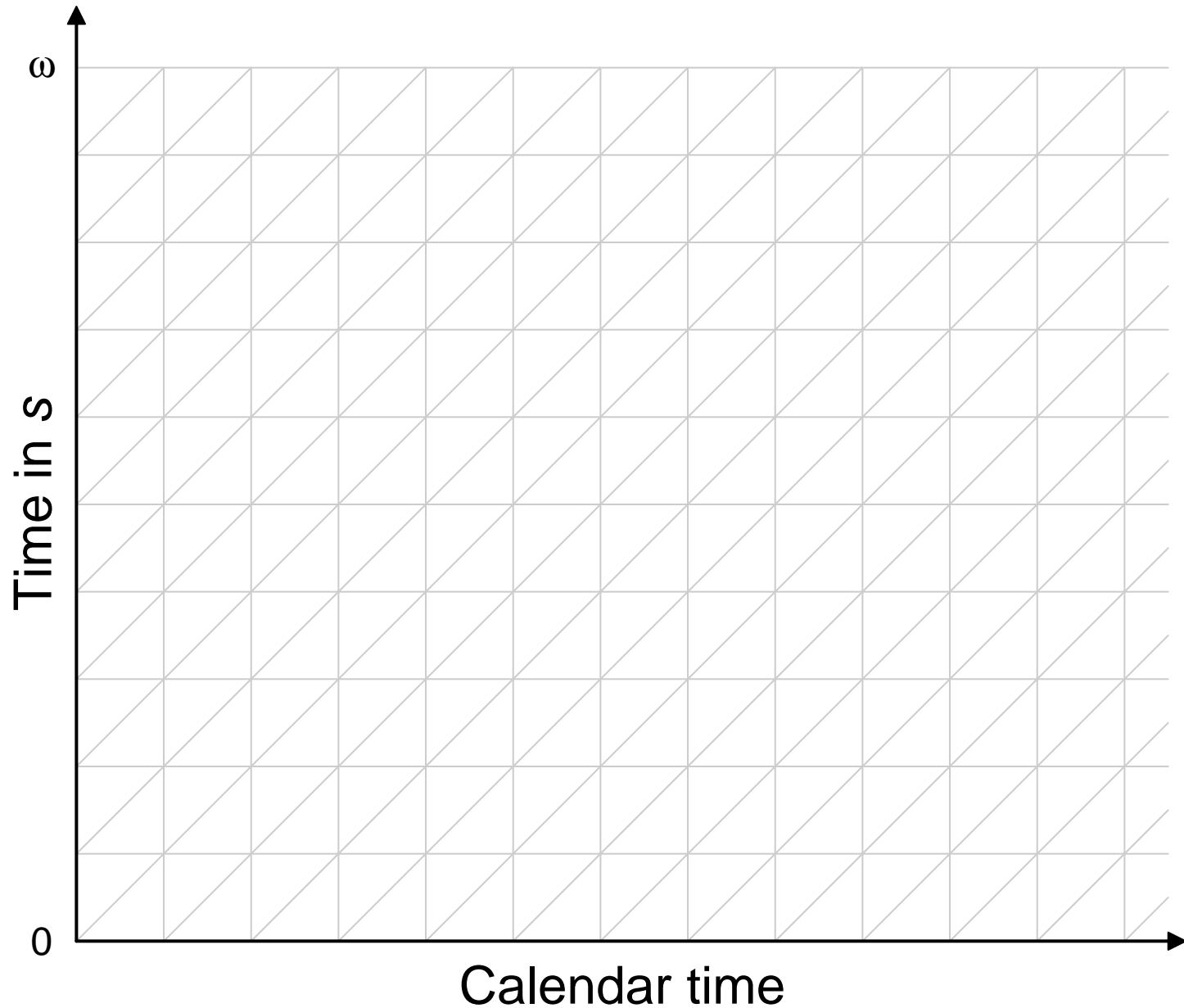
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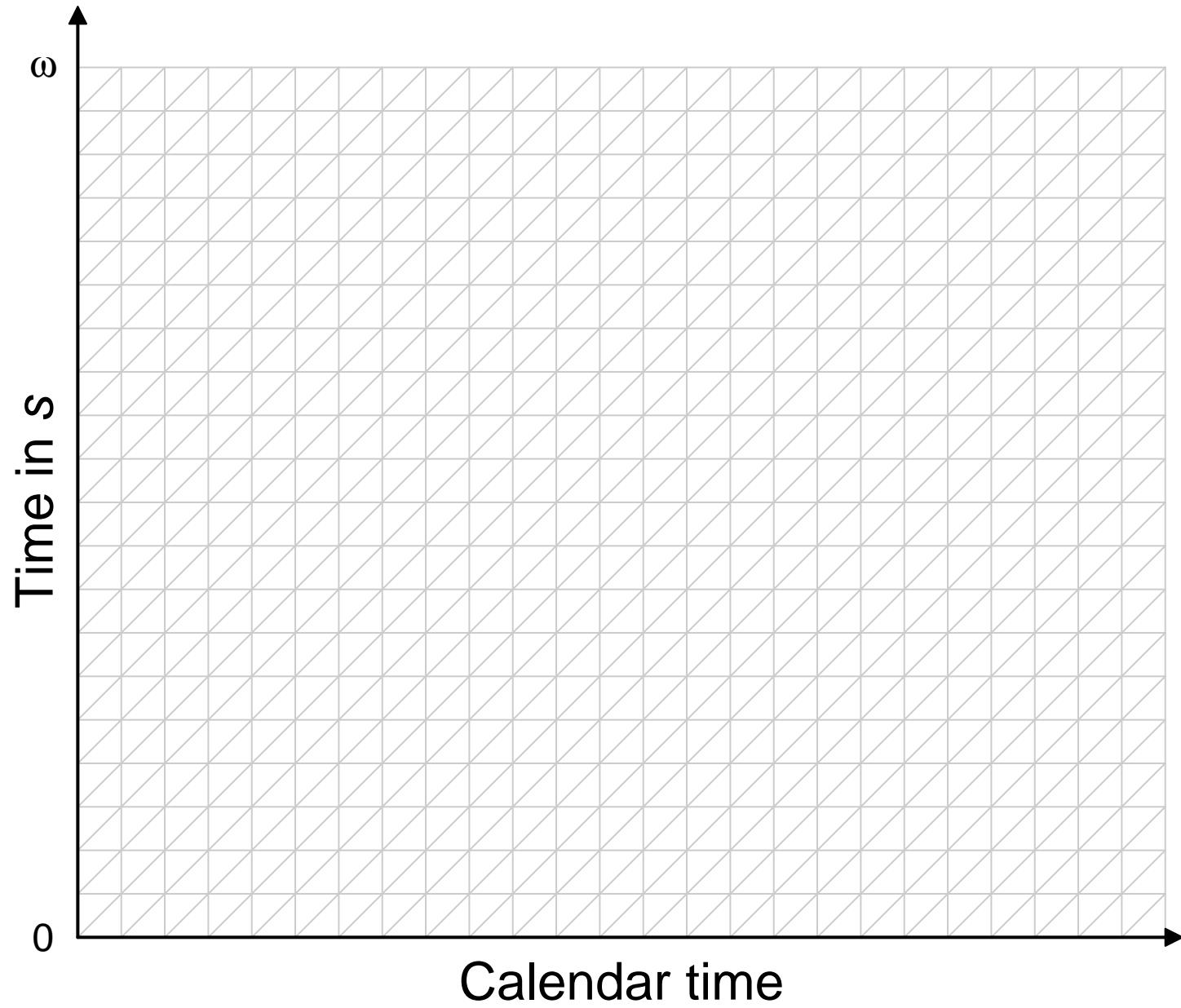
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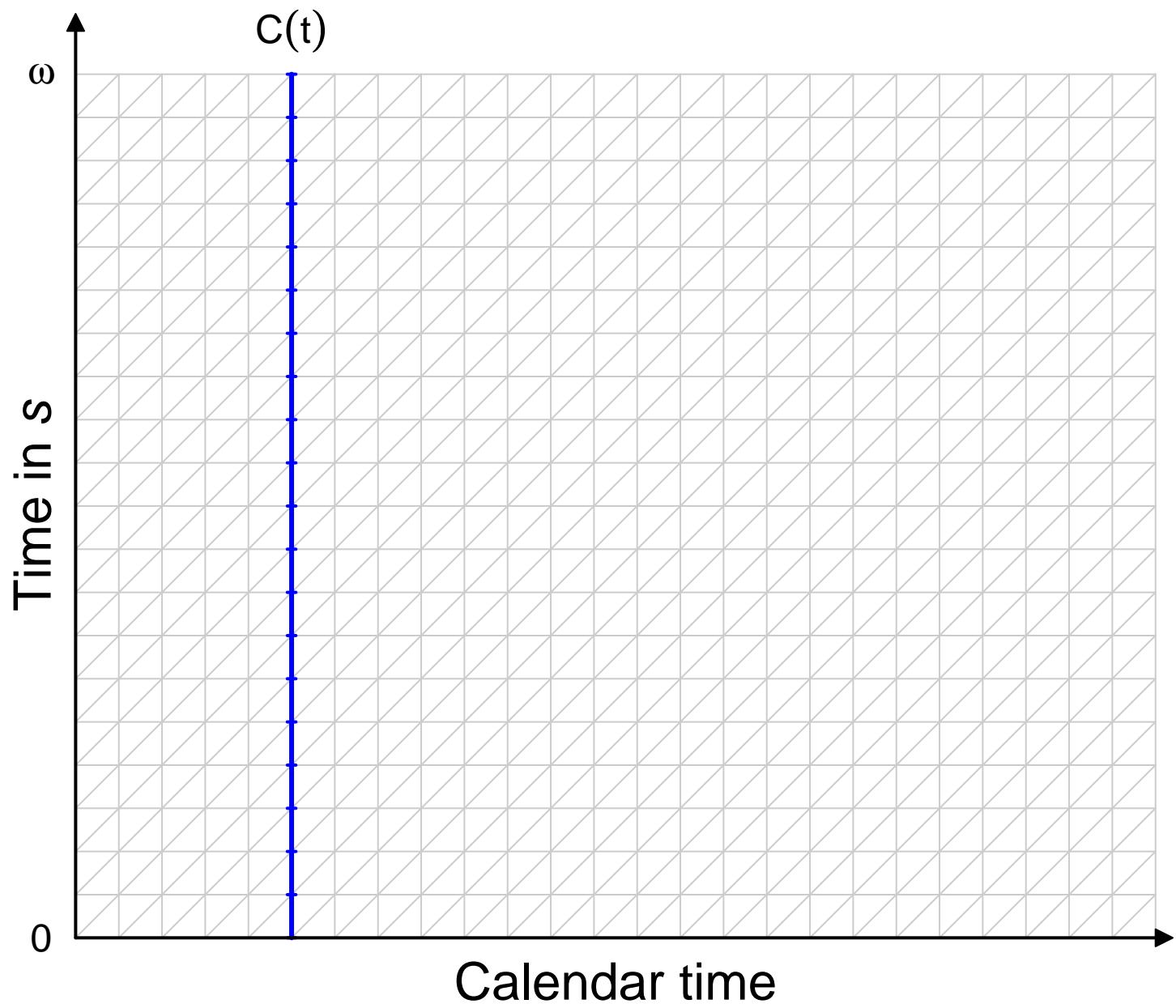
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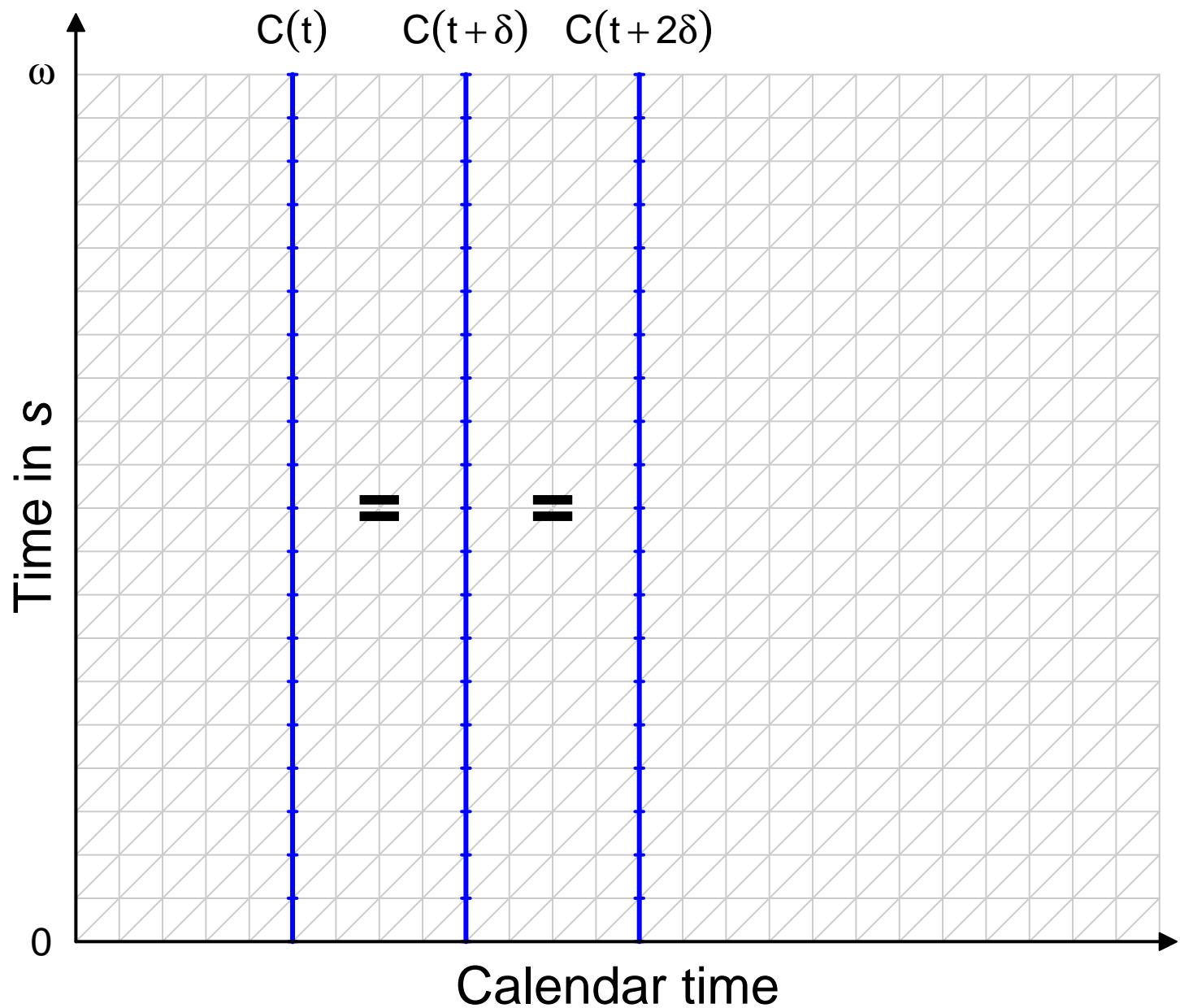


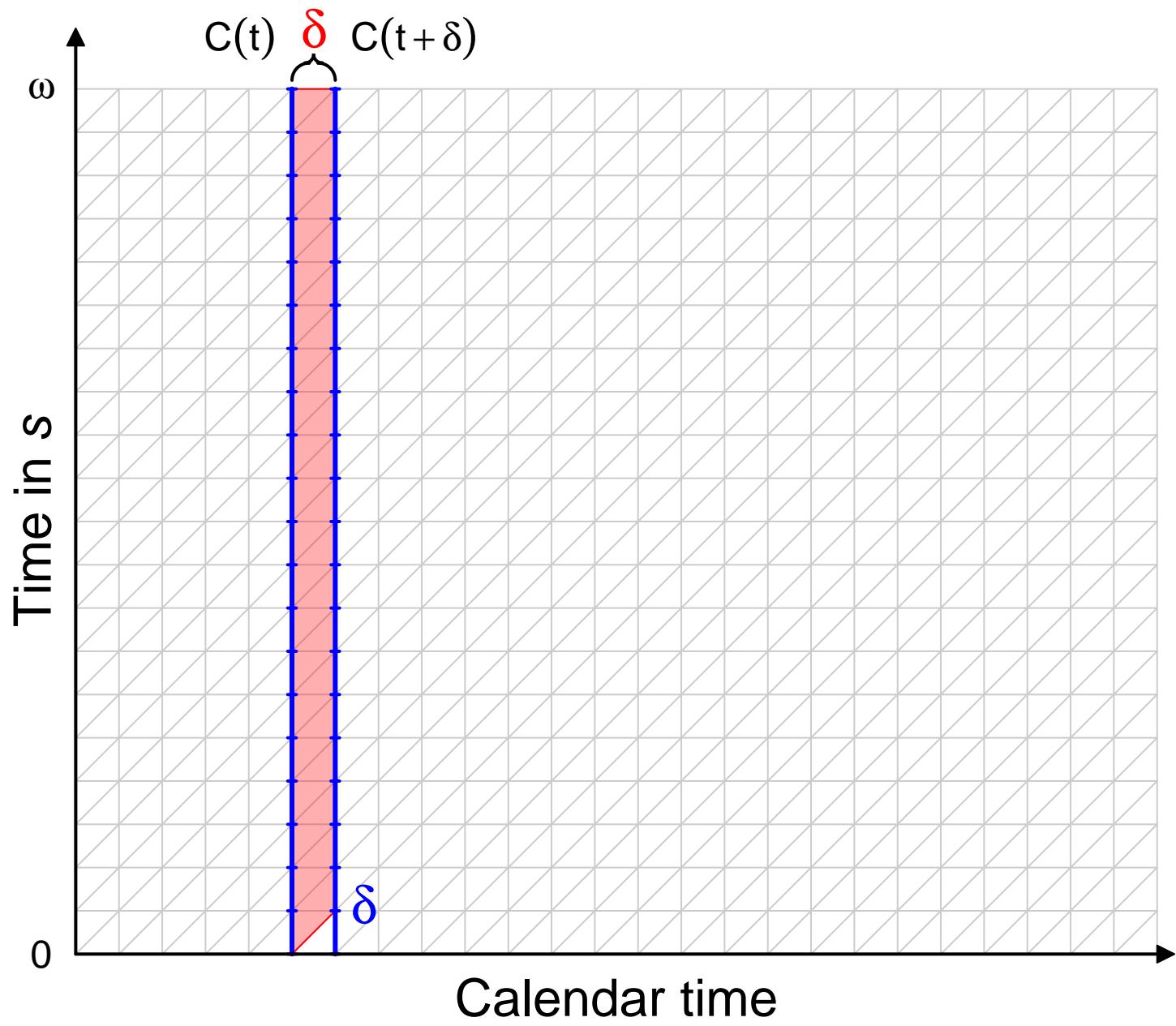


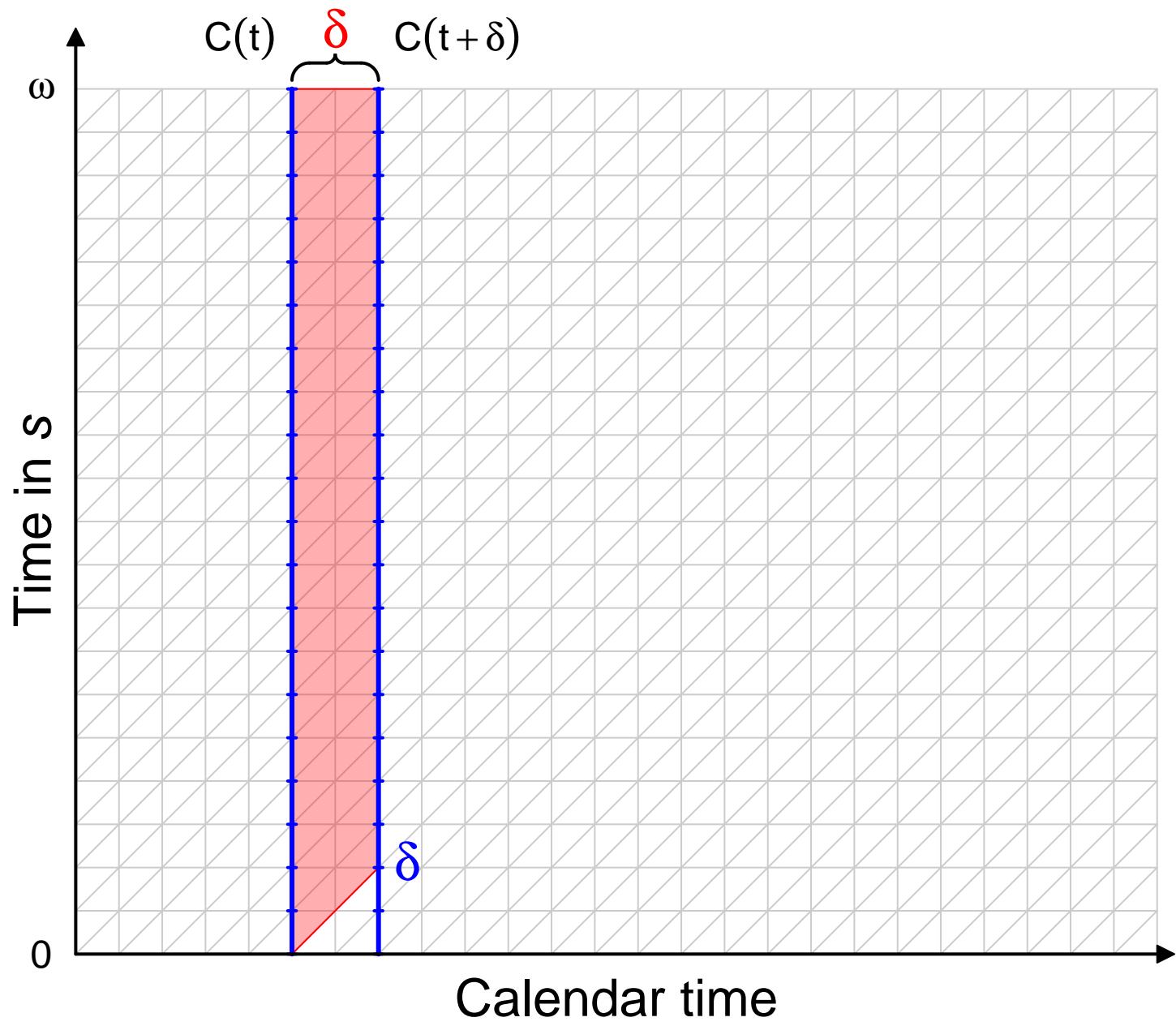


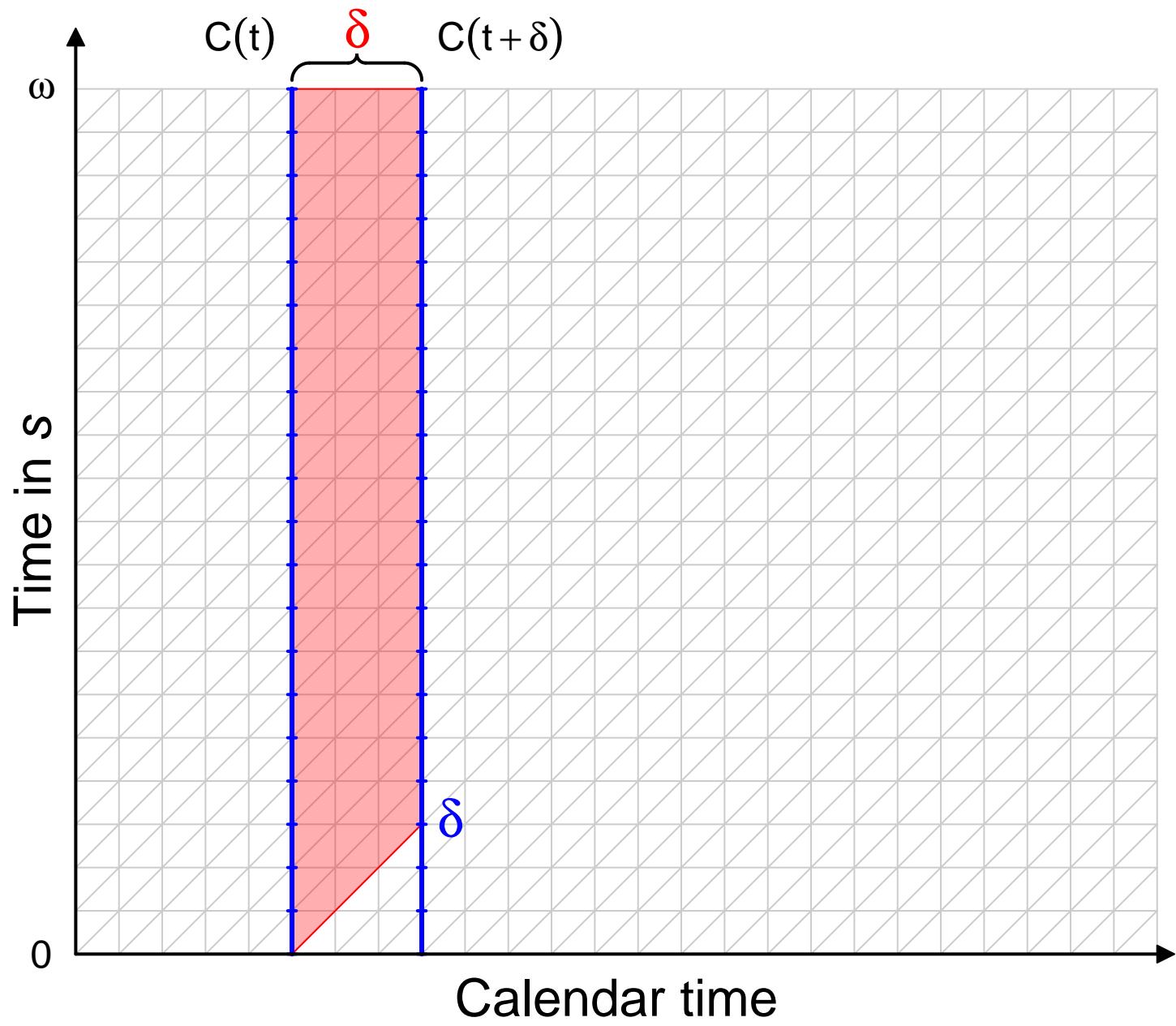


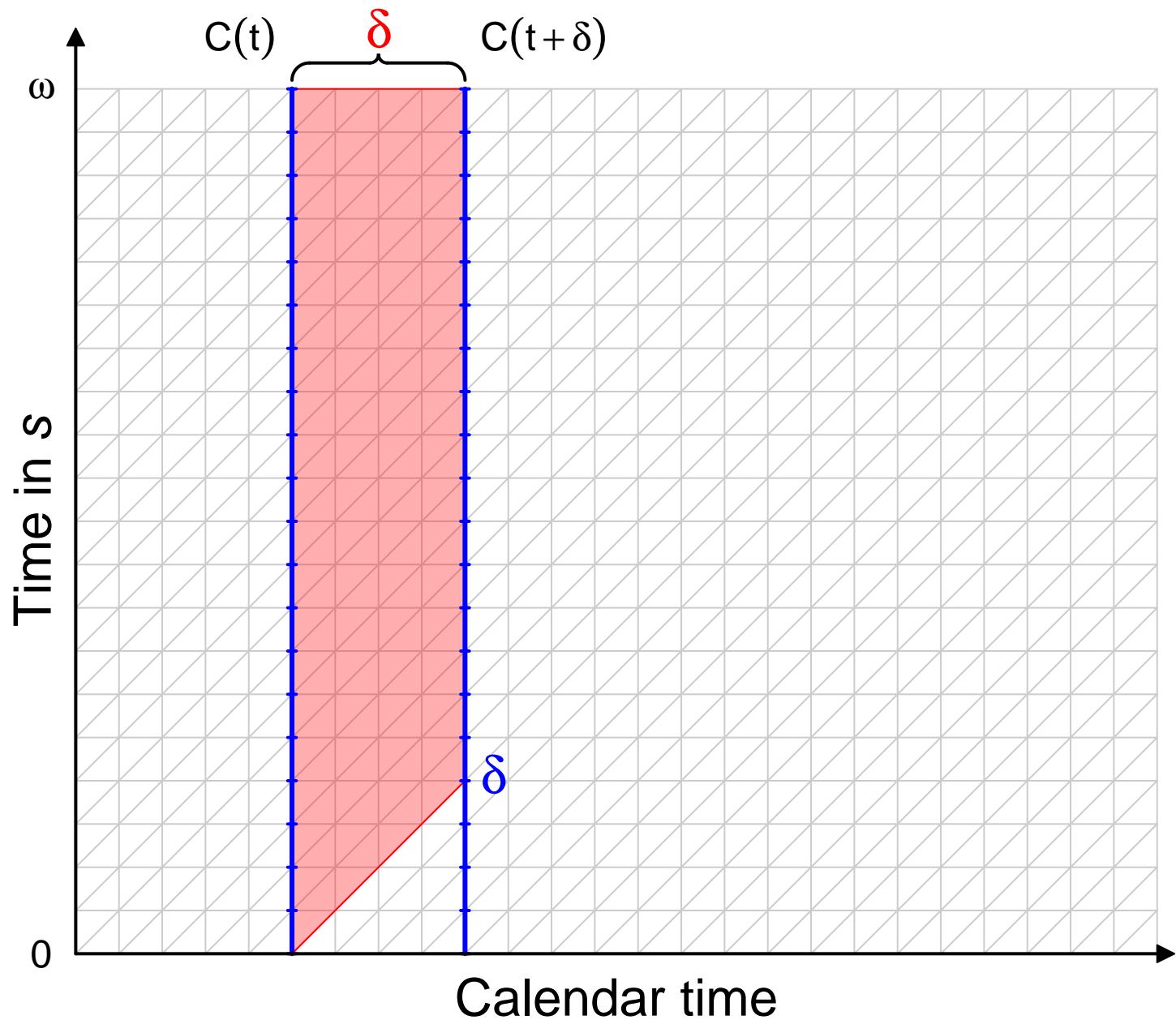


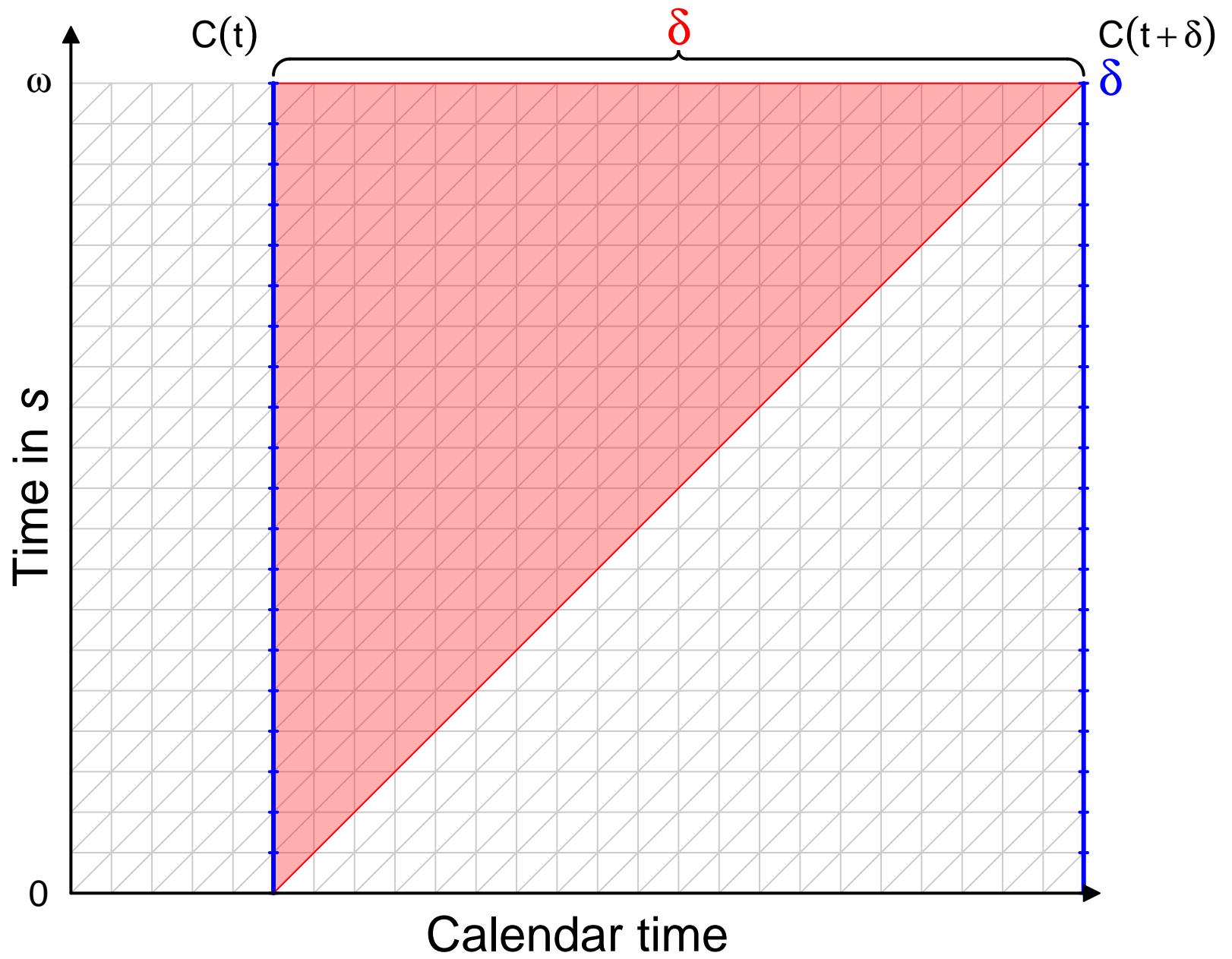


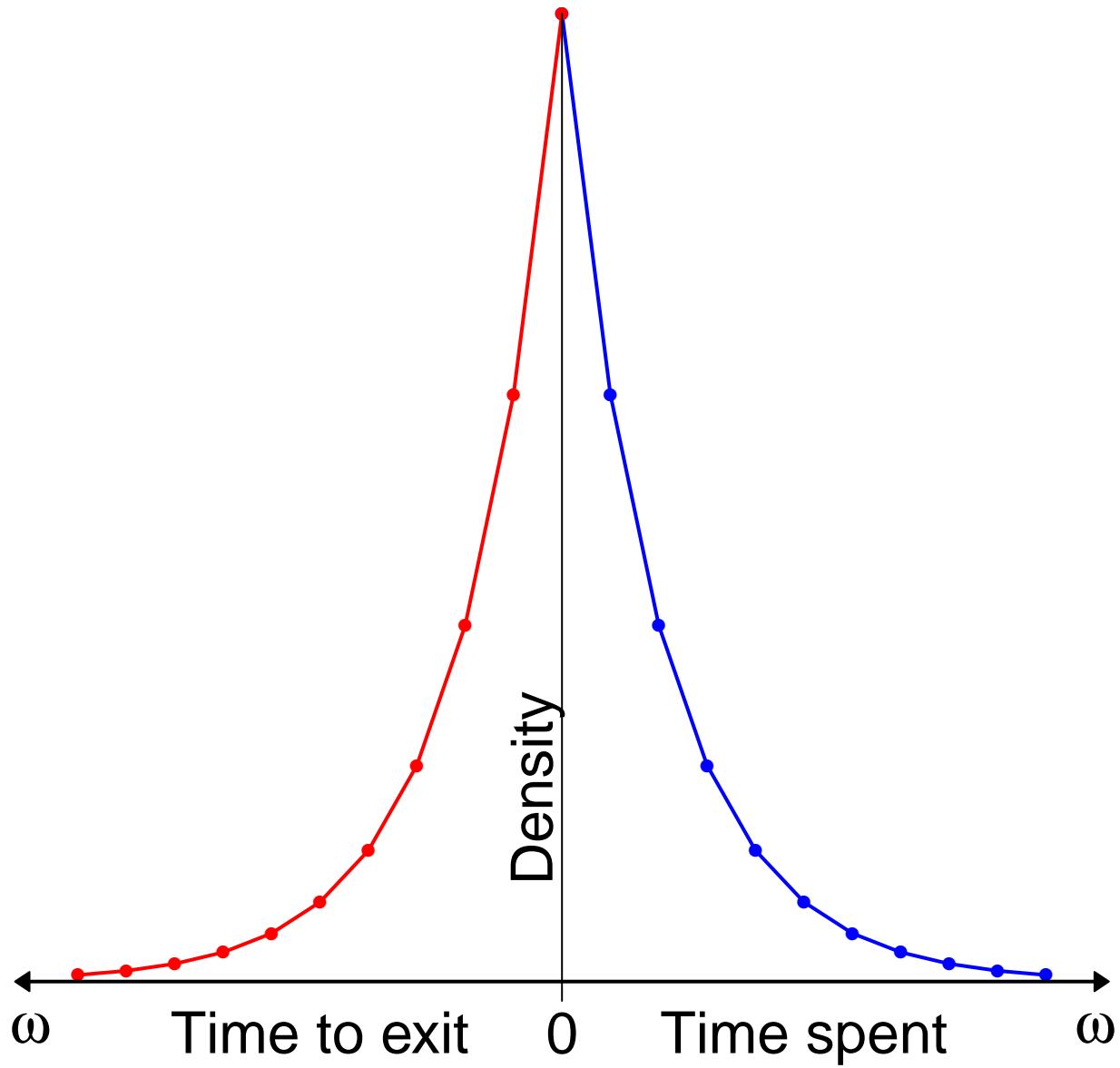












Implications:

- Equal time spent-left distributions within states.
- Within episode *order*.
- Cumulative over episodes.
- Brouard-Carey is degenerate case.

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Might it be useful?



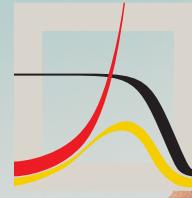
Photo by Eberhard Grossgasteiger on Unsplash

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- A wide-angle photograph of a serene landscape. In the foreground, a calm lake reflects the surrounding environment. On the far shore, there's a cluster of small, light-colored houses. Beyond the houses is a dense forest of tall evergreen trees. In the background, a range of majestic mountains rises, their peaks partially obscured by a hazy sky. The lighting suggests either sunrise or sunset, with warm orange and yellow hues illuminating the mountain tops and reflecting off the water.
- High state turnover – shorter followup.
 - Property observable in small stochastic samples.
 - Tractable under stability

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Estimate from the reflection!
Thanks!
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