Demystifying and into perspective; forest industry research investment impacts in Australia.

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Presented by

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Declaration of conflict of interest

This presentation has been prepared for the conference based on a wide range of information, including specific insights from a range of experience. The development and delivery of this presentation is funded entirely by Sylva Systems.

I have been funded by a range of national and international entities to undertake reviews of research, and development of research investment plans.

I have no pecuniary interests in any outcomes, but I hope you all find some useful messages and insights to take away.

Outline

- ✓ *Introduction and why*
- ✓ *Methods*
- ✓ *An impact equation*
- ✓ *Historic change and 'what if' impacts*
- ✓ *Analysis of research proposals*
- ✓ *Insights and concluding comments*

Why?

Why did I invest the time and funds to prepare and deliver this paper?

A hypothetical: Based on Palviainena *et al.,* (2020), we can achieve a 25% increase in hardwood plantation DBHOB productivity by the application of biochar.

Unpack the 'evidence':

- Application of 5 to 10 t/ha of biochar = 0.5 to 1.0 kg/m^2.
- Less than 20 year old regrowth *Pinus sylvestris* in Finland.
- increasing diameter increment by 1 mm/y; a 25% improvement.

Is this fungible???

Why?

Why did I invest the time and funds to prepare and deliver this paper?

There is a need to re-thinking and reinforce change to a traditional view of research:

Research, Development and Extension ('RDE')

Should be:

Extension, Research, Extension, Development, Extension leading to potential Adoption 'EREDEA'

Why?

Why did I invest the time and funds to prepare and deliver this paper?

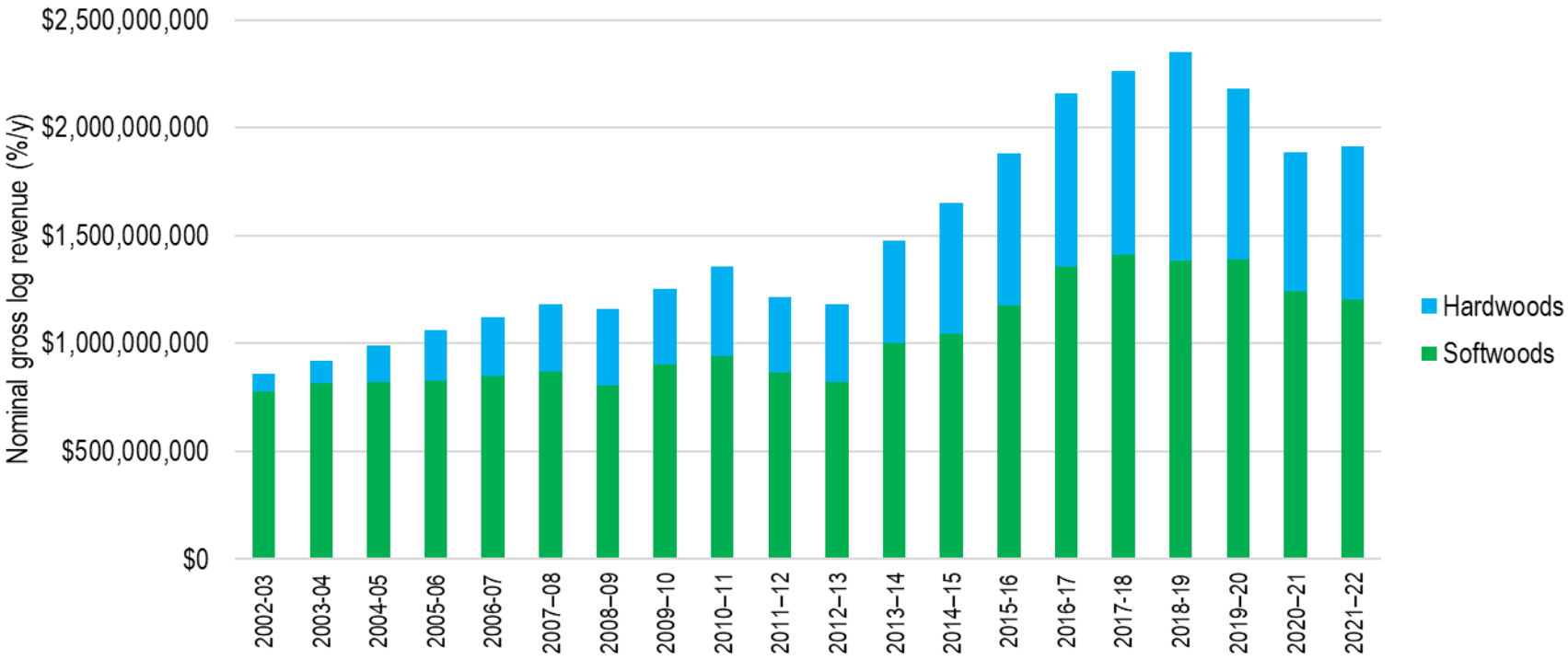
Seeking a tangible impact.

- Journal Impact Factor: Clarivate (2017) defines their Journal Impact Factor *'as citations to the journal in the current year to items in the previous two years divided by the count of scholarly items in those previous two years.'*

- Reality: This is a measure of reference to articles in a journal rather than a physical impact.

- A physical impact: A physical impact results in inputs and outcomes, and requires a party to make use of published information to generate an impact.

Why?



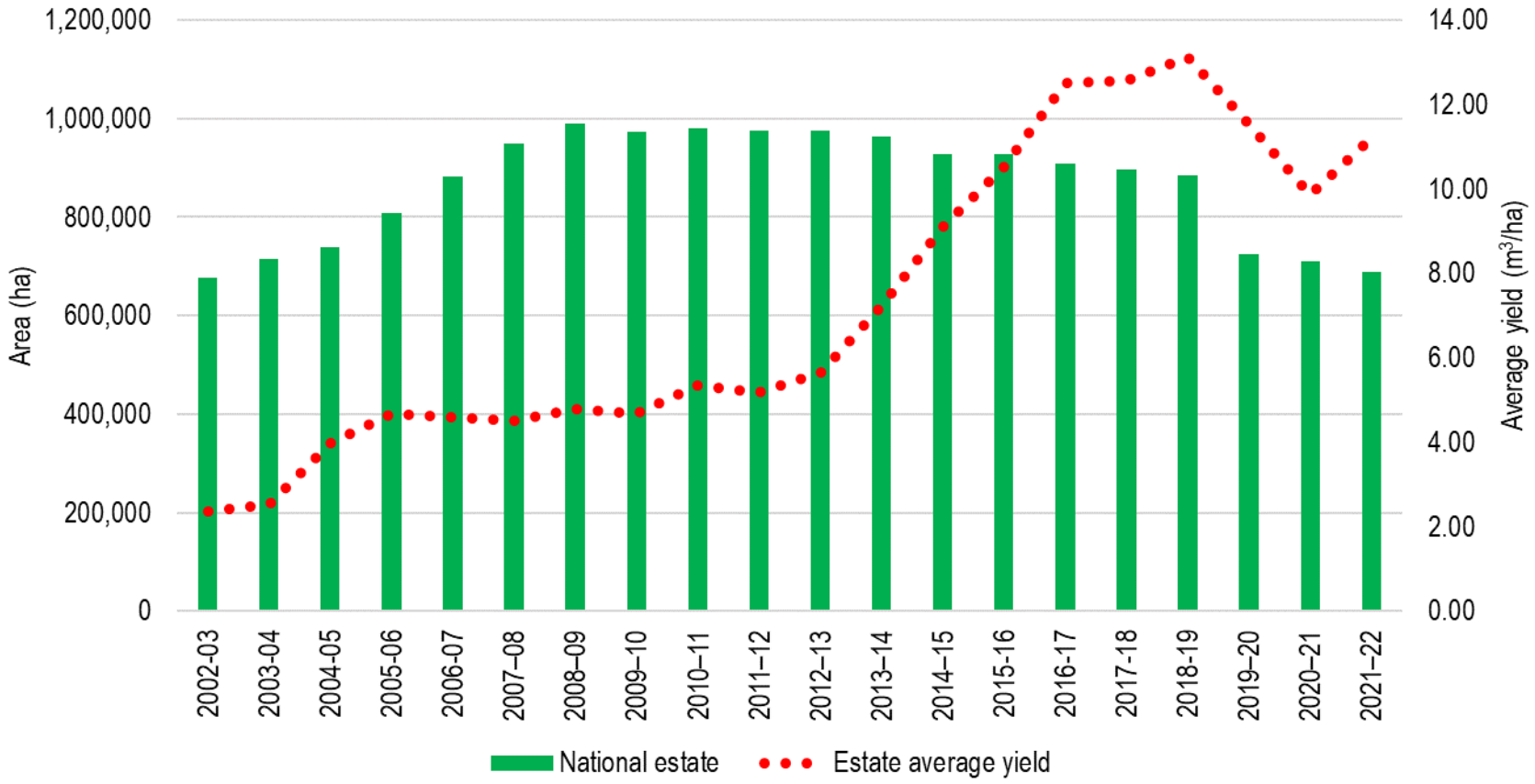
The scale of the national gross log revenue (mill door value) improvement will amplifies any impact.

Methods and basis

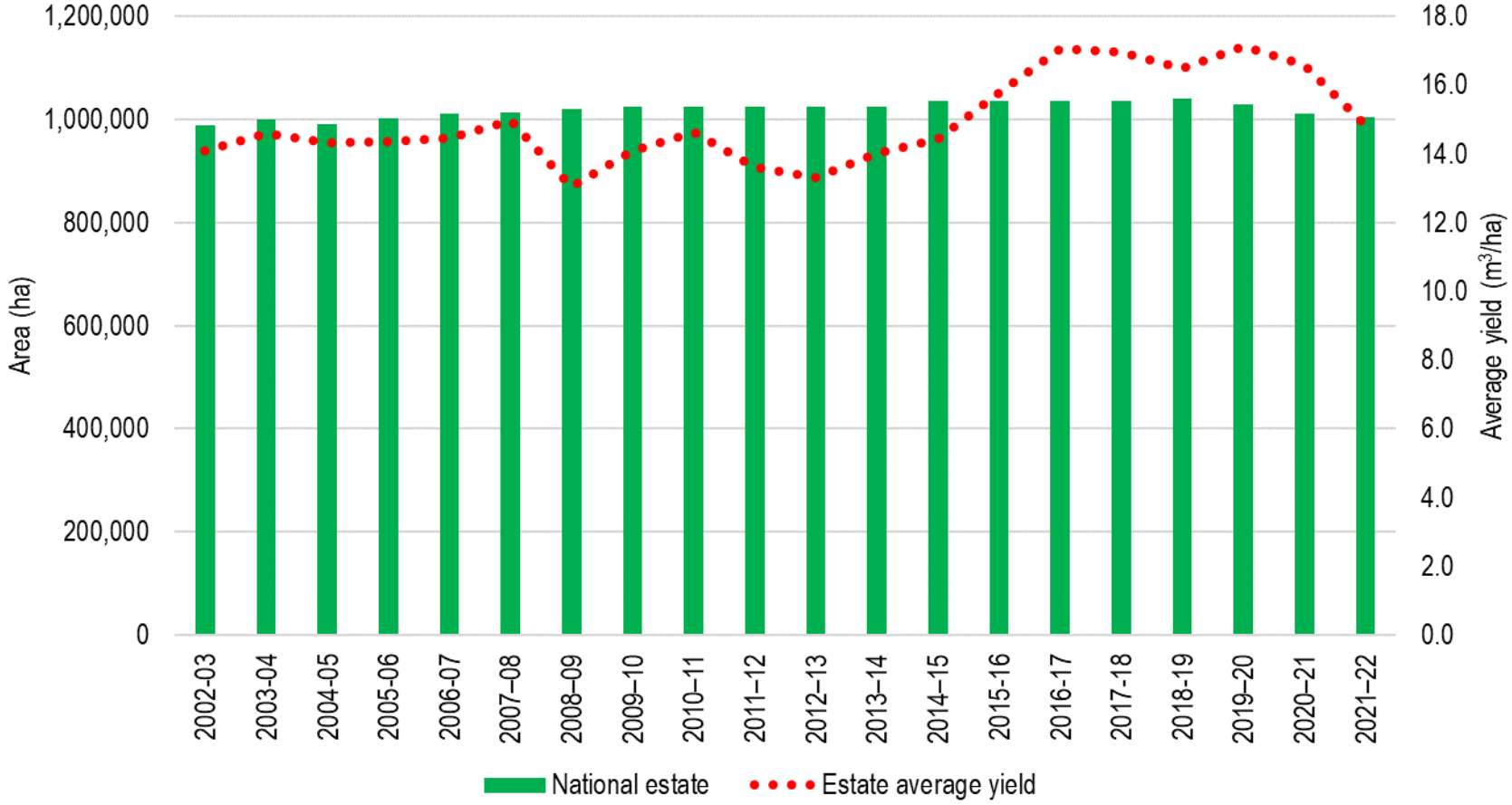
This presentation is based on experience and reviewing research from all angles.

- Engaged by FWPA to:
  - Development of research investment plans.
  - Review of research investment plans.
  - Ex-post assessment (post-completion reviews).
  - Ex-ante assessment (pre-research) project proposal assessment.
- The experience of working with great people, most recently the FWPA Grower Research Advisory Committee's (GRAC) sub-committee.
- Development of research investment plans for other bodies.
- Developing projects from initial concept, submission and implementation to 'sunsetting'.

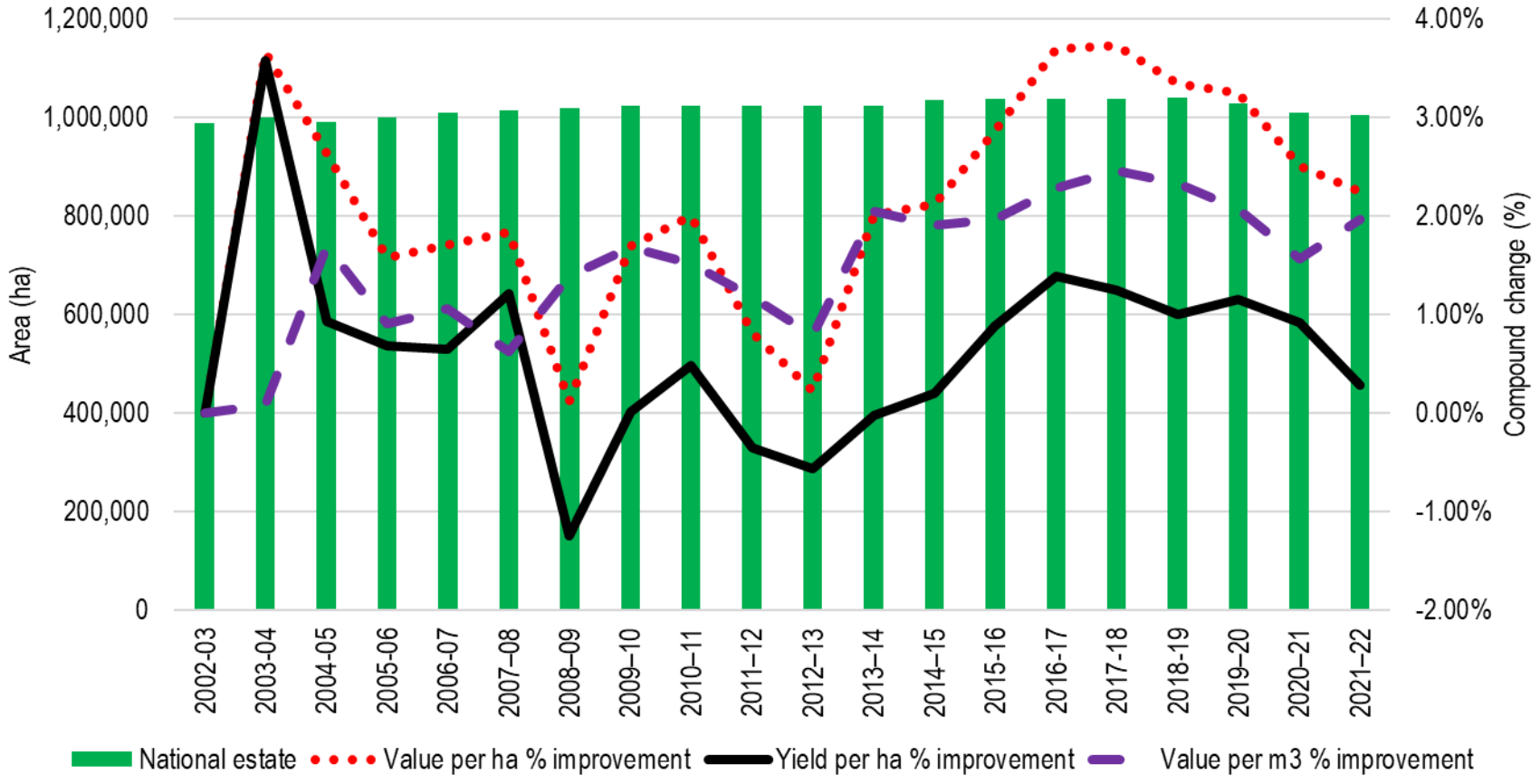
Historic change; hardwoods



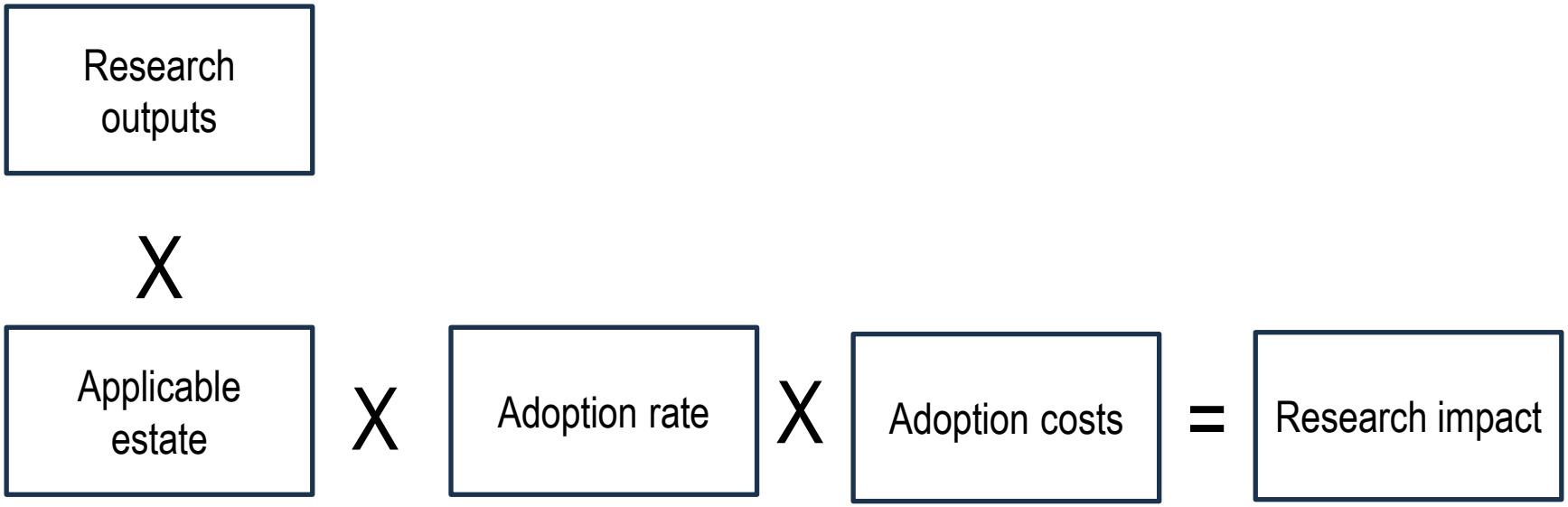
Historic change; softwoods



Historic compounded softwood change

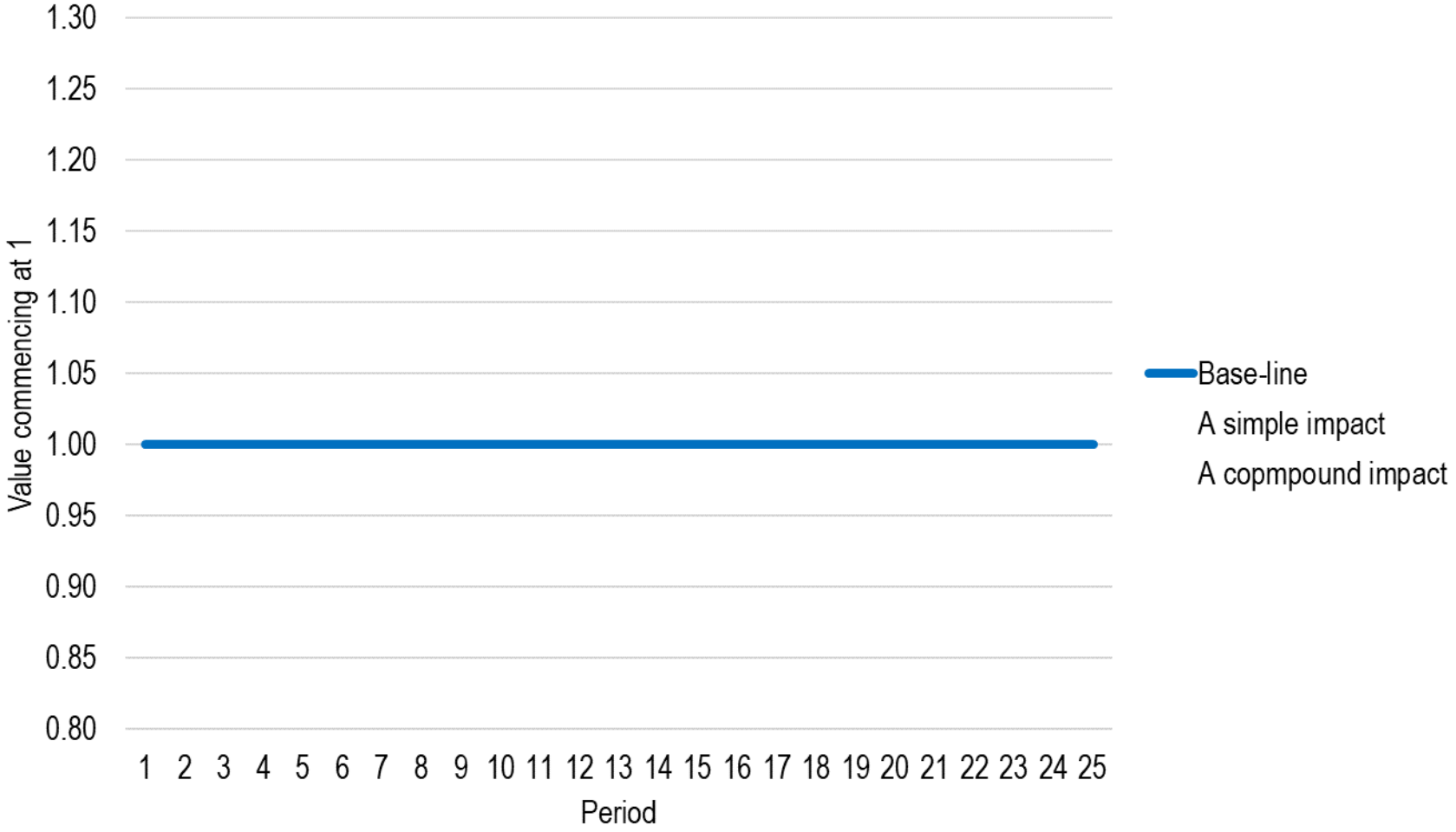


An impact equation

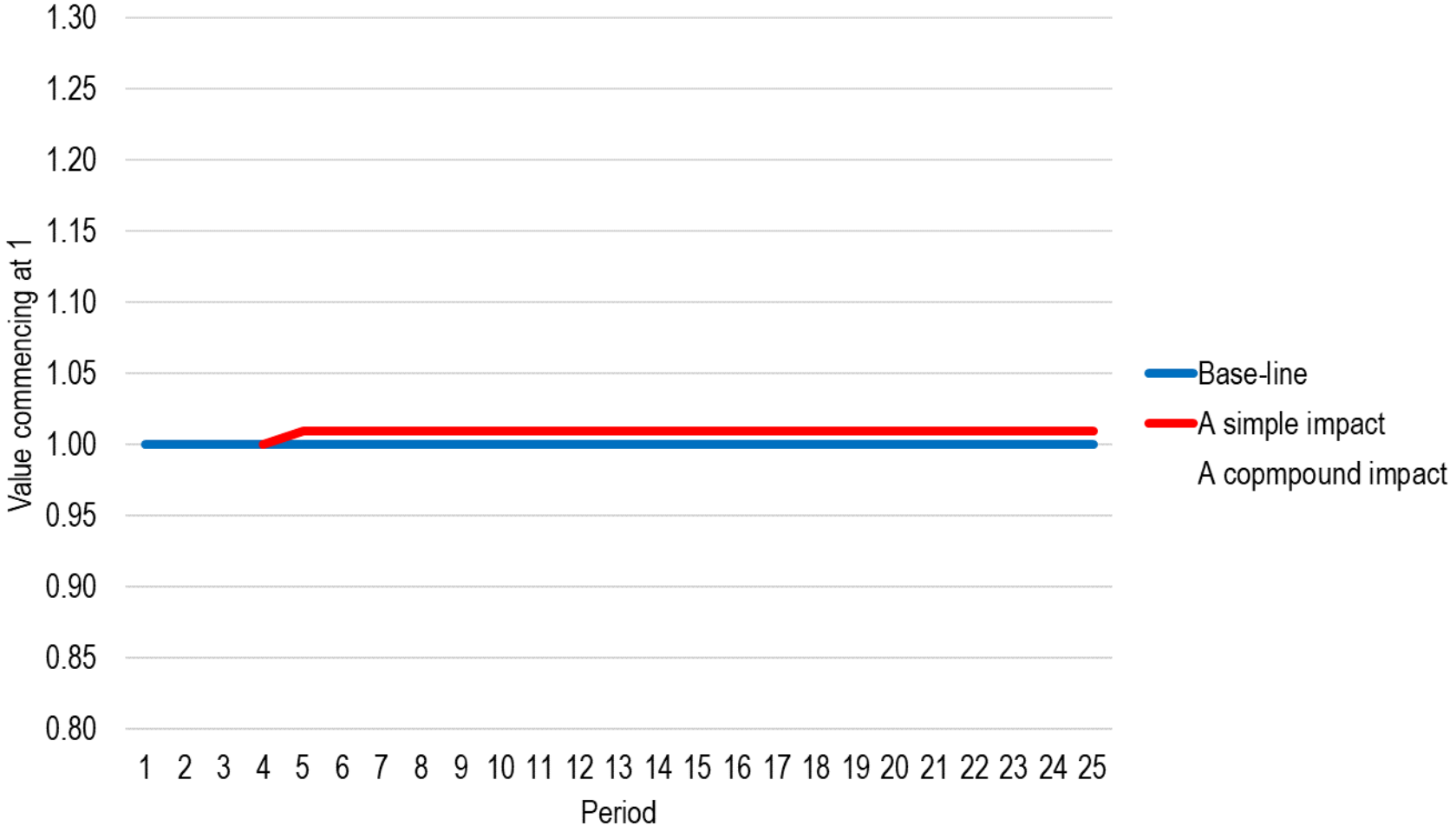


If adoption = ZERO, impact = ZERO

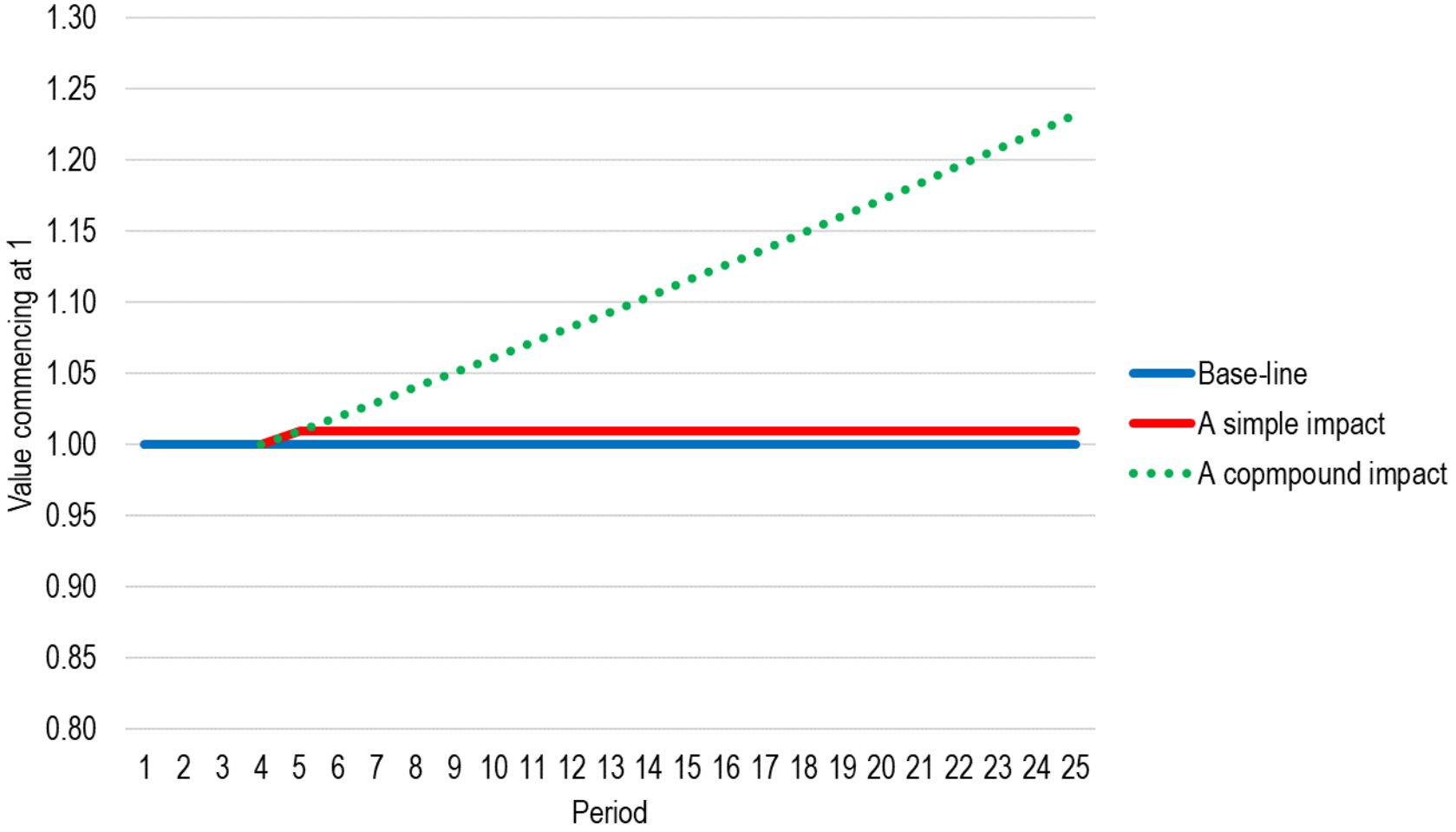
Research impacts at a 1% shift



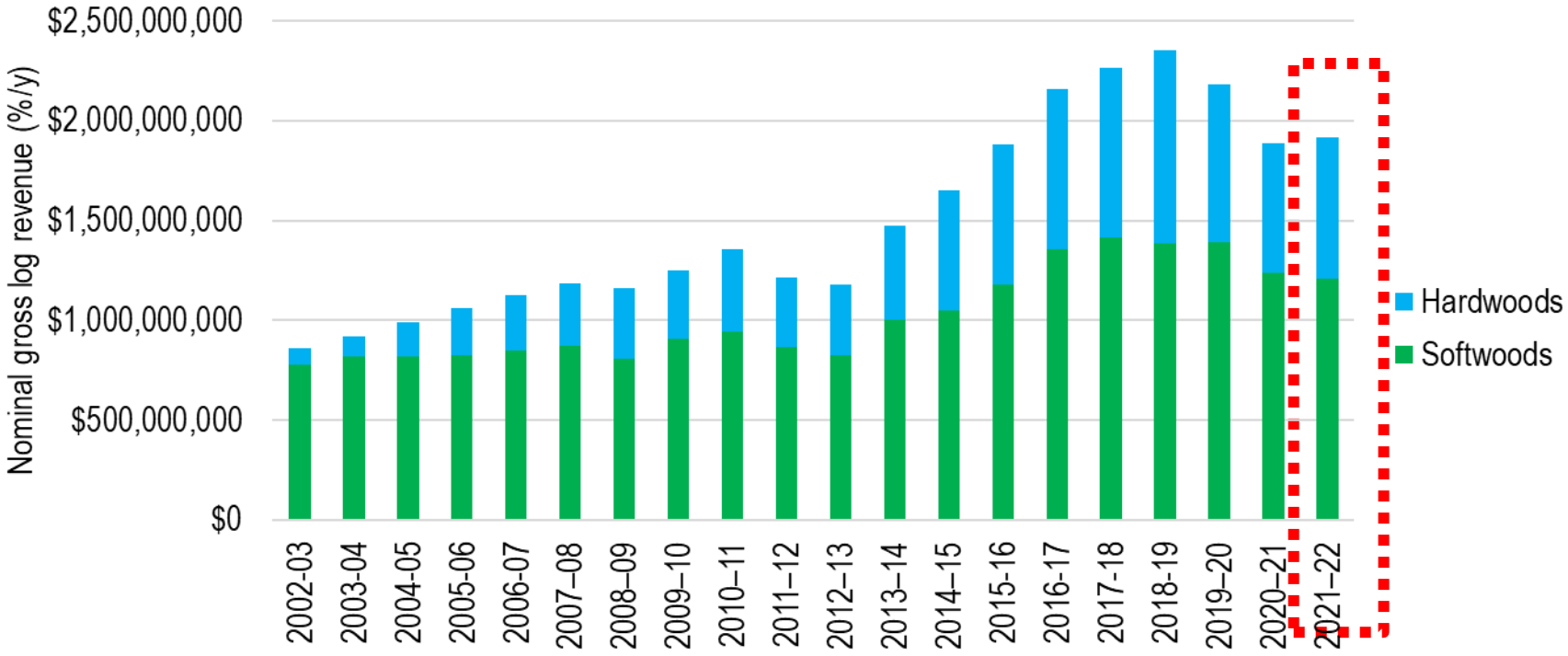
Research impacts at a 1% shift



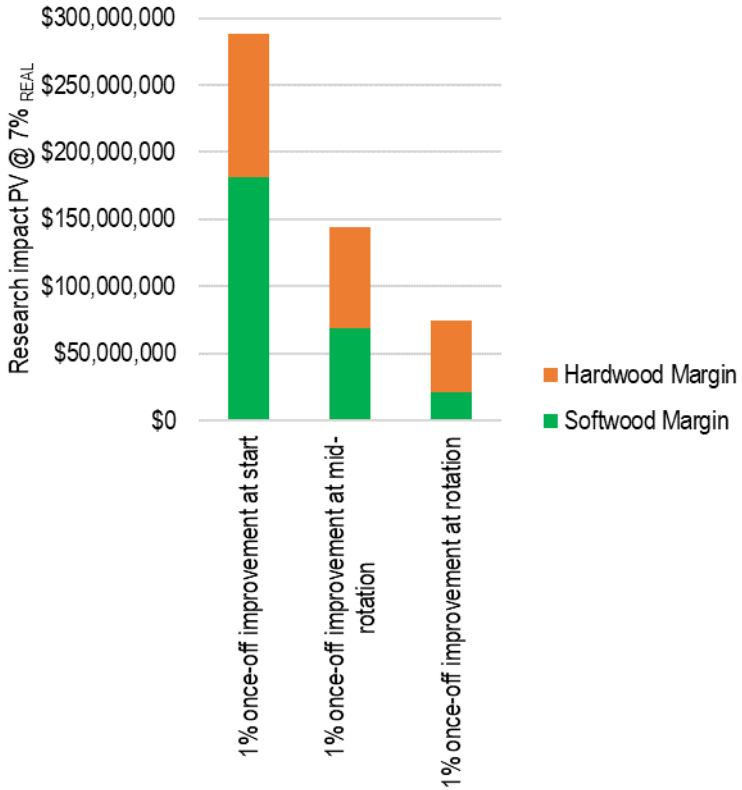
Research impacts at a 1% shift

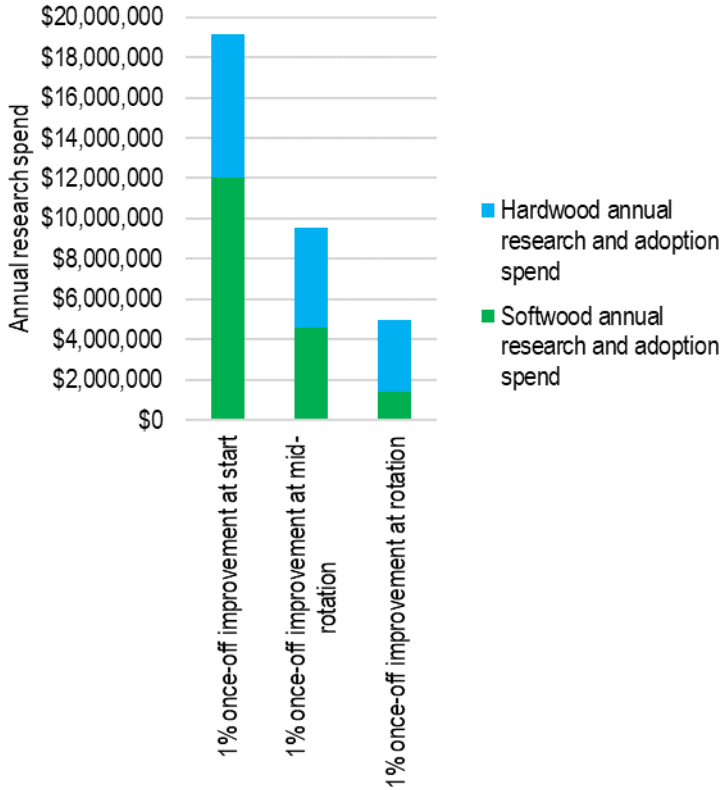


Break-even future research investment



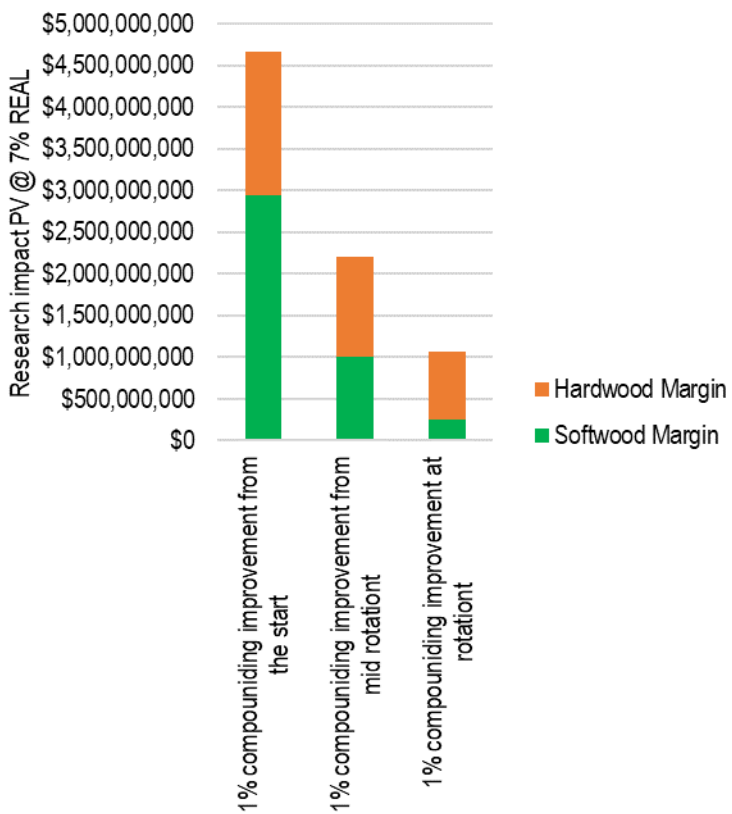
Break-even future research investment

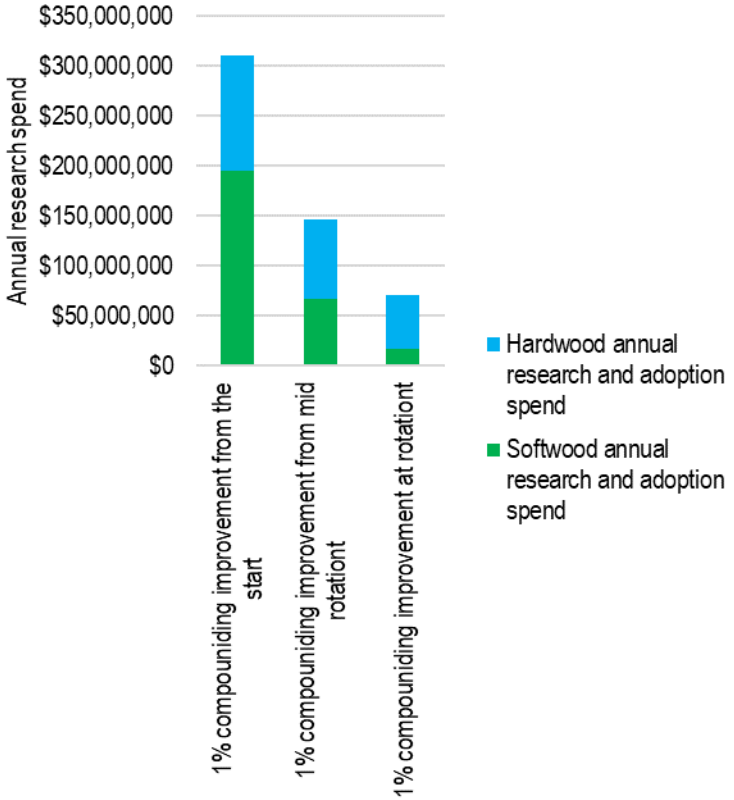




Assume a 1% simple lift in gross log revenues commencing at the times indicated and running out to 2061 and the break-even annual investment in research and adoption.

Break-even future research investment





Assume a 1% compounding lift in gross log revenues commencing at the times indicated and running out to 2061 and the break-even annual investment in research and adoption.

Assessment of research proposals

A challenging task is to assign an expected impact.

A more objective approach is to determine ***what the change NEEDS to be to break-even*** considering research and adoption costs and timing.

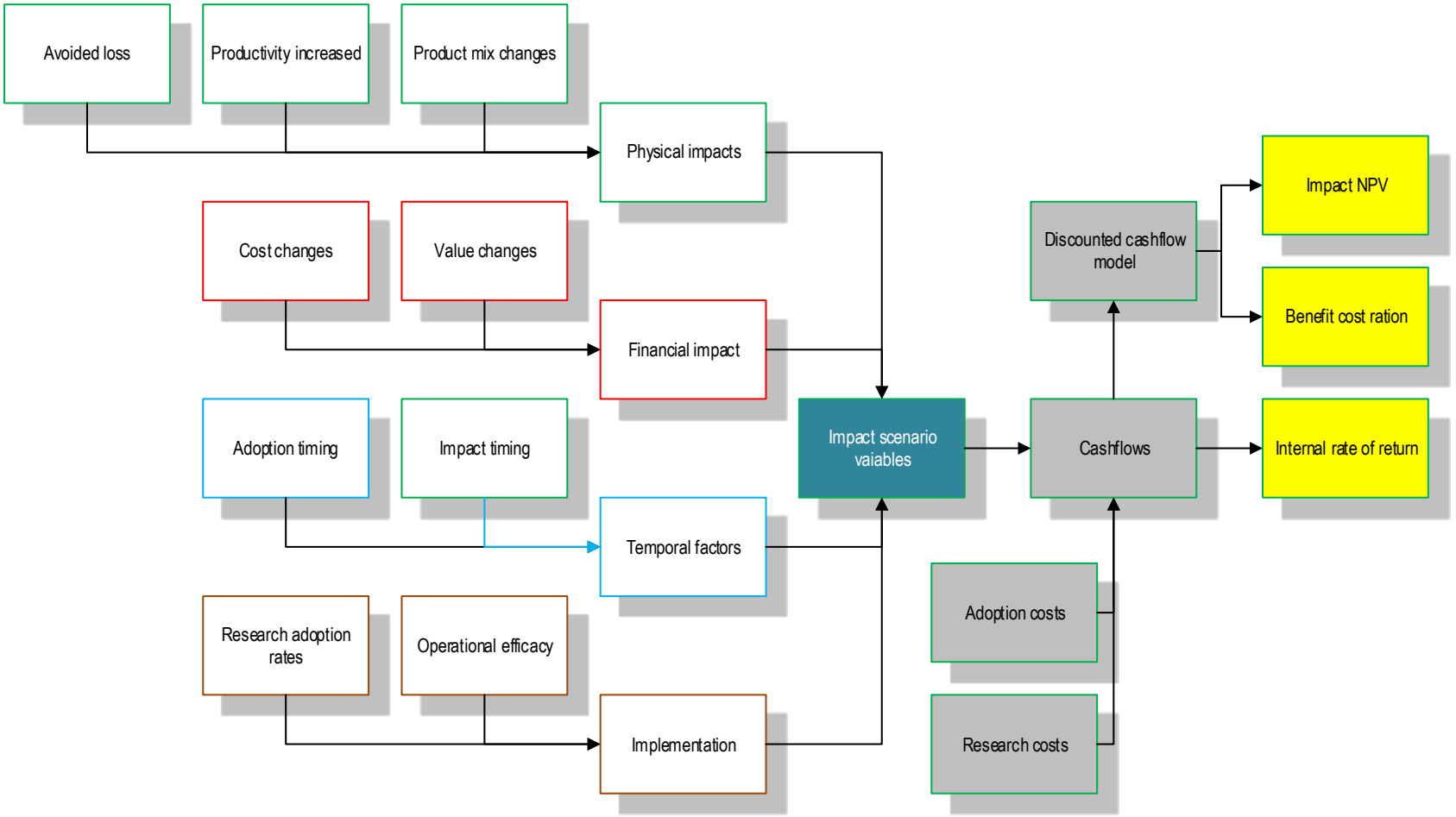
Then pose the question of does this make sense or seem plausible?

Assessment of research proposals

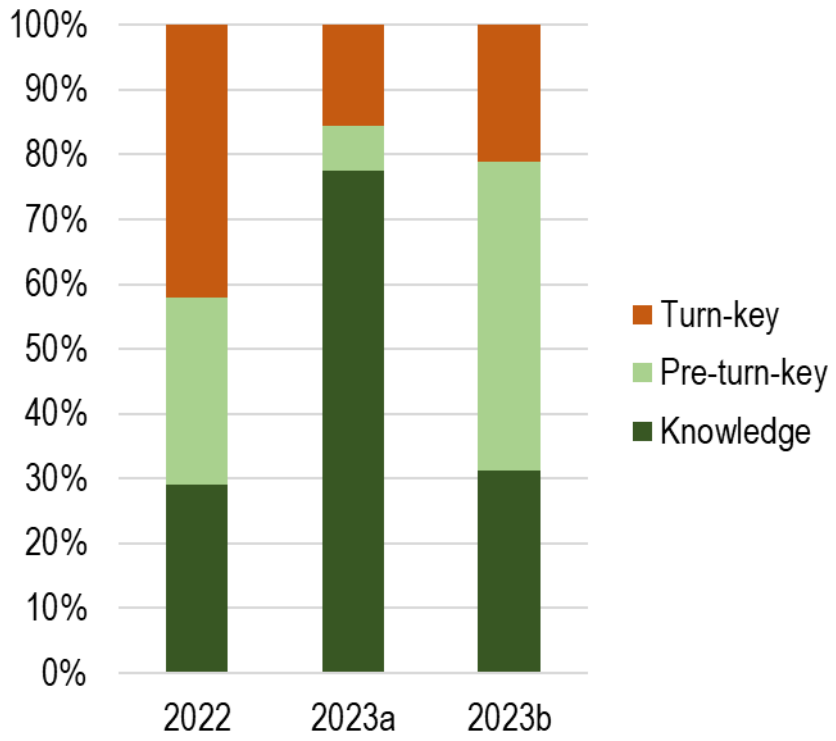
The analysis conducted an objective and relative assessment of projects as part of their assessment by FWPA / GRAC.

- Basis: Guidelines to conducting benefit cost analysis (BCA) resulting in a benefit cost ratio (BCR) have been prepared by the Council of Rural Research and Development Corporations (CRRDC, 2014).
- Approach: A BCA bespoke to a situation and circumstance; analysis undertaken on a financial basis.
- BAU data: Dataset provided by ABARES; runs of the Forest Resource Use Model (FORUM).
- Projects: 30 FWPA GRAC project proposals submitted; 2022 (n=8), 2023a (n= 14) and 2023b (n= 8).
- Basis: Discounting at $7\%_{REAL}$ based on the GRAC sub-committee guidance.
- Impacts: Based on projects, the impact mechanisms, the estate type impacted and level of uptake.

The model


Avoided loss
Productivity increased
Product mix changes
Physical impacts
Cost changes
Value changes
Financial impact
Adoption timing
Impact timing
Temporal factors
Research adoption rates
Operational efficacy
Implementation
Impact scenario vaiables
Discounted cashflow model
Impact NPV
Benefit cost ration
Cashflows
Internal rate of return
Adoption costs
Research costs

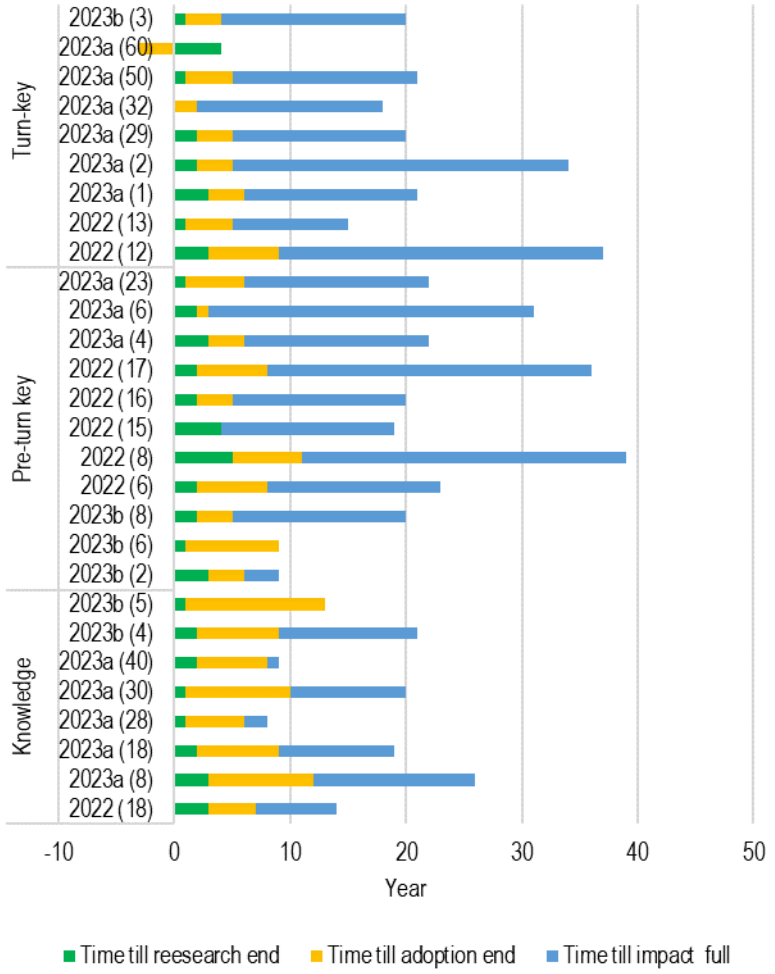
The nature of the research projects



The analysis defined research projects as either:

- Knowledge: Development of knowledge on the topic of research.
- Pre-turn-key: Development of knowledge and out-puts requiring commercialization.
- Turn-key: Development of an implementable outcome.

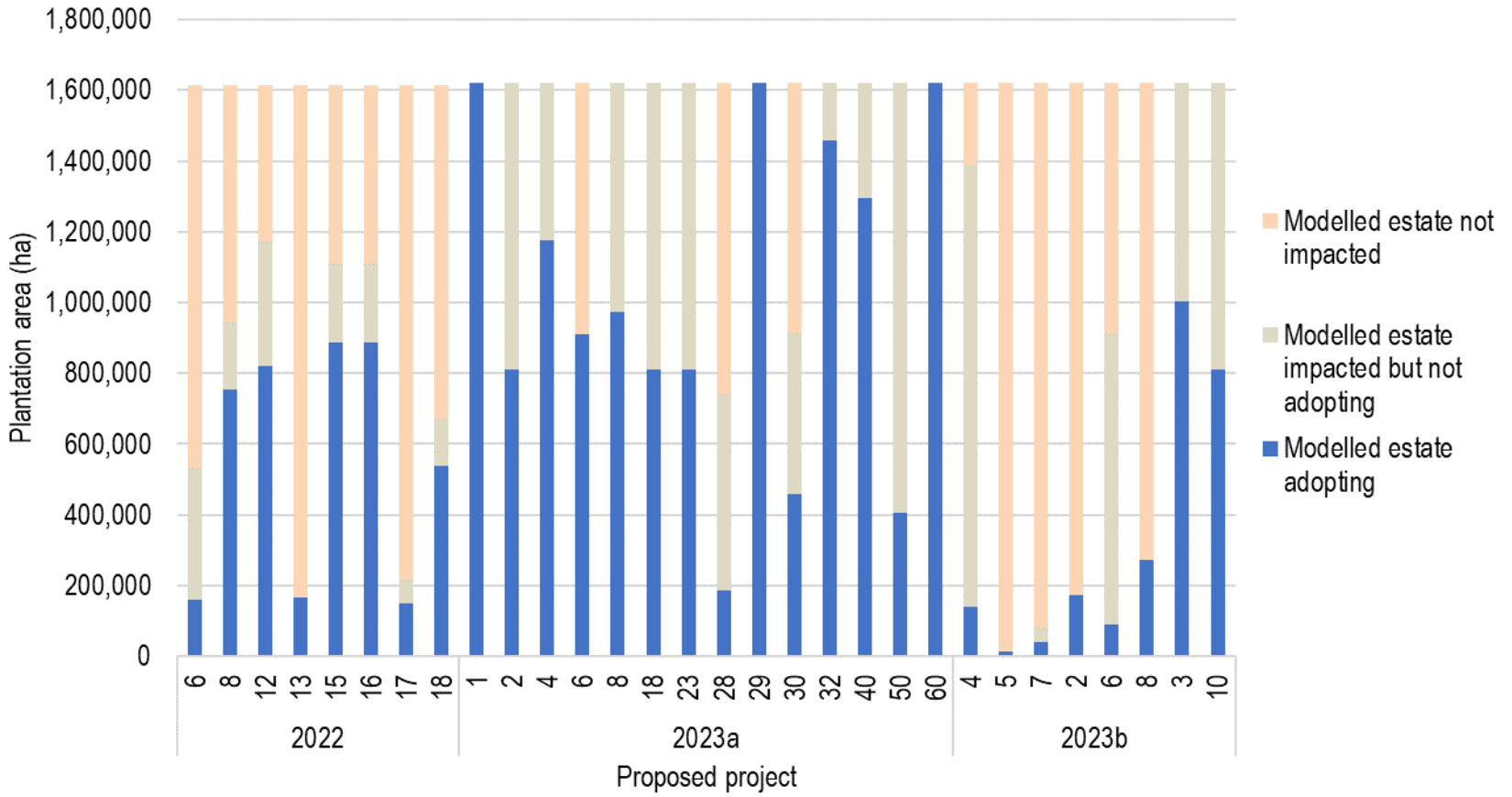
Assumptions; timing of research projects



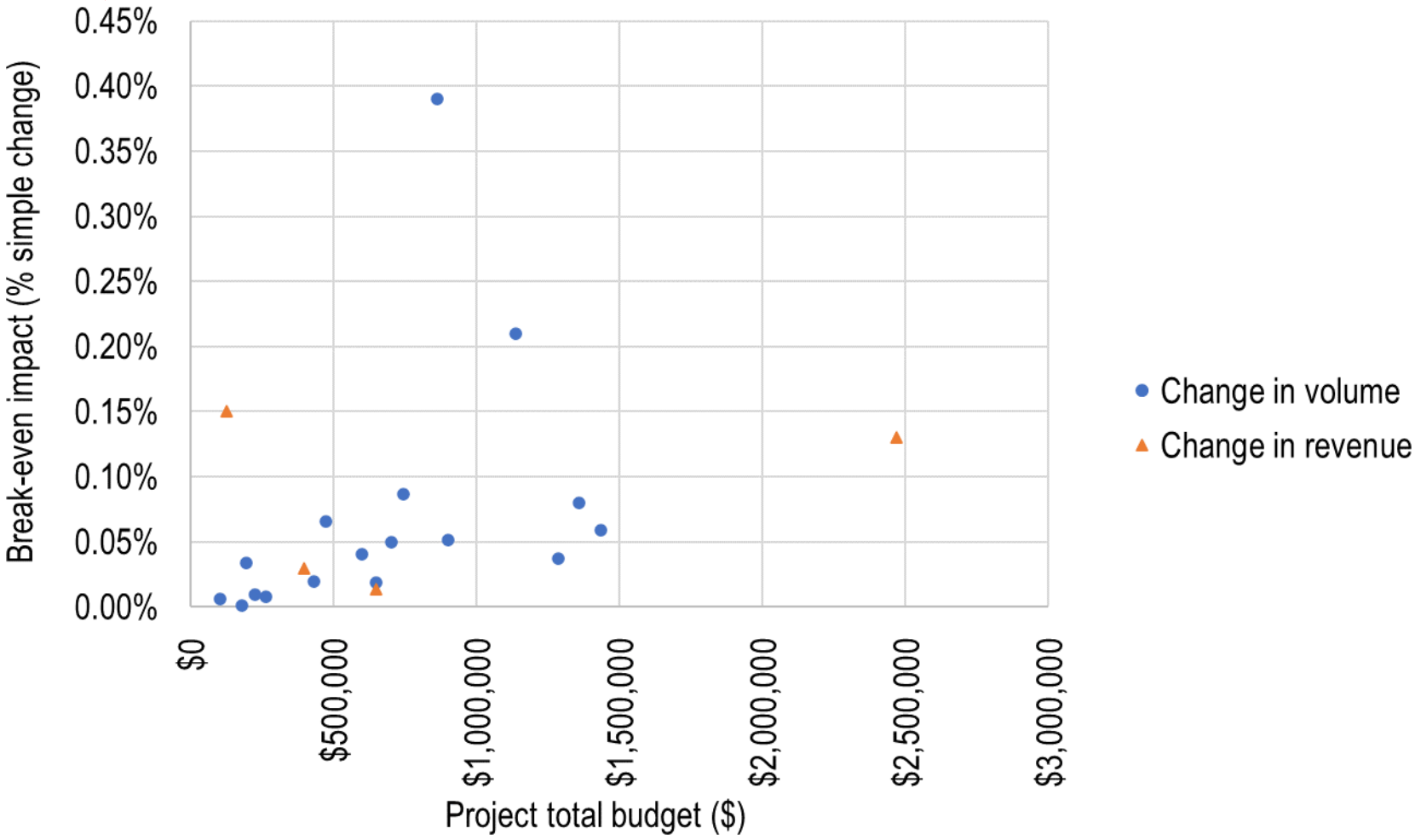
BCA on a break-even basis required assumed timing.

- Research duration: The commencement and completion year of the research.
- Adoption timing: The time to decide to adopt and then the actual adoption driven by internal processes; includes a ramp-up phase.
- Impact timing: The timing of the impact from research adoption.

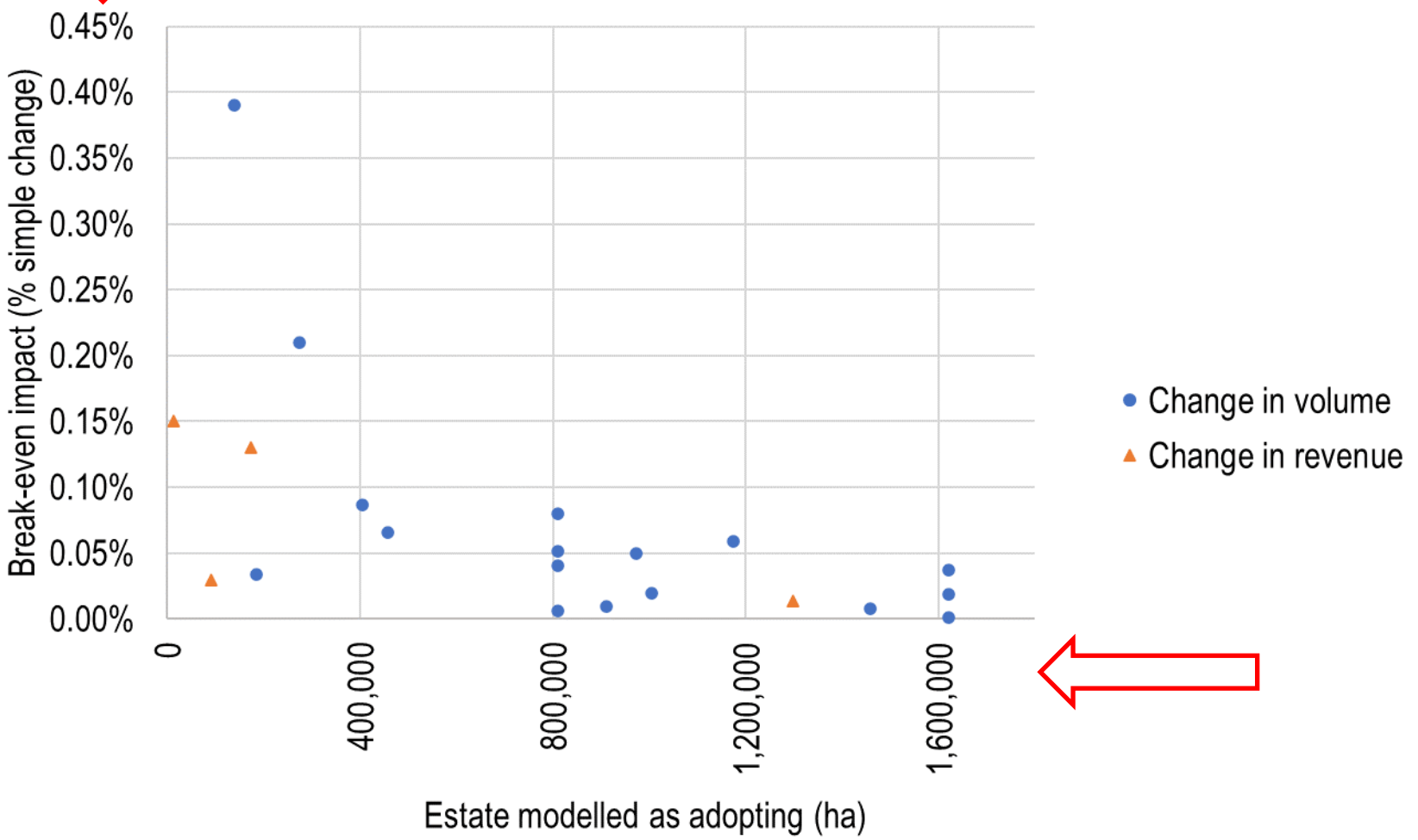
Assumptions; estate and adoption of outcomes



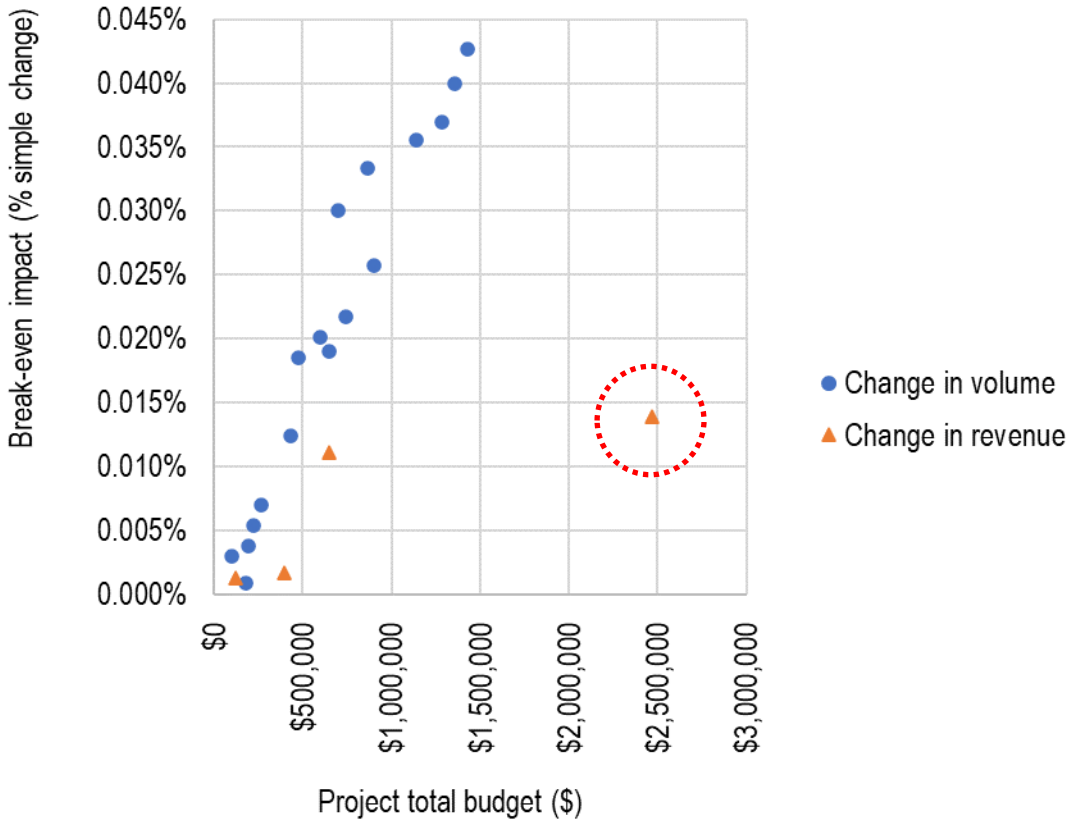
Break-even research impact; by budget



Break-even research impact; by estate



Break-even research impact; across total estate



The sum of the research project pool break even impacts are as follows.

- 2023a project pool: a 0.23% simple change.
- 2023b project pool: a 0.12% simple change.

This is not a superhuman impact, and is plausible….

Insights and concluding comments

- ✓ The scale of the gross value of logs produced in Australia is significant, amplifying any research impact.
- ✓ Each year's actual impact is reaping the rewards of past research investment and adoption.
- ✓ Research without adoption has no impact beyond a publication.
- ✓ It is questionable whether researchers should seek to place a value on outcomes on an ex-ante basis.
- ✓ However, a researcher should clearly define the estate impacted and the nature of the impact.
- ✓ A significant investment in research is justified for a simple impact change.
- ✓ It is important to have realistically ambitious projects but place these into perspective.
- ✓ Individual projects do not need 'superhuman' outcomes to provide an adequate return on investment.