Five years of NAV Purebred Beef evaluation

From joint pedigree breeding values to routine genomic evaluation

Växa Sverige: Elisenda Rius-Vilarrasa
Joint work with NAV, SEGES Innovation and Faba partners

2021–2026

Five years of development

Key milestones in the joint Nordic evaluation

Official launch

Joint EBVs for five breeds AAN, CHA, HER, LIM and SIM

Joint subindices

Seven Nordic subindices

Expanded scope

Large NAV pedigree and extra breeds, BAQ and HLA

Official Genomic evaluation

Single-step growth and carcass GEBVs

Genomic Reliability

Including genotyped information

Continue to Improve the evaluation

Calving genomic breeding values + other breeds etc.

Build the common evaluation → stabilise the routine → add genomics → extend scope

One Nordic evaluation framework

Common data, pedigree, genotype and models

Harmonised data edits

Shared rules for calving, weights, growth and carcass records.

Heterogeneous variance adjustment

Pre-adjustment for non-genetic systematic variance differences.

Genetic groups

Improved handling of imported animals and missing pedigree.

Breed-wise multi-trait models

Separate calving and growth/carcass evaluations.

What the evaluation delivers

A joint Nordic evaluation with a clear publication layer

CALVING

- Calf survival
- Calving ease
- Birth weight indicator
- Direct and maternal effects
- First and later calvings

GROWTH & CARCASS

- Birth and weaning weight gain
- Post-weaning or yearling growth
- Slaughter daily gain
- Conformation and fat score
- Direct and maternal effects

PUBLICATION

- Seven subindices
- 18 single breeding values
- Breed-wise evaluations
- NAV scale: mean 100, SD 10
- NAV search page Shared Nordic publication + genetic trends

A cautious look into the last 5 years

“Genetic predictions are only parameters for decision support procedures and not an end in themselves.”

B. L. Golden et al. *J. Anim. Sci. 2009. 87(E. Suppl.):E3–E10*
doi:10.2527/jas.2008-1430. **Milestones in beef cattle genetic evaluation**

2021

2025

Where does the genetic progress come from?

Registrations
Performance, Genotype and Pedigree

Evaluation of the Genetic changes/progress

Total merit index / Breeding goal

”Genetic predictions”
Breeding value estimation
NAV PbB Genetic Evaluation

Selection and mating
Which animals do we choose for next generation? AND with whom we mate them?

Why the genetic trend takes time to move

~ one generation

Animals born since the joint evaluation started are only **now getting their own records** for calving or as sires.

"Difficult" traits move slowest

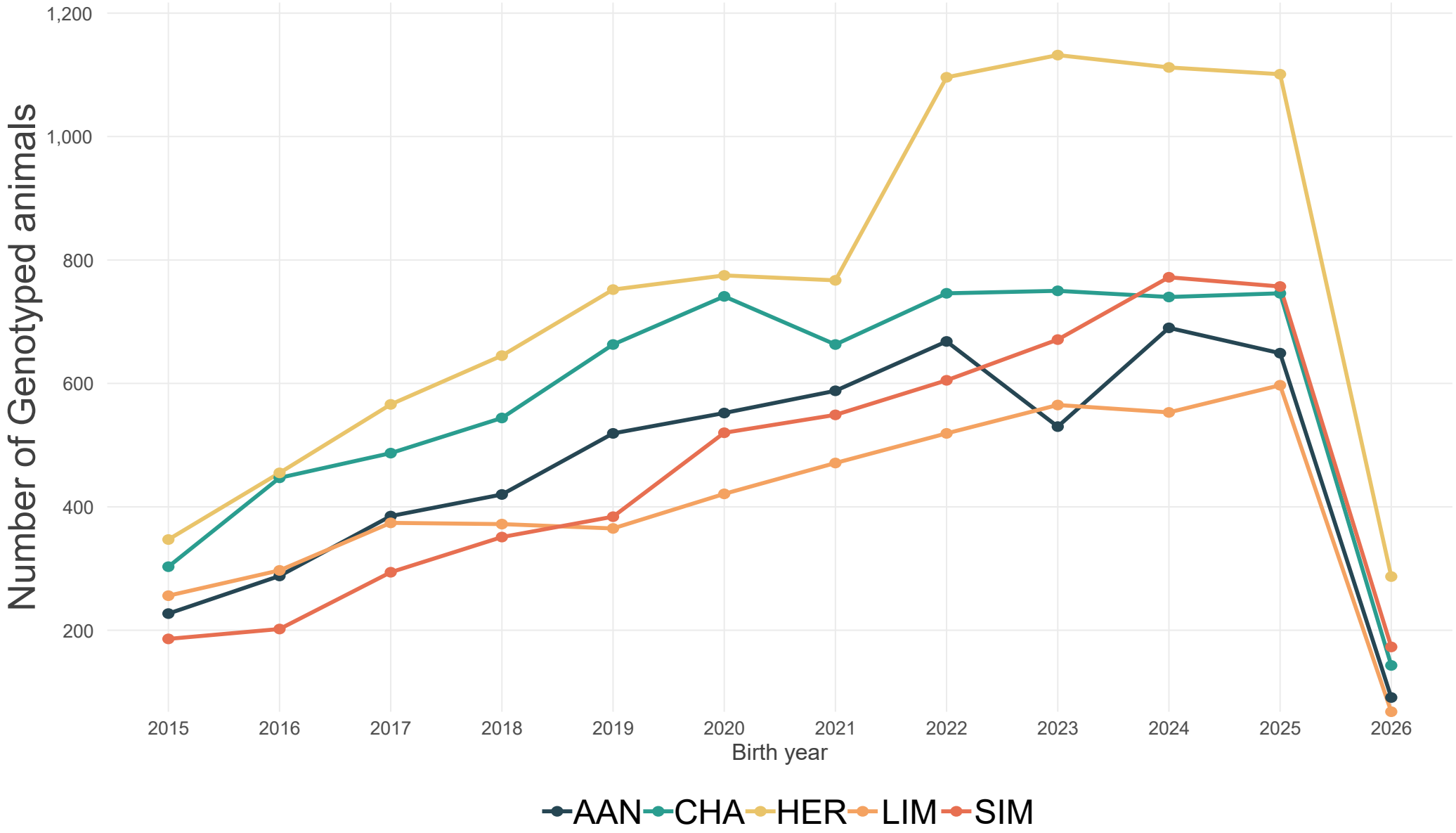
Calving ease and calf survival have low heritability. Many records over several generations are needed before the trend moves.

A breeding value is just one tool of many

Genetic progress comes from different sources: data quality, complete recording, genetic models, a breeding goal, selection decisions etc.

GENOTYPING

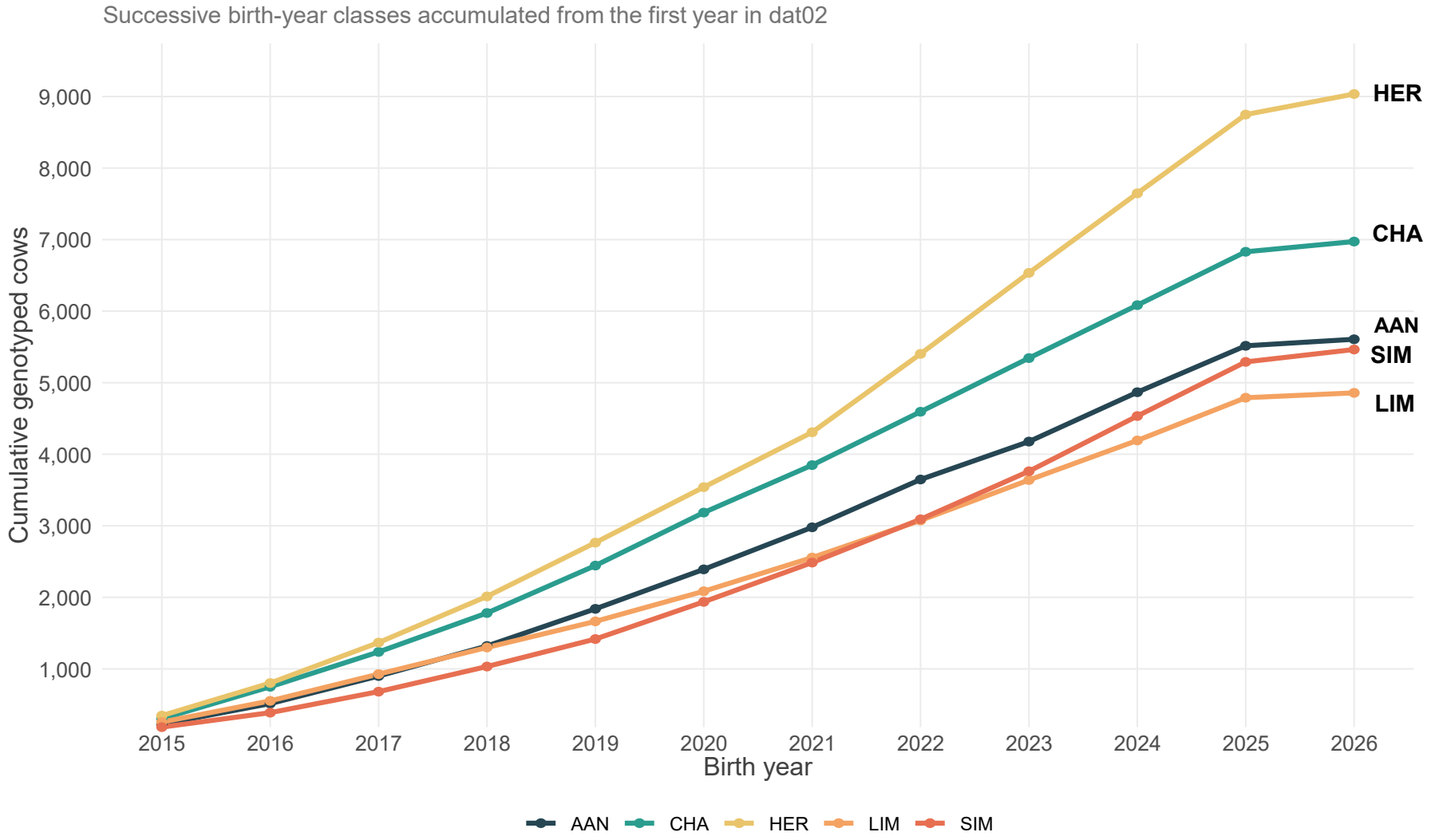
Genotyped animals by breed and birth year – rather stable



NAV G classification. Current evaluation snapshot. Birth-year development is not the date on which animals were genotyped.

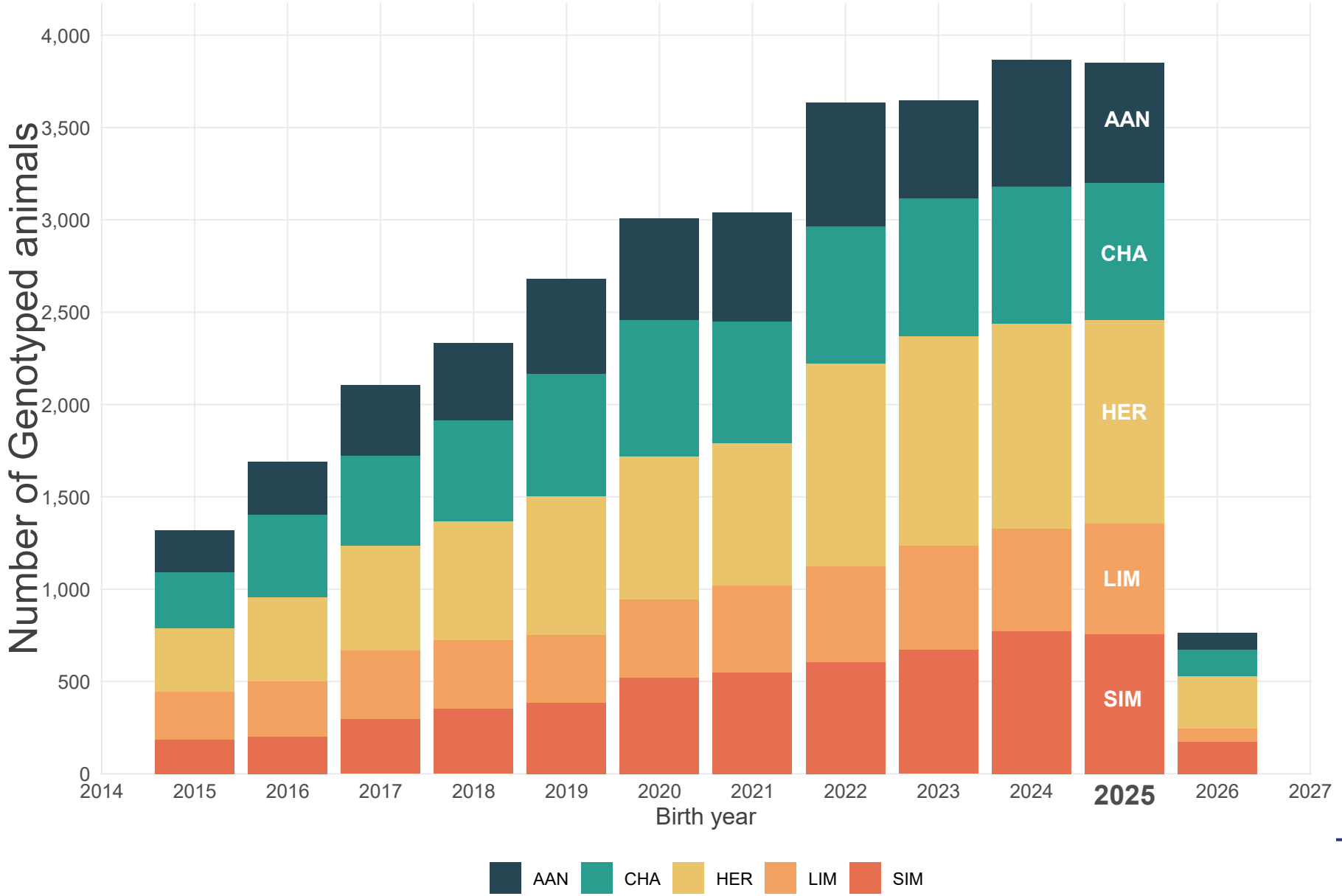
Number of genotyped animals by birth year

Values are accumulated across birth years



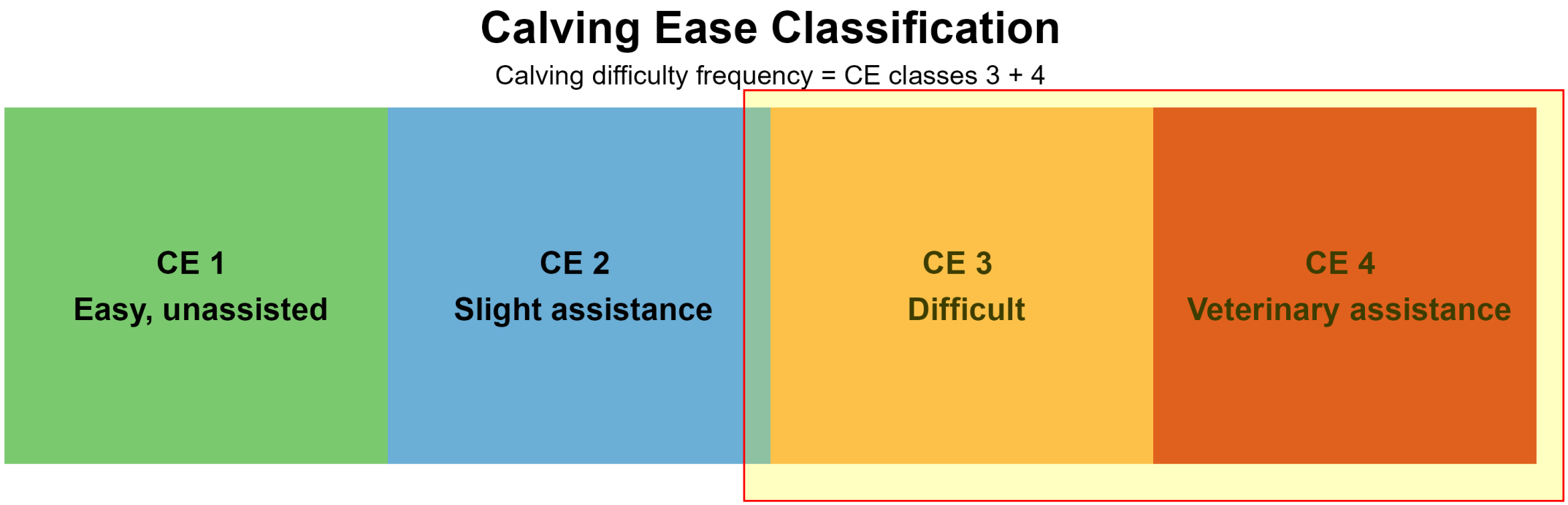
This is cumulative across birth cohorts, not historical genotype availability by evaluation date.

Breed composition of genotyped animals

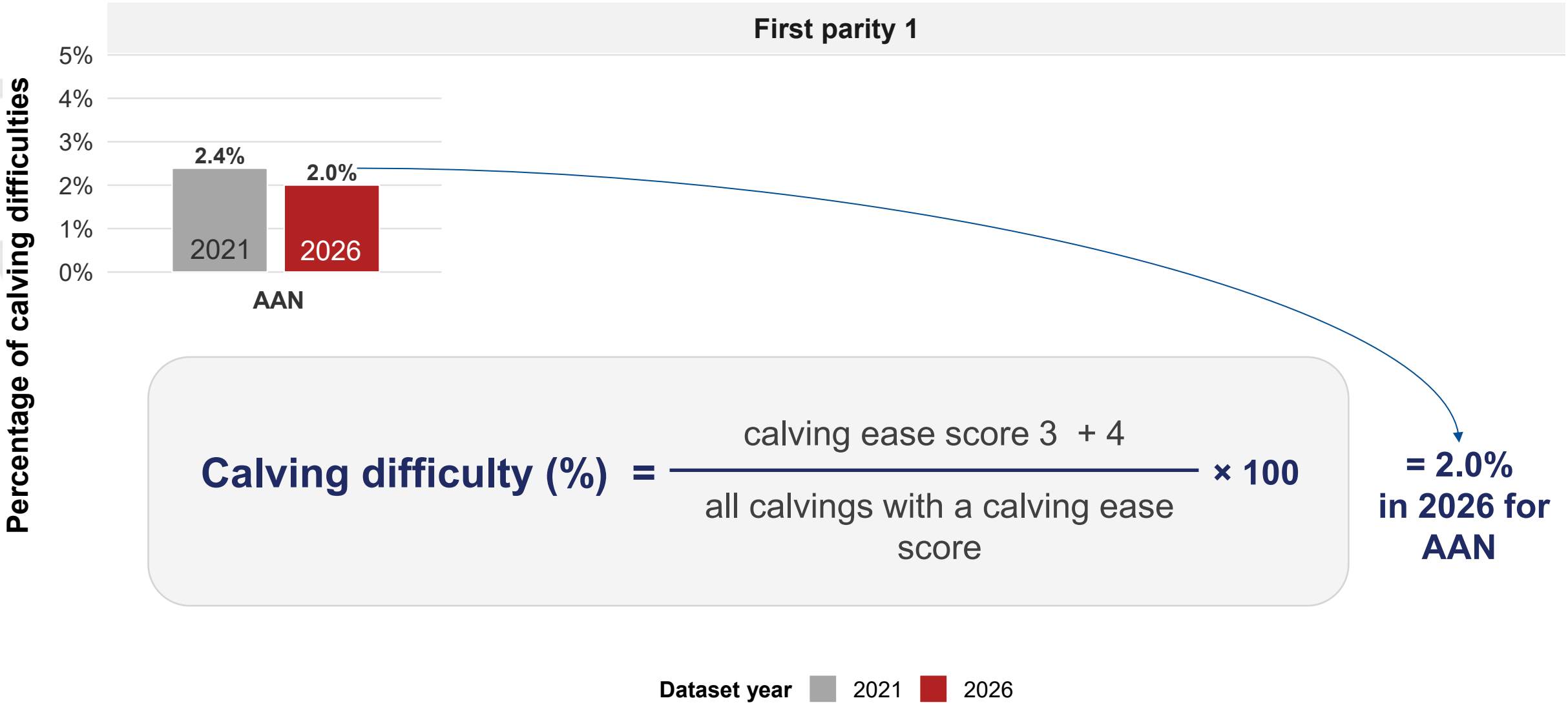


CALVING EASE RECORDS – A SNAPSHOT OF 2021 VERSUS 2026

Calving ease classification



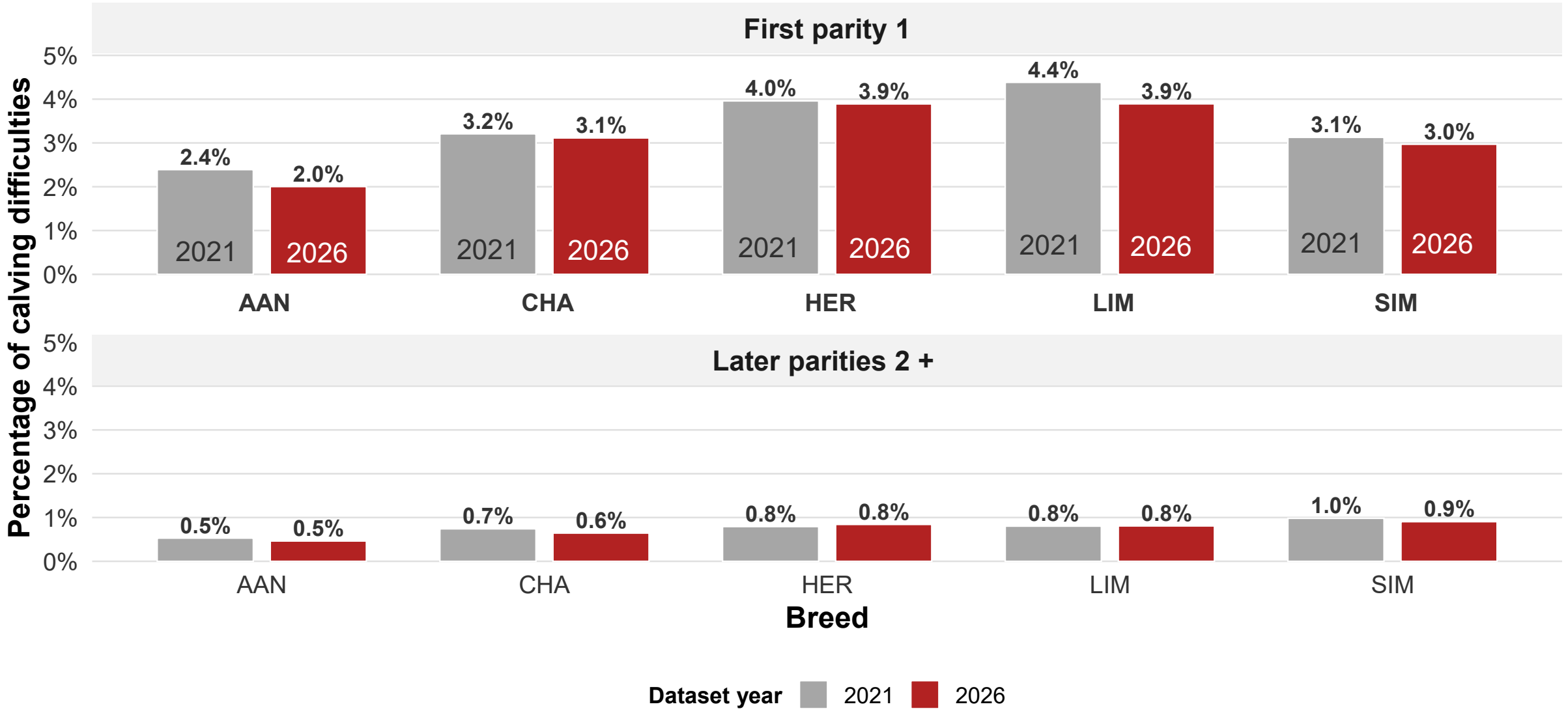
Frequency of calving difficulties



Percentages are calculated within each year, breed and fl group. Only breeds represented in both years are shown.

Frequency of calving difficulties by breed – from farm registrations

Comparison of the 2021 and 2026 datasets: CE classes 3 and 4 combined



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GENETIC TRENDS
– ARE WE MOVING IN THE RIGHT DIRECTION?

Five years of genetic change: what moved and what did not

Change in mean EBV/GEBV between birth years 2021 and 2025, in index points (mean 100, SD 10)

Index	AAN	CHA	HER	LIM	SIM
Birth	— +1.5	— +1.8	▲ +2.4	— +0.6	— +1.7
Calving	— +0.3	▼ -1.7	▼ -0.3	— +0.0	— +1.2
Dam	— +1.7	▼ -0.1	— +1.4	— +1.2	▲ +2.9
Growth	▲ +2.9	— +1.7	▲ +2.1	▲ +2.1	▲ +3.2
Milk	▲ +2.1	— +1.7	— +1.6	— +1.7	▲ +3.0
Production	▲ +2.9	▲ +2.1	▲ +3.4	— +1.5	▲ +3.1
Slaughter quality	— +1.5	— +1.6	▲ +3.0	— +0.5	— +1.5

▲ gain of 2 points or more — small change (under 2 points) ▼ decline

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What remains difficult

CHALLENGE	WHY IT MATTERS
DATA HETEROGENEITY	Different recording histories and population sizes
SMALL POPULATIONS and usage of AI bulls	Limited genomic and phenotypic depth
GENOMIC VALIDATION	Selective genotyping complicates genomic evaluation for calving traits
INTERPRETABILITY	Index units need translation to trait scales
NEW TRAITS	Maintain a healthy, fertile and productive beef population in the Nordics

LOOKING AHEAD

THE FUTURE OF PbB

Which traits should shape the next generation?

01	**Fertility**	Can we strengthen reproductive efficiency and robustness?
02	**Crossbreds/ multibreed?**	NAV PbB genetic evaluation include crossbred animals?
03	**Meat & carcass quality**	Which traits? Across countries?
04	**Sustainability**	Feed efficiency?

DISCUSSION PROMPT

Which traits/strategy should PbB prioritise next, and why?

How far are we, and where are we going?

1 Population outlook

Are beef populations growing or contracting in each country?

Purebred | Crossbred

What is changing?

2 Evaluation readiness

NEW traits, Do we have sufficient, comparable data and connectedness?

Phenotypes | Genotypes

What is feasible?

3 Index traits

What would you like to include in the future?

Balance | Trade-offs

What creates value?

4 Joint Nordic direction

What should be delivered next, and what requires further development?

Next step | Longer term

What do we agree?

FURTHER READING

Production indices: how the weights are set

Table 2. Growth, slaughter quality and the combined production index - final weights in percentage

Growth + Slaughter quality → Production index

Index	Underlying index	AAN	CHA	HER	LIM	SIM
Growth	Slaughter daily gain (SDG)	**75**	**75**	**50**	**75**	**75**
	Yearling weight - direct (dYW)	**25**	**25**	**50**	**25**	**25**
Slaughter quality	Carcass fat score (CFA)	**0**	**25**	**10**	**0**	**25**
	Carcass conformation score (CCO)	**100**	**75**	**90**	**100**	**75**
Production	Growth	**70**	**70**	**50**	**70**	**50**
	Slaughter quality	**30**	**30**	**50**	**30**	**50**

Dam indices: how the weights are set

Table 3. Calving, milk and the combined dam index - final weights in percentage

Calving + Milk → Dam index

Index	Underlying index	AAN	CHA	HER	LIM	SIM
Calving	Calving ease heifer - maternal (mCAE1)	**40**	**40**	**29**	**30**	**35**
	Calf survival heifer - maternal (mCSU1)	**40**	**40**	**34**	**31**	**25**
	Calving ease cow - maternal (mCAE2)	**10**	**10**	**20**	**16**	**19**
	Calf survival cow - maternal (mCSU2)	**10**	**10**	**17**	**24**	**21**
Milk	Weaning weight gain - maternal (mWG)	**100**	**100**	**100**	**100**	**100**
Dam	Calving	**50**	**50**	**30**	**50**	**50**
	Milk	**50**	**50**	**70**	**50**	**50**

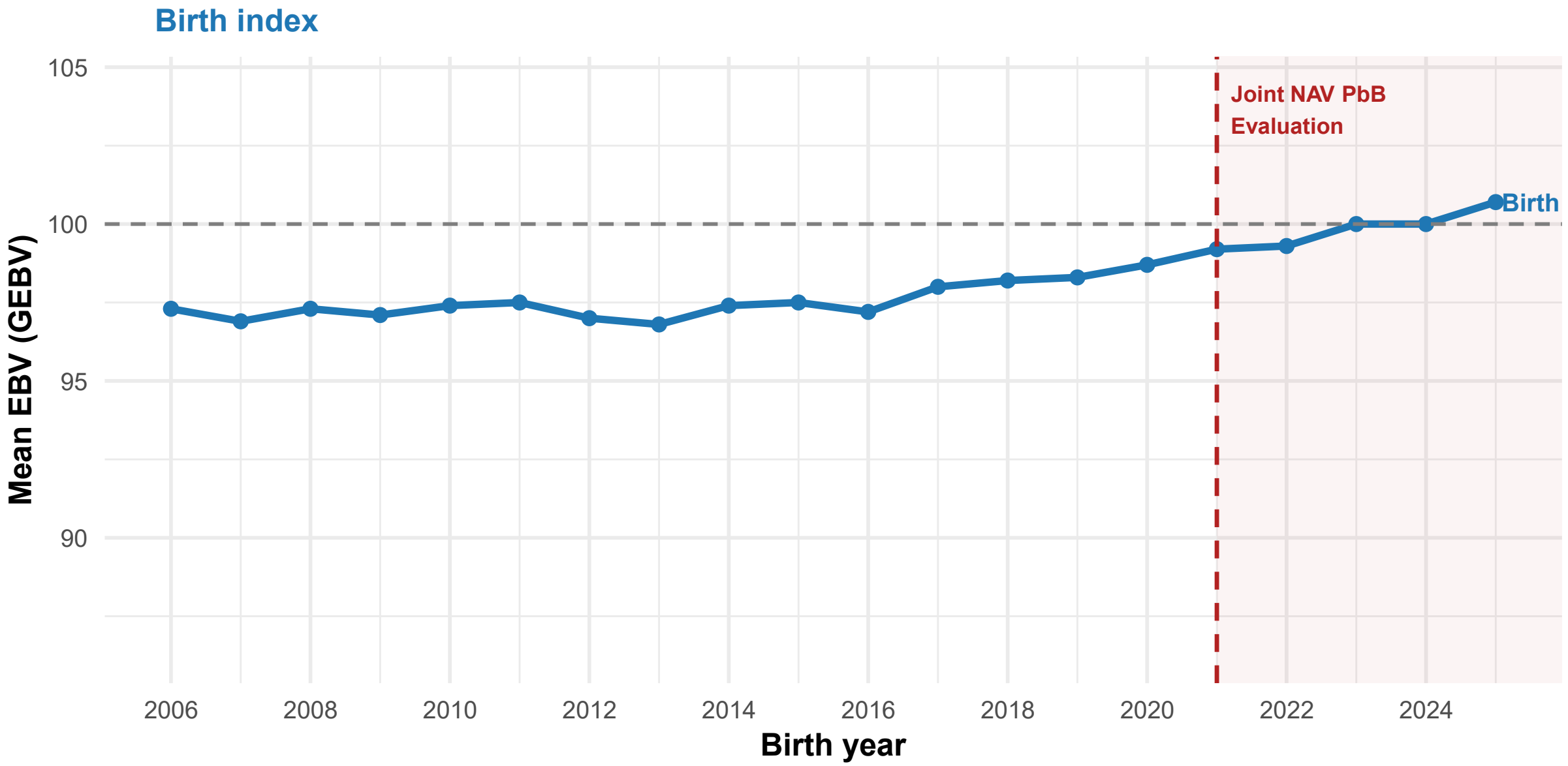
Birth index: how the weights are set

Table 4. Direct calving traits behind the birth index - final weights in percentage

Direct calving ease + calf survival → Birth index

Index	Underlying index	AAN	CHA	HER	LIM	SIM
Birth	Calving ease heifer - direct (dCAE1)	**41**	**30**	**36**	**28**	**32**
	Calf survival heifer - direct (dCSU1)	**43**	**25**	**46**	**25**	**20**
	Calving ease cow - direct (dCAE2)	**9**	**25**	**15**	**17**	**21**
	Calf survival cow - direct (dCSU2)	**7**	**20**	**3**	**30**	**27**

AAN: Genetic trend in mean EBV (GEBV)



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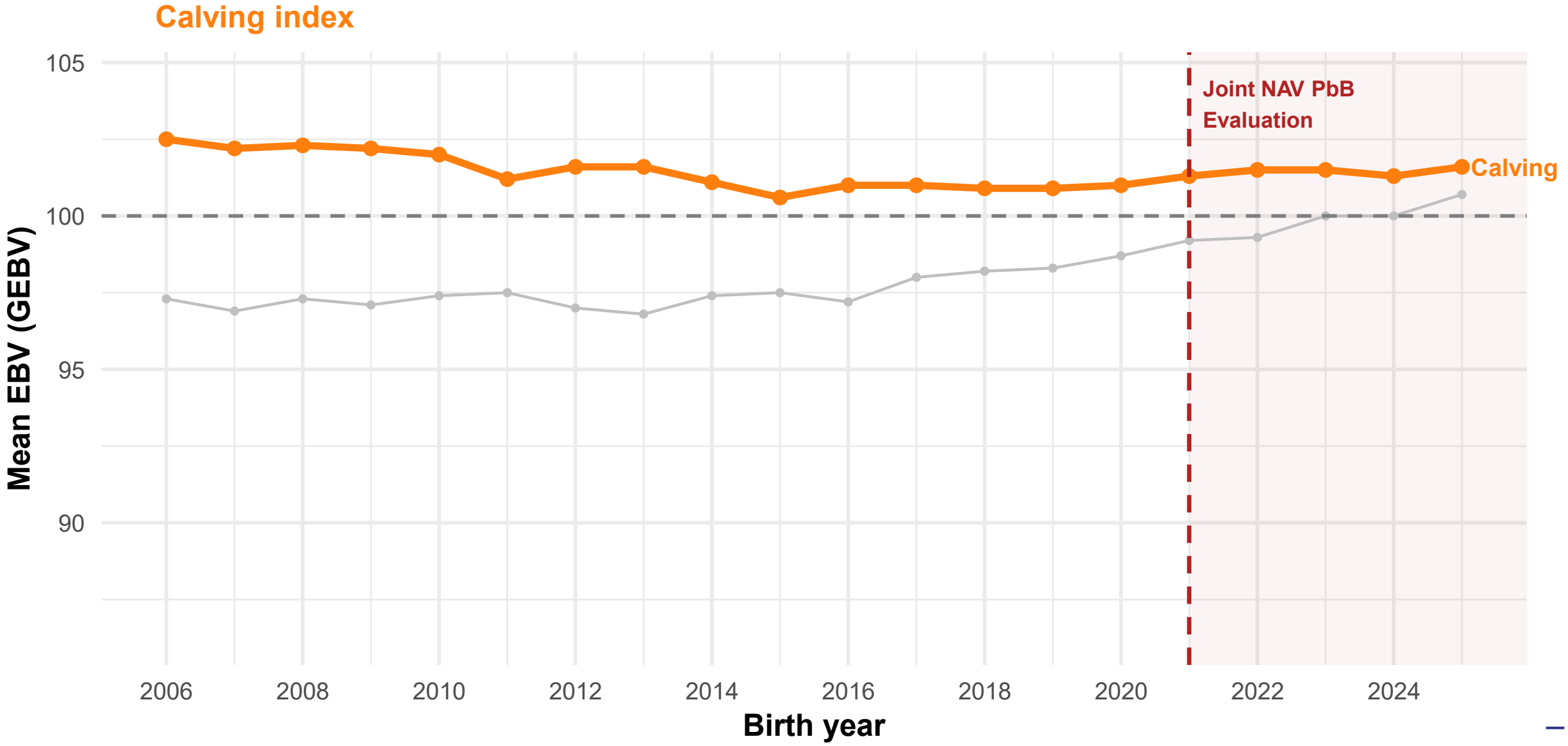

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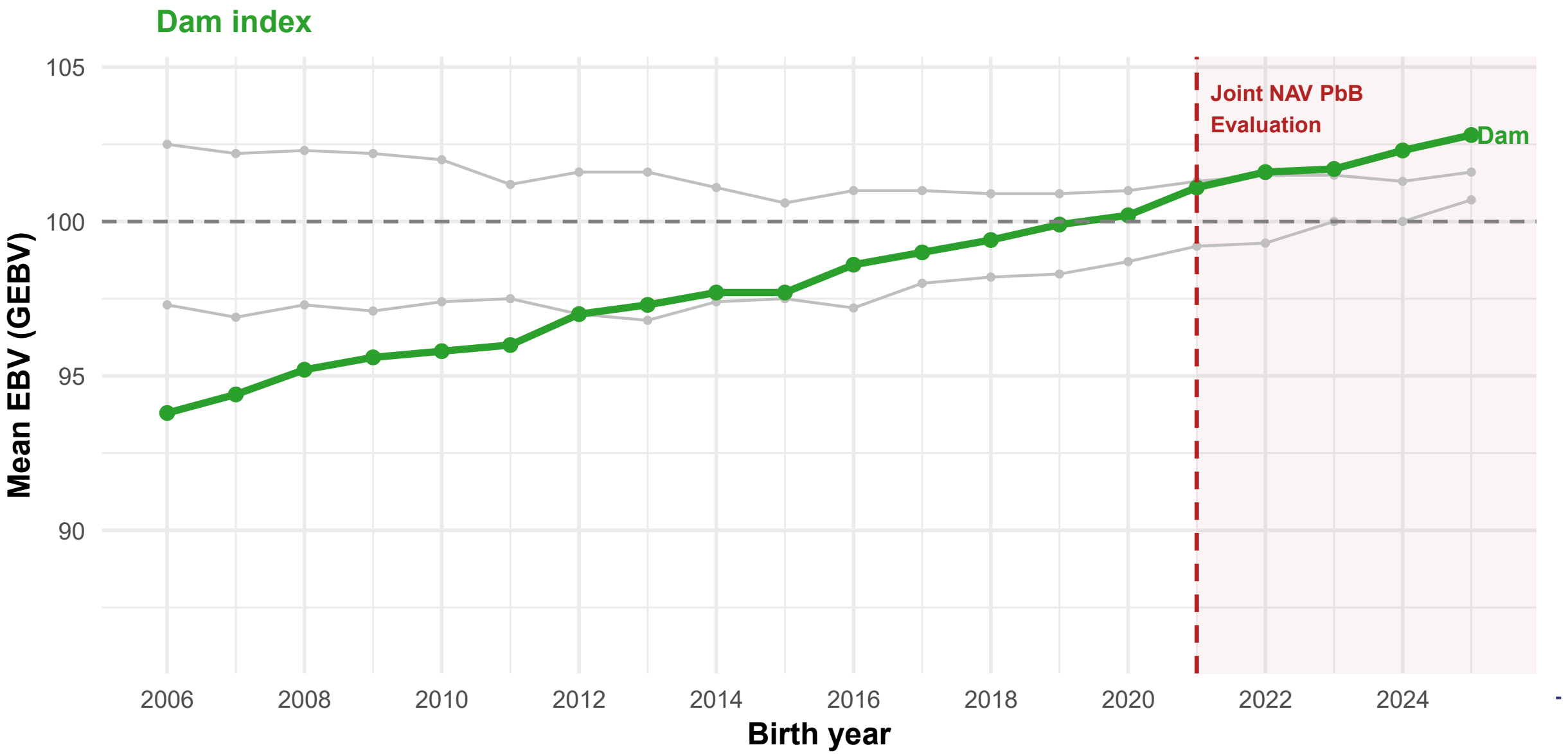

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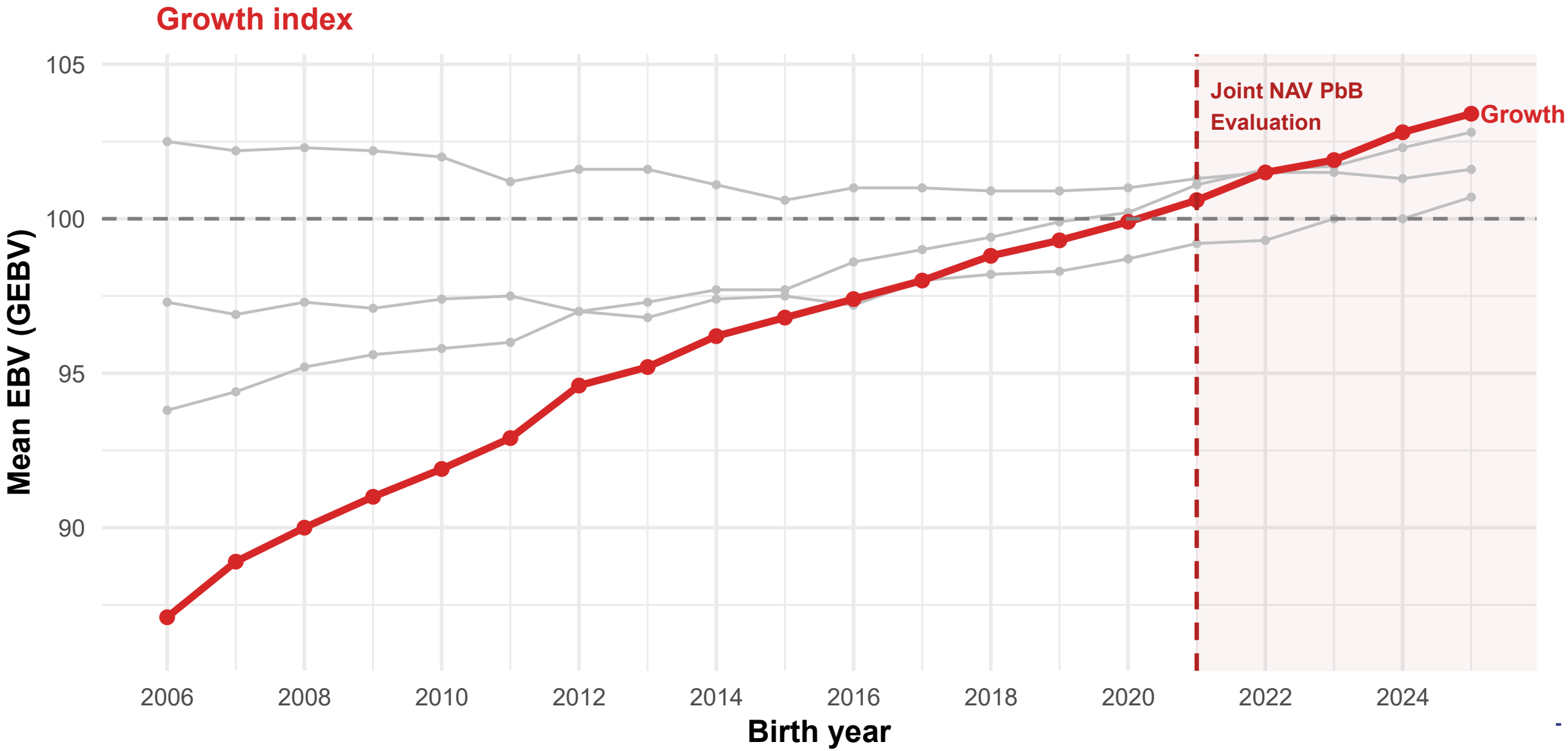

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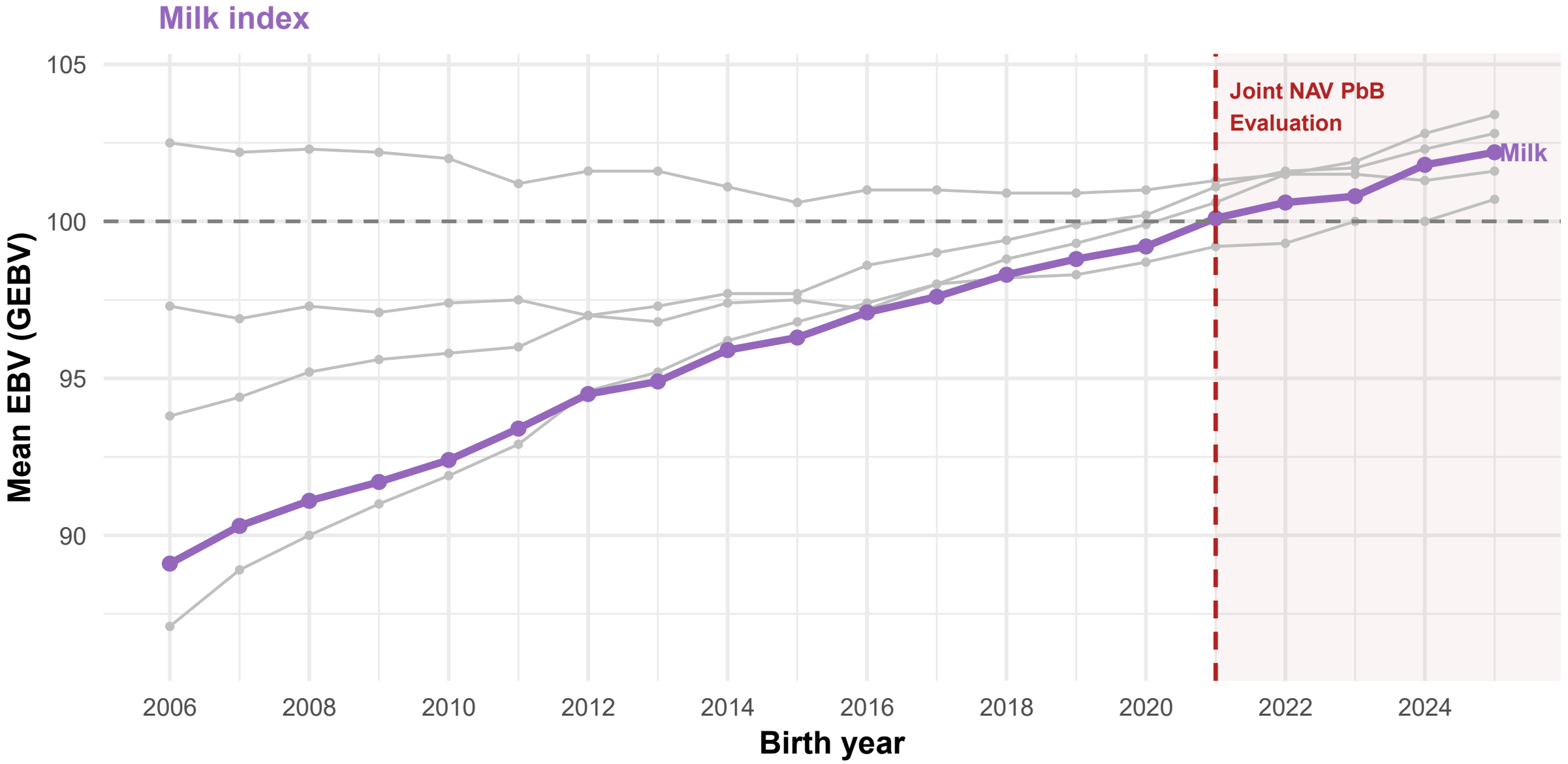

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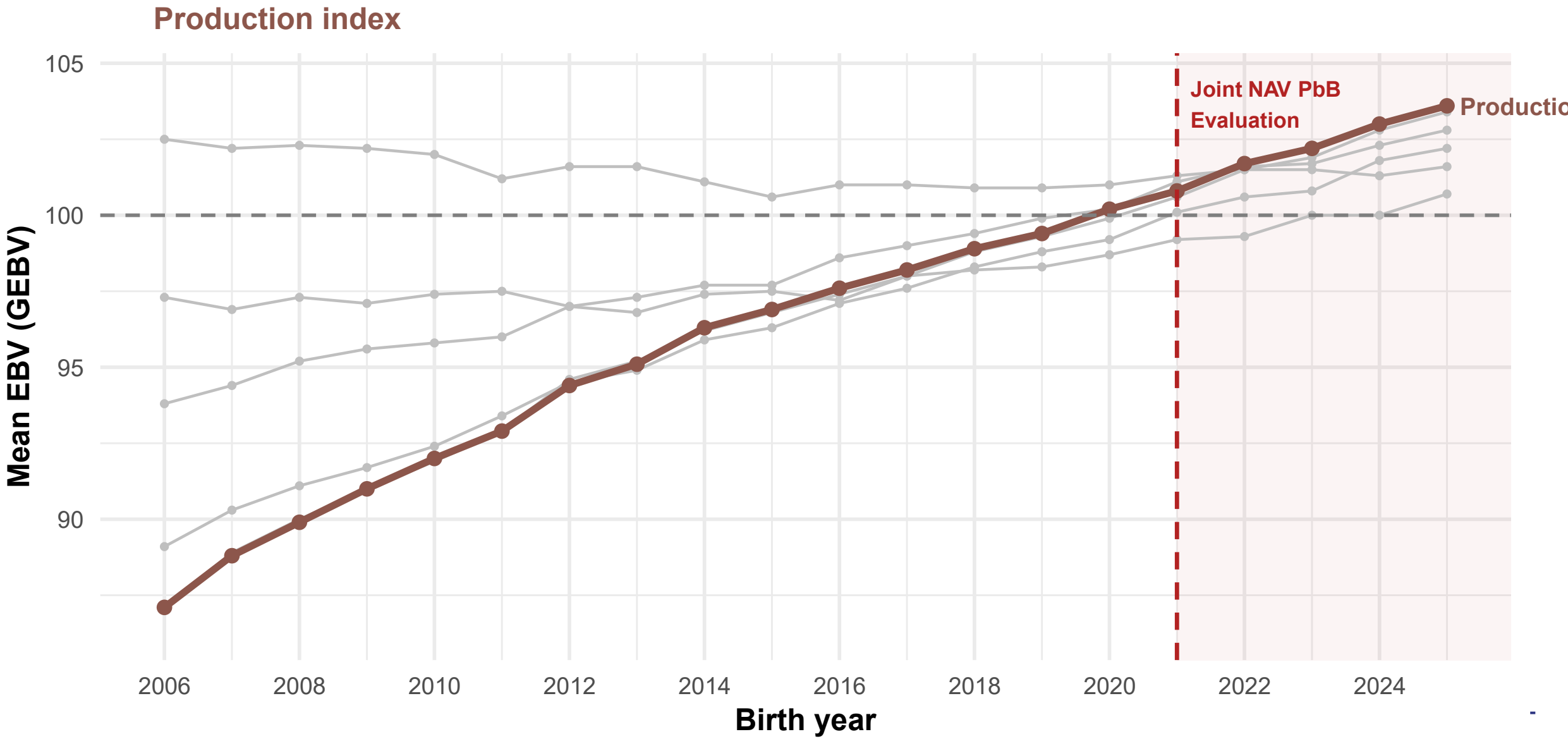

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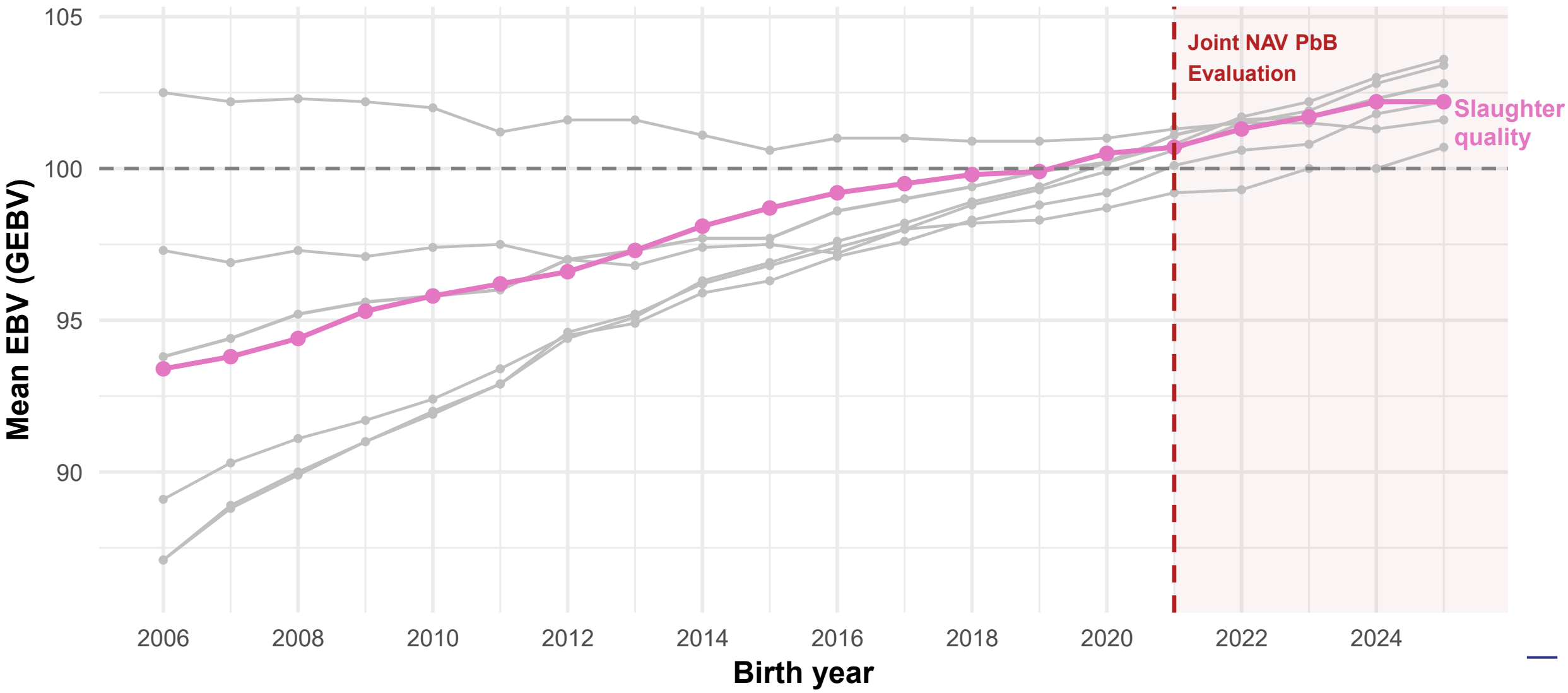

GENETIC TRENDS - CHAROLIAS

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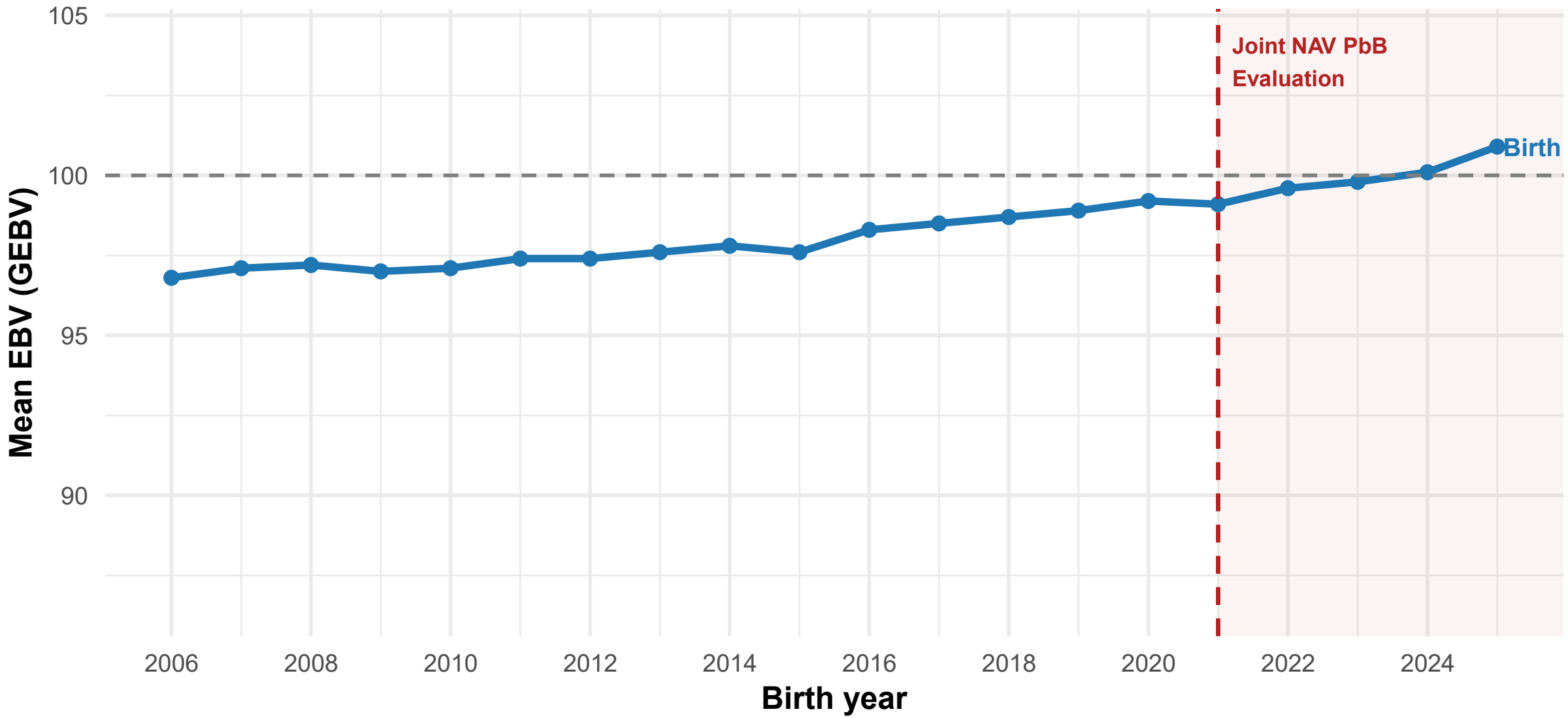

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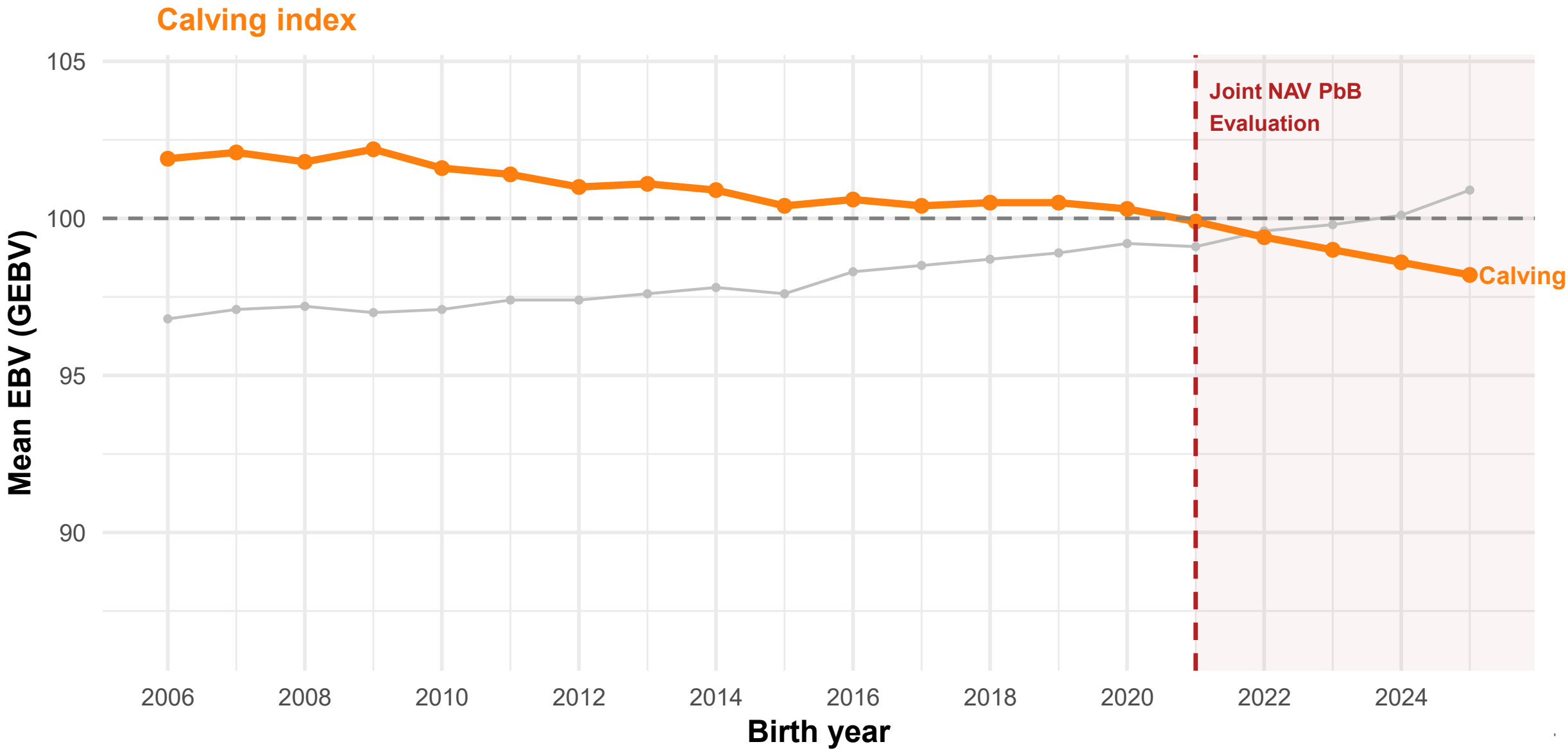

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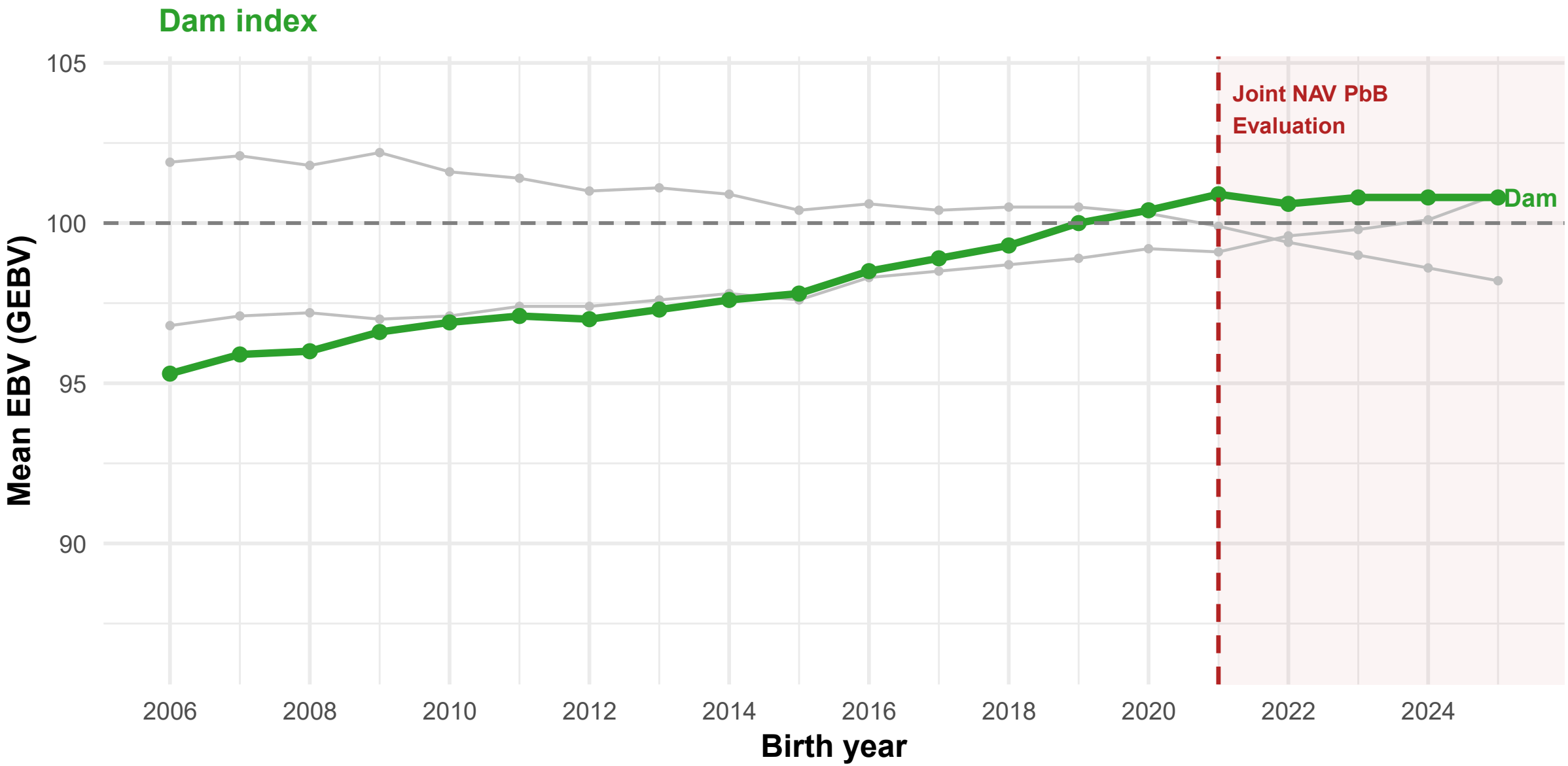

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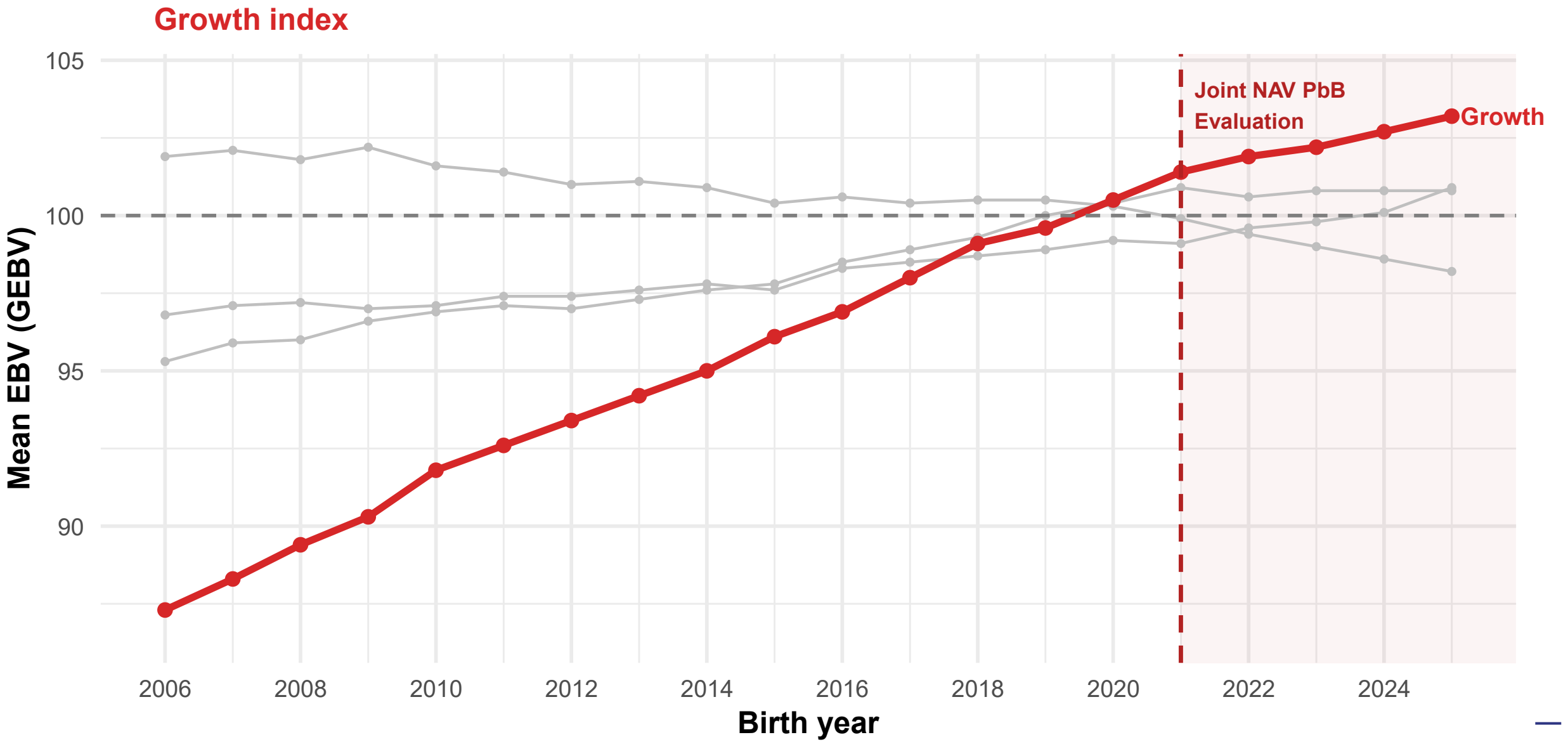

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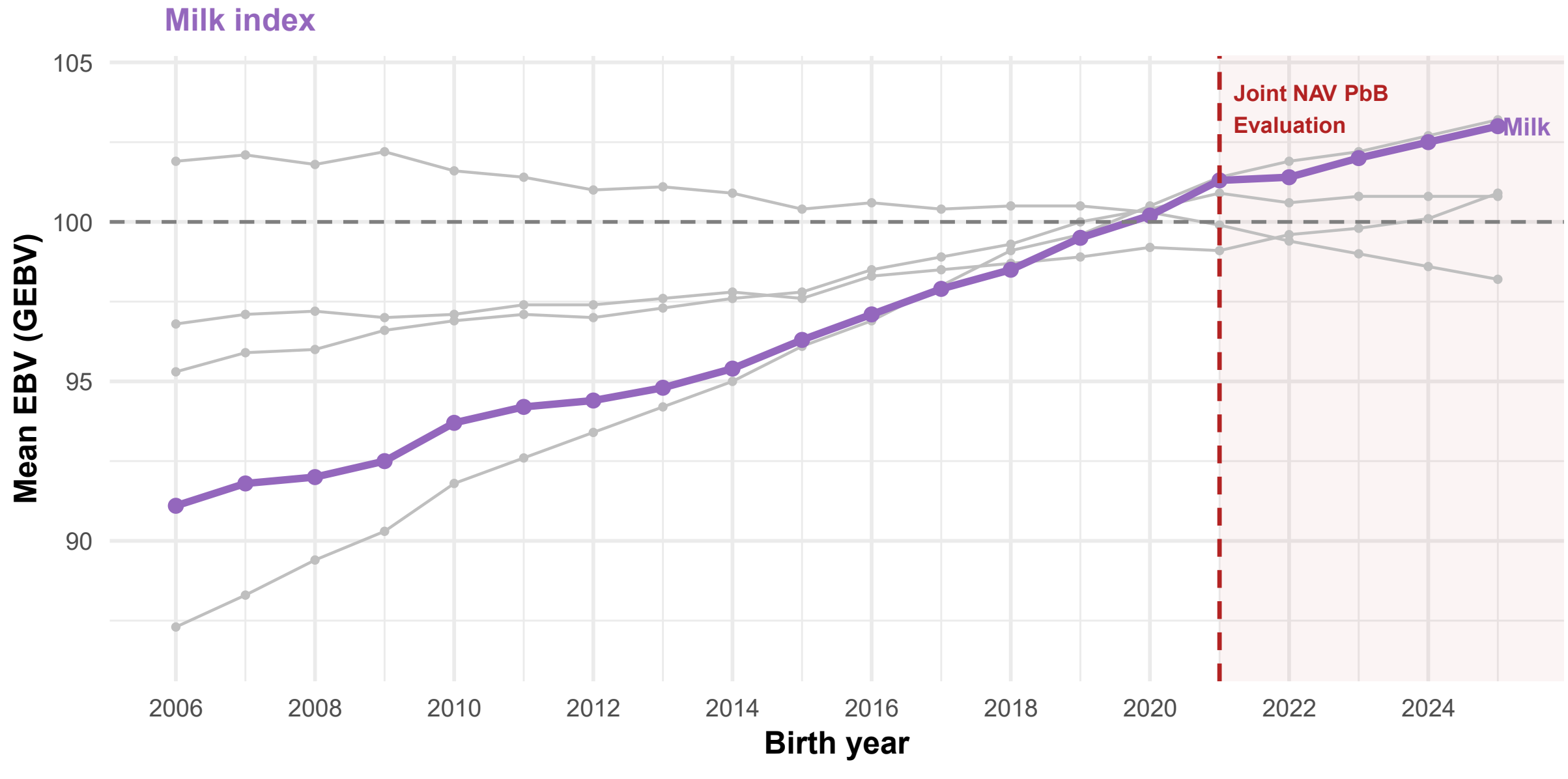

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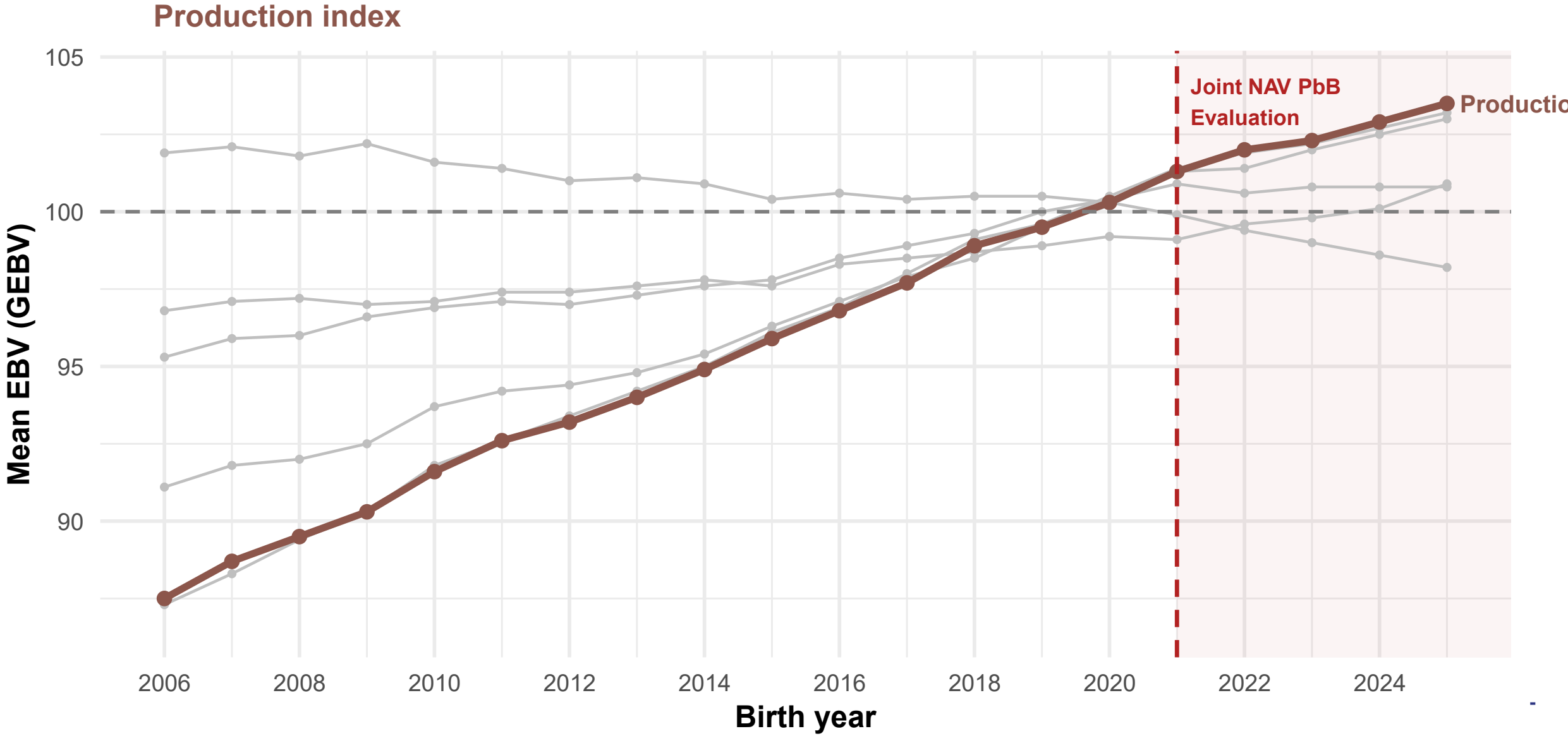

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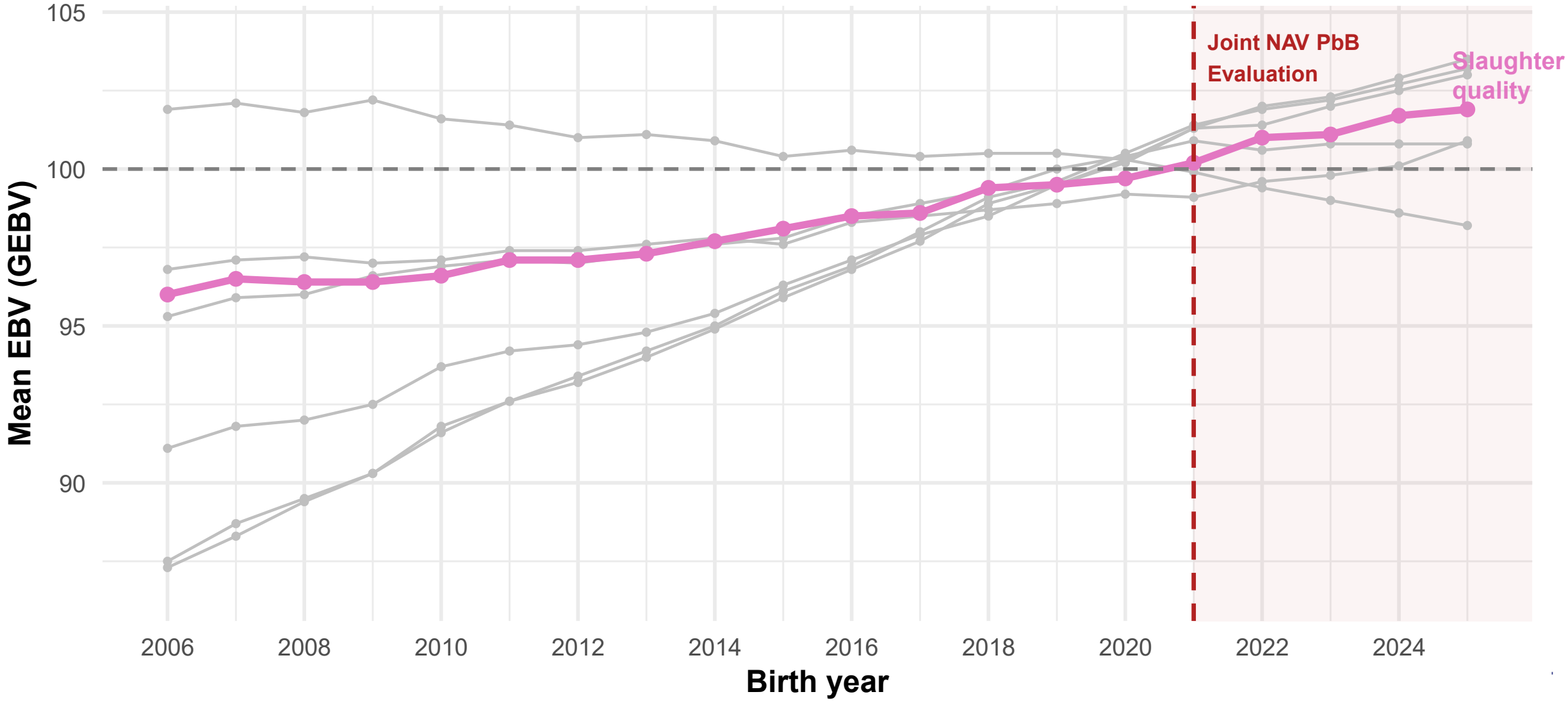

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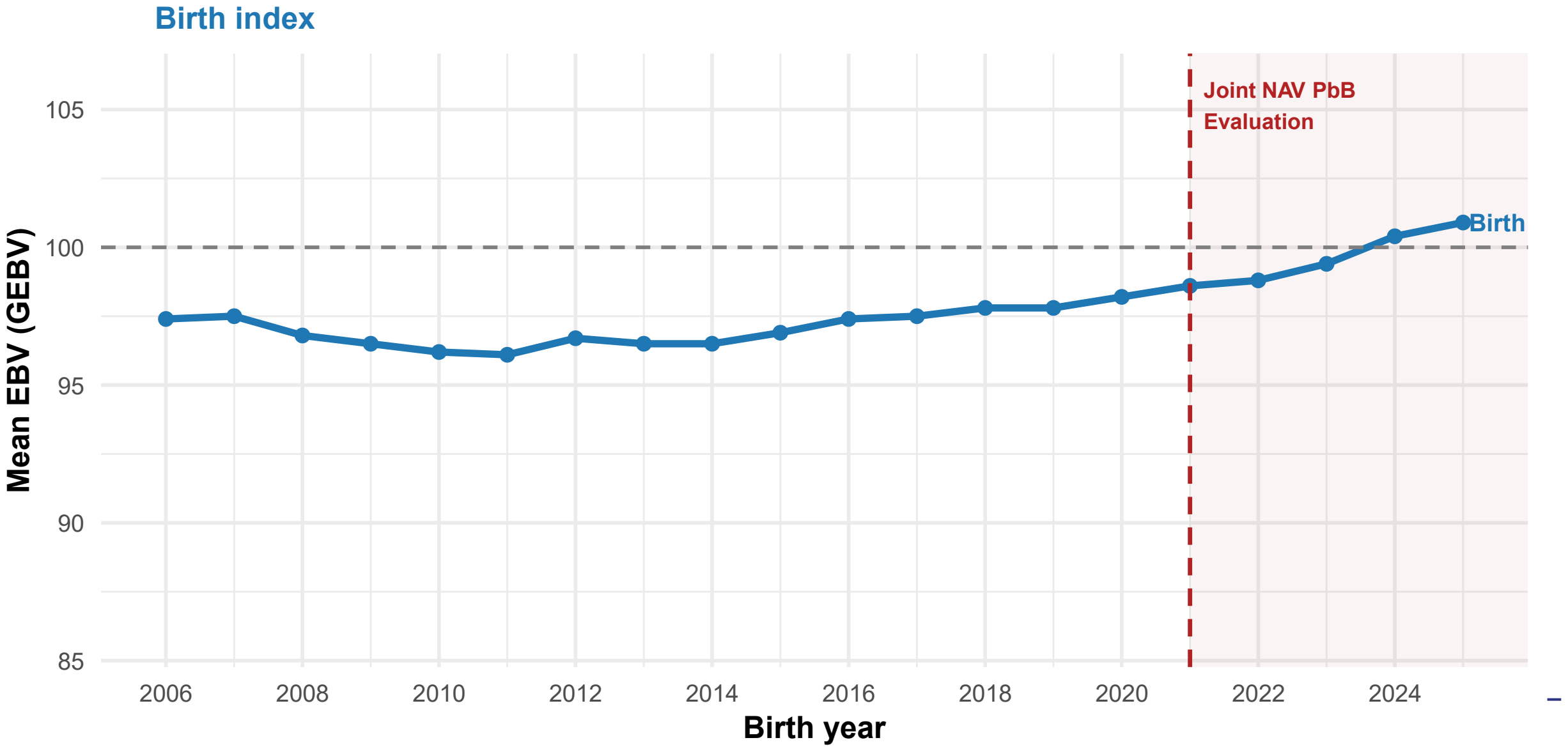

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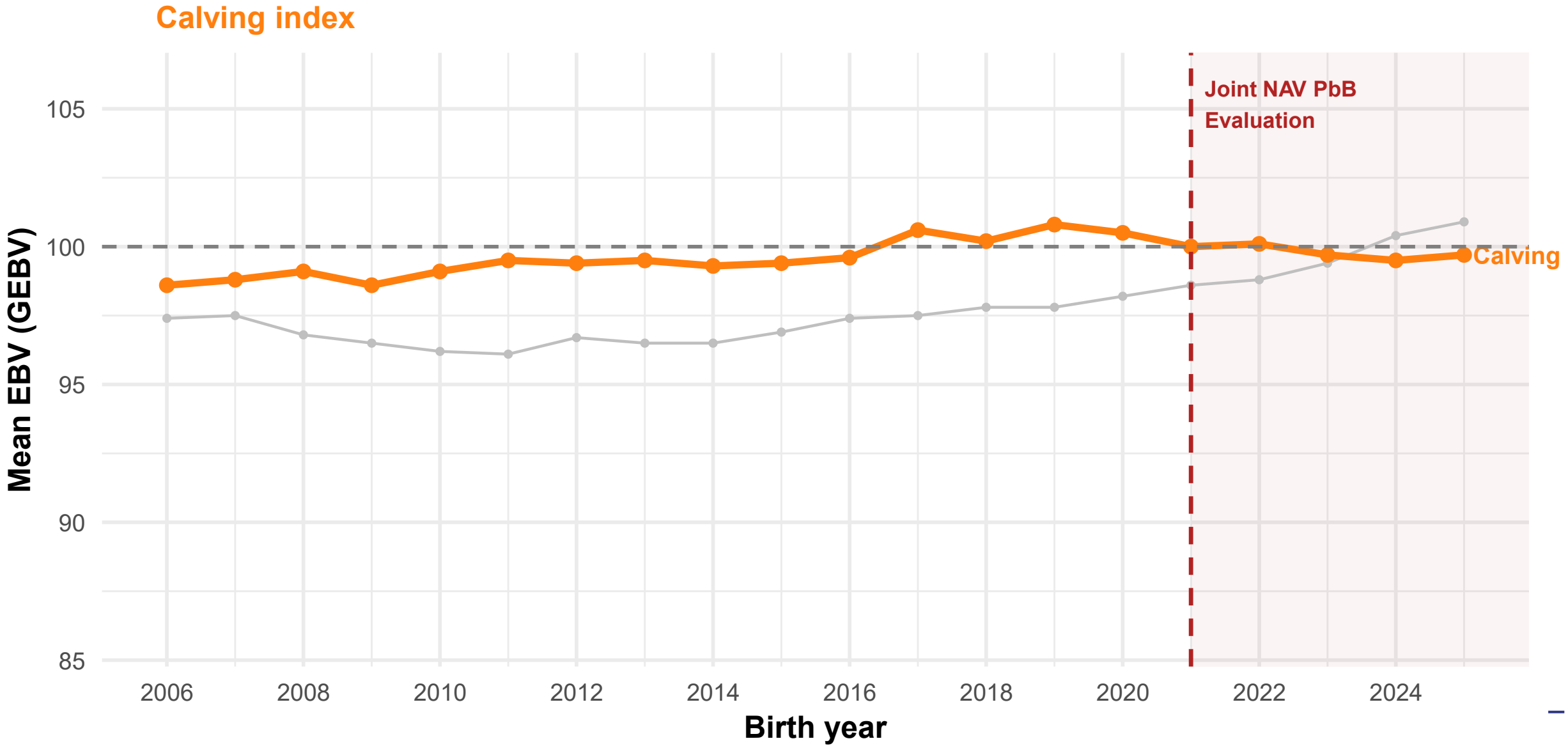

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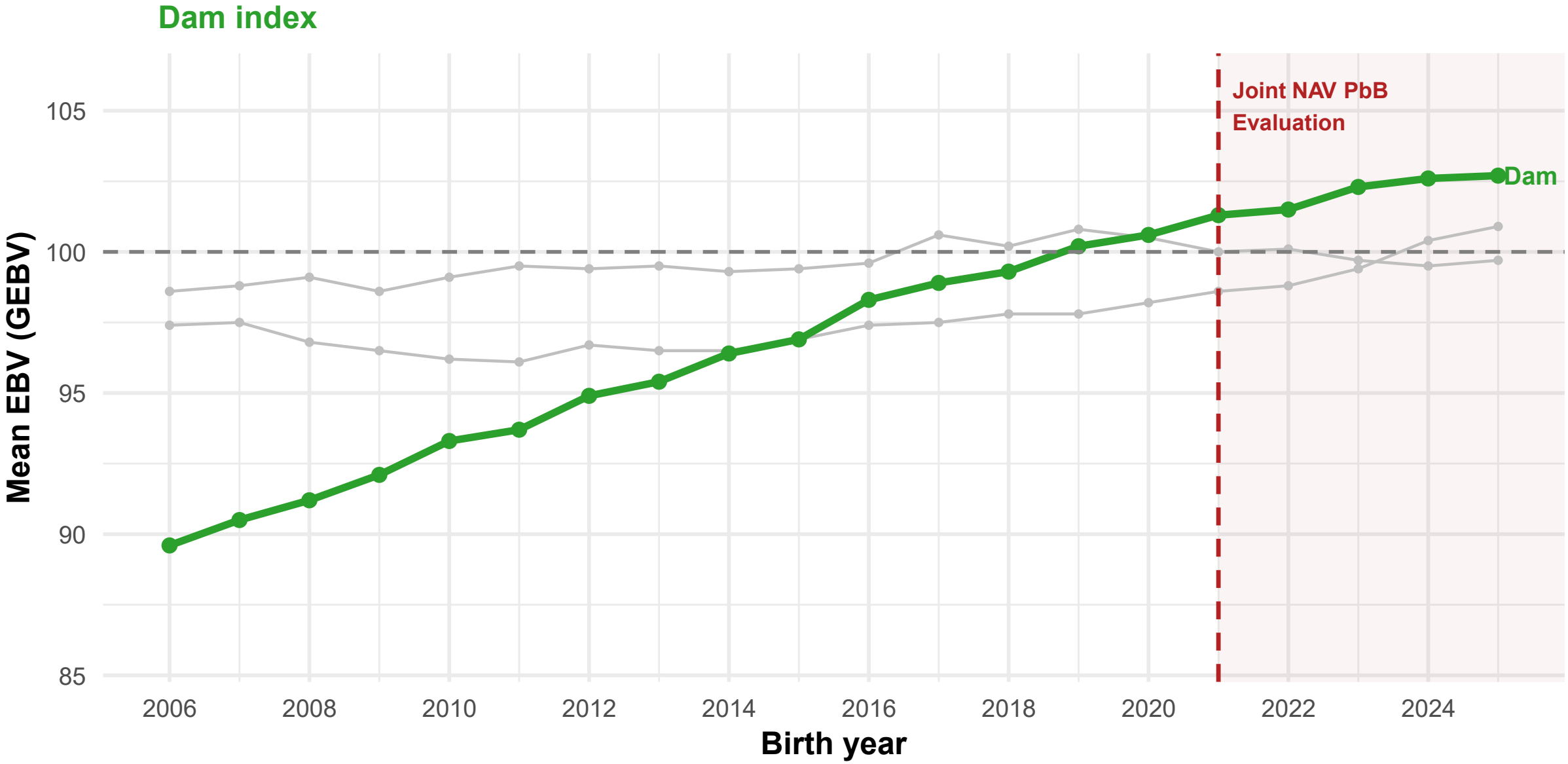

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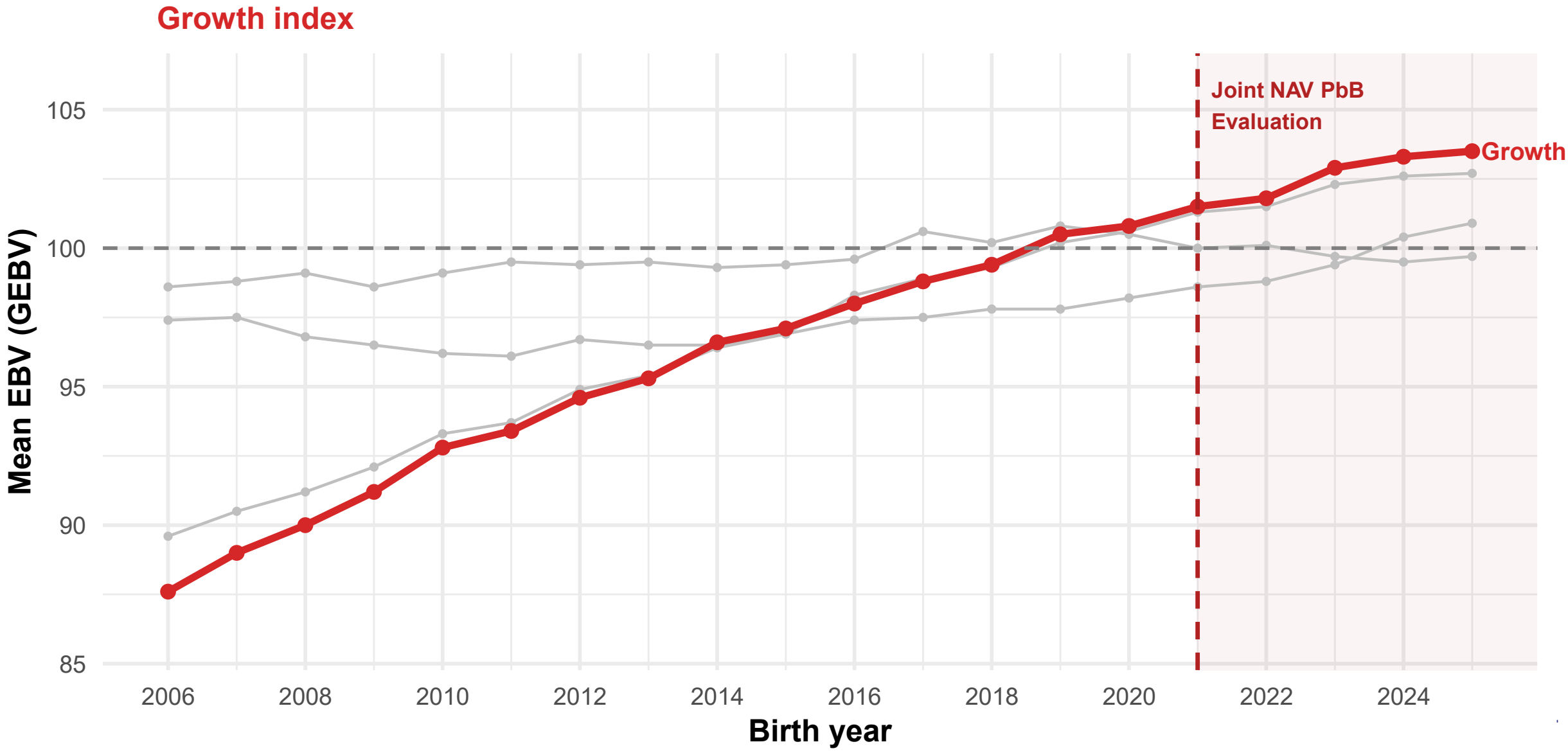

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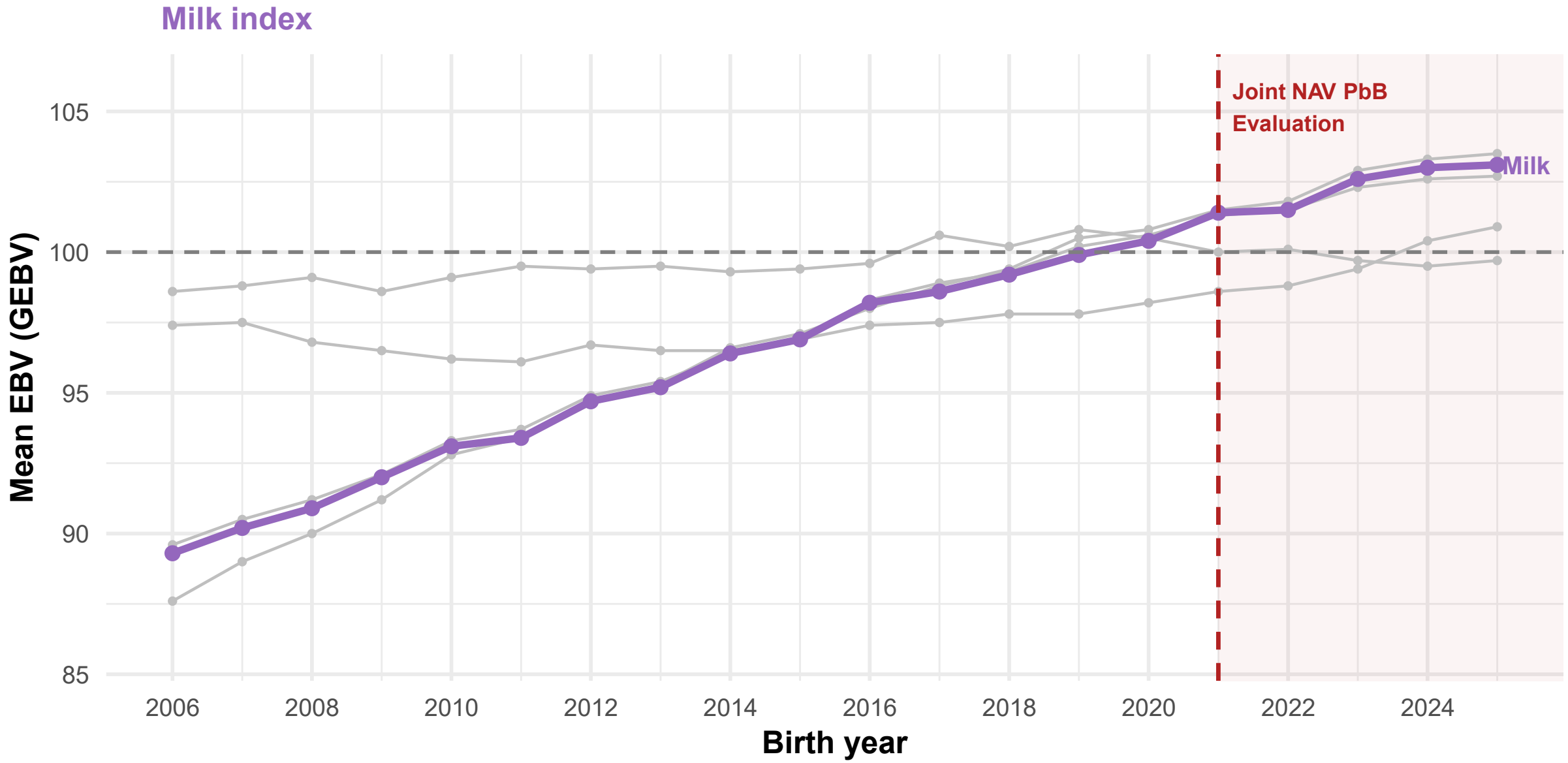

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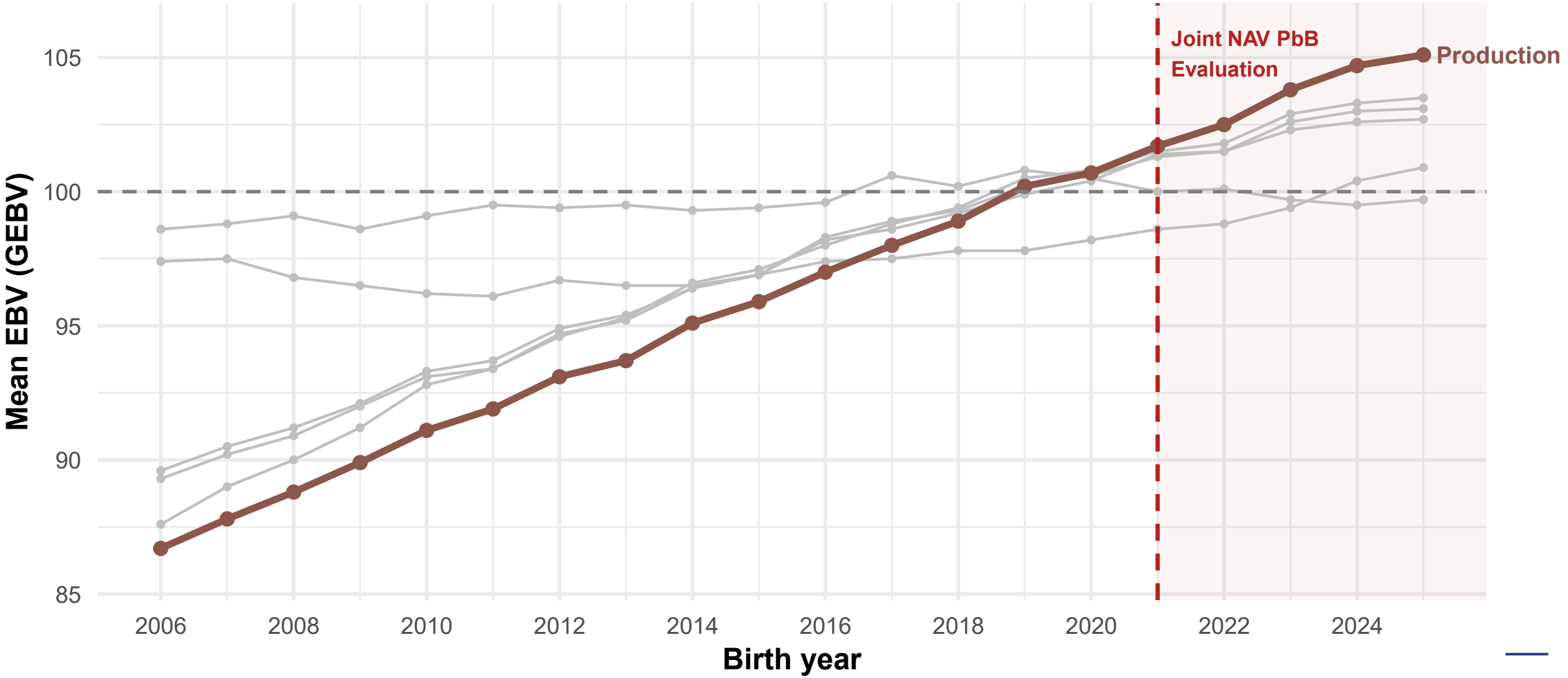

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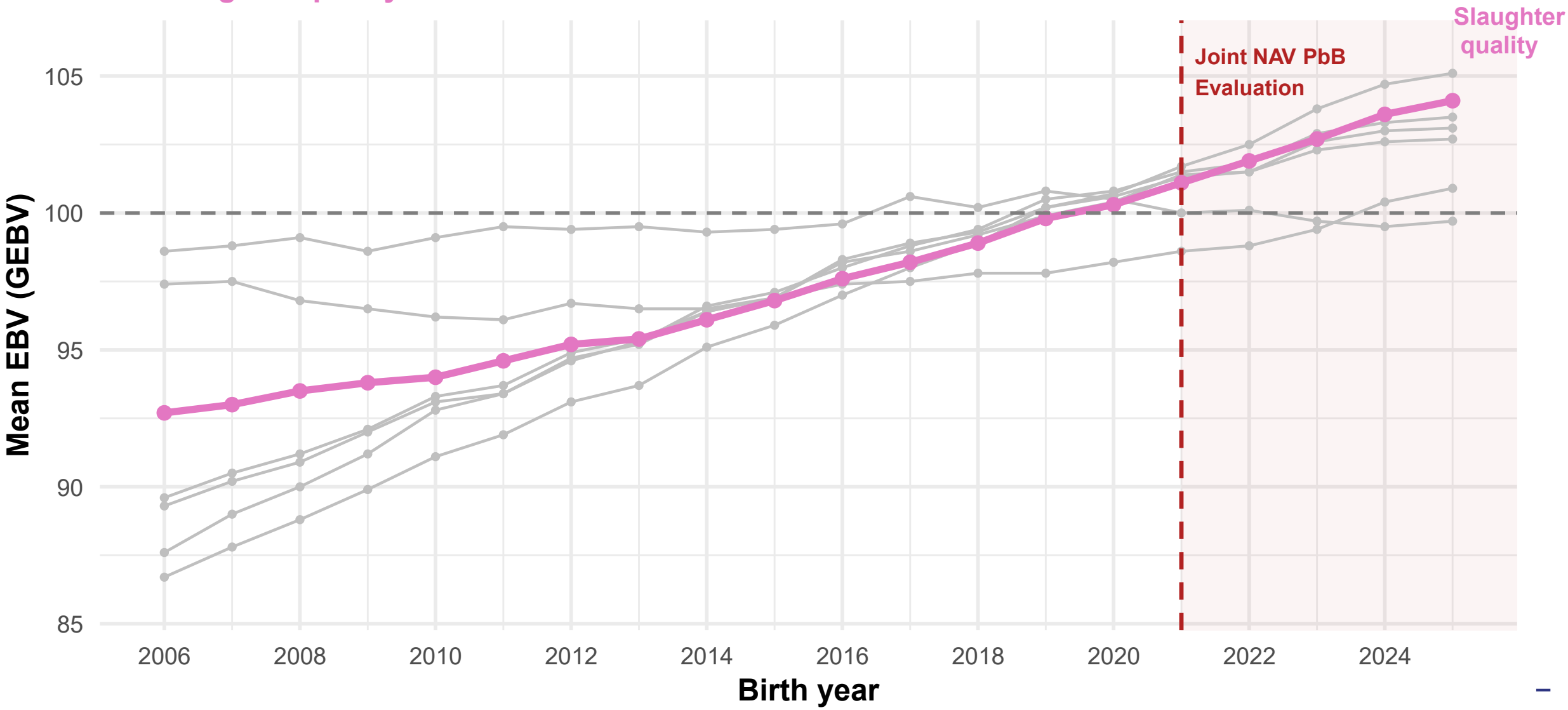

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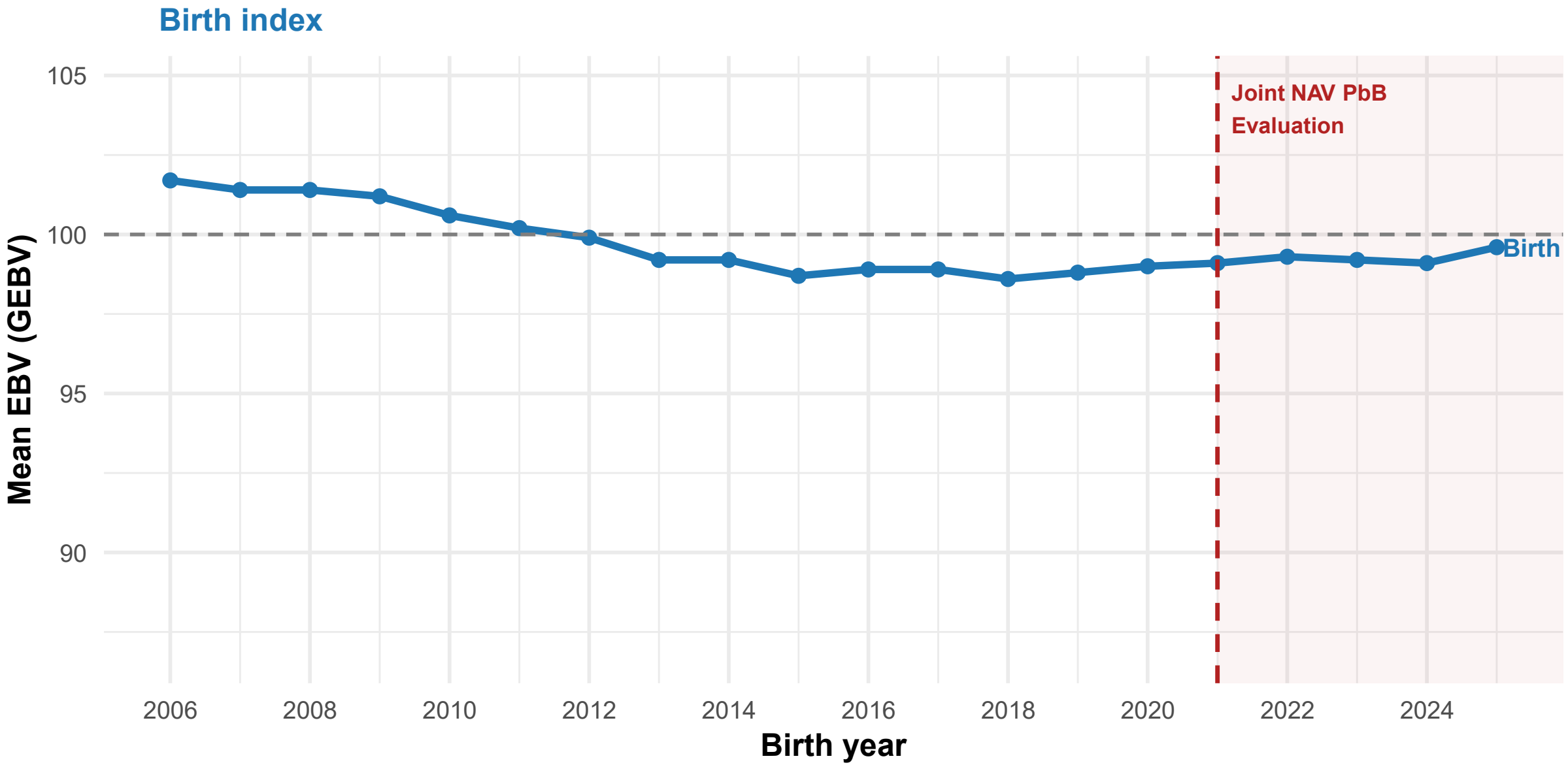

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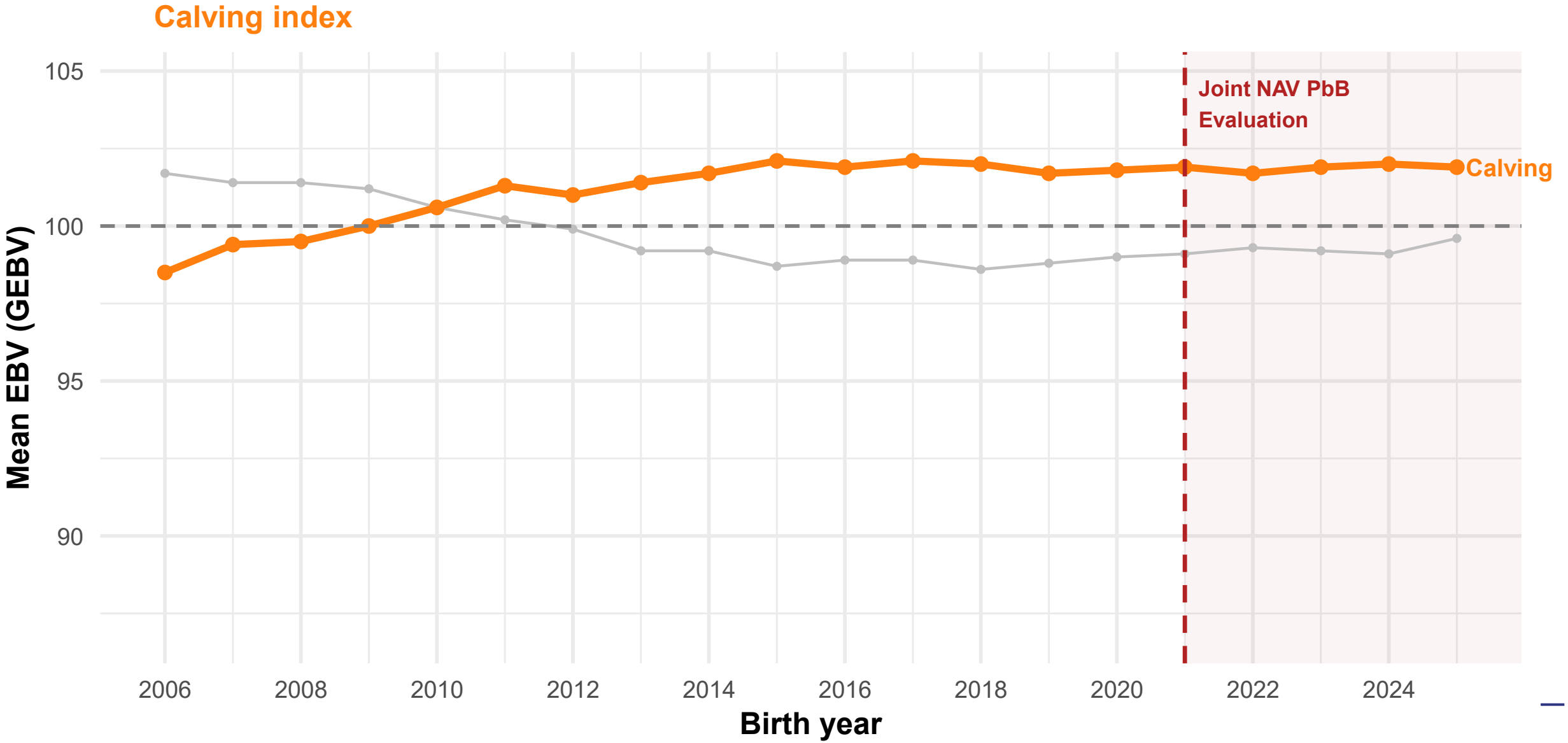

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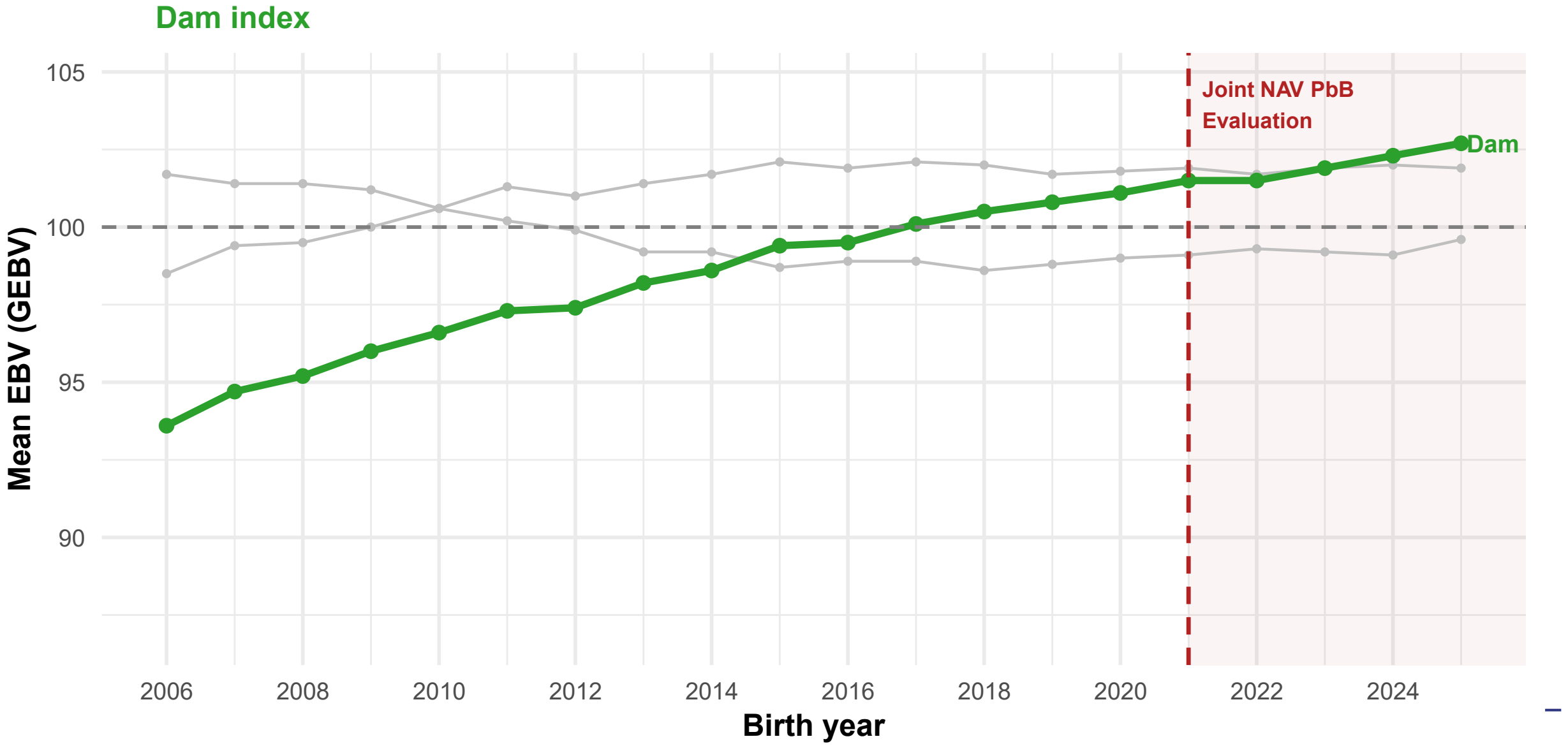

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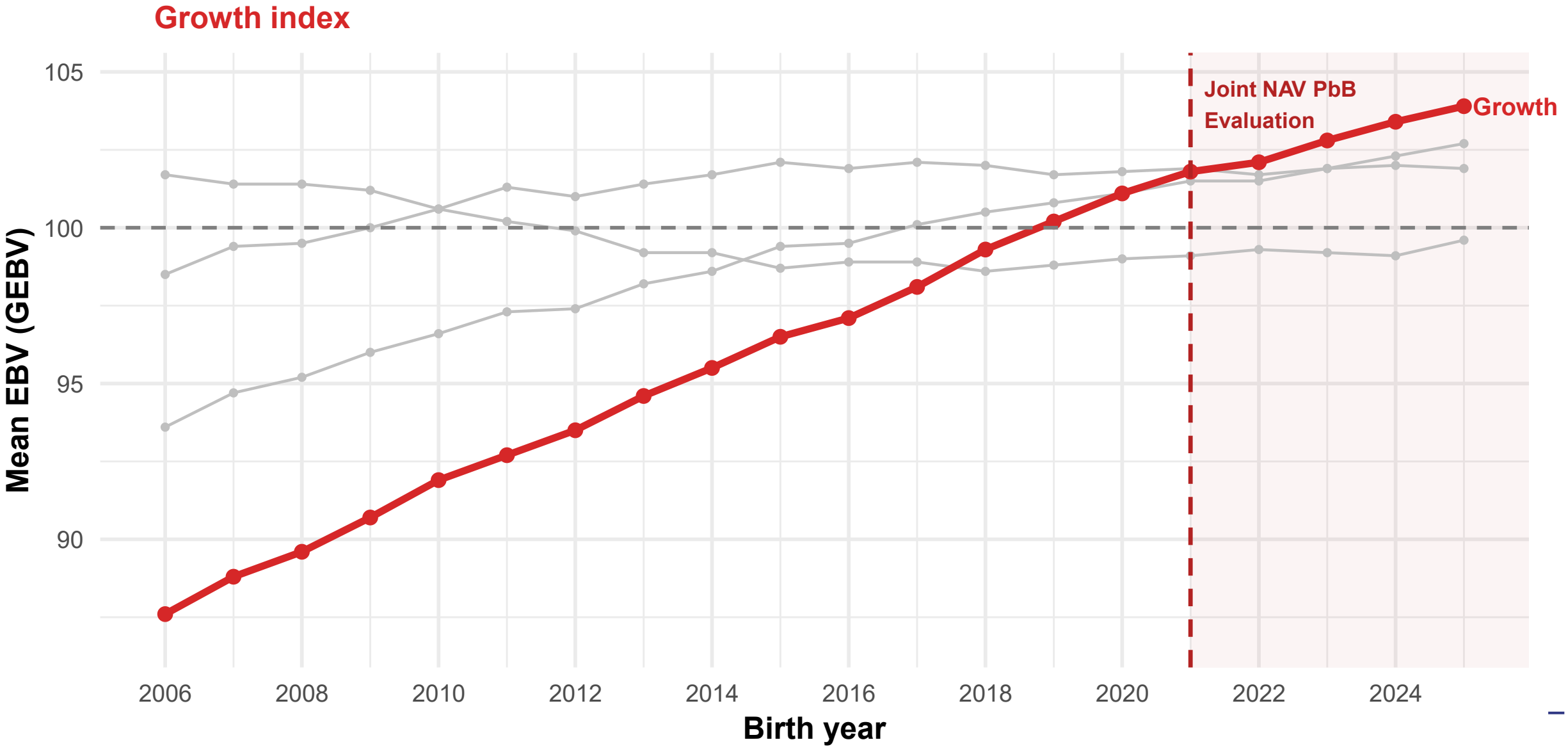

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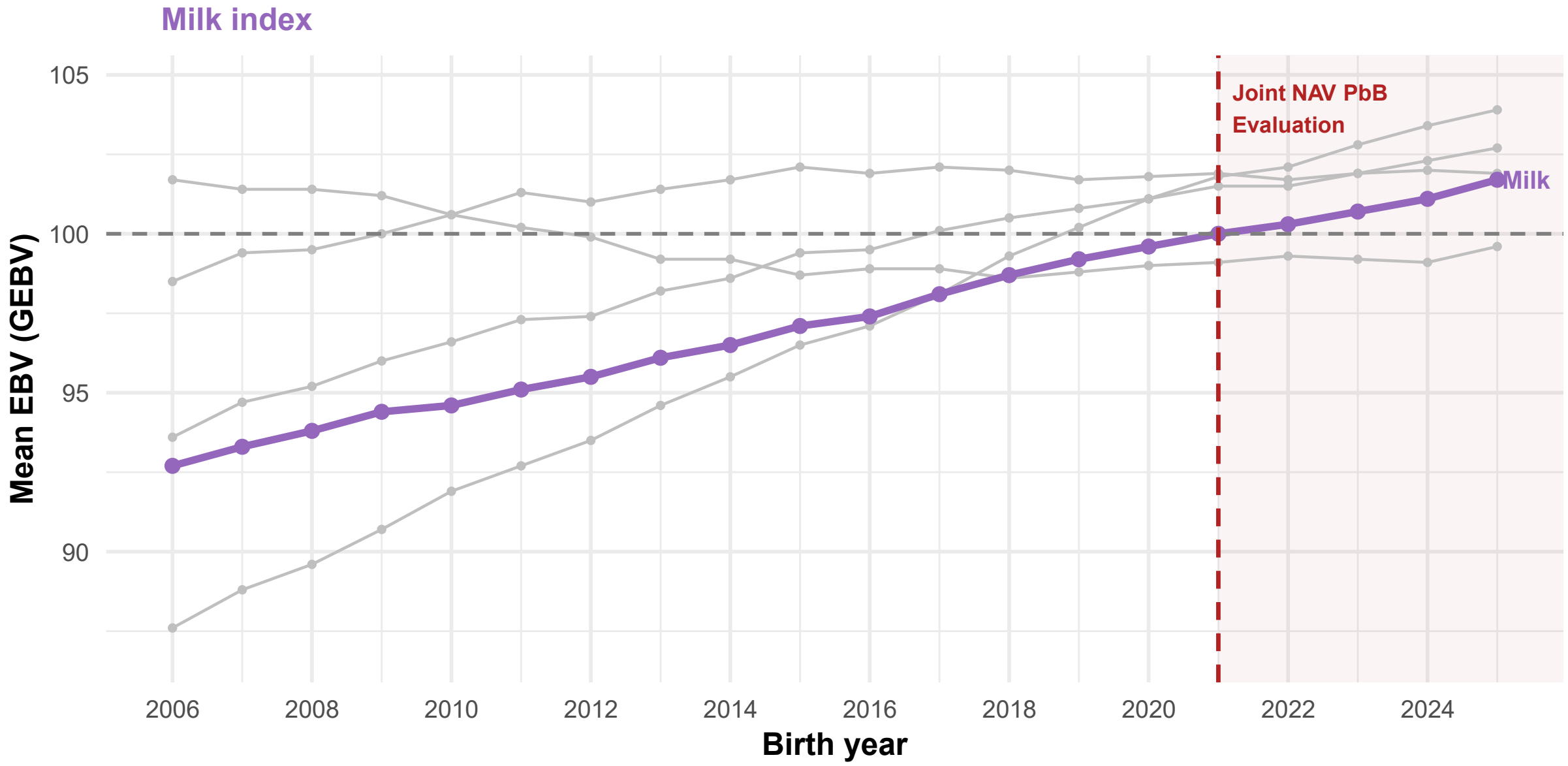

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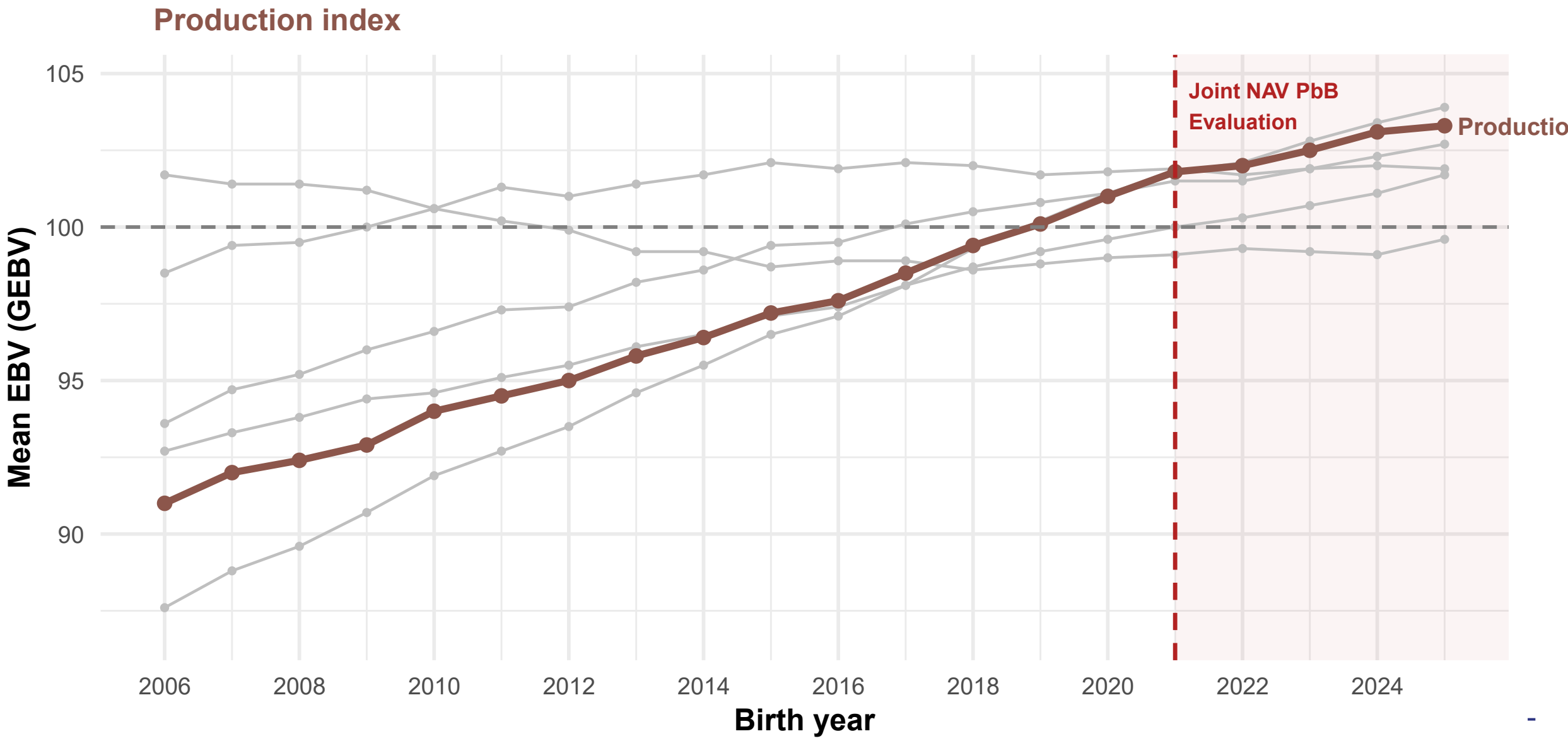

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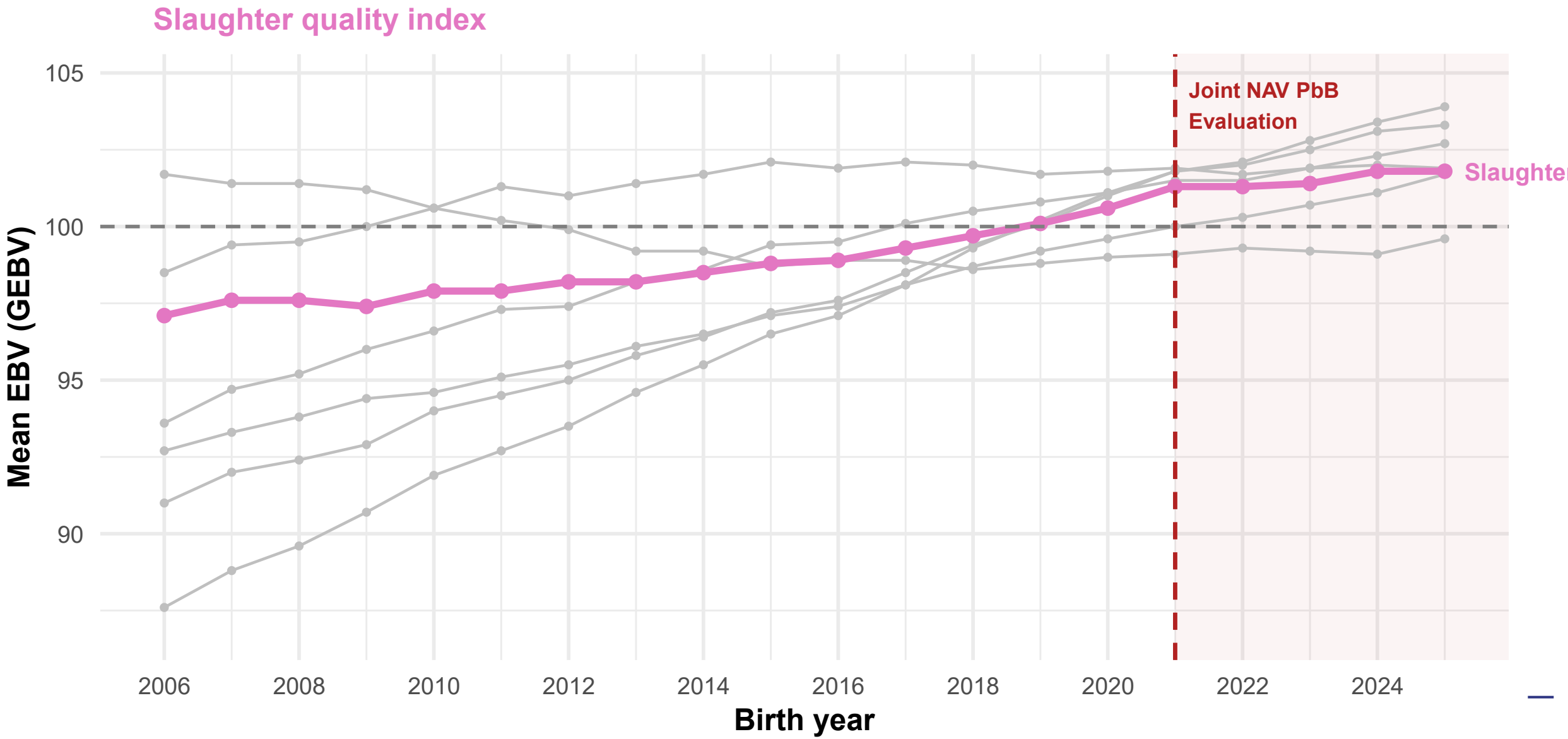

GENETIC TRENDS - SIMMENTAL

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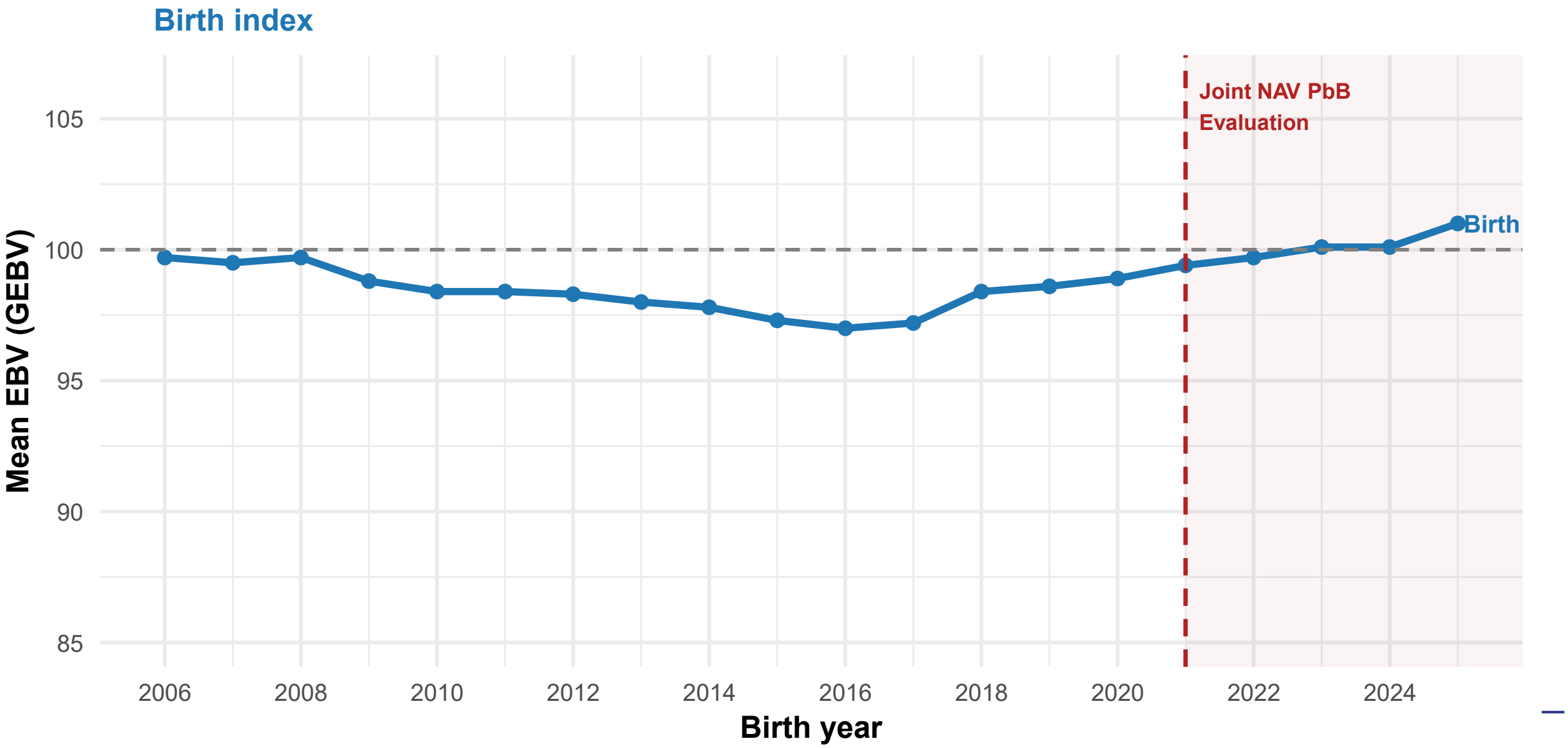
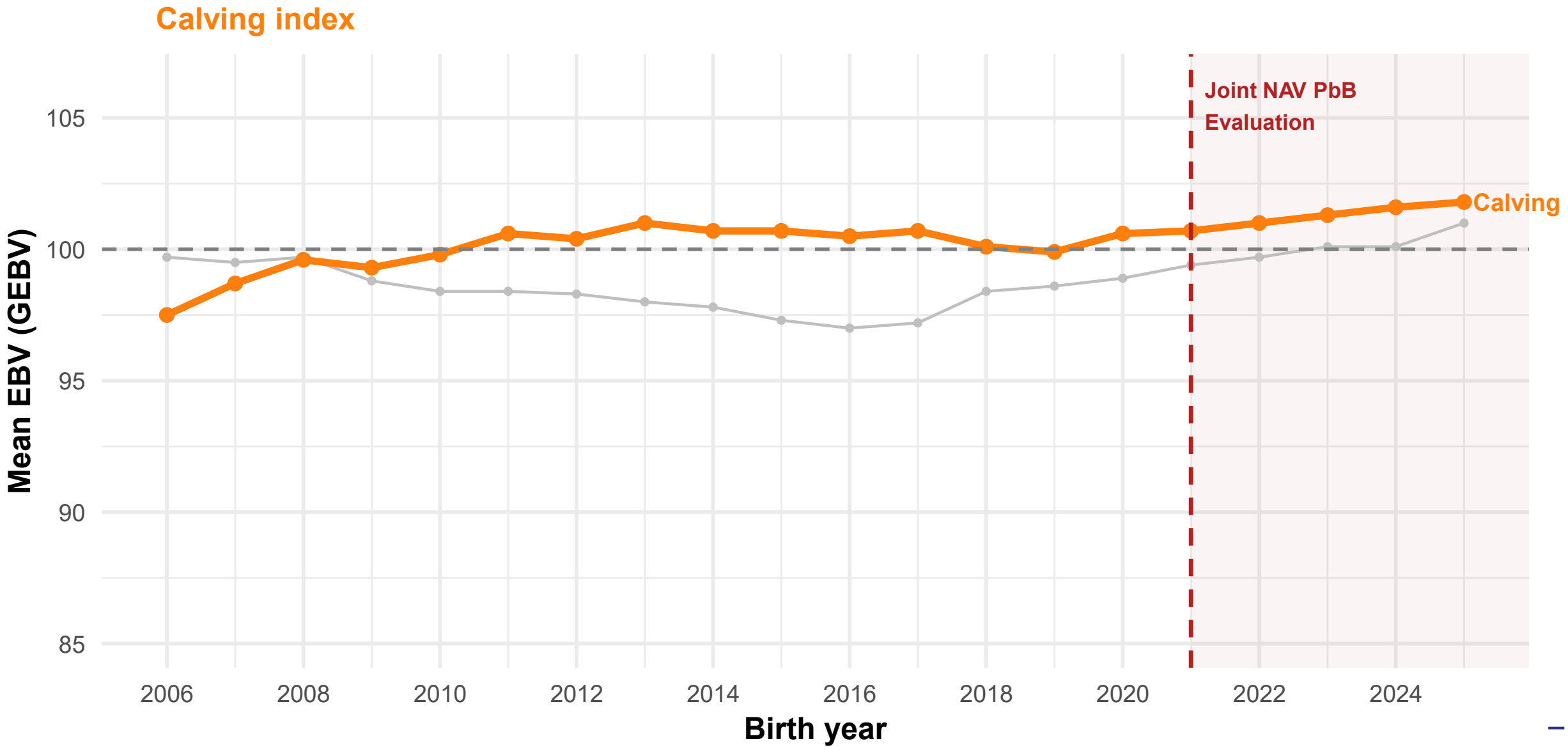
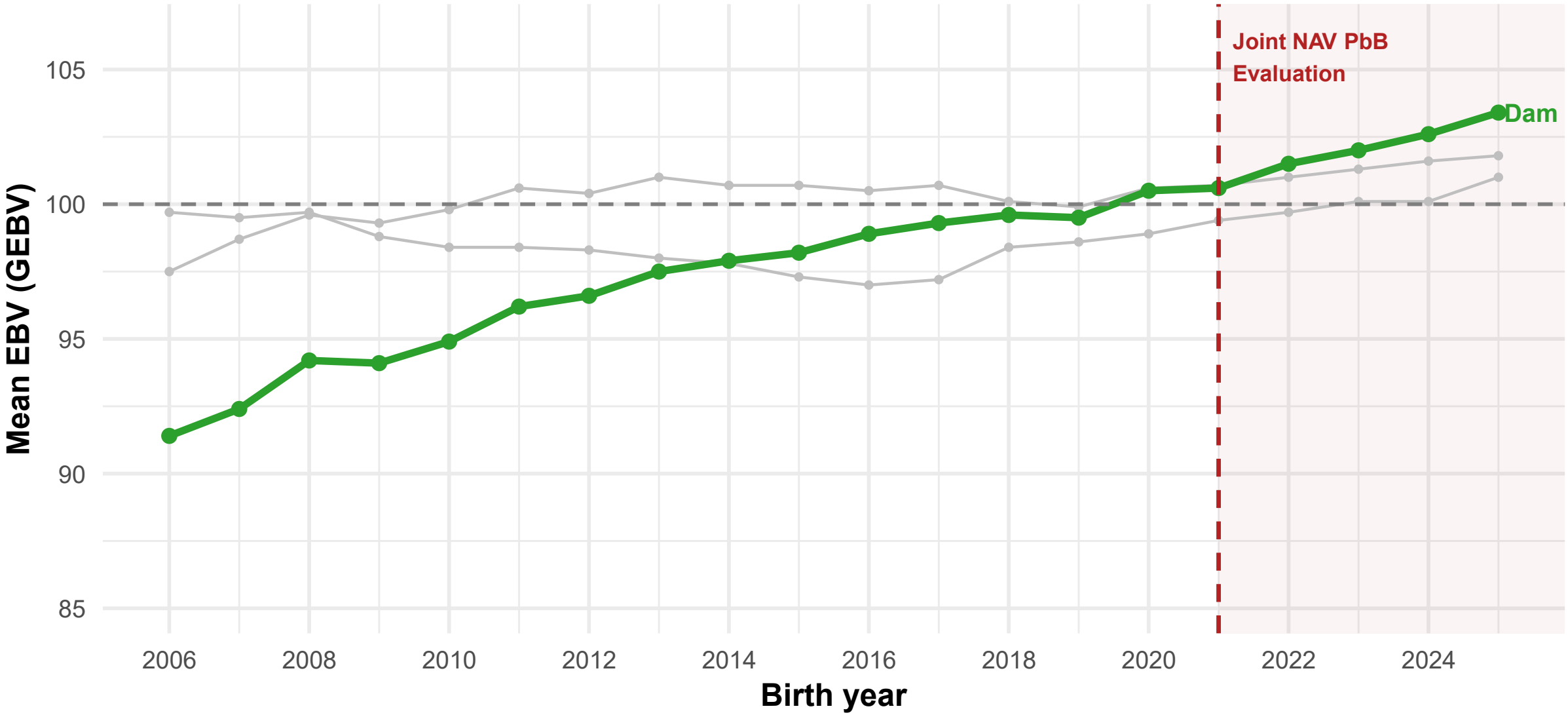


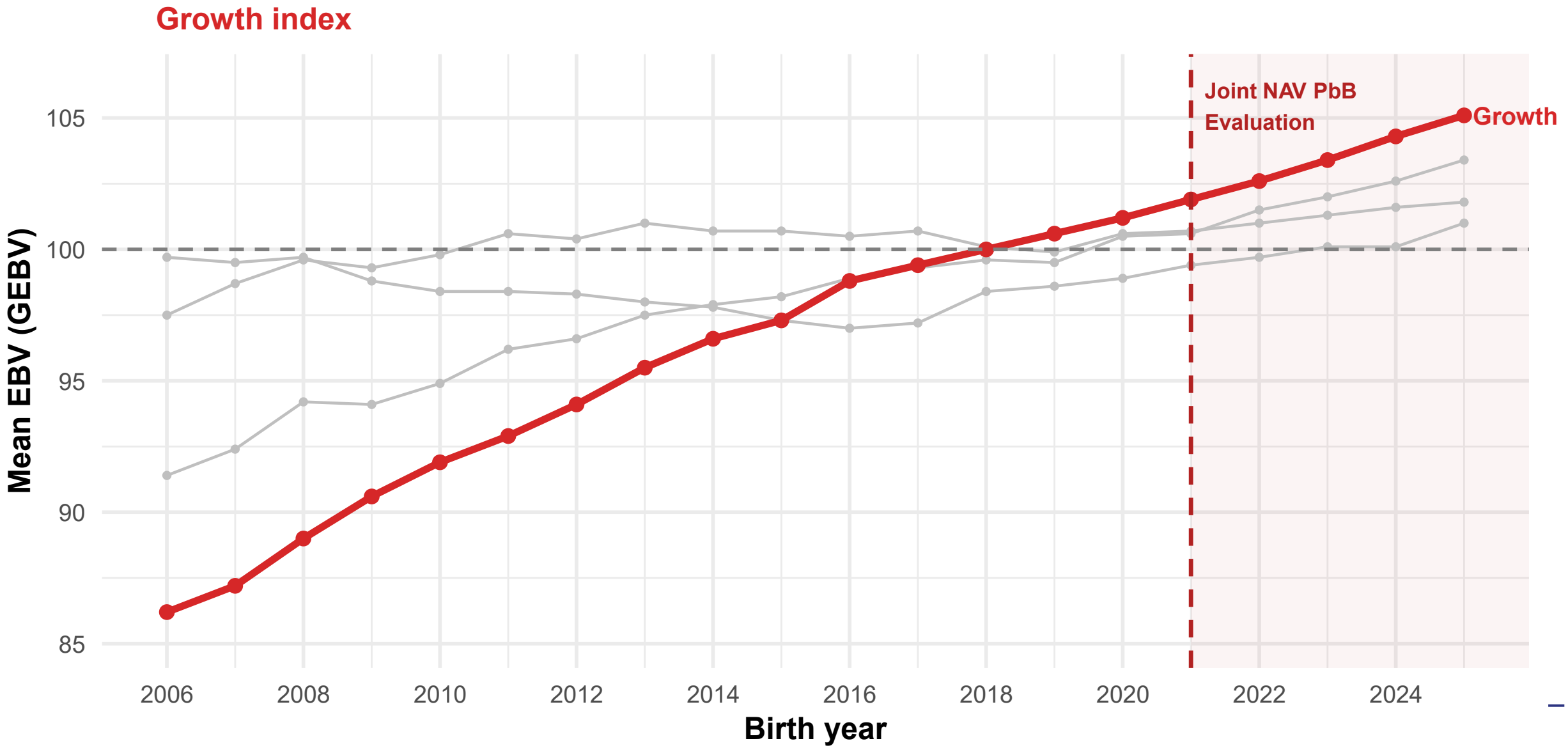
SIM: Genetic trend in mean EBV (GEBV)



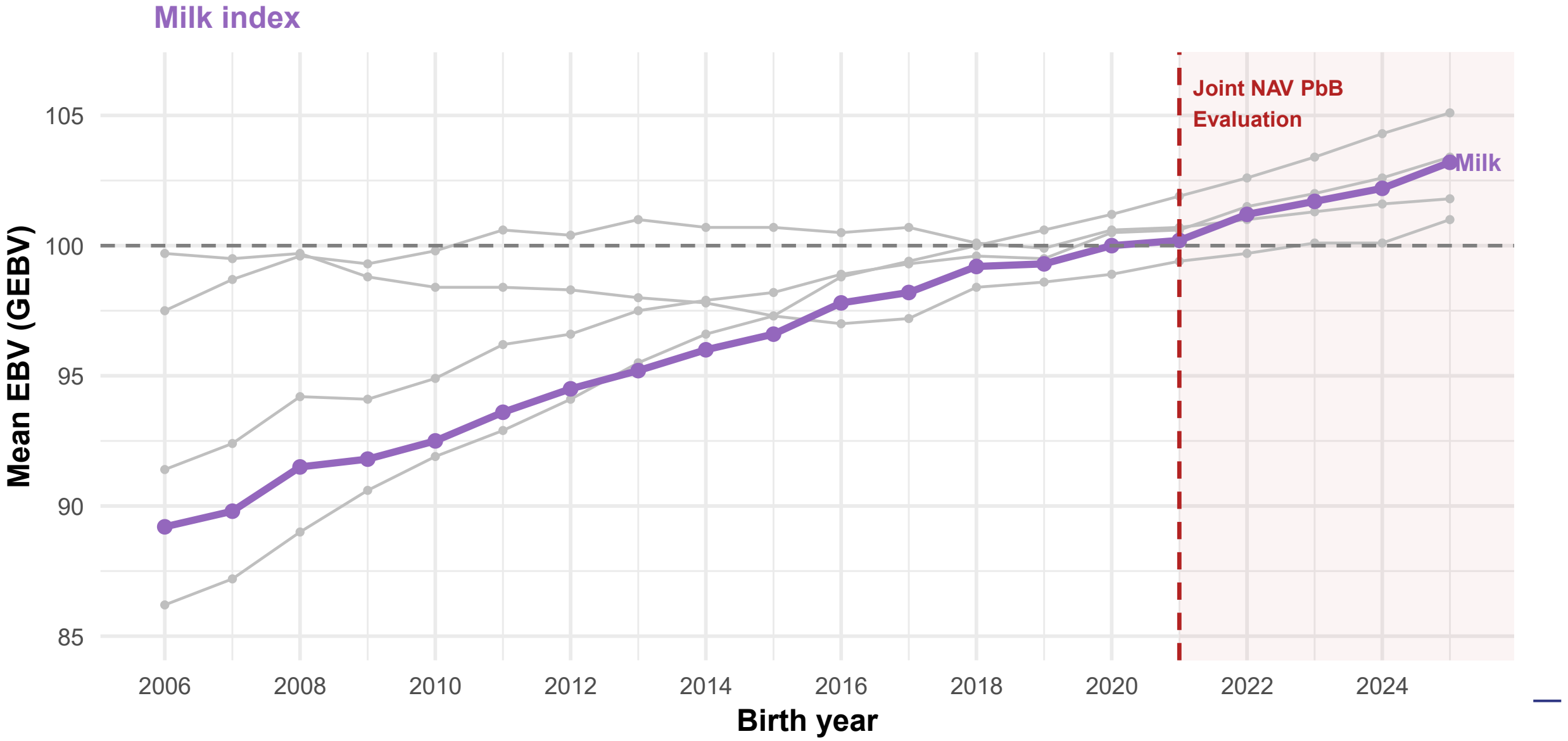
SIM: Genetic trend in mean EBV (GEBV)



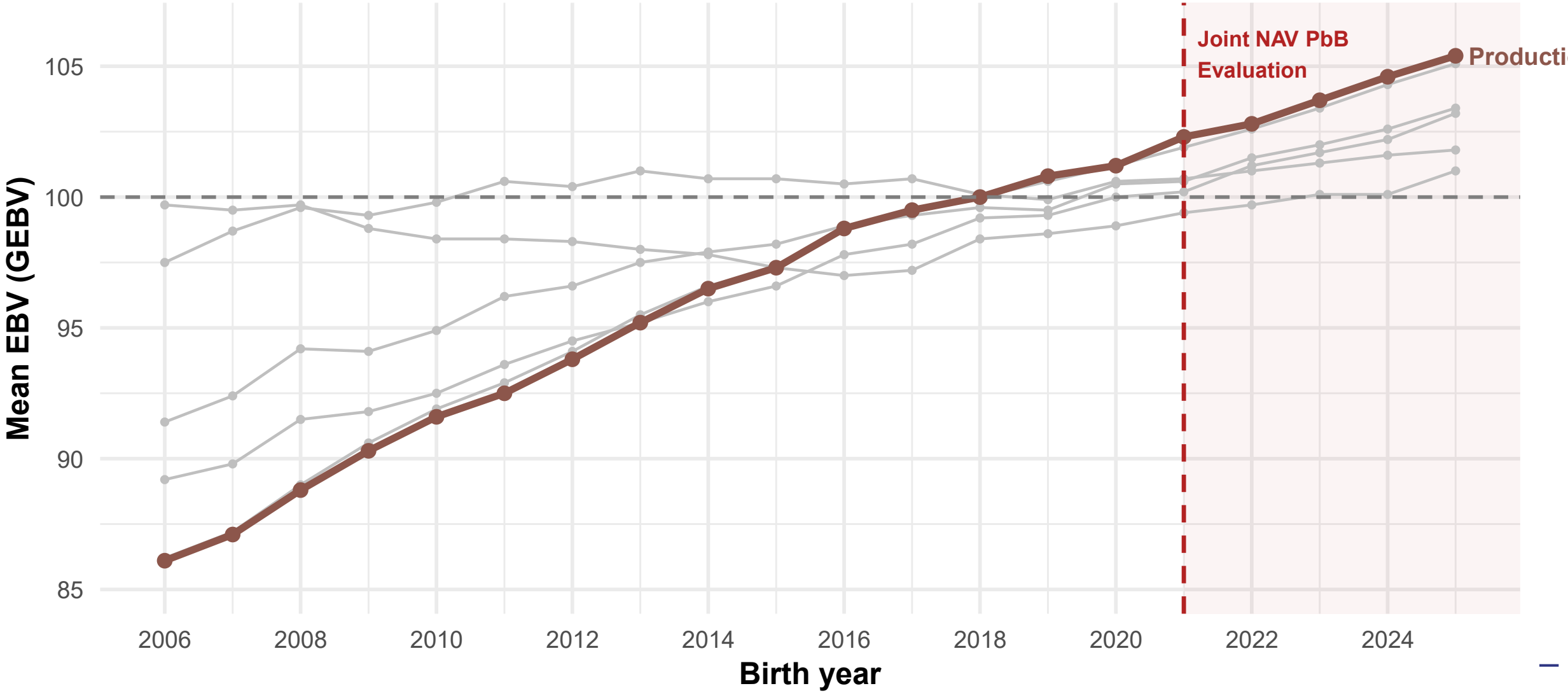
SIM: Genetic trend in mean EBV (GEBV)



SIM: Genetic trend in mean EBV (GEBV)



SIM: Genetic trend in mean EBV (GEBV)



SIM: Genetic trend in mean EBV (GEBV)