How much should we pay to avert bad lives? Valuing reductions of intensive farming

Kevin Kuruc

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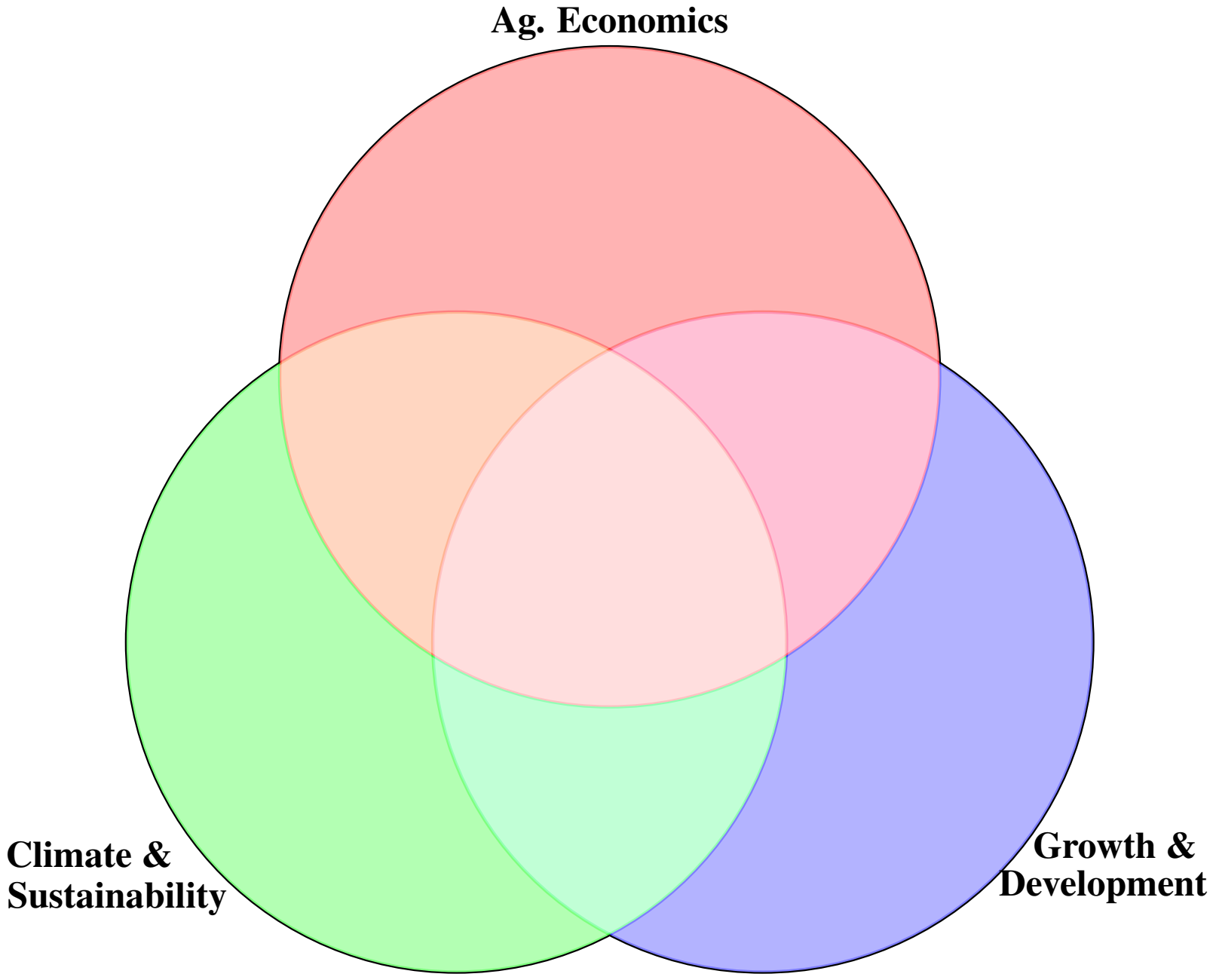
Montana State University
May, 2024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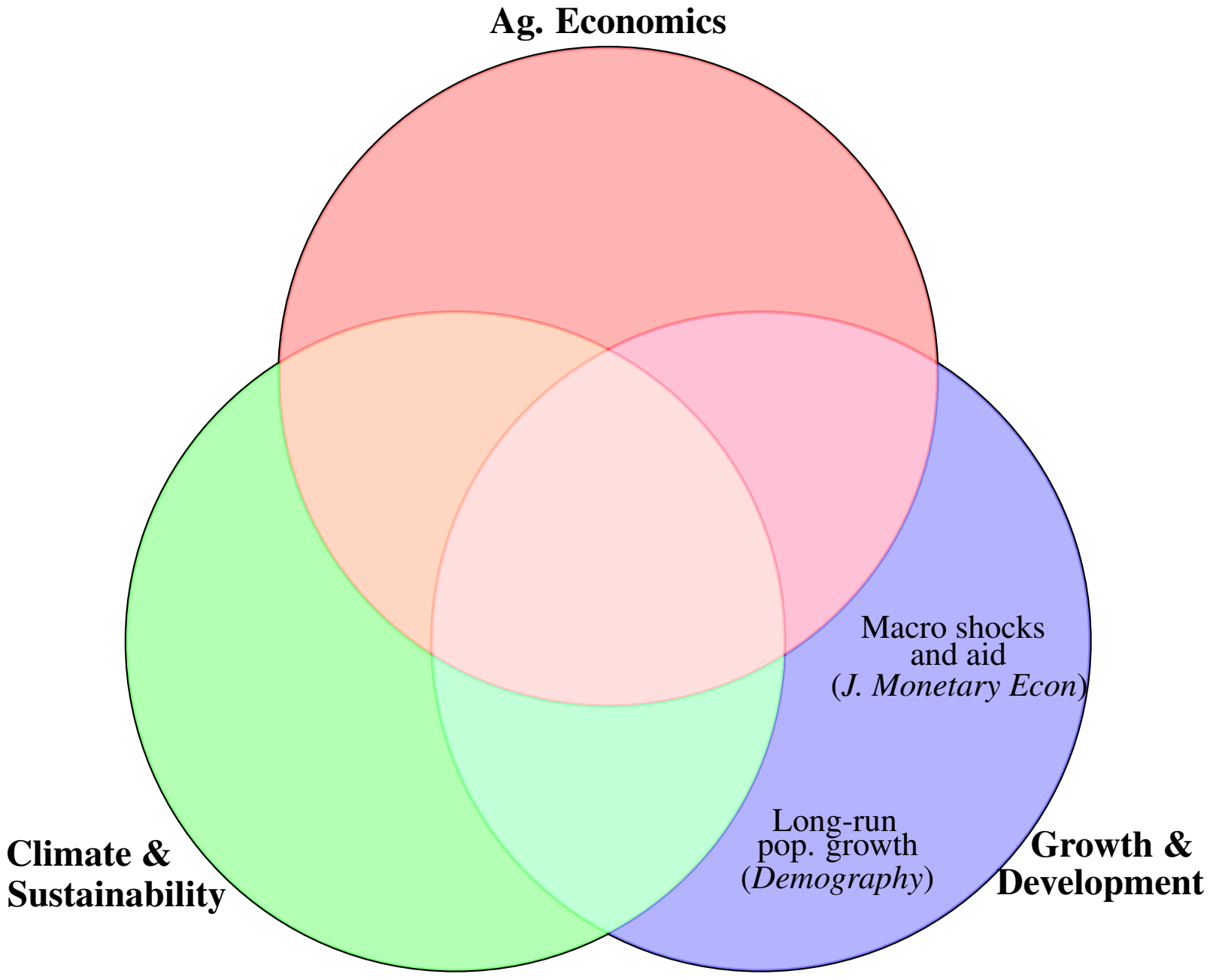
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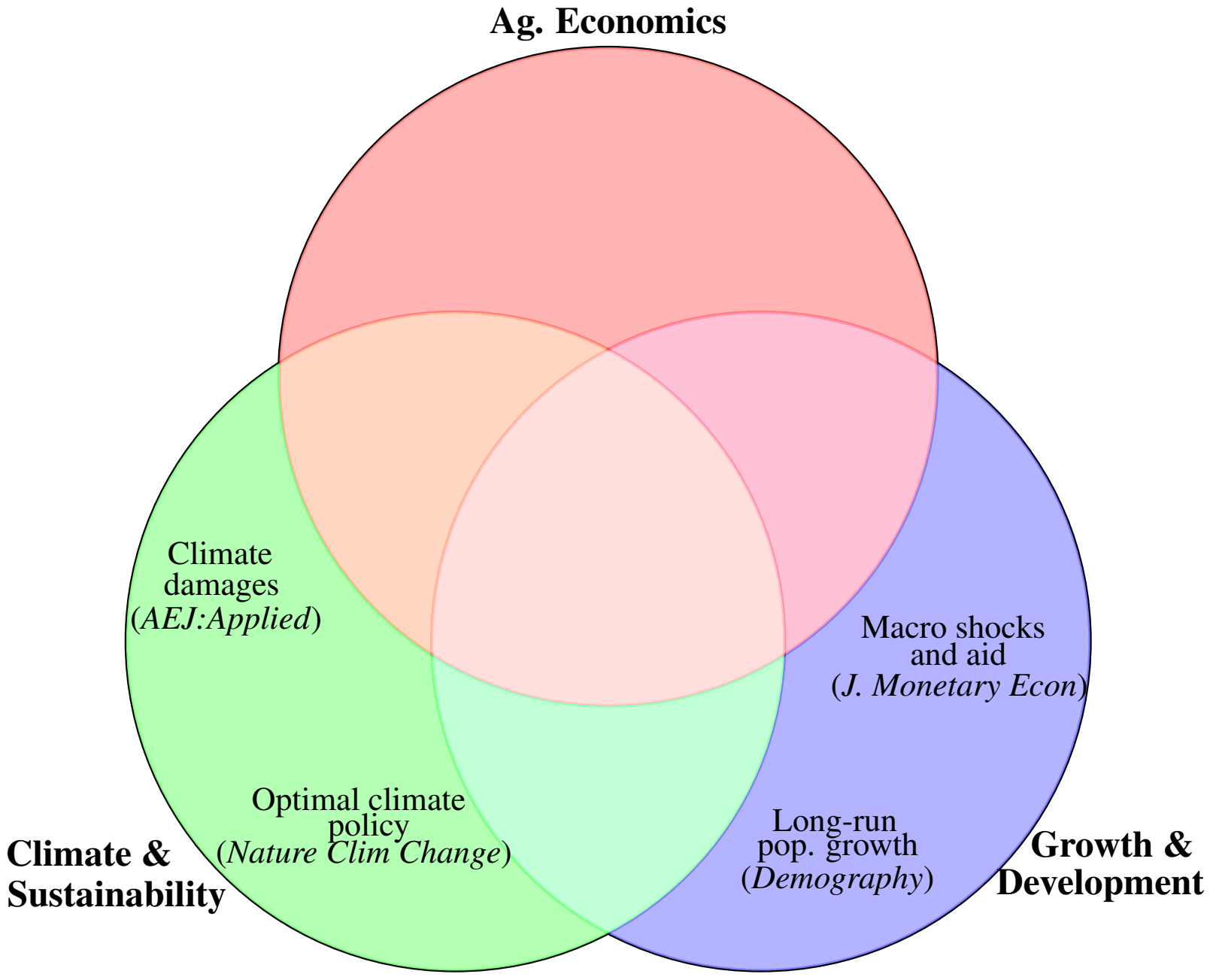
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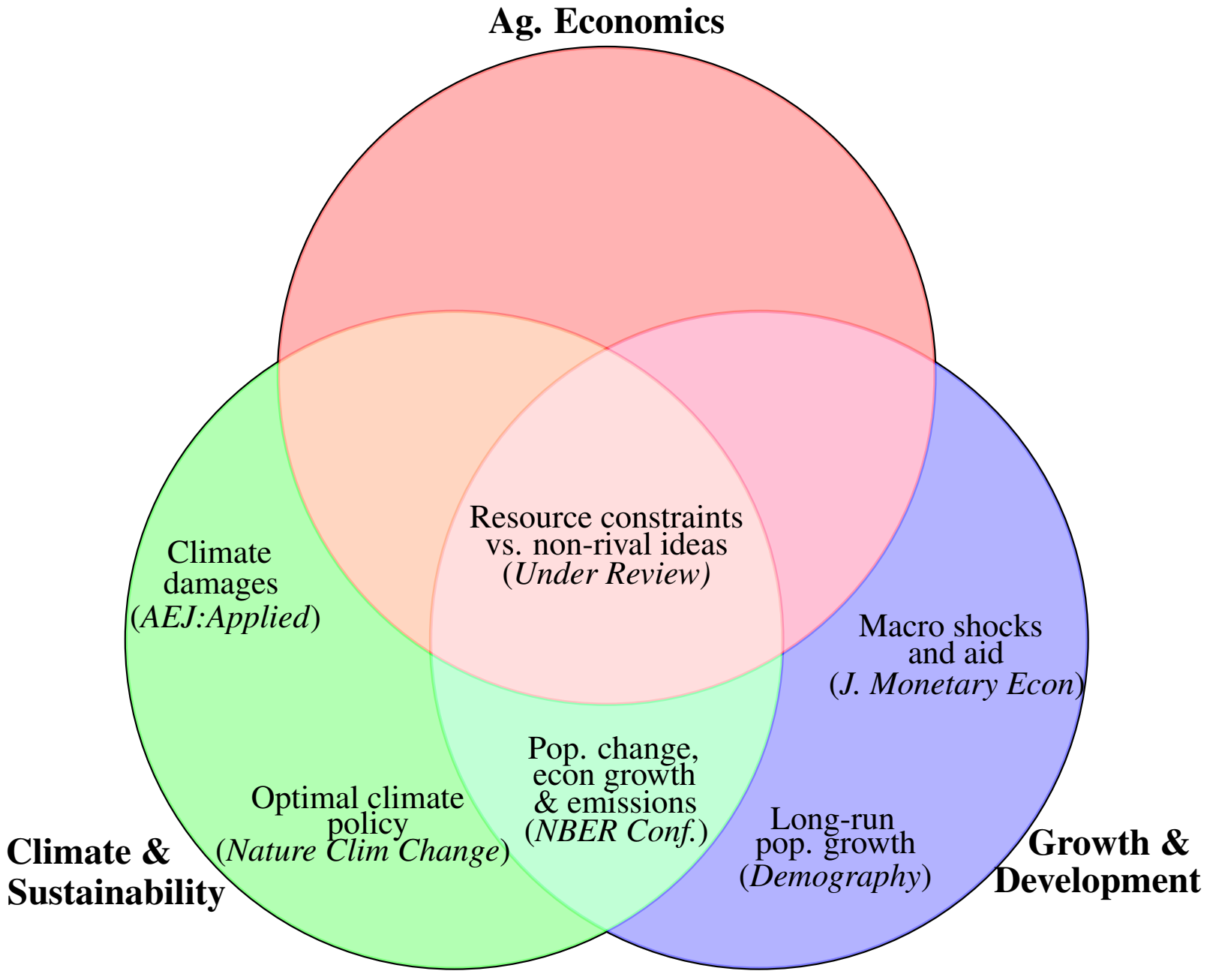
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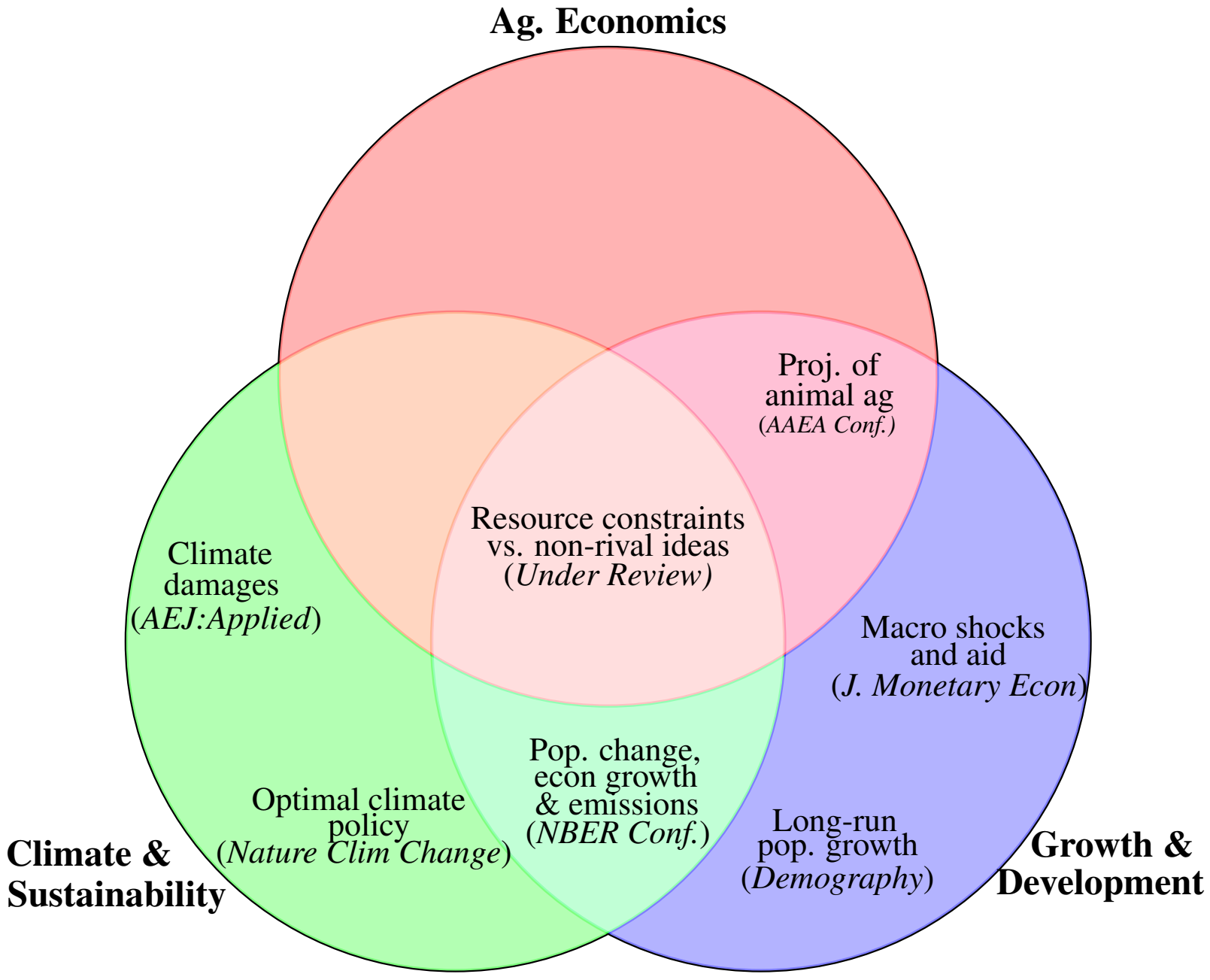
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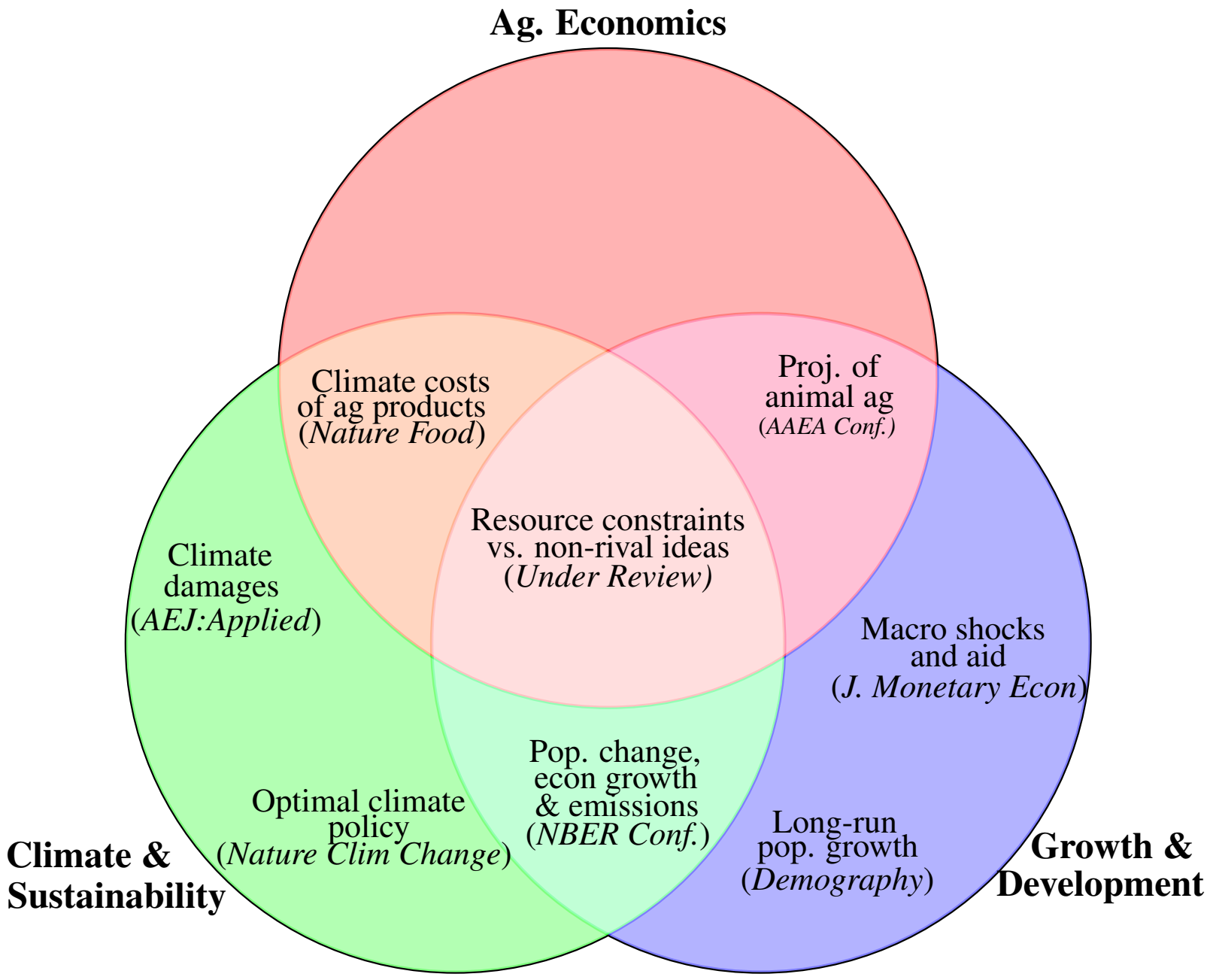
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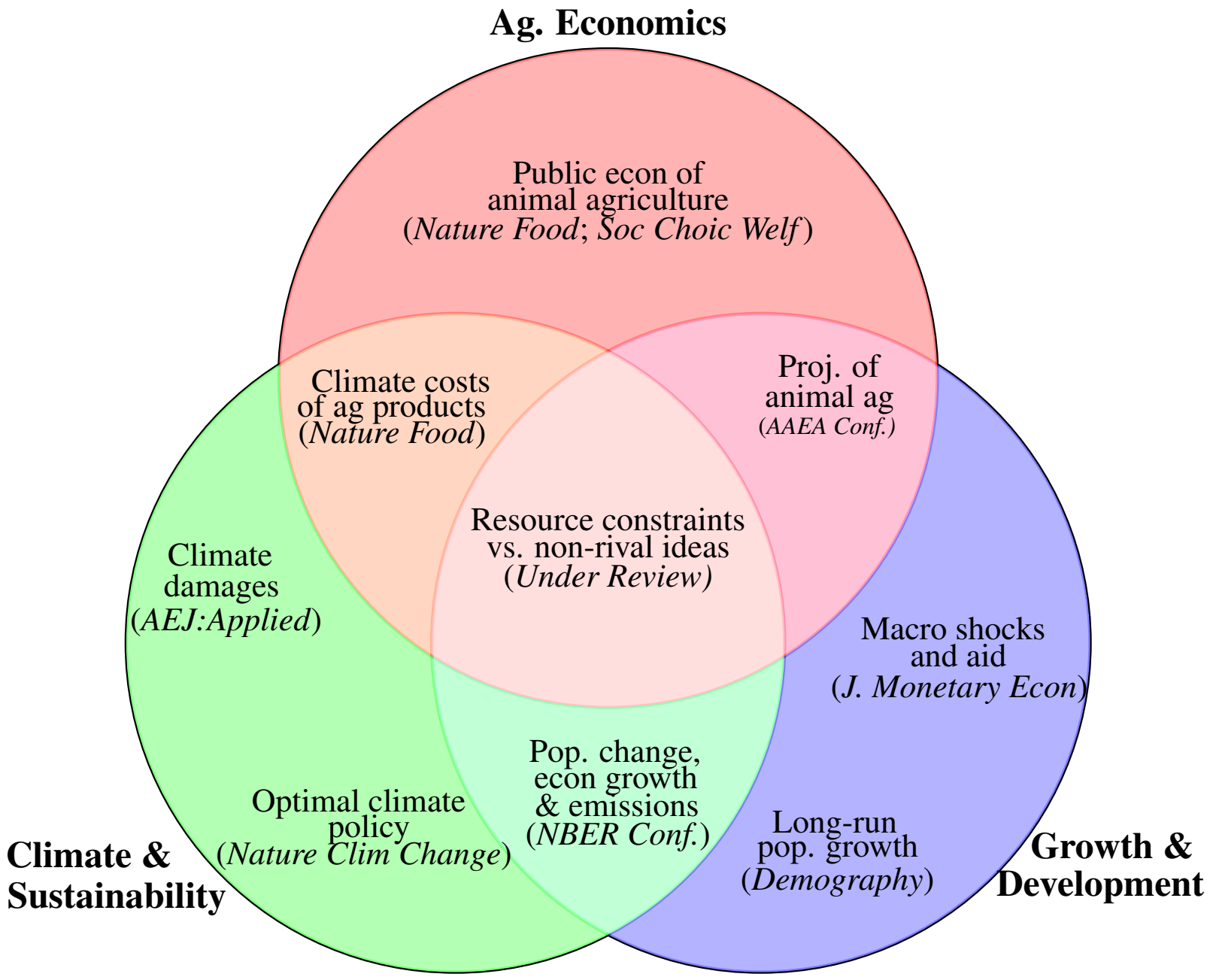
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“Modernized” CBA is likely going to include animal welfare

Biden administration recently issued an update to Circular-A4, which guides regulatory CBA

- Moves away from Kaldor-Hicks and towards a social welfare function approach
  - E.g., away from sum of willingness-to-pay, towards summing utility

Natural next step: inclusion of benefits and costs to animal welfare

Calls for this are already widespread (including USDA?)

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Animal Welfare Valuation Research

Description

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Regulators Should Value Nonhuman Animals

Cass R. Sunstein*

Abstract

Some regulations do not only reduce human deaths, injuries, and illnesses; they also protect nonhuman animals. Regulatory Impact Analyses, required by prevailing executive orders, usually do not disclose or explore benefits or costs with respect to nonhuman animals, even when those benefits or costs are significant. This is an inexcusable gap. If a regulation prevents dogs, horses, or cats from being killed or hurt, the benefits should be specified and quantified. This proposition holds even if those benefits are in some sense incidental to the

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This is not just elites (Johansson-Stenmen, 2018):

Table 1

Response distribution for the following question: *Society can reduce animal as well as human suffering through various, usually costly, measures. To be able to prioritize, we need to know how great a weight society should place on reducing suffering in an animal (such as a cow) compared with reducing an equal amount of suffering in a human. Which of the following statements is most in accordance with your opinion regarding the weight that should be given to animal suffering in public decisions?*

Animal suffering should not count at all in public decisions	0.8%
Animal suffering should not count per se. However, some people suffer when knowing that animals suffer, and this should be taken into account in public decisions	3.2%
Animal suffering should be taken into account to a certain extent in public decisions, even when no human beings suffer when knowing that animals suffer. However, animal suffering should be given much less weight than human suffering	13.2%
Animal suffering should be taken into account to a fairly high degree in public decisions, even when no human beings suffer when knowing that animals suffer. However, animal suffering should be given somewhat less weight than human suffering	30.3%
Animal suffering should be taken into account to a degree equal to human suffering in public decisions, even when no humans suffer when knowing that animals suffer	49.3%
Animal suffering should be taken into account to a very high degree in public decisions, even when no human beings suffer when knowing that animals suffer. Animal suffering should be given more weight than human suffering	3.2%

Note: Number of observations = 1072.

Economists need to be involved in these efforts

We all know about the case of environmental regulation:

- Optimal pollution is not zero
- Optimal pollution is not generated by the free market

Economic analyses allow us to (imperfectly!) trade off costs and benefits in a principled way

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- Optimal pollution is not generated by the free market

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Analogously:

- Optimal treatment of animals does not entail eliminating slaughterhouses
- Nor should we expect it to be generated in a free market

Ranchers should welcome this, and perhaps even actively support it

Despite cows being cuter than chickens, beef has a very low animal-welfare-footprint:

1. Their lives seem reasonably good!
2. They are large: so very few slaughtered per serving

Poultry has outcompeted beef, in large part, because of declines in animal welfare for chickens

- E.g., Poultry is excluded from laws like the Humane Slaughter Act!

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In other words: This would be an awkward presentation to give for a Georgia State extension position, but not for MSU

- I explicitly caution against the anti-beef narrative that has come from the sustainability world Nature Food Commentary

A major CBA difficulty: *existence* is on the line

Two major difficulties for agricultural settings:

1. **Interspecies comparisons**: benefits/costs accrue to non-humans
2. **Valuing (non-)existence**: if fewer animals are raised for food, fewer animals exist
   - E.g., if broad calls or regulations to reduce animal product consumption are successful

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Relevant question:

How (dis-)valuable is a broiler's existence, relative to raising the income of an average American?

We cannot rely on willingness-to-pay

Valuation exercises usually rely on willingness to pay, but...

1. Animals don't have money, or participate in markets
2. No one pays to come into existence (human or animal)

This does not preclude these things from being valuable

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We will need to rely on external judgements about the (cardinal) utility of these various options for animals

- I am certain we will not come to a consensus over the quantitative values

I hope to convince you that I've got a reasonable *framework*

The plan: Illustrate how this might be done for broilers

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4. Contextualize the size of plausible estimates by comparing them to climate externalities

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3. How does reported (human) **happiness increase with income**, on a 0-100 scale?
   - Rely on experience sampling (Killingsworth, 2021)

This delivers very large valuations

1. Adopt the widely held view that a **broiler has an experience below neutral**, say 10-30 utils below neutral (on 0-100 scale)
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Even $300 would imply the animal welfare externality of poultry (per serving) would be 10x larger than the climate-externality of beef

Conceptual Framework

Existence Value & Population Ethics

Variable population social welfare asks: how do we compare outcomes with different numbers of utility functions?

- Should a social planner prefer a world of 10B people with utility X, or 1B with utility $X + \varepsilon$?
  - Can the quantity of lives trade-off against quality of lives?

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Uncontroversial existence claim: If an individual would have a life worse than never having been born, it would improve social welfare to prevent that life

- Imagine a puppy bred only to be a 'bait dog'—it would be good to prevent that existence!

Monetizing this *extensive* margin of utility

Let social welfare be defined as the sum of utilities, where non-existence is normalized to $u_i = 0$

$$W(\{u_i\}) = \sum_{i=1}^{N} u_i$$

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To monetize, we want to solve for Δy_j, such that:

$$\Delta W = \frac{\partial W}{\partial y_j}\Delta y_j + \frac{\partial W}{\partial N}\Delta N = 0$$

where y_j is person j's income. Rewrite as:

$$\Delta W = \underbrace{\frac{\partial u_j}{\partial y_j}\Delta y_j}_{\text{make } j\text{'s existence better}} + \underbrace{u_N}_{\text{make } N \text{ exist}} = 0$$

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If $u_N < 0$, society should be willing to pay Δy_j to prevent u_N

Broiler lives will plausibly be judged as worse than neutral

Survey evidence suggests this is the majority opinion

Espinosa and Treich (2021) ask whether various broiler-rearing conditions would constitute 'lives worth living'

Table A1: Living conditions in each scenario – Please fill in the last line of the table

	Scenarios						
	Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario 6**	**Scenario 7**
Indoor rearing	20 chickens/ m²	14 chickens/ m²	14 chickens / m²	8 chickens / m²			
Natural light	No	Yes	Yes	Yes			
Perches	No	Yes	Yes	Yes			
Pecking objects	No	Yes	Yes	Yes			
Outdoor access	No	No	No	Yes			
Free-range rearing					Yes	Yes	Yes
Number of chickens inside the farm	> 1000	> 1000	> 1000	> 1000	> 1000	Around 10	Around 10
Stunning before slaughter	No	Yes	Yes	Yes	Yes	Yes	
Age at slaughter	40 days	40 days	60 days	80 days	80 days	200 days	6 years (natural death)
Transport time to slaughterhouse	8h	6h	3h	3h	3h	On the farm	On the farm
"The life of a chicken reared in those conditions is worth living". *1 Strongly disagree ; 2 Tend to disagree ; 3 Neither agree nor disagree ; 4 Tend to agree ; 5 Strongly agree*							
Your opinion on a scale from 1 to 5							

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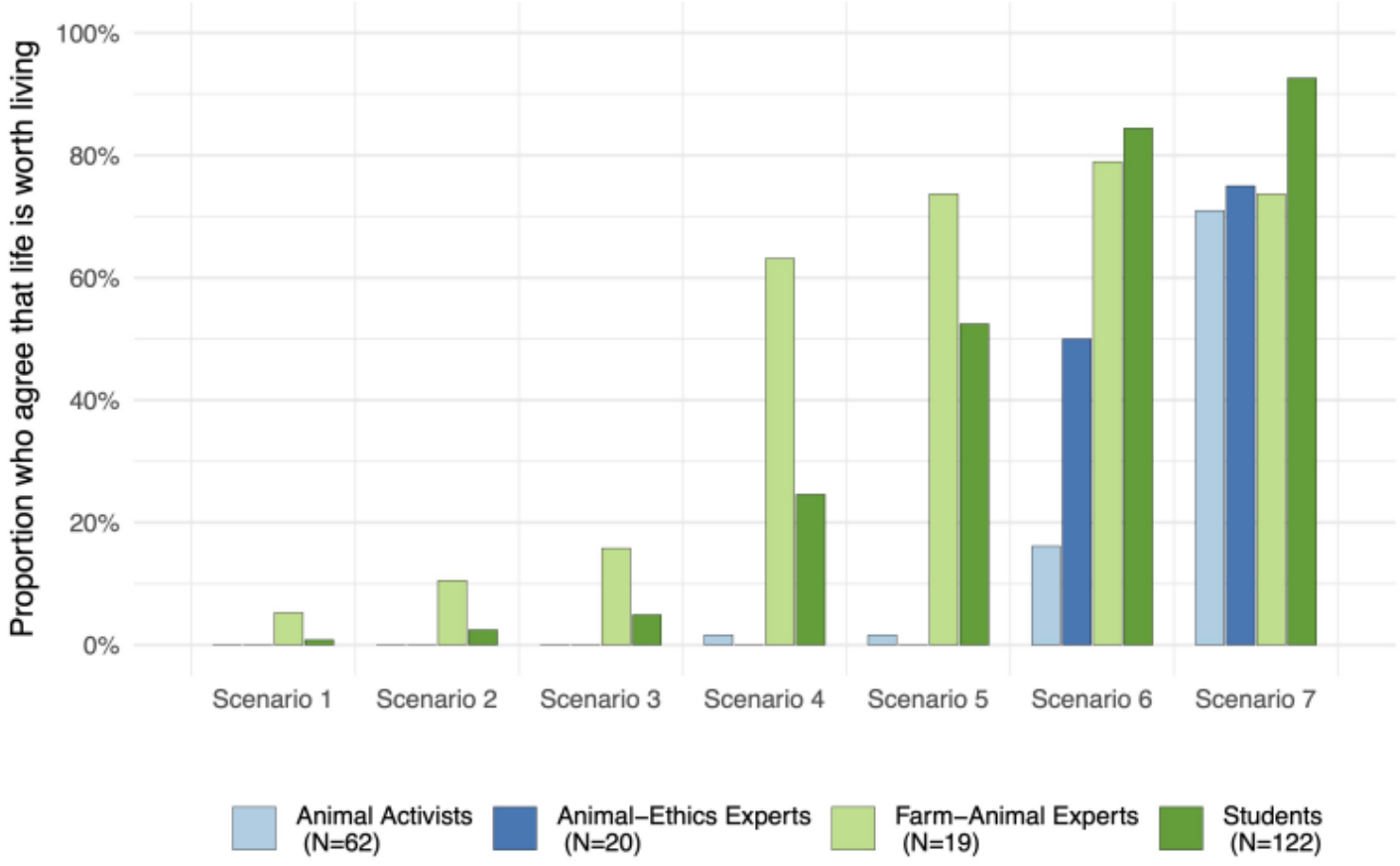
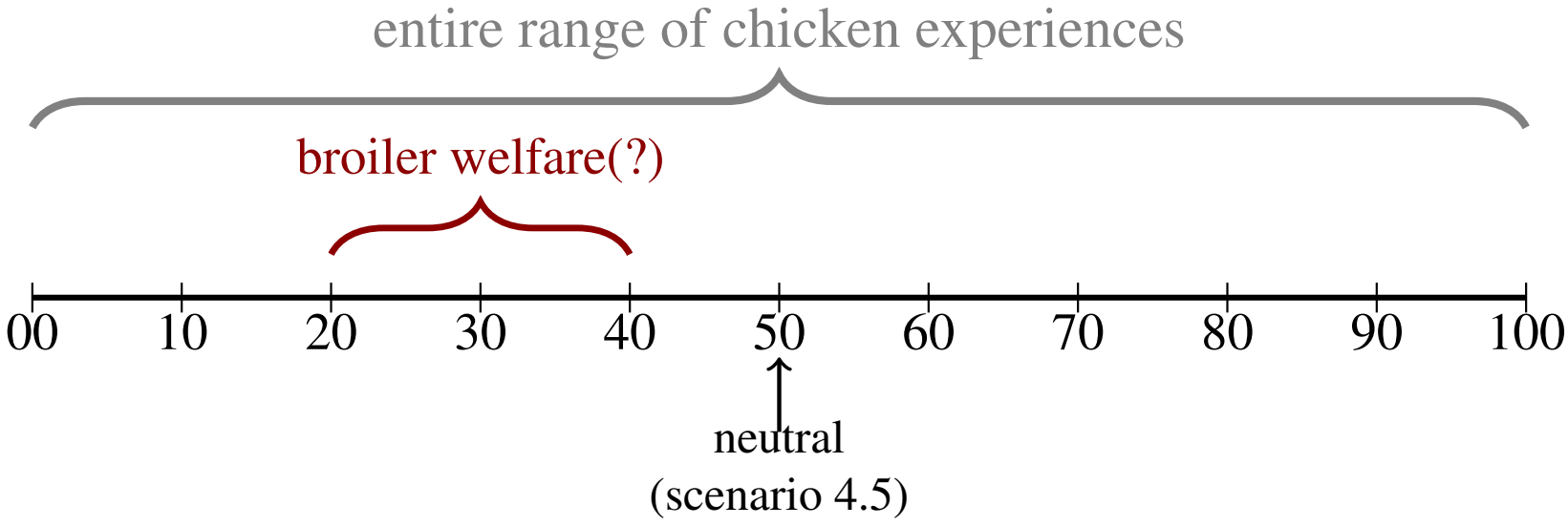


Baseline assumption: Broiler lives are 20% as bad as they could be



Let's say a broiler existence is 10 utils below neutral

- Does not leave a lot of space between neutral and scenarios 2-4

One fewer broiler-year (i.e, 8.5 life-cycles) contributes 10 chicken-utils to social welfare

How many human utils is 10 chicken utils?

Relative welfare ranges should be based on animal sciences

Suppose chicken brains are such that they can only have .000001 the range of experiences humans have

- E.g., the worst chicken-pain might produce the same intensity of suffering as you gently stubbing your toe
- Or, maybe they just have no idea what is going on, and no preference for it to be any different

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Relative intensity of experiences is something **animal sciences** can guide us on

Somewhere between 0.3% and 30% seems reasonable

Two candidates:

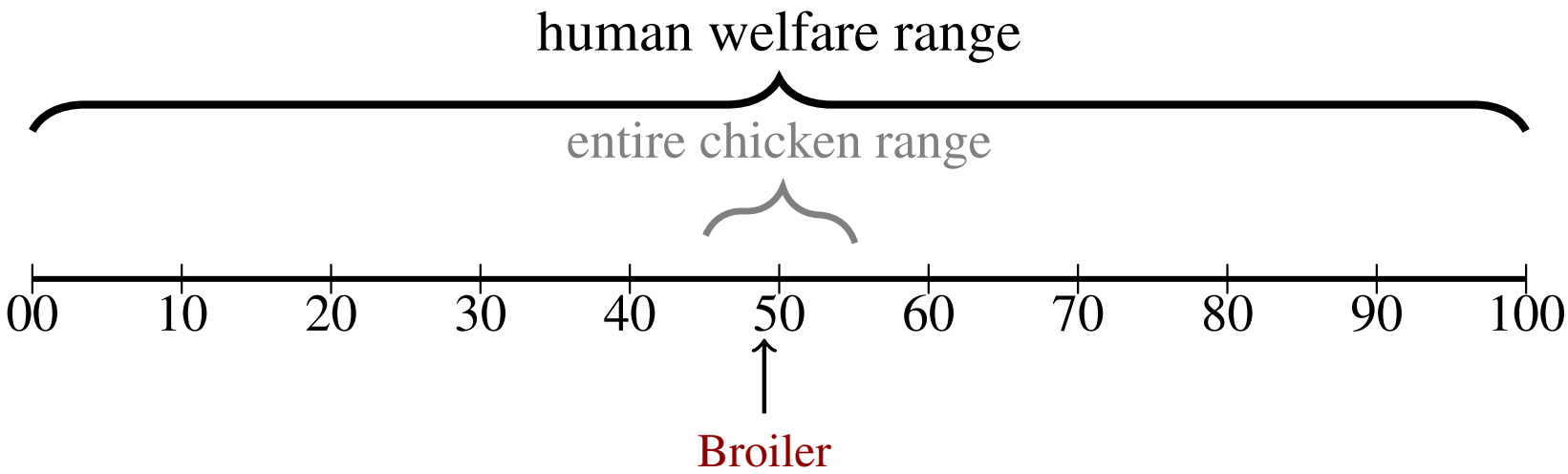
1. Chickens have 0.3% the **cortical neurons** of humans
   - Cortical neurons govern emotion valence, sensory perception, etc.
2. Survey a broad range of indicators of **emotional and intelligence capabilities** across species
   - Fischer (2023) and estimates chickens have a welfare range 30% as large as humans

A discount between 0.3% and 30% seems defensible based on existing literature

Illustration of cross-species discounting

Humans and chickens are each on **their own** 0-100 normalized scale

Example: if we use a discount rate of 10%, then each human util is worth 10 chicken utils



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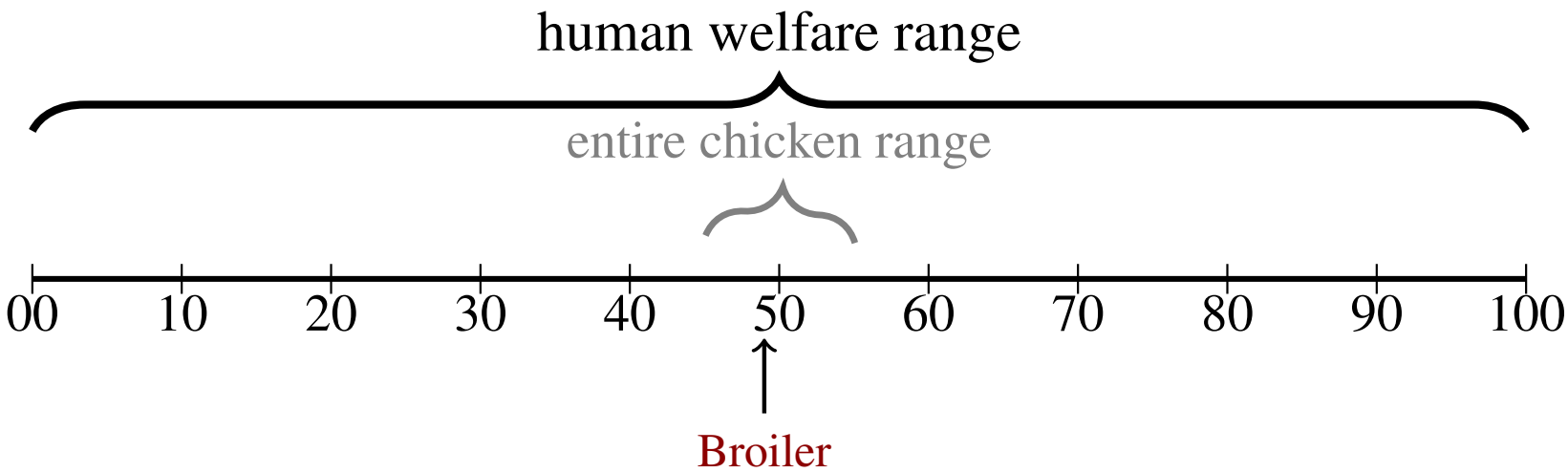

Being 10 below-neutral for a chicken is equivalent to being 1 below neutral for a human (each for one year)

What is the value of a human util, in dollars?

Experience Sampling

Killingsworth (2021) estimates the relationship between happiness and income using data from 1 million **experience samples** (33,000 individuals)

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- Gold Standard: **pings your phone** and asks you how you're feeling in that moment
  - Sliding scale from "Not at all good" to "Very good"
- Pairs this with data on **household income** that was collected at survey start

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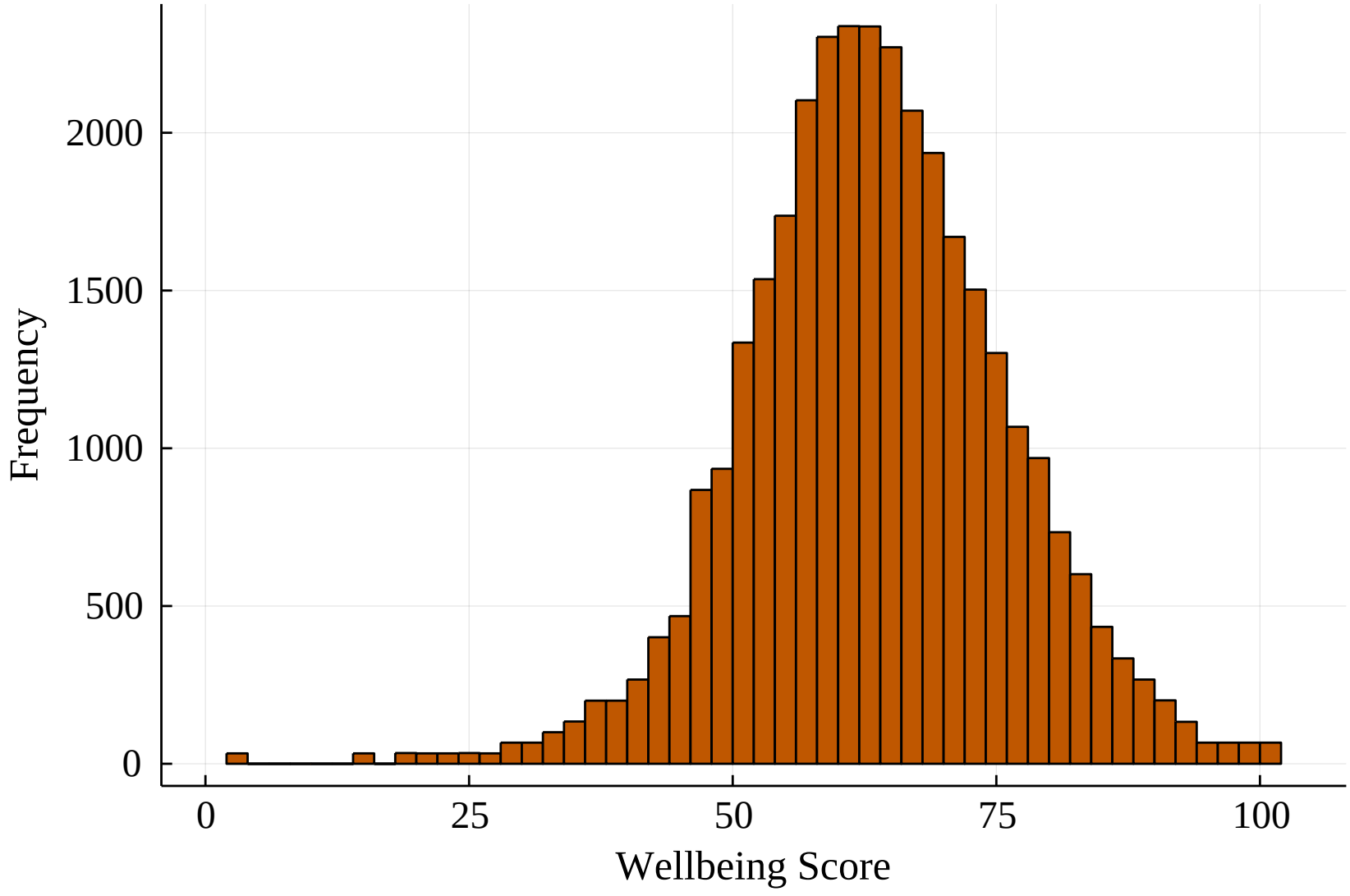
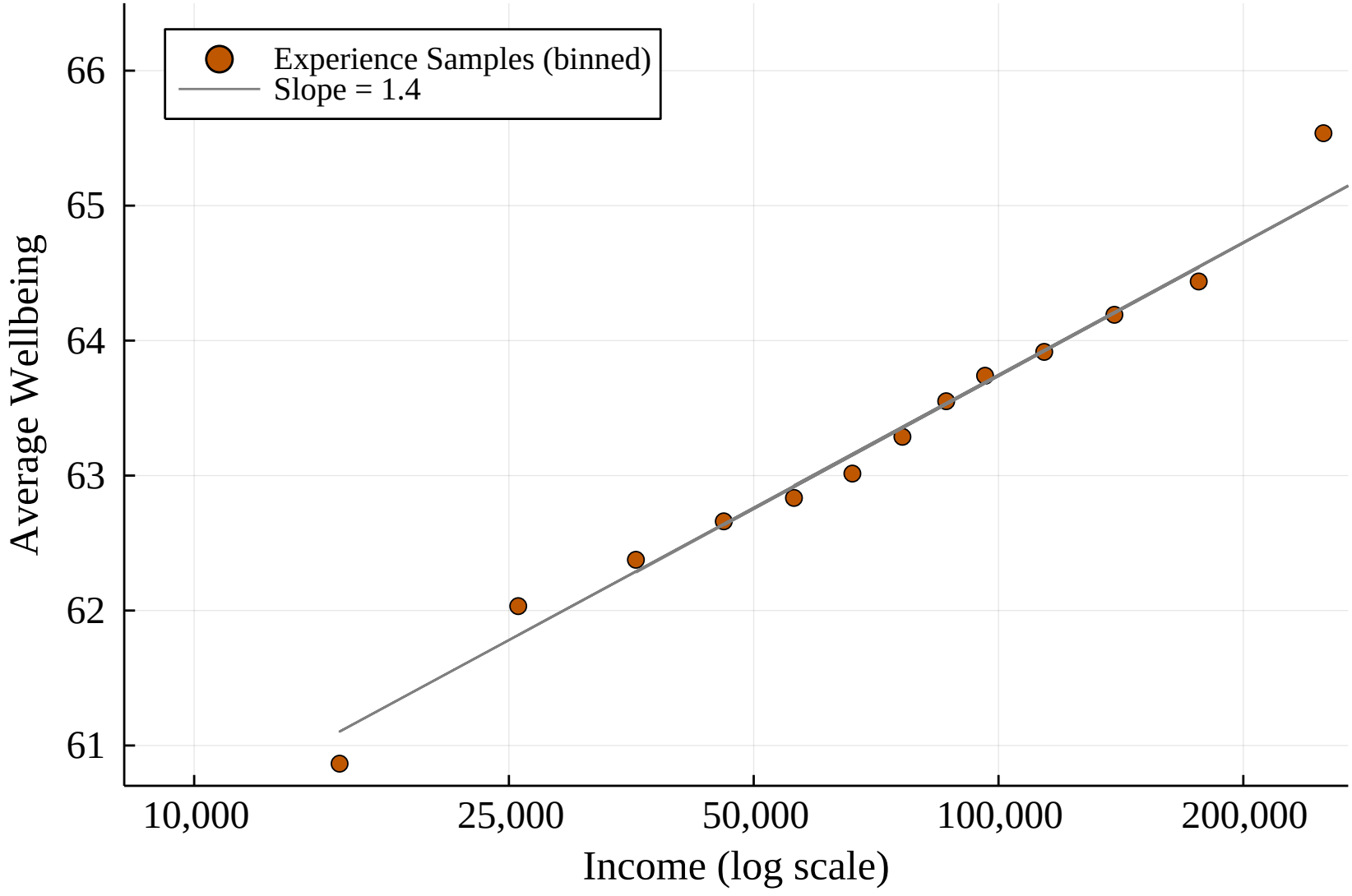
(Note: Cross-country data generates similar results)

Distribution of Wellbeing is (Surprisingly) Reasonable



Happiness is linear in log-income



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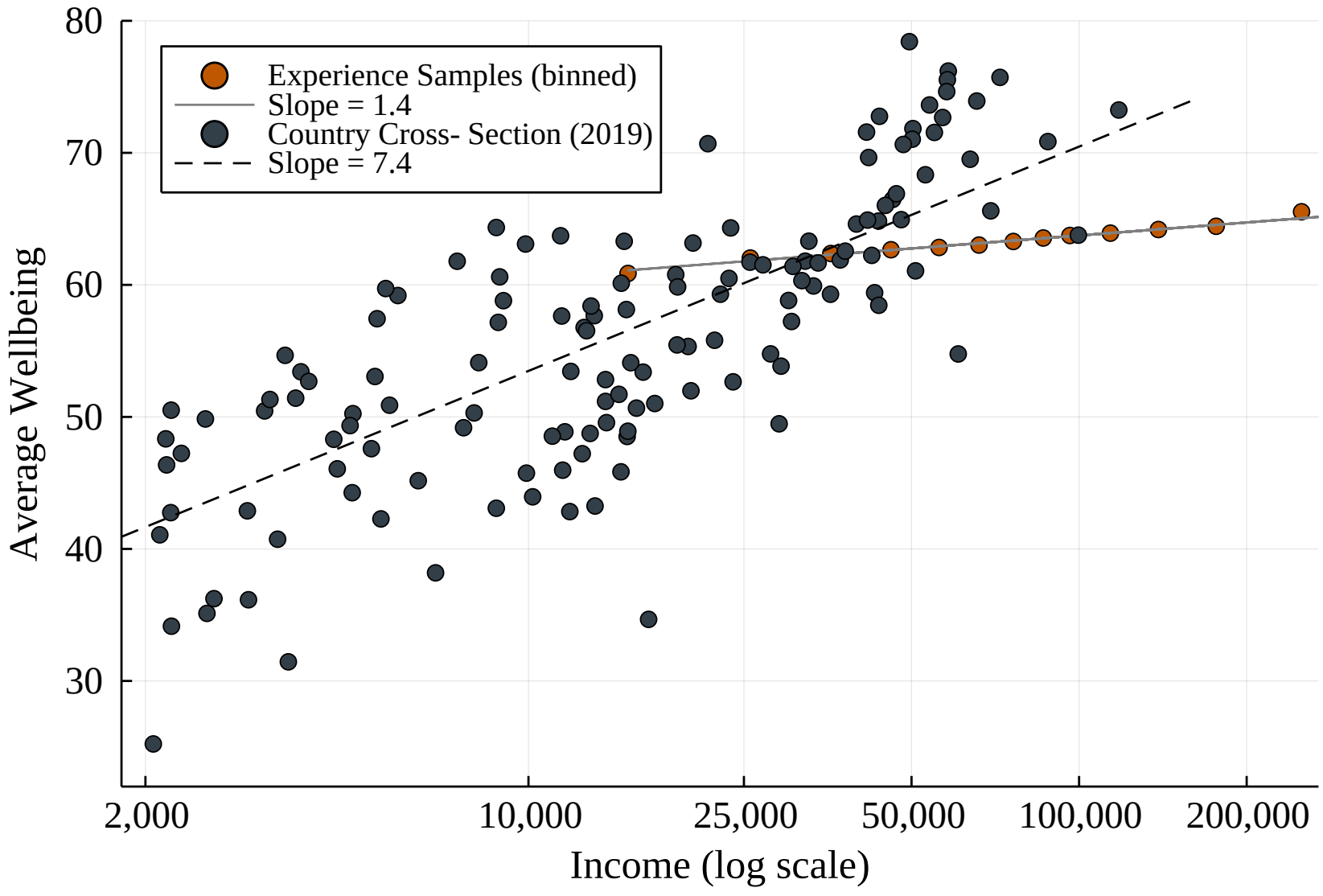

Killingsworth data implies that one util is worth $15000

A 1% increase in HH income $\Rightarrow$ 0.014 util increase on a 0-100 scale

- Assume all 2.5 members experience this increase (so .035 utils total)
- Mean HH income is $70K
- So, $700 generates .035 utils

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Or, $15000 generates 1 util

- Cross-country evidence implies about half this value

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- Assume all 2.5 members experience this increase (so .035 utils total)
- Mean HH income is $70K
- So, $700 generates .035 utils

Or, $15000 generates 1 util

- Cross-country evidence implies about half this value

Let's call it $10K per util, for the average American

Tying it all together: Preventing one broiler life-year would be worth between $300-$30,000

Recall, we're looking for Δy_j, such that:

$$\Delta W = \frac{\partial u_j}{\partial y_j} \Delta y_j + u_N = 0$$

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So, averting a broiler-year is "worth" $300 ($30,000), since it is equivalent to generating 0.03 (3) human utils

(1 year=8.5 broiler-life-cycles; $300 $\Rightarrow$ $35 for a 6-week broiler-life)

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Common claim: “Society should reduce beef production, because cattle emit GHGs”

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- Each 20g serving of protein has about $0.20 of climate externalities (Errickson, Kuruc & McFadden, 2020)
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A climate tax on beef may well reduce overall welfare

- We're in a second-best world, we should proceed thoughtfully

General methodological takeaway

This **does not** need to be limited to (non-)existence

$$M = \underbrace{\eta}_{\text{Cost per util}} \times \underbrace{\Delta u}_{\text{Improvement}}$$

Here I've assumed the improvement is non-existence

- Other plausible regulatory analyses might be to bring broilers from below-neutral to neutral
  - On this framing, this would be equivalent

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The key ingredients were merely:

i. **Dollar per experienced util**, coming from human wellbeing surveys

ii. **Range of plausible improvements** for other animals on a human-util scale, coming from animal sciences

Conclusion

Cost-benefit analysis is likely to include animal welfare in the not-distant future

There is substantial unmet demand for formal economic analysis on this subject

This framework delivers a starting point—and suggests this may be a dominant consideration in food policy if included

Executive Order 13563

> *Executive Order 13563 states, "each agency is directed to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. Where appropriate and permitted by law, each agency may consider (and discuss qualitatively) values that are difficult or impossible to quantify."*
>
> *–Sunstein (2024) p. 6*

Can animals be implicitly taken as excluded? Sunstein says that would be inconsistent with the fact that some regulations are specifically designed to protect the lives of animals

- e.g., Animal Welfare Act; Marine Mammal Protection Act

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Commentary in Nature Food (Kuruc and McFadden)

Well-intentioned governments and individuals who act on this lesson may cause more harm than good if dietary substitutions result in increased production of poultry, pork, seafood and eggs. This is for reasons of both quantity and quality: (1) the animals bred to produce these foods are smaller, meaning that more of them need to be slaughtered per serving; and (2) the intensive conditions in which they are raised lead industry participants to believe they have lives more unpleasant than those of cows. In other words, more animals — and animals with worse lives. It is difficult to confidently state which products cause the most overall harm in light of the environment–animal welfare trade-off, but we would not be surprised if, as research advances, the scientific community comes to regret the message that red meat is disproportionately harmful.

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