Diversion Research

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Introduction

Brown & Williamson, 1969 memo

Doubt is our product since it is the best means of competing with the "body of fact" that exists in the mind of the general public. It is also the means of establishing a controversy. Within the business we recognize that a controversy exists. However, with the general public the consensus is that cigarettes are in some way harmful to the health. If we are successful in establishing a controversy at the public level, then there is an opportunity to put across the real facts about smoking and health. Doubt is also the limit of our "product". Unfortunately,

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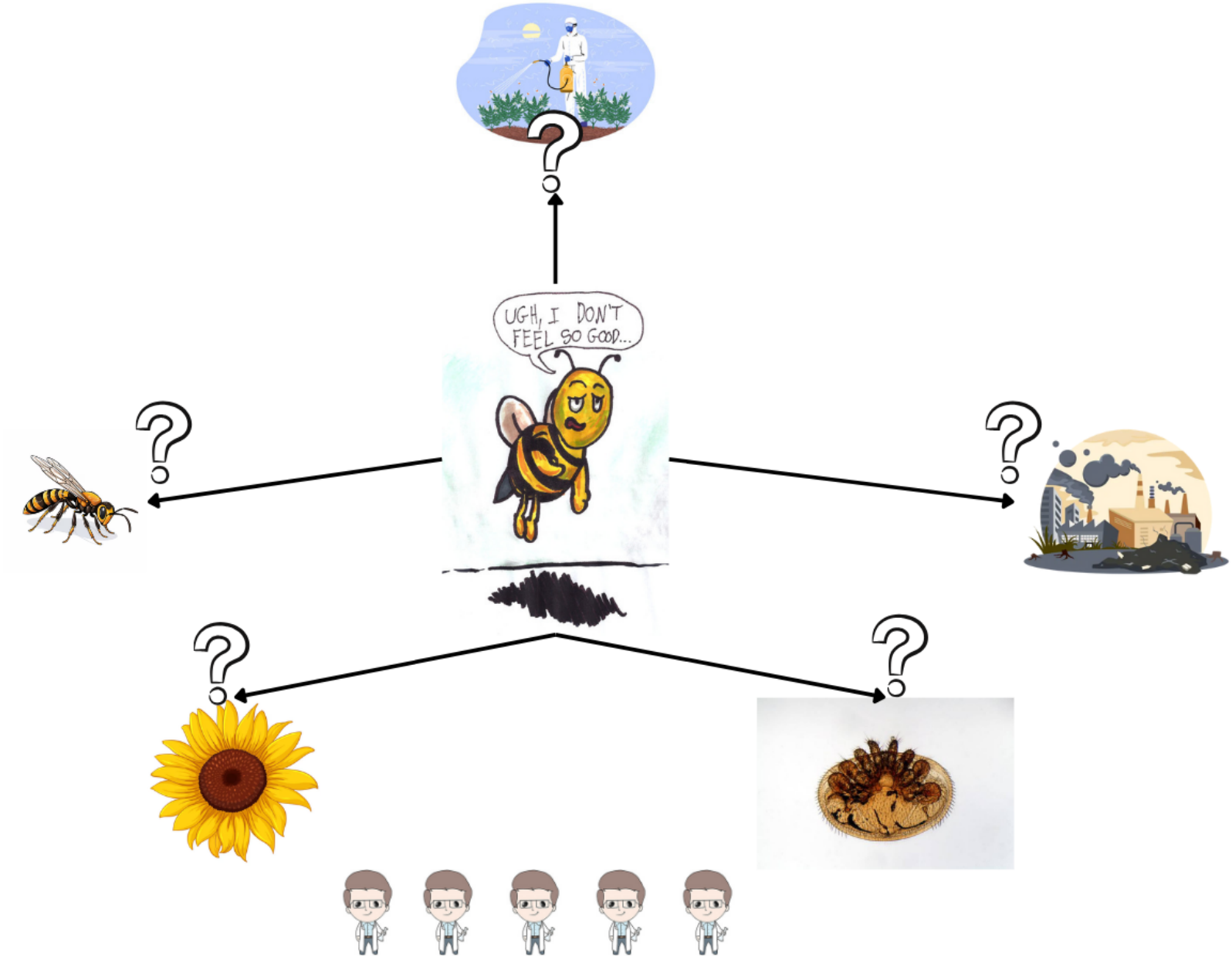
Diverting to Perpetuating Doubt

Diversion research: legitimate scientific research that diverts public attention from the implications of industrial activity for a public health or environmental issue.

$\rightarrow$ Research on alternative causes

$\rightarrow$ Research on alternative solutions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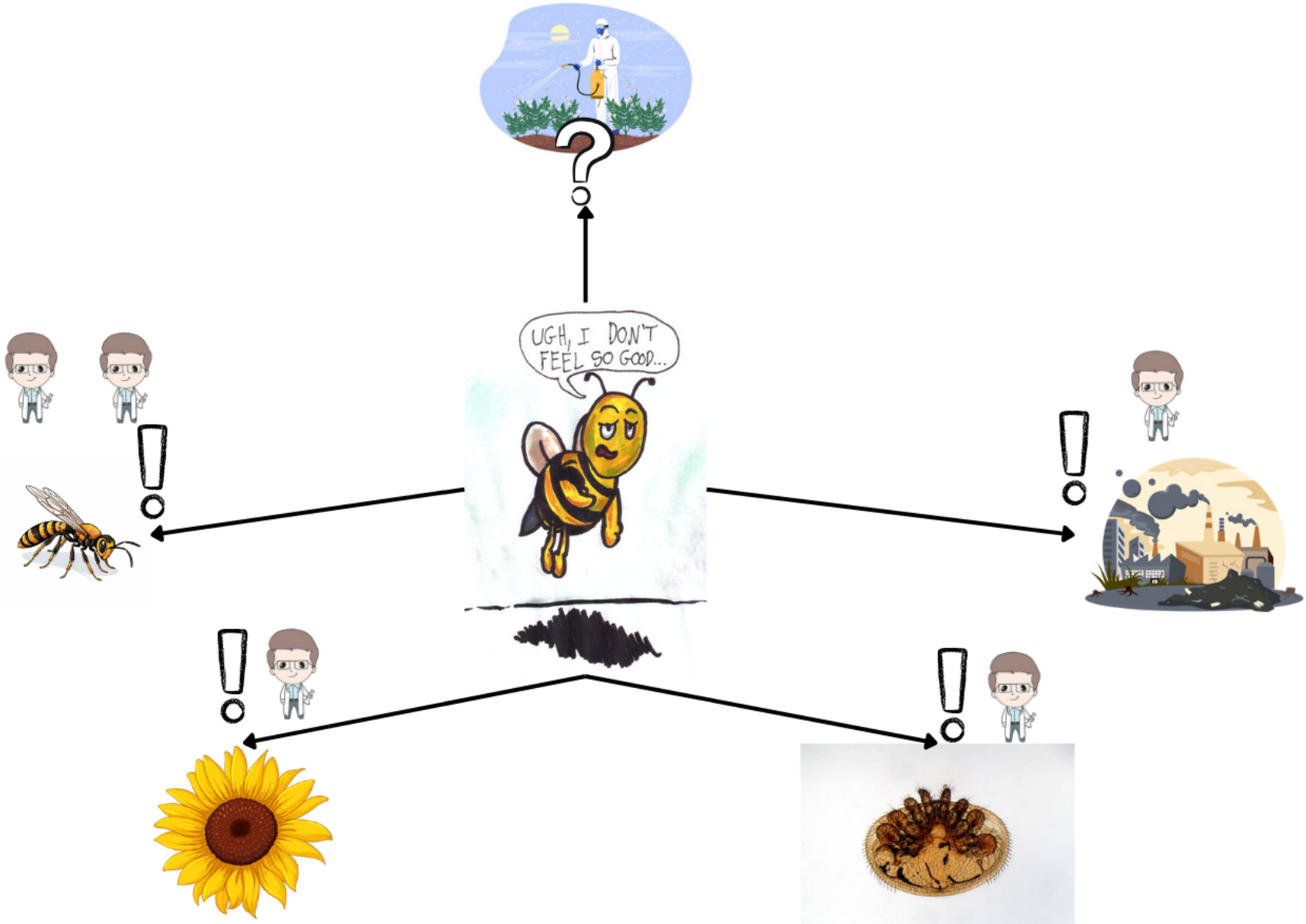
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Examples of Diversion Research

- 1955-1995: The Council for Tobacco Research spent $300 million on studying many causes of lung cancer, without considering cigarettes or tobacco.

  (Proctor 2011, The Golden Holocaust)

- 2009: Warwick University received £1 million co-funding from Syngenta to study bee declines caused by various factors, without considering pesticides.

  (Foucart 2019, Et le monde devint silencieux)

Research Question

What are the determinants and implications of diversion research?

Main result

Industrial lobbies have an interest in funding diversion research if:

- Re-allocating every scientists is possible and no regulation is initially required
- Some scientists are engaged to research the industry's harmfulness and the regulation is relatively costly

Main result

Industrial lobbies have an interest in funding diversion research if:

- ◇ Re-allocating every scientists is possible and no regulation is initially required
- ◇ Some scientists are engaged to research the industry's harmfulness and the regulation is relatively costly

Industrial lobbies have an interest in funding research on their own harmfulness if:

- ◇ Re-allocating every scientists is possible and a regulation is initially required
- ◇ Some scientists are engaged to research the industry's harmfulness and the regulation is relatively inexpensive

Literature

Literature and Contribution

- **Doubt manufacturing strategies**

  Bramoullé and Orset (2018, JEEM), Chiroleu-Assouline and Lyon (2020, JEMS)

  → First model of analysis of diversion research

- **Indirect Lobbying and public persuasion**

  see e.g. Yu (2005, RES), Baron (2005, JEMS), Shapiro (2016, JPE)

  Strategic information provision

  see e.g. Persson (2018, BPP), Lipnowski et al. (2020, AER), and Kirneva (2023)

  → Manipulation of beliefs through the scientific process

The Model

Setup

4 groups of agents:

- Strategic agents: The government and firms (act as a lobby)
- Passive agents: Scientists and citizens

Firms: Produce $x \in [0, x_0]$ goods, $x_0 =$ *"Business as usual"*

Government: Determine a maximum x allowed

The environment / public health

- The initial state y_0 (e.g. amount of bee colonies)
- Production harmful $\alpha_1 = 1$ or not $\alpha_1 = 0$ (e.g. pesticides)
- Alternative factor harmful $\alpha_2 = 1$ or not $\alpha_2 = 0$ (e.g. Asian hornet)
- Unknown state of the world $\rightarrow \tilde{\alpha}_1, \tilde{\alpha}_2$
- Prior belief: $P(\tilde{\alpha}_j = 1) = p_{0j}$
- If $\tilde{\alpha}_1 = 1$, the fraction of y_0 that is lost is $h(x) = h \cdot x$
- If $\tilde{\alpha}_2 = 1$, the fraction of y_0 that is lost is a

$$\tilde{y} = y_0(1 - \tilde{\alpha}_1 h x - \tilde{\alpha}_2 a),$$
$$\text{s.t.} \quad h x_0 + a \leq 1.$$

The Scientific Process

- N scientists
- Each can run one experiment on $\tilde{\alpha}_1$ or $\tilde{\alpha}_2$
- n_1 the number of experiment on $\tilde{\alpha}_1$, and n_2 on $\tilde{\alpha}_2$

$$\rightarrow n_1 + n_2 = N$$

Scientific progress

$$\underset{\text{Prior}}{p_{0j}} \Rightarrow \underbrace{n_j \text{ signals of } \tilde{\alpha}_j} \Rightarrow \underset{\text{Posterior (log-odd)}}{\ln\left(\frac{p_j}{1-p_j}\right) = \ln\left(\frac{p_{0j}}{1-p_{0j}}\right) + \frac{n_j}{\sigma^2}\left(\mu - \frac{1}{2}\right)}$$

$$\Downarrow$$

$$s_{ij} \sim \mathcal{N}(\tilde{\alpha}_j, \sigma^2) \Rightarrow \mu_j = \frac{1}{n_j}\sum_{i=1}^{n_j} s_{ij} \sim \mathcal{N}\left(\tilde{\alpha}_j, \frac{\sigma^2}{n_j}\right)$$

Details

Timing of the game

1. The industrial lobby provides funds to reallocate scientists among research questions.

$\sim$

Scientific experiments are performed

$\sim$

2. The government regulates the industry to maximize social welfare.

The Government (Second period)

Ex-post expected social welfare function:

$$\hat{W}(p_1, p_2, x) = \underbrace{by_0(1 - p_1 hx - p_2 a)}_{\text{Expected benefit from } \tilde{y}} - \underbrace{c(x_0 - x)}_{\text{Abatement cost}}$$

$$x^* = \begin{cases} x_0 & \text{if } c > by_0 p_1 h, \\ 0 & \text{if } c < by_0 p_1 h. \end{cases}$$

$$\Rightarrow \bar{p} \equiv \frac{c}{by_0 h} \in (0, 1) \text{ Belief threshold of regulation}$$

$p_1 > \bar{p} \Rightarrow$ prohibition $\qquad$ $p_1 < \bar{p} \Rightarrow$ no regulation

The lobby (First period)

- Initial allocation of scientists: n_{01}, n_{02}
- The cost of reallocating $|n_{01} - n_1|$ scientists is $\frac{\gamma}{2}(n_{01} - n_1)^2$
- The lobby is deep-pocketed
- Expected cost of regulation: $cx_0\delta(n_1)$ with $\delta(n_1) \equiv P(p_1 > \bar{p})$

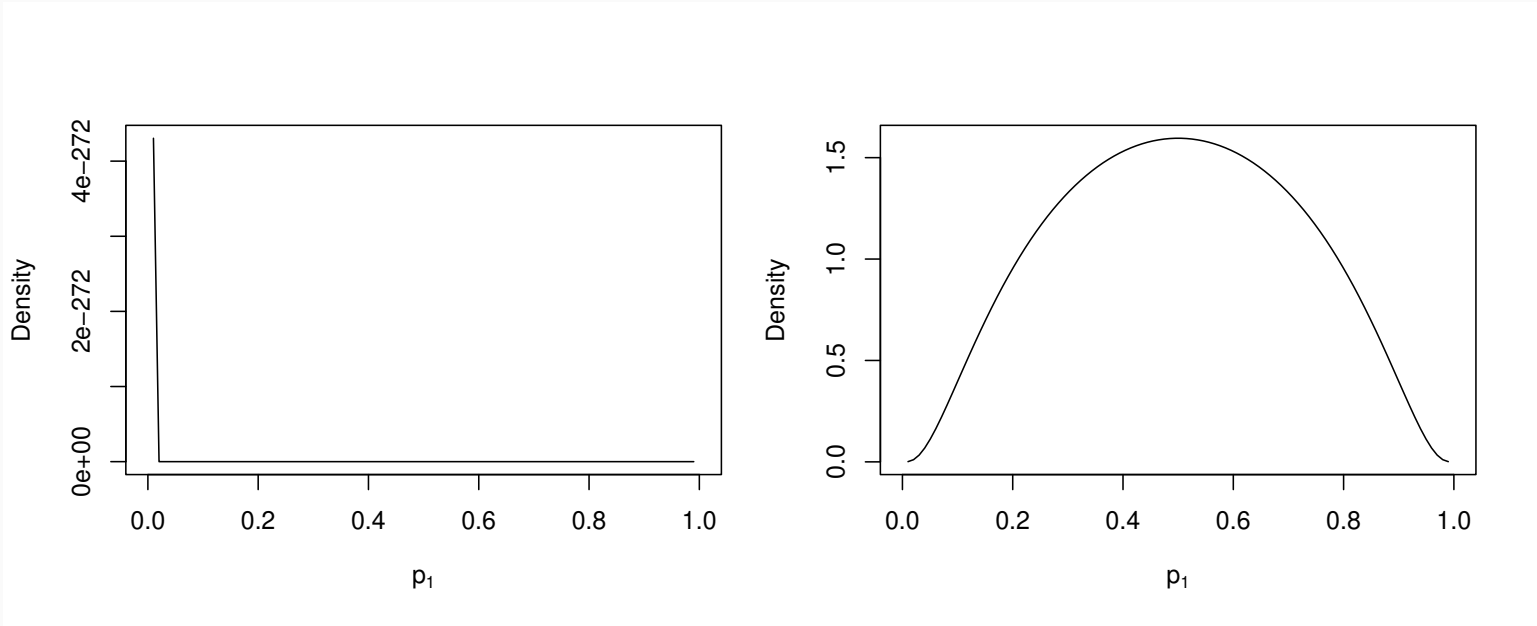
$$\min_{n_1, n_2} \quad \underbrace{cx_0\delta(n_1)}_{\text{Benefits of re-allocating}} + \underbrace{\frac{\gamma}{2}(n_{01} - n_1)^2}_{\text{Cost of re-allocating}}$$

Results

Main mechanism

(A) $\nearrow n_1 \Rightarrow p_1$ converges to 0 or 1 $\Rightarrow$ gov less concerned with $\bar{p} = \frac{c}{by_0 h}$

(B) $\nearrow n_2 \Rightarrow \searrow n_1 \Rightarrow p_1 \in (0,1) \Rightarrow$ gov still concerned with $\bar{p} = \frac{c}{by_0 h}$



(A) (B)

Theorem 1- Industry's interest in funding research

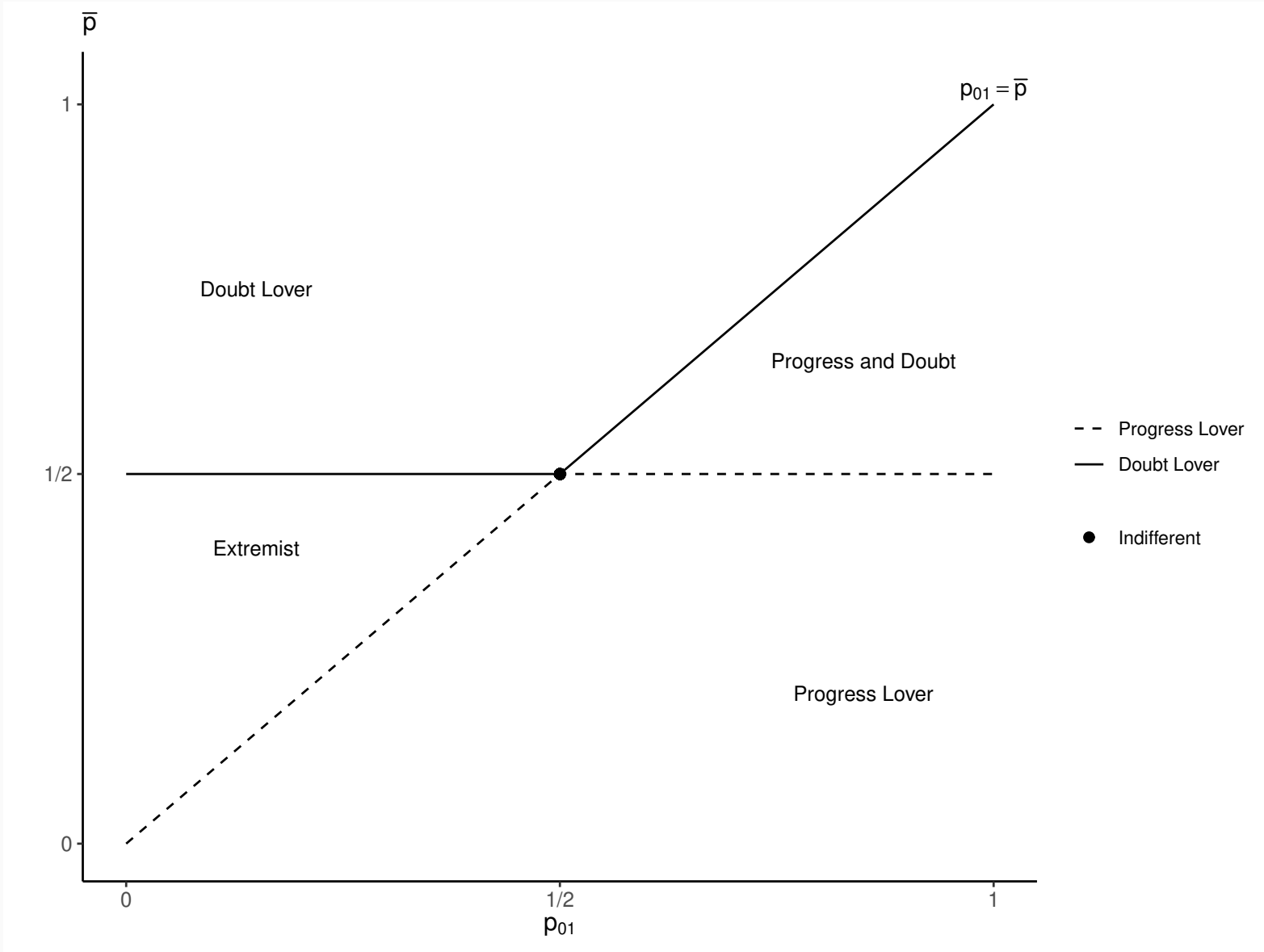
The expected cost of regulation for the industry is increasing with n_1 if:

- $\forall n_1 < \hat{n}$ if $p_{01} < \bar{p}$, or $p_{01} = \bar{p}$ and $\bar{p} > \frac{1}{2}$.
- $\forall n_1 > \hat{n}$ if $\bar{p} > \frac{1}{2}$, or $\bar{p} = \frac{1}{2}$ and $p_{01} < \frac{1}{2}$.

The expected cost of regulation for the industry is decreasing with n_1 if:

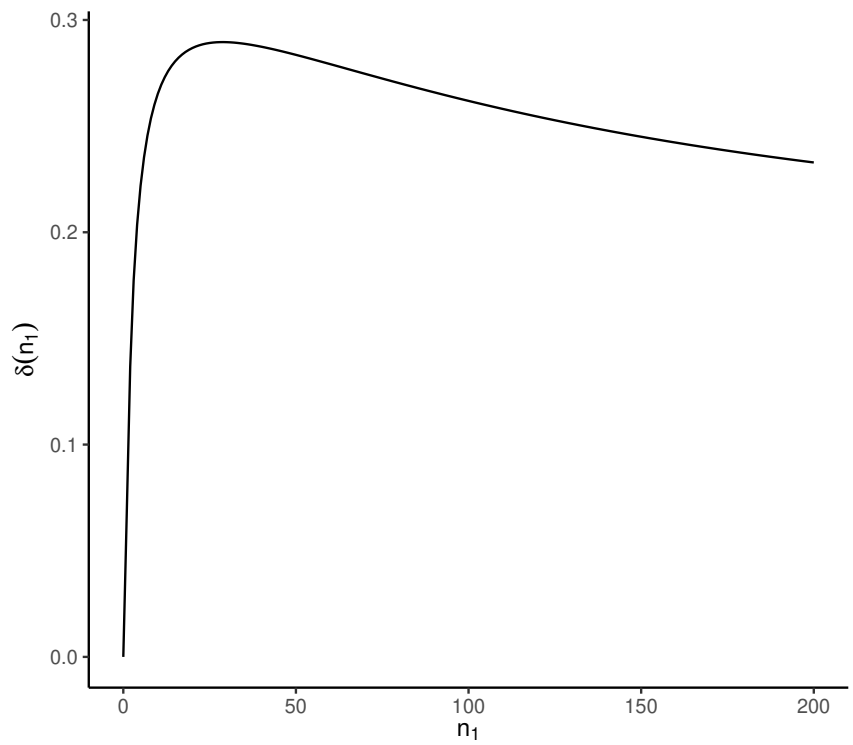
- $\forall n_1 > \hat{n}$ if $p_{01} > \bar{p}$, or $p_{01} = \bar{p}$ and $\bar{p} < \frac{1}{2}$.
- $\forall n_1 > \hat{n}$ if $\bar{p} < \frac{1}{2}$, or $\bar{p} = \frac{1}{2}$ and $p_{01} > \frac{1}{2}$.

The expected cost of regulation for the industry is unchanged with n_1 when $n_1 = \hat{n}$ or $p_{01} = \bar{p} = \frac{1}{2}$.

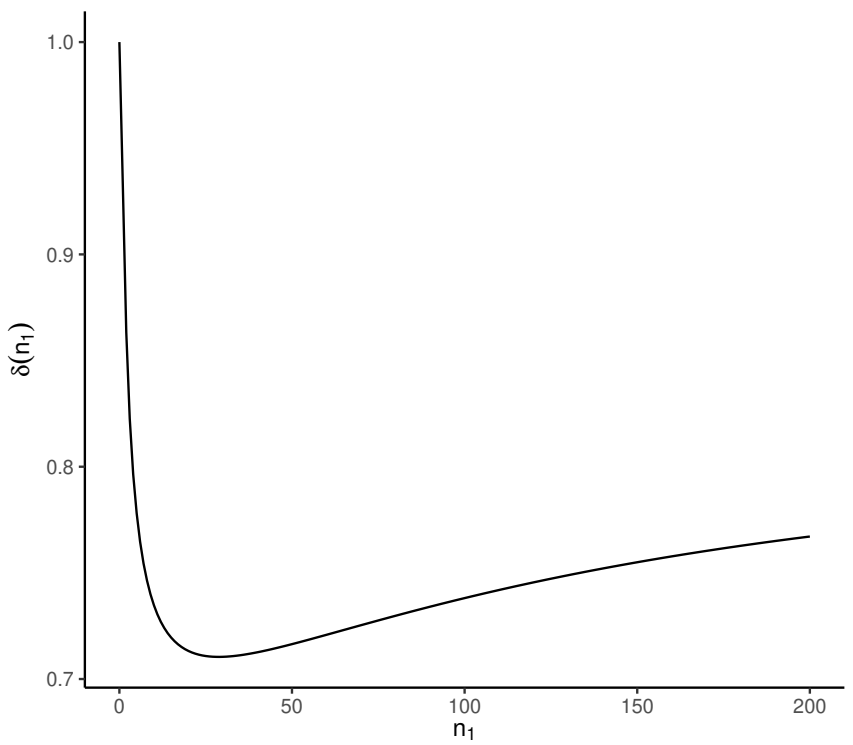


Heterogeneous Priors | Decomposition

Non-monotonic interests



Extremist



Progress and doubt

Conclusion

Conclusion

- **Diversion research** perpetuates doubt and maintains a government more concerned with **costly regulation**.
- **Research on the harmfulness of the industry** may clear the industry and alleviate the government's concerns about the **high benefits of regulation**.

Is diversion research a problem?

- On the short run, it prevents learning useful information to make optimal regulatory decisions.

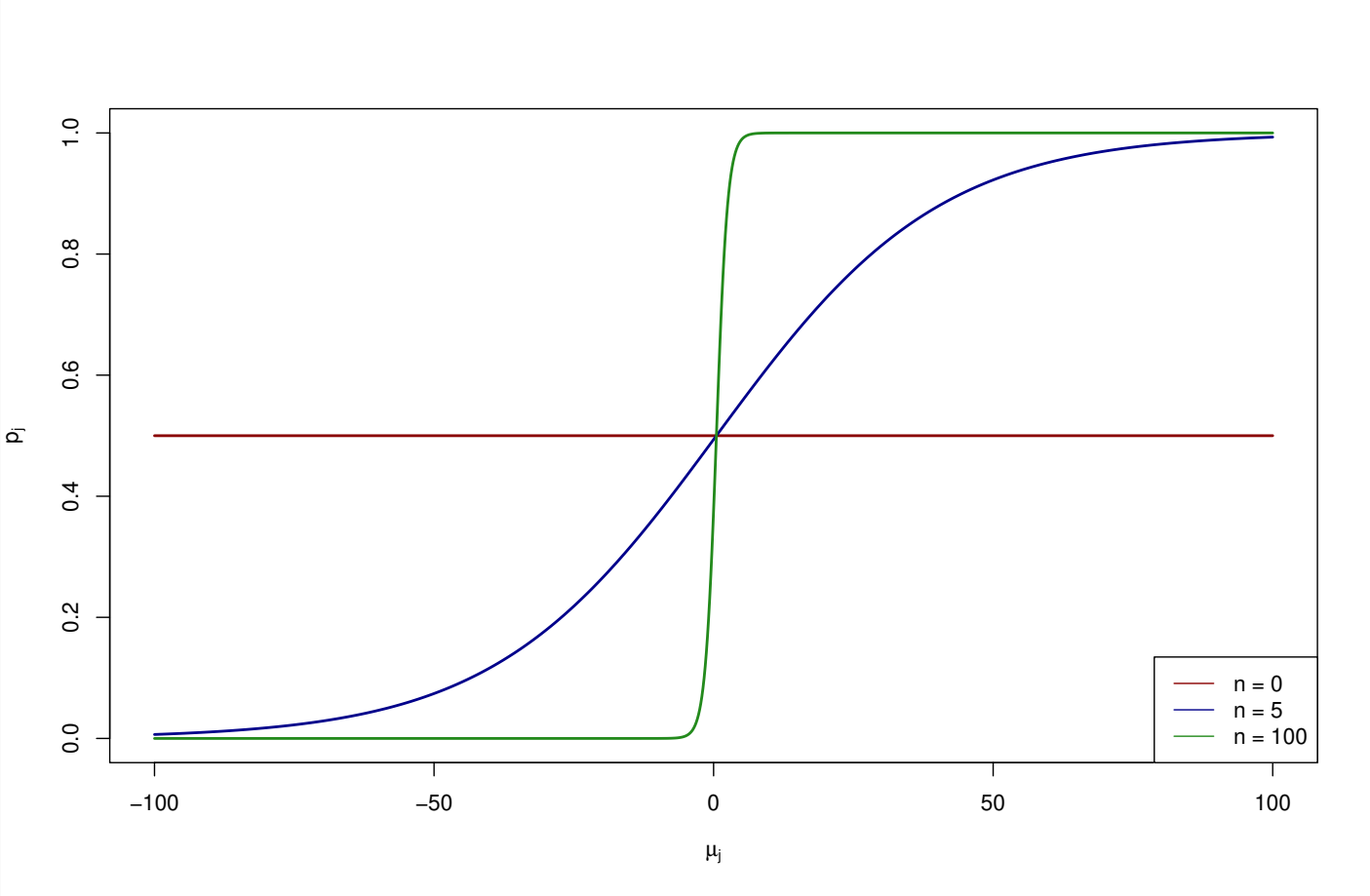
Policy recommendation:

- Private funds have to be overseen by an independent committee for their allocation.

Appendices

Posterior beliefs formation (ex-post)

$$p_j = \frac{1}{1 + \left(\frac{1-p_{0j}}{p_{0j}}\right) \exp\left[\frac{n_j}{\sigma^2}\left(\frac{1}{2} - \mu_j\right)\right]}$$



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Posterior beliefs formation (ex-ante)

- Ex-ante: $\tilde{p}_j(n_j)$
- As $n_j \to \infty$:
  - $\tilde{p}_j = 1$ with probability p_{0j}
  - $\tilde{p}_j = 0$ with probability $1 - p_{0j}$

Main feature: Scientists converge to the truth with the number of experiments.

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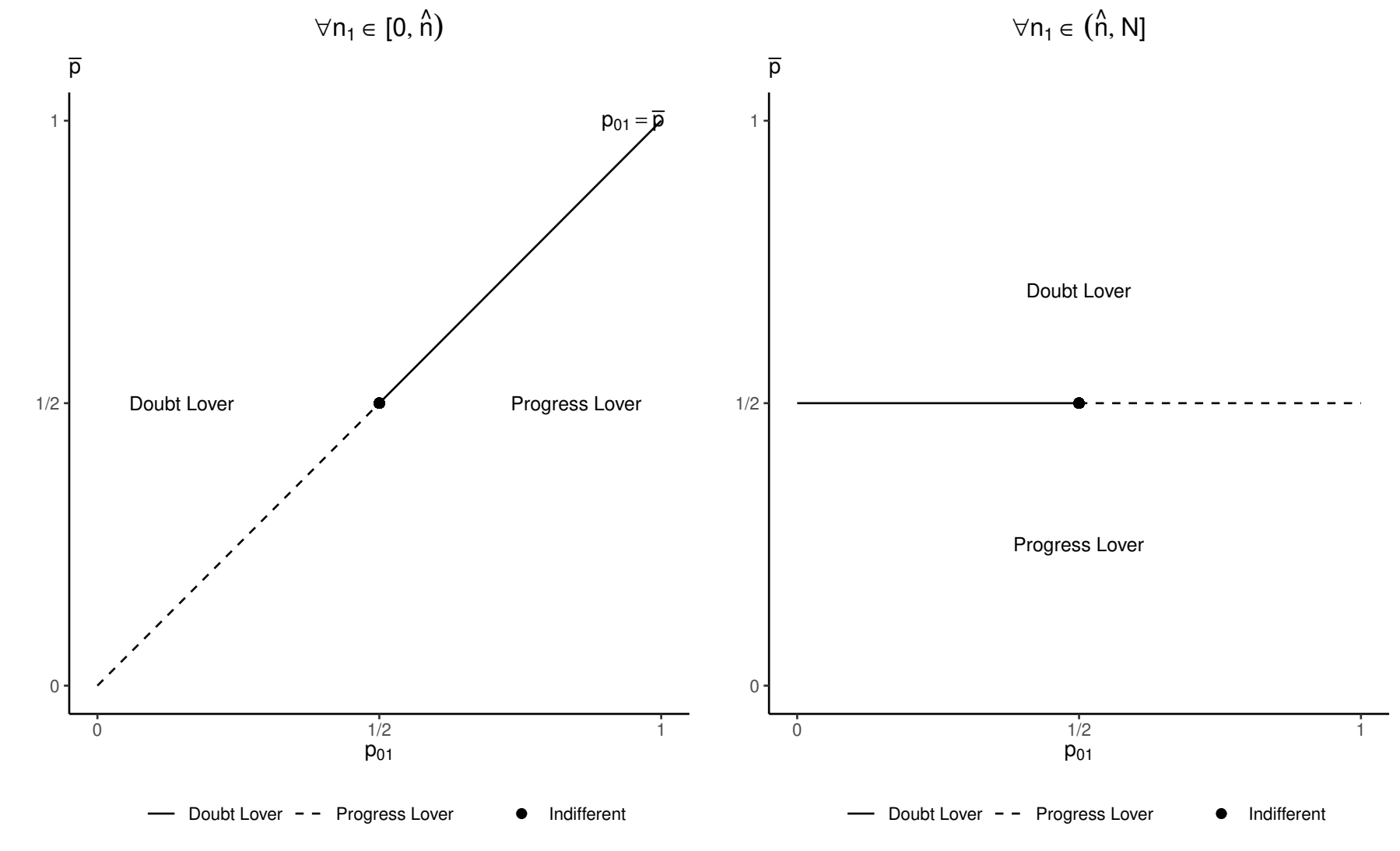
Industry's interest with a small and a large amount of n_1



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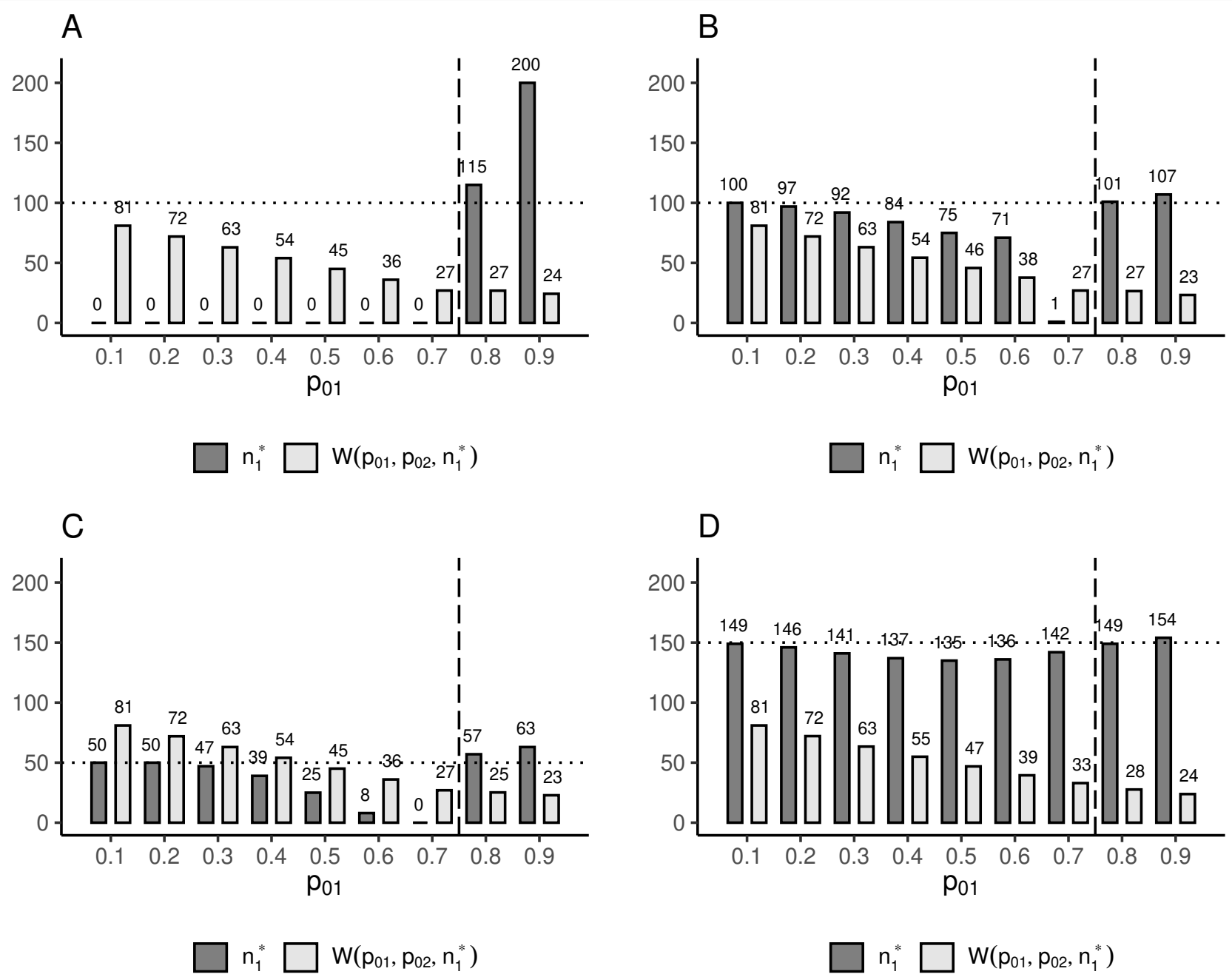
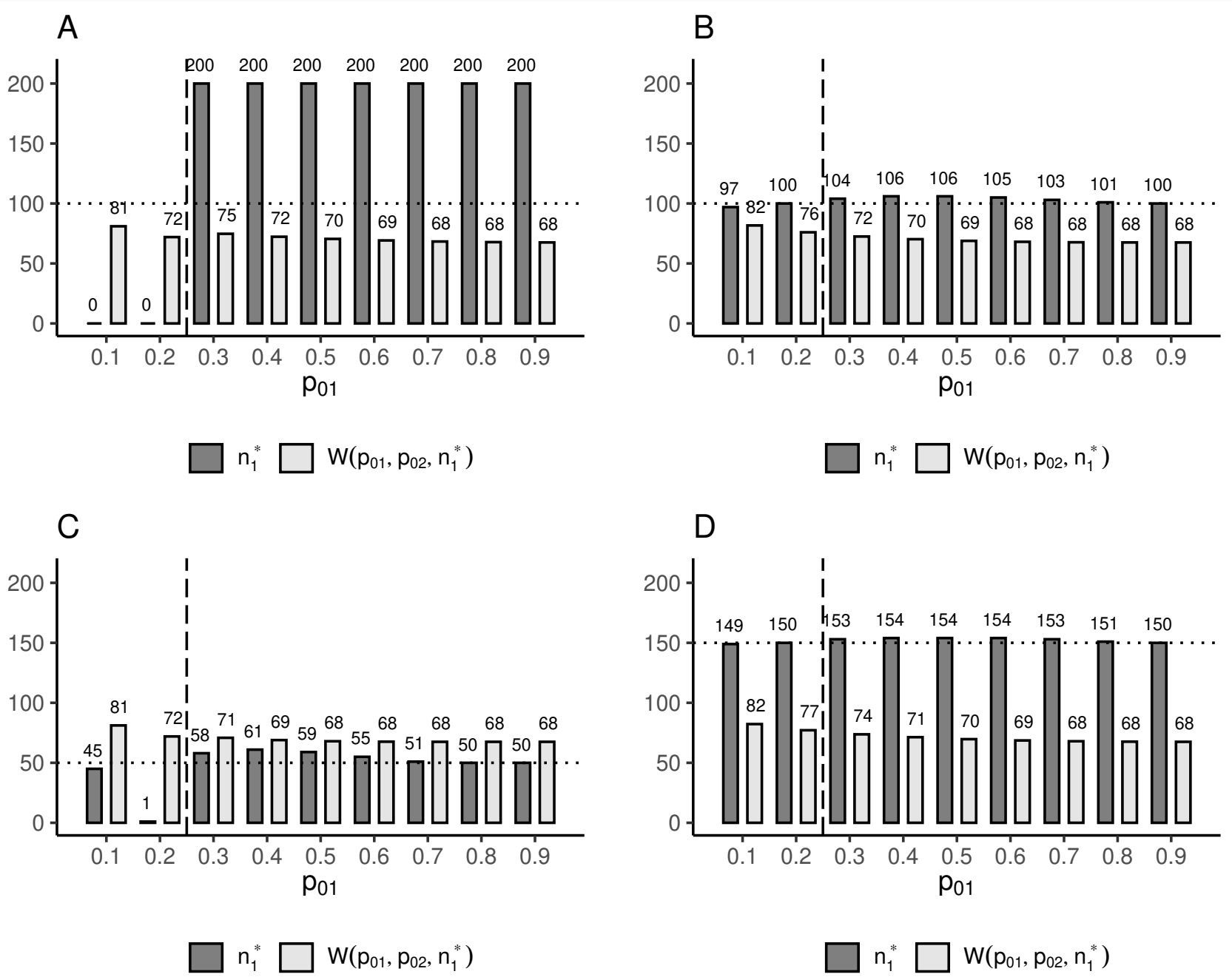
Lobby's optimal scientists' reallocation



Lobby's optimal scientists' reallocation



Heterogeneous Priors

- Industry's prior on pesticides p_{01}^L differs from scientists one p_{01}^S
- Everybody observe p_{01}^S
- Nobody observes p_{01}^L

The government's decision is unchanged:

- $x^* = x_0$ if $p_{01}^S < \bar{p}$
- $x^* = 0$ if $p_{01}^S > \bar{p}$

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Heterogeneous Priors. Lobby's interests

The industrial lobby has an interest in funding diversion research

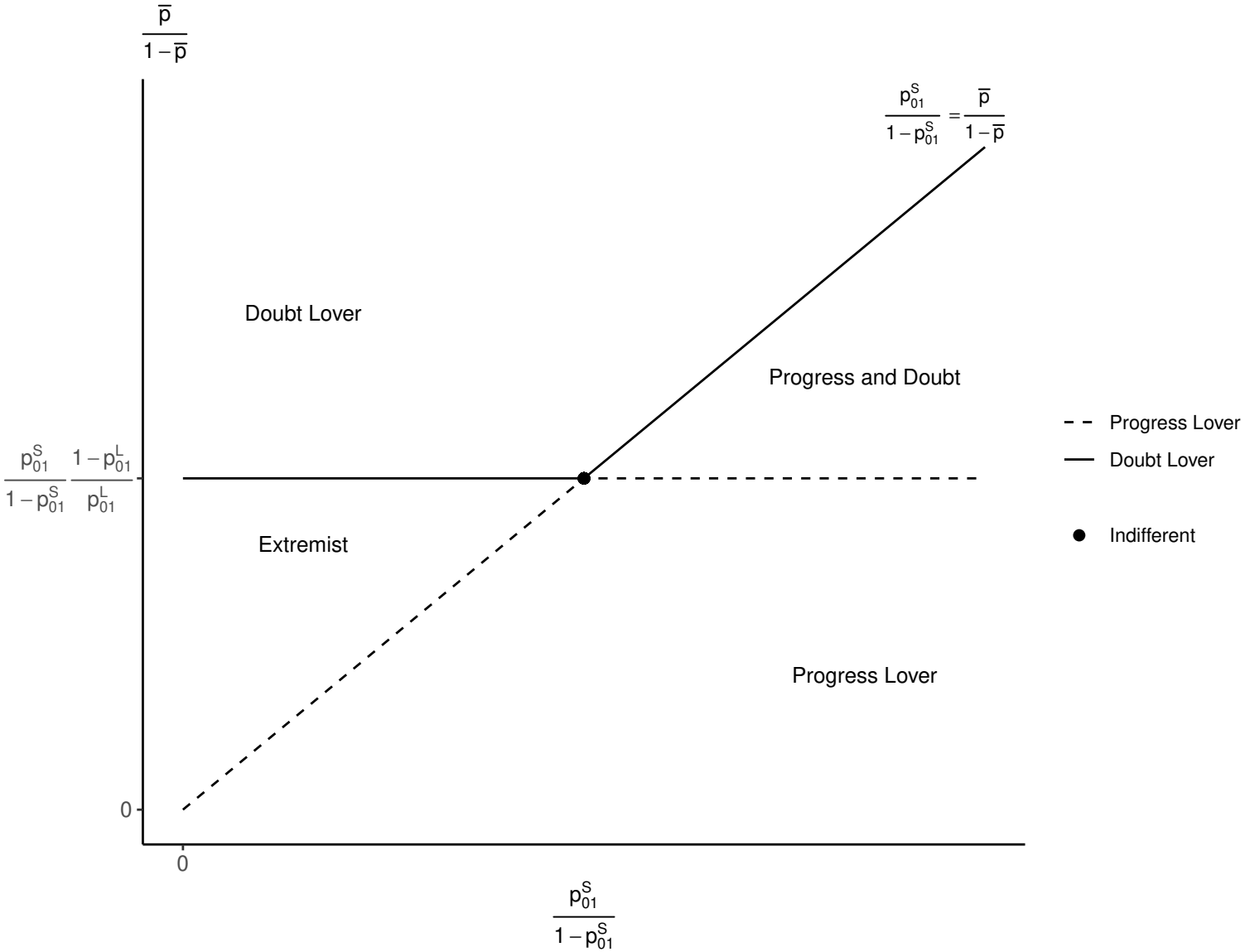
- $\forall n_1 < \hat{n}$ if $p_{01}^S < \bar{p}$, or $p_{01}^S = \bar{p}$ and $p_{01}^L > \frac{1}{2}$.
- $\forall n_1 > \hat{n}$ if $\frac{\bar{p}}{1-\bar{p}} < \frac{p_{01}^S}{1-p_{01}^S}\frac{1-p_{01}^L}{p_{01}^L}$, or $\frac{\bar{p}}{1-\bar{p}} = \frac{p_{01}^S}{1-p_{01}^S}\frac{1-p_{01}^L}{p_{01}^L}$ and $p_{01}^S > \bar{p}$.

The industrial lobby has an interest in funding research on the harmfulness of their activities

- $\forall n_1 < \hat{n}$ if $p_{01}^S > \bar{p}$, or $p_{01}^S = \bar{p}$ and $p_{01}^L < \frac{1}{2}$.
- $\forall n_1 > \hat{n}$ if $\frac{\bar{p}}{1-\bar{p}} < \frac{p_{01}^S}{1-p_{01}^S}\frac{1-p_{01}^L}{p_{01}^L}$, or $\frac{\bar{p}}{1-\bar{p}} = \frac{p_{01}^S}{1-p_{01}^S}\frac{1-p_{01}^L}{p_{01}^L}$ and $p_{01}^S > \bar{p}$.

The industrial lobby has no interest in funding academic research when $n_1 = \hat{n}$ or $p_{01}^S = \bar{p}$ and $p_{01}^L = \frac{1}{2}$. Back

Heterogeneous Priors. Lobby's interests



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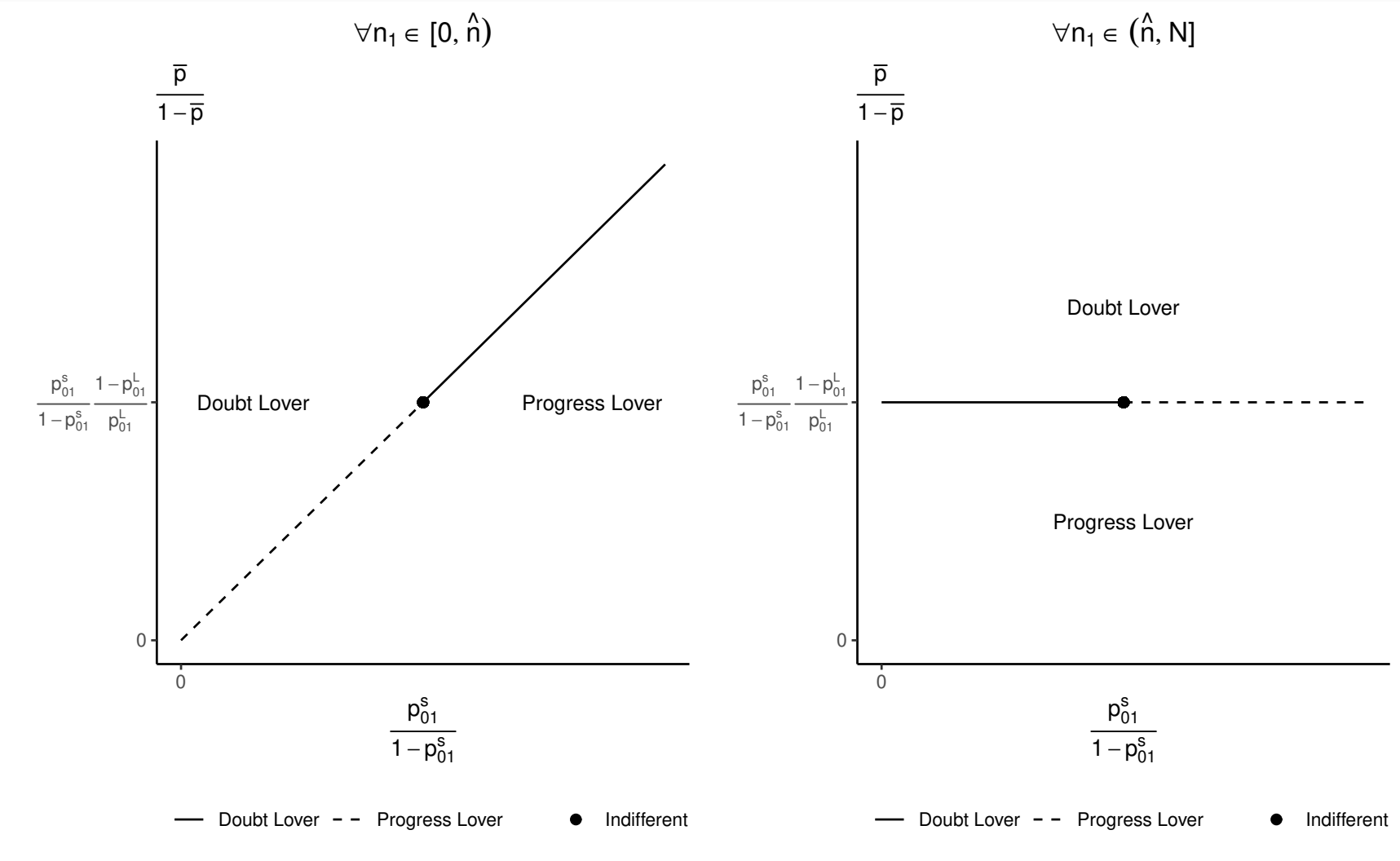
Heterogeneous Priors. Lobby's interests decomposition



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