Risk-taking or risk aversion? When and why?

Qi-Wen Ding

致謝: 莊昀軒 (資料提供者)

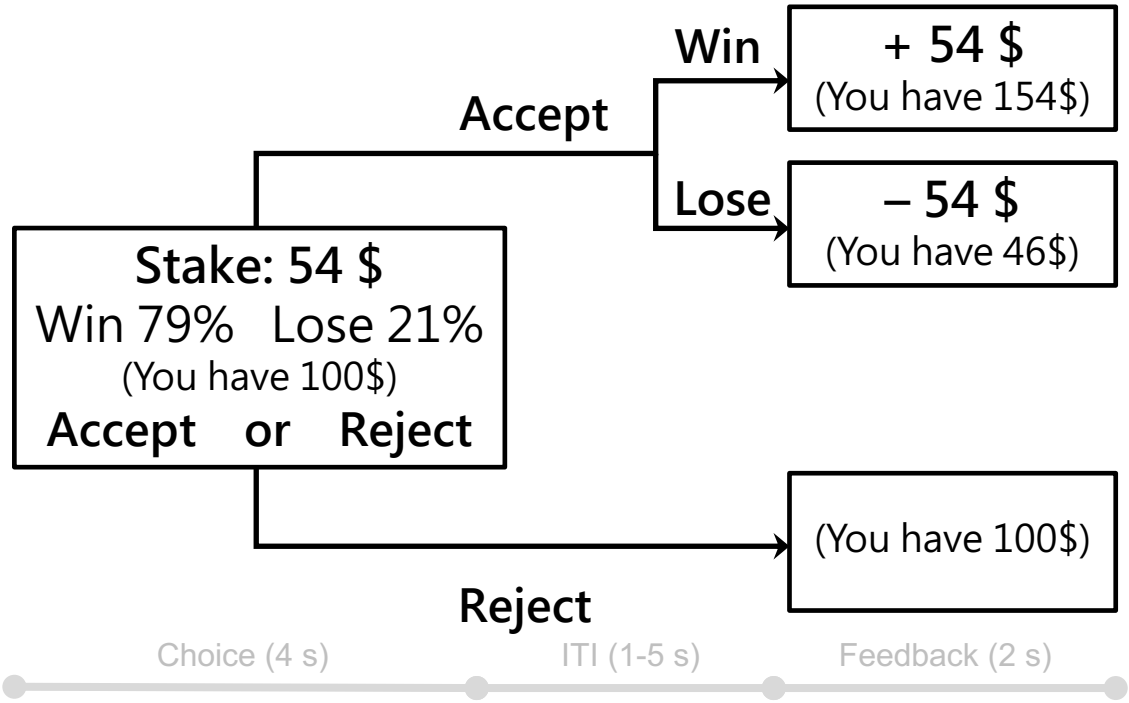
Research question

Personal belief

Value security

Value hedonism

Lottery task (Goh et al., 2016)



Q1: Does personal belief affect decision making?
Q2: When and how?

Variables

Personal belief
(N = 43)

Value security

Value hedonism

& Sex

Lottery task (225 trials)

Stake: 54 $
Win 79% Lose 21%
(You have 100$)
Accept or Reject

Three levels
Five levels

Accept
- Win → + 54 $ (You have 154$)
- Lose → – 54 $ (You have 46$)

Reject → (You have 100$)

$Y_{it} \sim B(1, p_{it})$
p_{it}: P(accept)

: X : Y

Data

ID	Sex	Trial	Win%	Stake	Decision	Hedonism	Security
1	0 (♀)	1	89	55	1 (Accept)	-1.21	0.32
1	0 (♀)	2	54	3	0 (Reject)	-1.21	0.32
1	0 (♀)	3	11	56	1 (Accept)	-1.21	0.32
				⋮			
43	1 (♂)	1	65	100	1 (Accept)	2.63	-0.64
43	1 (♂)	2	25	7	0 (Reject)	2.63	-0.64
				⋮			

享樂與安全的分數之計算方式為，將各類別內的題目取平均，再減去參與者在所有題目的平均得分後（以此排除個參與者的答題偏好（Schwartz, 2009），即得到該參與者在該信念類別的偏好程度。

Bayesian logistic regression

Model

$$\begin{cases} Y_{it} \sim Bern\left(p_{it}\right) \\ \text{logit}\left(p_{it}\right) = \beta_0 + \beta_1 X_i^{\text{Security}} + \beta_{2_i} X_t^{\text{Prob}} + \beta_{3_i} X_t^{\text{Mag}} + \\ \qquad \beta_{12} X_i^{\text{Security}} X_t^{\text{Prob}} + \beta_{13} X_i^{\text{Security}} X_t^{\text{Mag}} + \beta_{23_i} X_t^{\text{Prob}} X_t^{\text{Mag}} + \beta_{123} X_i^{\text{Security}} X_t^{\text{Prob}} X_t^{\text{Mag}} + \\ \qquad \beta_4 X_i^{\text{Gender}} + \gamma_i \end{cases}$$

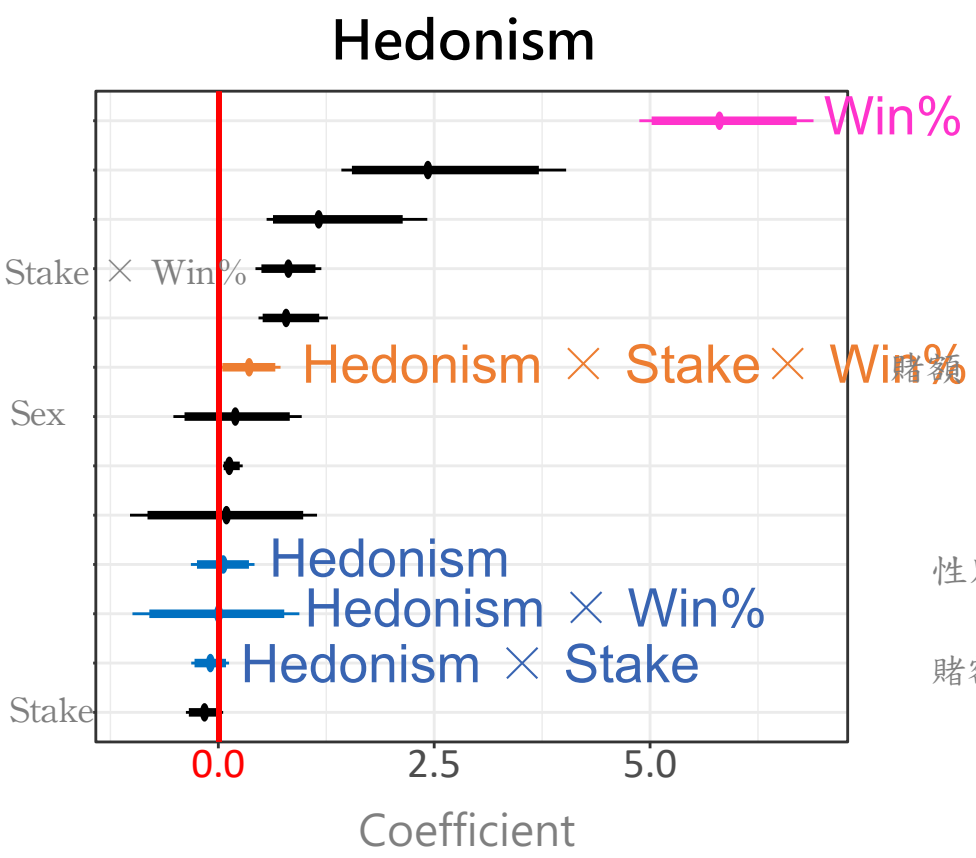
Prior

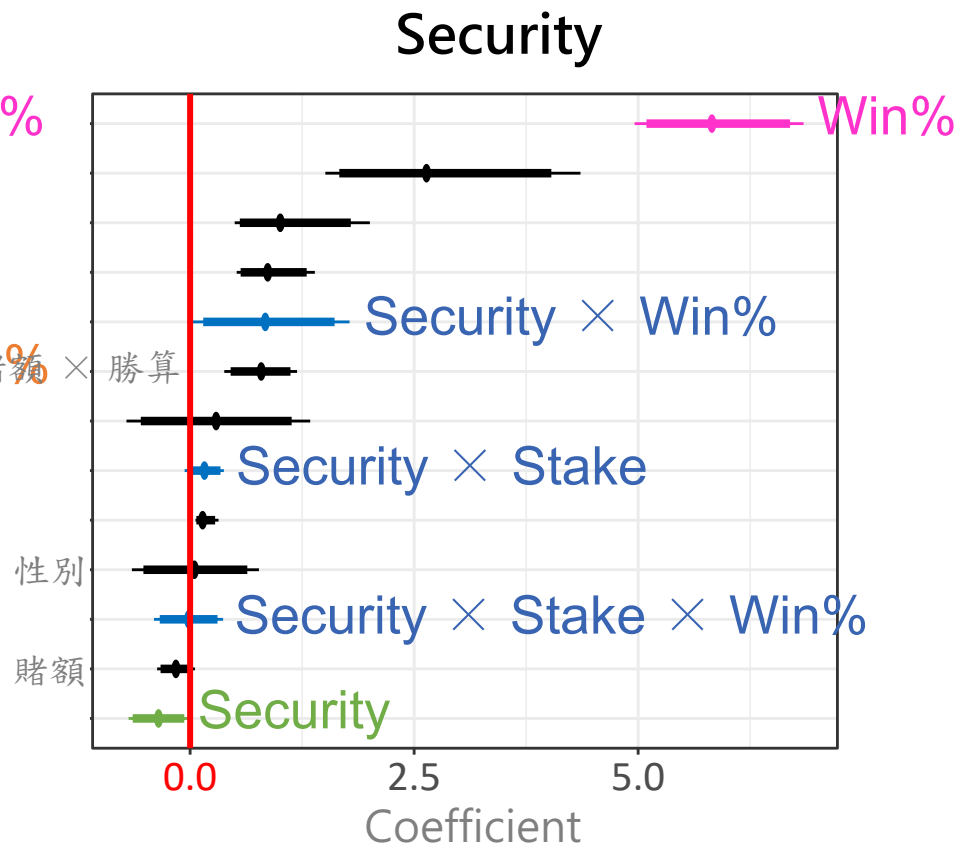
$$\beta_0 \sim N\left(0,10\right)$$
$$\beta_1 \sim N\left(-0.5,10\right)$$
$$\beta_{2i} \sim N\left(\mu_2,\sigma_2^2\right)$$
$$\beta_{3i} \sim N\left(\mu_3,\sigma_3^2\right)$$
$$\beta_{12} \sim N\left(0,10\right)$$
$$\beta_{13} \sim N\left(0,10\right)$$
$$\beta_{23i} \sim N\left(\mu_{23},\sigma_{23}^2\right)$$
$$\beta_{123} \sim N\left(0,10\right)$$
$$\beta_4 \sim N\left(0.5,10\right)$$
$$\gamma_i \sim N\left(0,\sigma_\gamma^2\right)$$

Hyperprior

$$\mu_2 \sim N\left(0.5,10\right)$$
$$\mu_3 \sim N\left(0,10\right)$$
$$\mu_{23} \sim N\left(0,10\right)$$
$$\sigma_2^2 \sim Gamma\left(2,1\right)$$
$$\sigma_3^2 \sim Gamma\left(2,1\right)$$
$$\sigma_{23}^2 \sim Gamma\left(2,1\right)$$
$$\sigma_\gamma^2 \sim Gamma\left(2,1\right)$$

Coefficient estimates





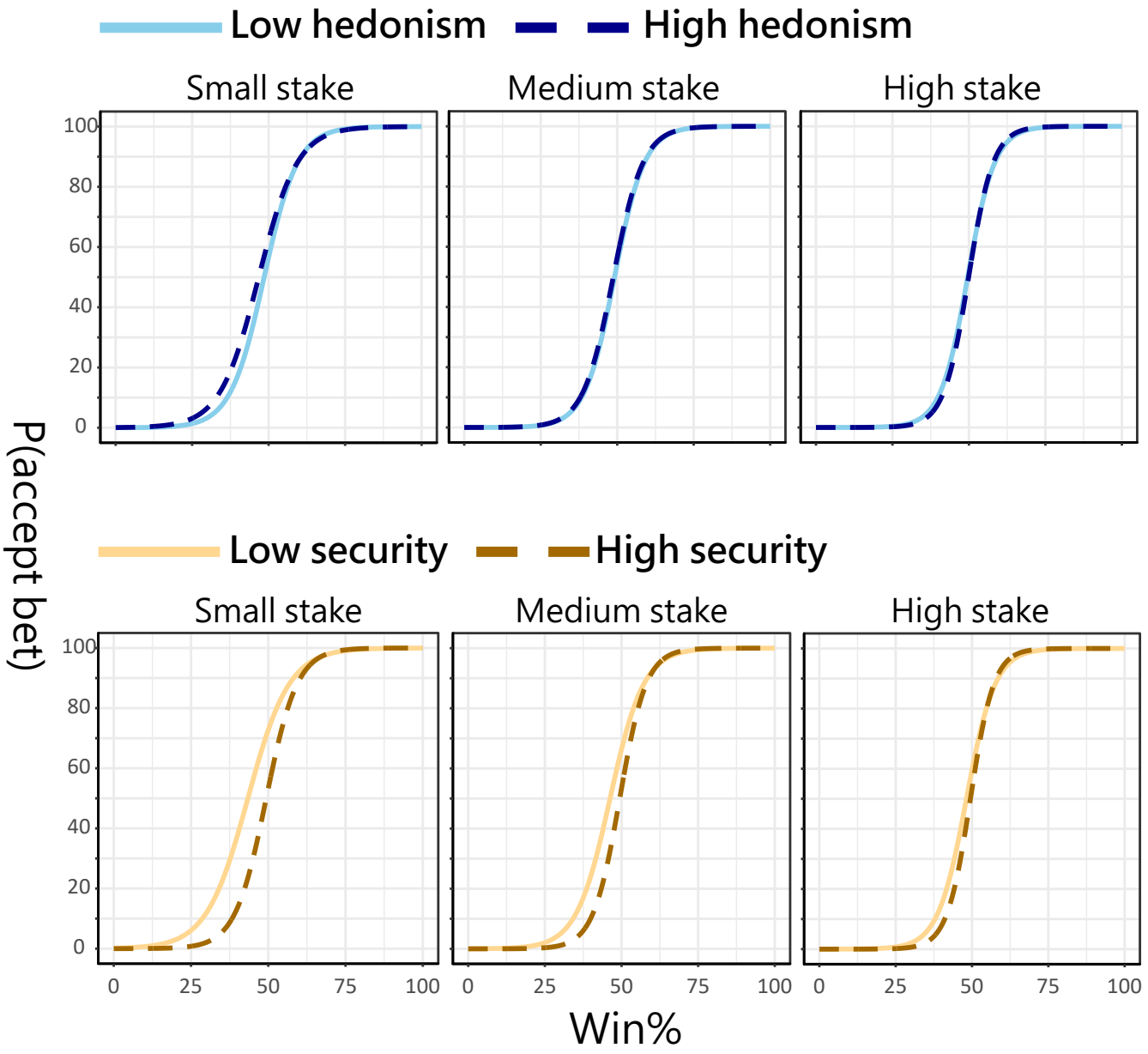
Win% ↑, P(accept) ↑

Effect of Hedonism on P(accept) depends on stake and Win% (p. 8)

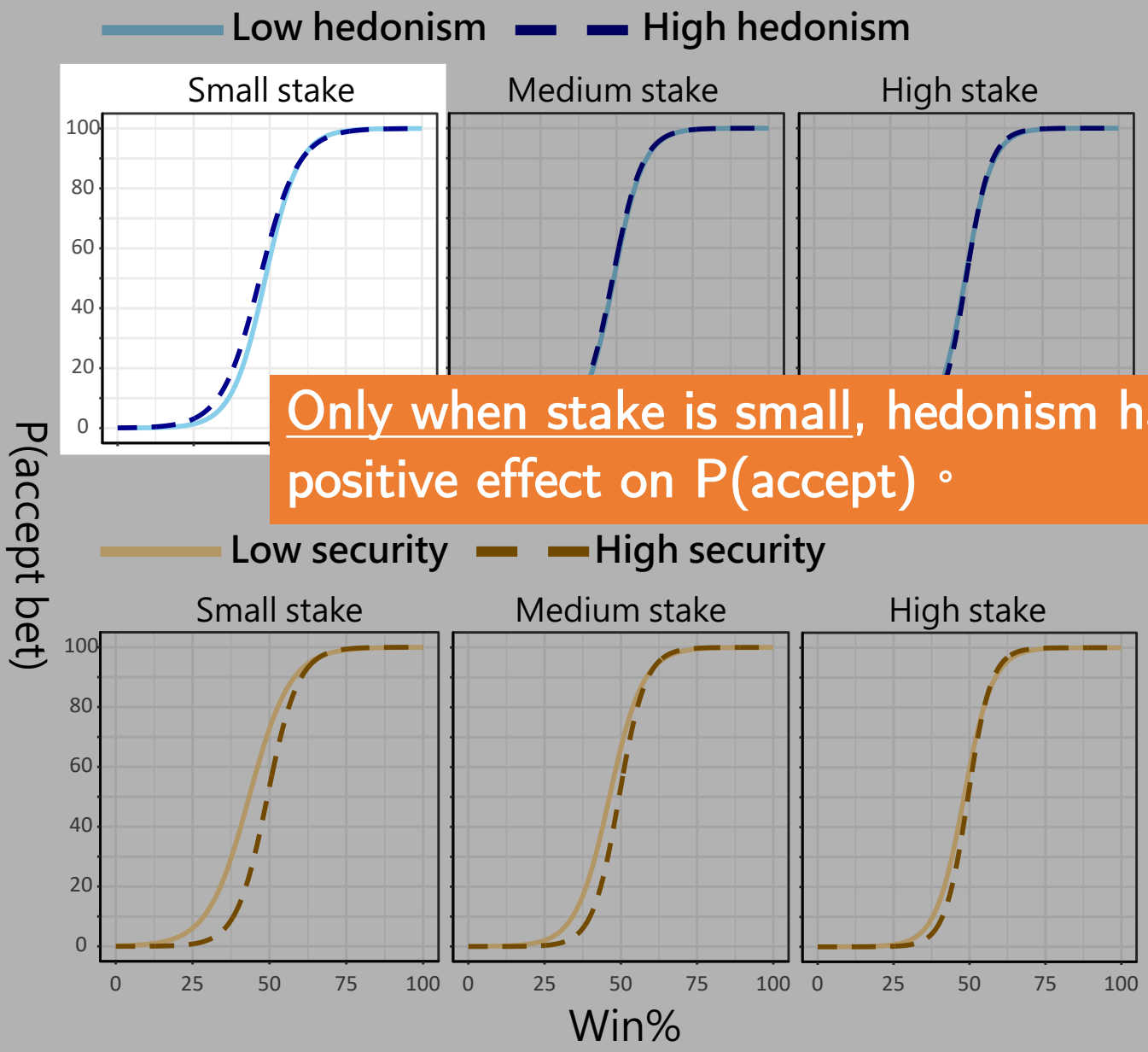
Regardless of stake and Win%, people who value security ↑ have ↓ P(accept) (p.9)

Bold line: 95% HPD; Regular line: 90% HPD

Interaction effect

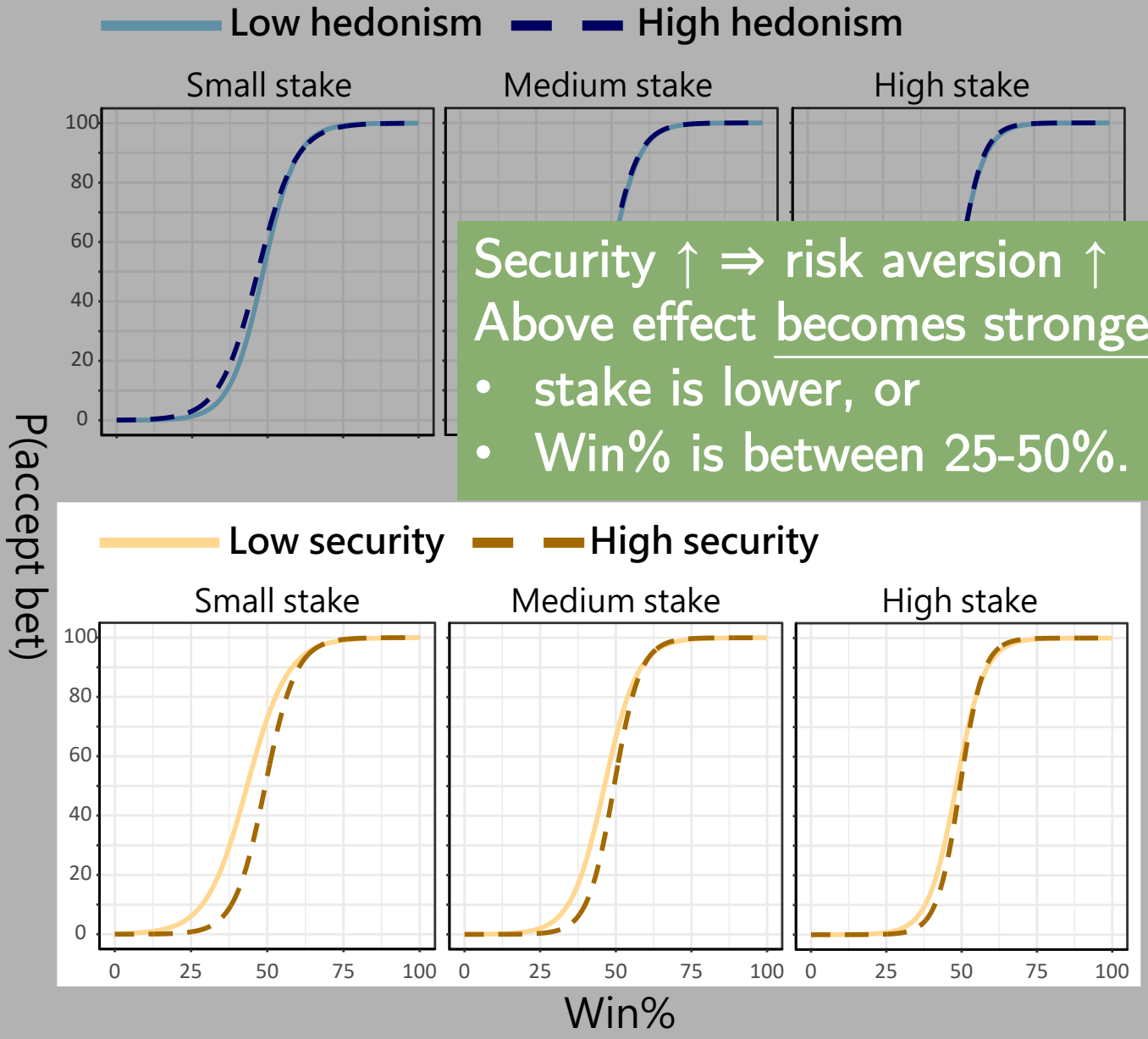


Interaction effect



Only when stake is small, hedonism has a small positive effect on P(accept)。

Interaction effect

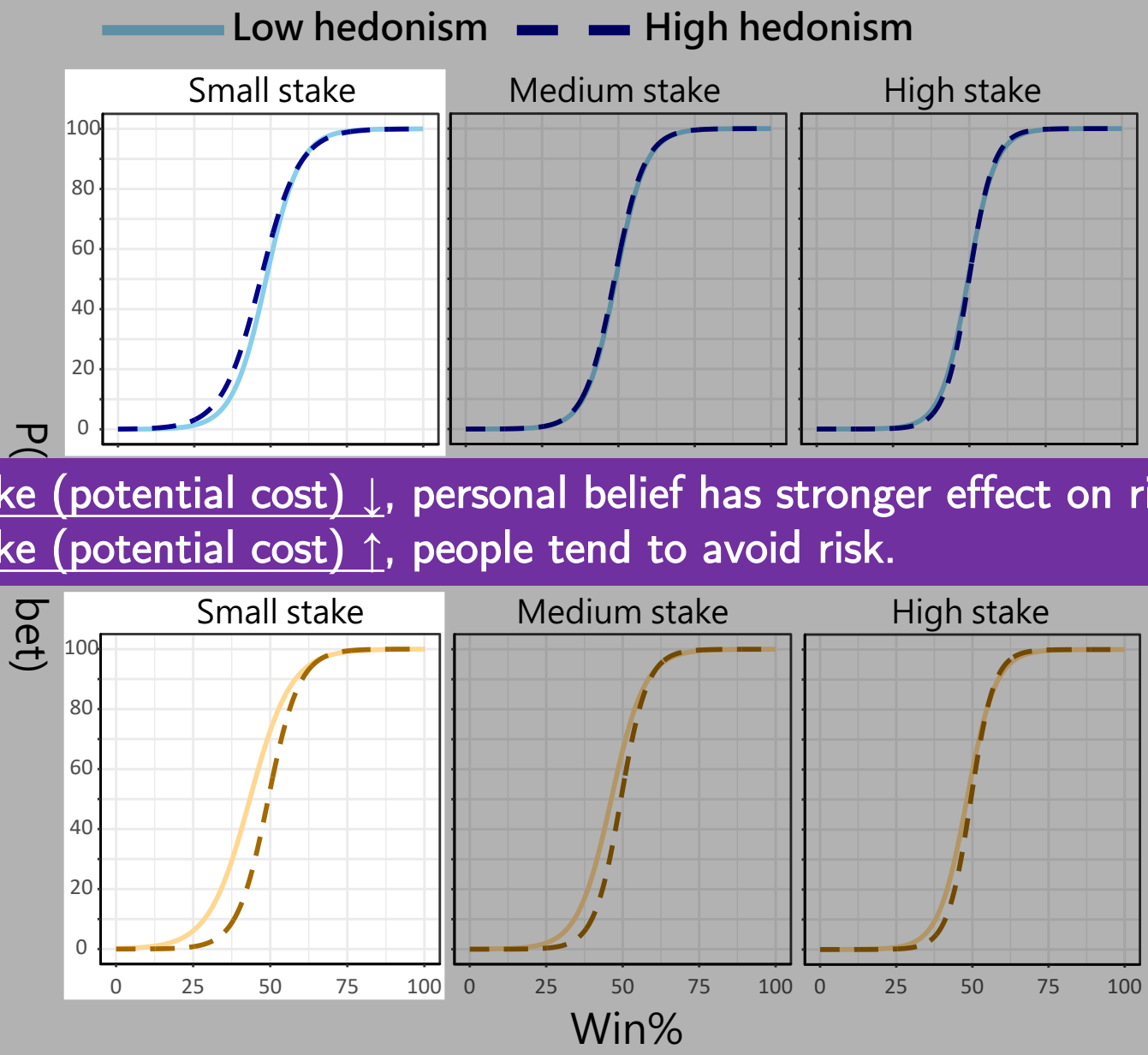


Security ↑ ⇒ risk aversion ↑

Above effect becomes stronger when:

- stake is lower, or
- Win% is between 25-50%.

Interaction effect



When stake (potential cost) ↓, personal belief has stronger effect on risk decision.
When stake (potential cost) ↑, people tend to avoid risk.

Summary

- Personal beliefs are closely related to risk decision-making in Taiwanese university students.
- The more one values safety, the less likely they are to take risks. This effect is significant at different stakes or Win%.
- The effect of hedonism only appears at low stakes and mid-to-low Win%, and the magnitude is quite small.
- Once the potential cost is large, personal beliefs have little influence on risk decision-making. Most people will just avoid risk.