Week 4. Micro I Summary

Charlie Shin 201611041

Welfare Evaluation

- Performance of Welfare measured in:
  - Utility = Vague & Subjective & Difficult to measure & Compare → M
  - **<u>Cost / Expenditure = Easy to measure & Compare</u>**

  - **<u>Change in Expenditure → Change in Welfare</u>**

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EV(Equivalent Variation) vs CV(Compensating Variation)

- Expenditure to achieve utility level at ***reference price***:
  - $e(p^{ref}, u)$
  - Measured by Unit of x_2
- Equivalent Variation (EV):
  - Fixing the reference price as initial price ($p^{ref} = p^0$)
  - $EV(p^0, p^1, w) = e(p^0, u^1) - e(p^0, u^0) = e\left(p^0, v(p^1, w)\right) - \boxed{e\left(p^0, v(p^0, w)\right)}$

Duality: To Achieve **u^0**, you need at least **w**

$$= e\left(p^0, v(p^1, w)\right) - \boxed{w} = e\left(p^0, v(p^1, w)\right) - \boxed{e\left(p^1, v(p^1, w)\right)} = \boxed{e(p^0, u^1) - e(p^1, u^1)}$$

(Change in P l Fixing at New Utility)

Duality: To Achieve **u^1** with **p^1** you need at least **w**

EV(Equivalent Variation) vs CV(Compensating Variation)

- Expenditure to achieve utility level at ***reference price***:
  - $e(p^{ref}, u)$
  - Measured by Unit of x_2
- Compensating Variation (CV):
  - Fixing the reference price as the new price $(p^{ref} = p^1)$
  - $EV(p^0, p^1, w) = e(p^1, u^1) - e(p^1, u^0) = \boxed{e(p^1, v(p^1, w))} - e(p^1, v(p^0, w))$

Duality: To Achieve **u⁰**, you need at least **w**

$$= \boxed{w} - e(p^1, v(p^0, w)) = \boxed{e(p^0, v(p^0, w))} - e(p^1, v(p^0, w)) = \boxed{e(p^0, u^0) - e(p^1, u^0)}$$

(Change in P | Fixing at Original Utility)

Duality: To Achieve **u⁰** with **p⁰** you need at least **w**

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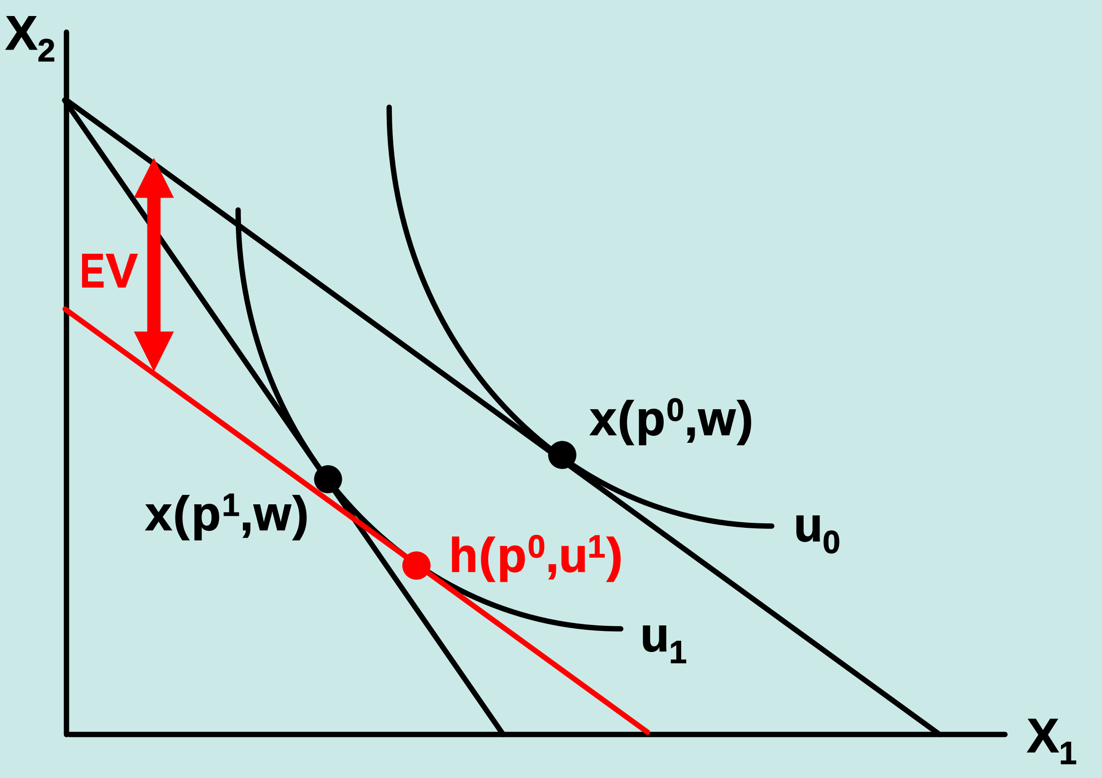
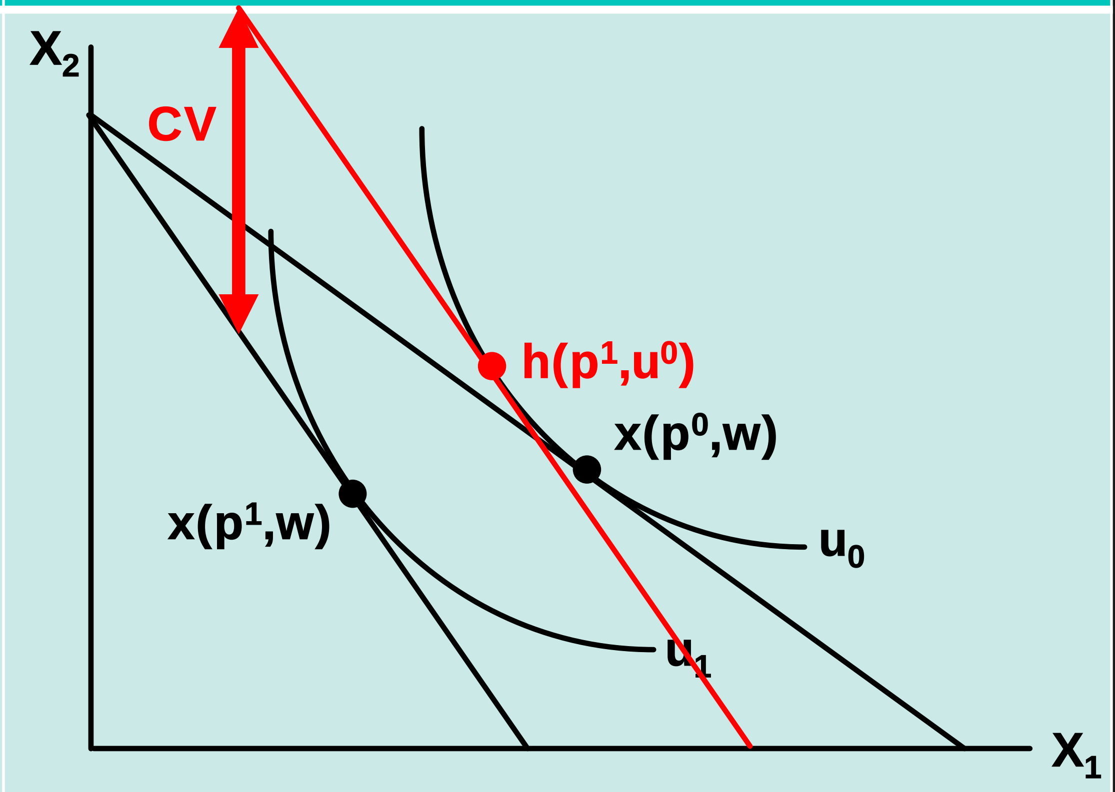
EV(Equivalent Variation) vs CV(Compensating Variation)

EV	CV





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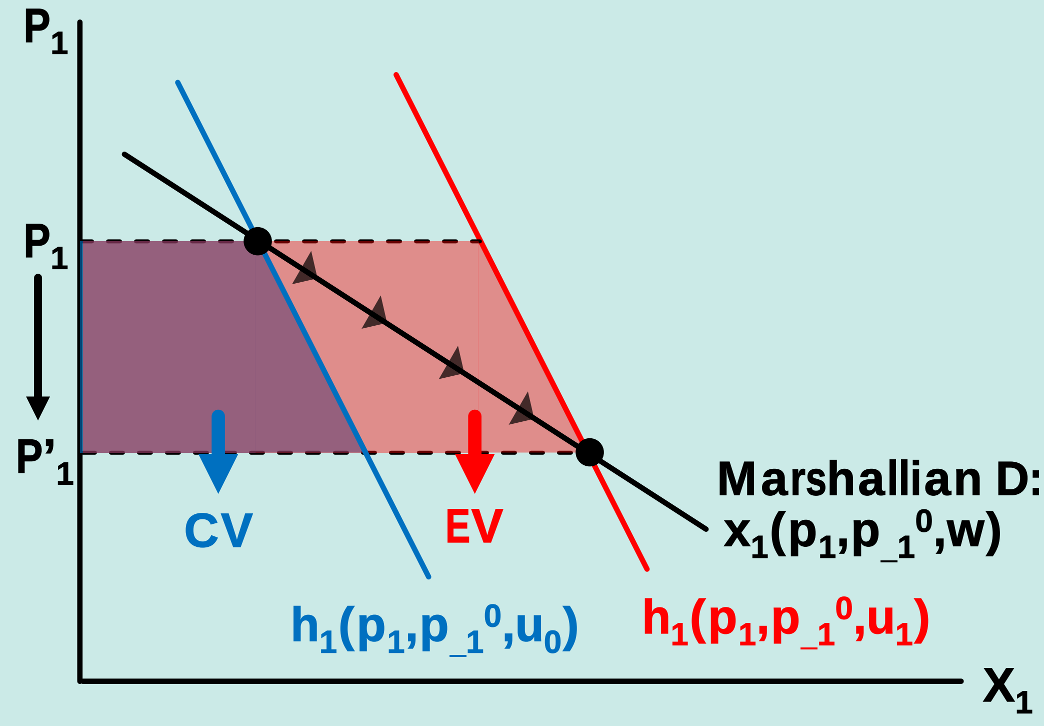
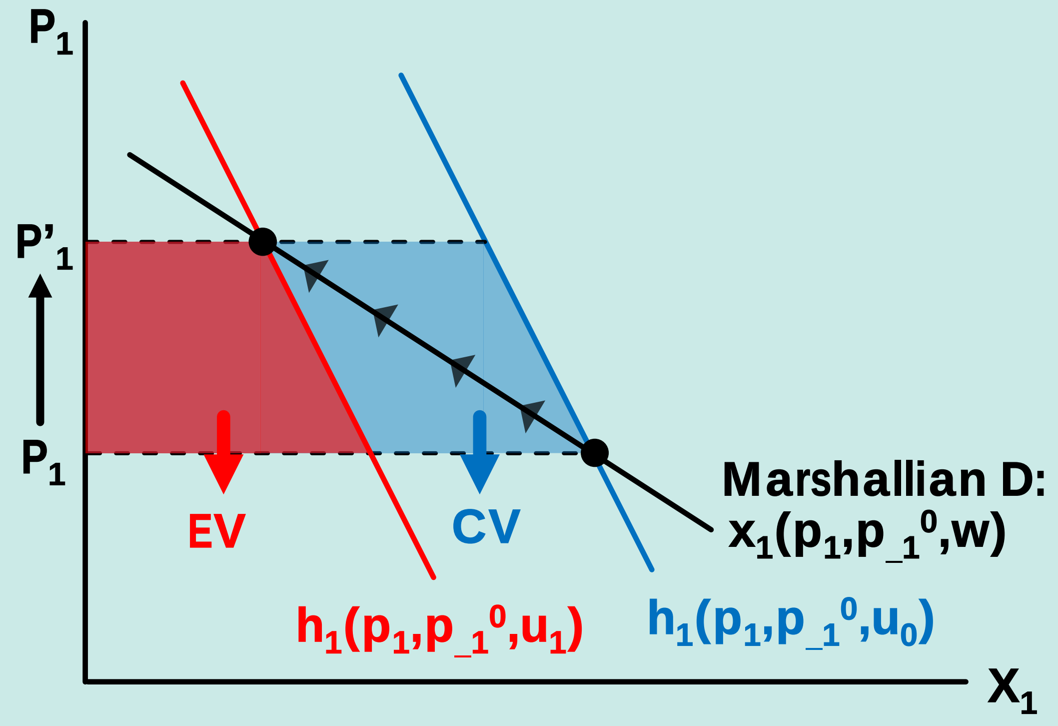
EV vs CV : Normal Goods (EV > CV)

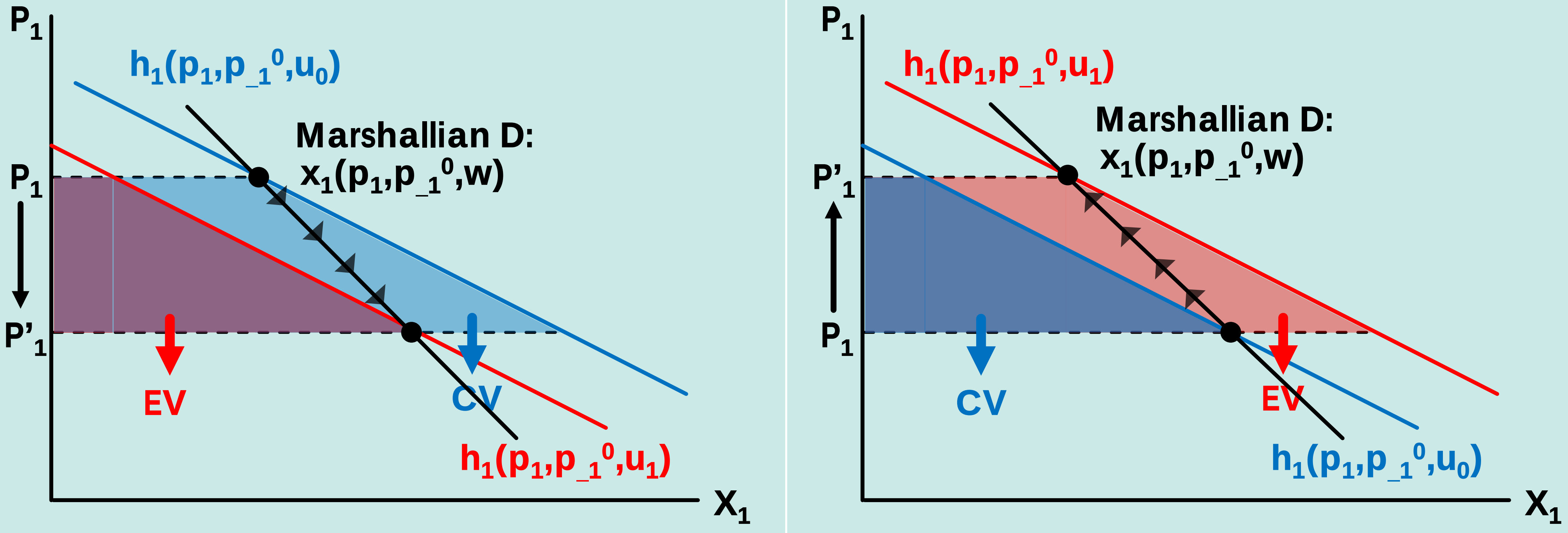
P Falls ($u_1 > u_0$)	P Increases ($u_1 < u_0$)
EV > CV > 0	0 > EV > CV





EV vs CV : Inferior Goods (CV > EV)

P Falls ($u_1 > u_0$)	P Increases ($u_1 < u_0$)



CV > EV > 0

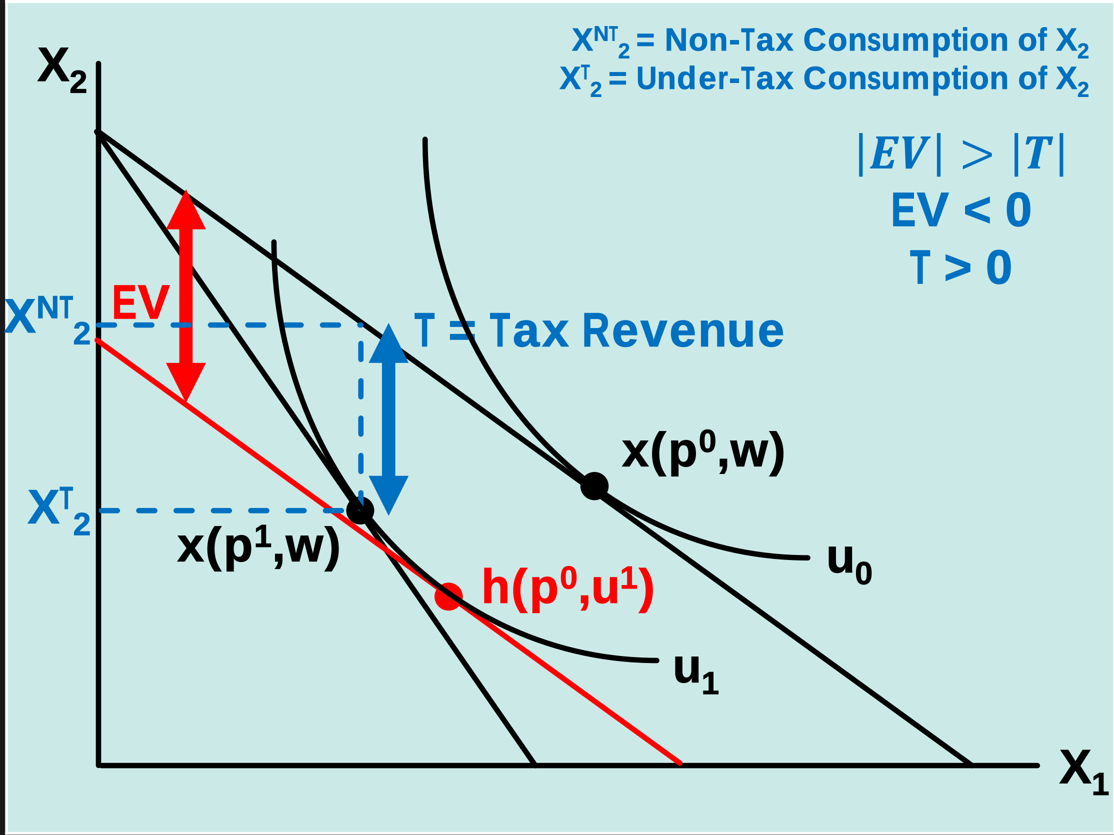
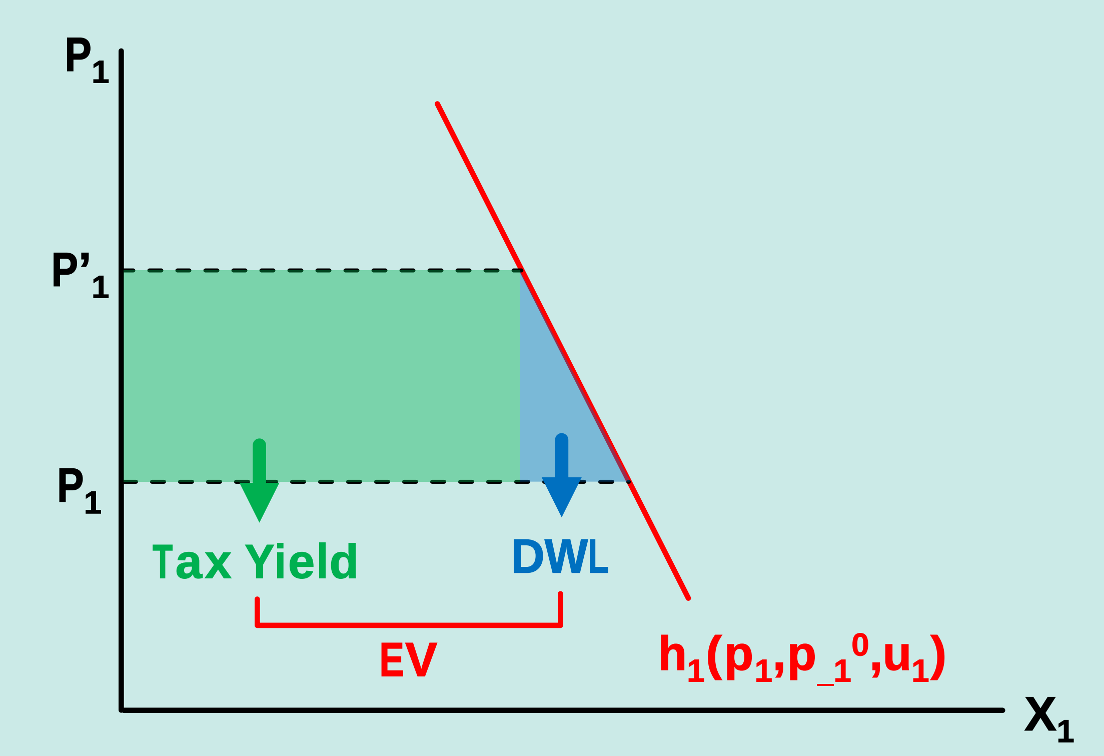
0 > CV > EV

Why EV & CV Matter?

- Good Approximation of Change in Consumer Surplus (ΔCS)
- When the Wealth Effect = 0 ($\boldsymbol{\varepsilon_{x,I} = 0}$), **EV = CV = $\boldsymbol{\Delta CS}$**

Tax Imposition

DWL = -EV –T, where T = Tax Revenue

Utility	Demand
	

Tax Imposition: Lump-sum Tax

- In case of Lump-sum Tax, DWL = 0
- Since The Budget Line Moves in Parallel

Choice Under Uncertainty: Lottery

- A Decision maker faces a choice among a number of risky alternatives.

$$L = (p_1, \ldots, p_N), where\ p_n \geq 0$$

- Each alternative can lead to one of a number of possible outcomes,

$$A = \{a_1, \ldots, a_N\}$$

- All probability of possible outcomes add up to 1

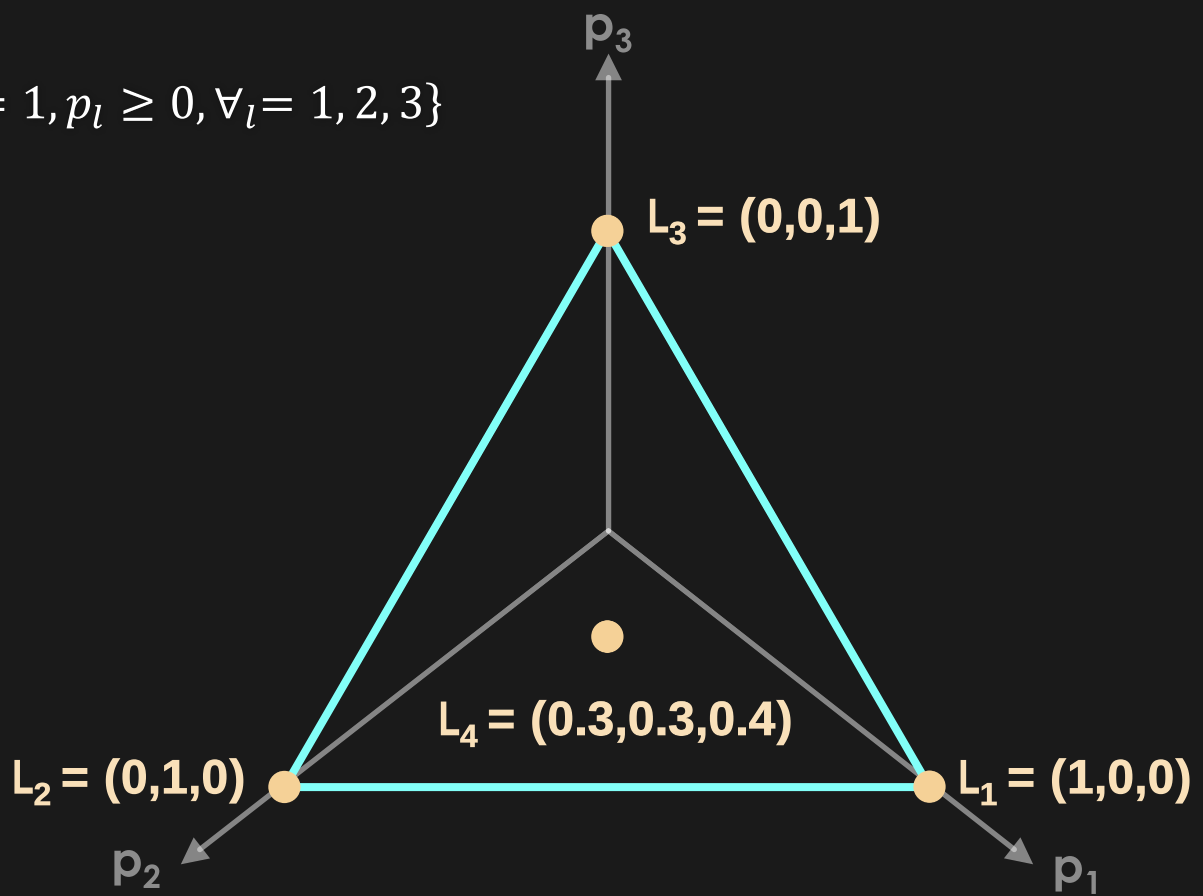
$$\sum_n p_n = 1$$

Choice Under Uncertainty: Simple Lottery

- 3 Outcome Cases

$$N = 3, \qquad \{a_1, a_2, a_3\}$$
$$\{(p_1, p_2, p_3) | p_1 + p_2 + p_3 = 1, p_l \geq 0, \forall_l = 1, 2, 3\}$$

- $\boxed{L_1 = (1,0,0)}$
- $\boxed{L_2 = (0,1,0)}$ **Degenerated Lotteries**
- $\boxed{L_3 = (0,0,1)}$
- $L_4 = (0.3,0.3,0.4)$
- A Simple Lottery can be represented geometrically as a point in the N-1 dimensional simplex



Choice Under Uncertainty: Compound Lottery

- There's a Package of Games (Lotteries)
- L_A: Roll a die

$$A = \{1,2,3,4,5,6\}; \quad L_A = \{1/6, 1/6, 1/6, 1/6, 1/6, 1/6\}$$

- L_B: Draw a Card from 1 ~ 10

$$B = \{1,2,3,4,5,6,7,8,9,10\}; \quad L_B = \{1/10, 1/10, 1/10, 1/10, 1/10, 1/10, 1/10, 1/10, 1/10, 1/10\}$$

- L_A and L_B have different dimension so we cannot compare

$$A' = \{1,2,3,4,5,6,7,8,9,10\}; \quad L'_A = \{1/6, 1/6, 1/6, 1/6, 1/6, 1/6, 0,0,0,0\}$$

- Tossing a Coin to Choose a Game (A or B) - ***<u>In a situation that Randomly Choosing Game</u>***

$$Q = \{L_A, L_B; 1/2, 1/2\}$$

Choice Under Uncertainty: Reduction of Compound Lottery

Compound Lottery Transformed into a Simple Lotter with 10 Possible Outcomes

- L_A: Roll a die

$$A' = \{1,2,3,4,5,6,7,8,9,10\}; \quad L'_A = \{{}^1/_6, {}^1/_6, {}^1/_6, {}^1/_6, {}^1/_6, {}^1/_6, 0,0,0,0\}$$

- L_B: Draw a Card from 1 ~ 10

$$B = \{1,2,3,4,5,6,7,8,9,10\}; \quad L_B = \{{}^1/_{10}, {}^1/_{10}, {}^1/_{10}, {}^1/_{10}, {}^1/_{10}, {}^1/_{10}, {}^1/_{10}, {}^1/_{10}, {}^1/_{10}, {}^1/_{10}\}$$

- Tossing a Coin to Choose a Game (A or B) - ***<u>In a situation that Randomly Choosing Game</u>***

$$Q = \{L_A, L_B; {}^1/_2, {}^1/_2\}$$

- $P(1) = {}^1/_2 \cdot {}^1/_6 + {}^1/_2 \cdot {}^1/_{10} = {}^8/_{60}$
- $P(10) = {}^1/_2 \cdot 0 + {}^1/_2 \cdot {}^1/_{10} = {}^3/_{60}$
- Now,

$$Q = \{1,2,3,4,5,6,7,8,9,10\}; \quad L_Q = \{{}^8/_{60}, {}^8/_{60}, {}^8/_{60}, {}^8/_{60}, {}^8/_{60}, {}^8/_{60}, {}^3/_{60}, {}^3/_{60}, {}^3/_{60}, {}^3/_{60}\}$$

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