



ECON 207 Exam Tutorial

Intermediate Microeconomics: Households and Government

TODAY

Four examinable topics, each with past exam questions

01

Risk and uncertainty

Expected utility, insurance, diversification, information, flexibility

02

Asymmetric information

Adverse selection, moral hazard, signals, screening, the contract game

03

Transaction costs

Coase, property rights, the Native Land Court

04

General equilibrium

Linked markets, Edgeworth box, welfare theorems

01

Risk and uncertainty

Why risk-averse people buy insurance and diversify

The shape of the utility curve sets risk attitude

Expected value $E(I) = \sum p_i \times I_i$

Expected utility $E(U) = \sum p_i \times U(I_i)$

Risk averse

Concave curve

Diminishing marginal utility of income.
Prefers a sure $E(I)$ to the gamble:
 $U(E(I)) > E(U)$.

Risk neutral

Straight line

Constant marginal utility. Cares only
about expected value: indifferent to a
fair gamble.

Risk loving

Convex curve

Increasing marginal utility. Prefers the
gamble to its expected value.

A **fair gamble** has expected value equal to its cost (expected net gain of zero). Played many times, gains and losses average out towards zero.

Drawing the insurance diagram

1 • Expected utility lies on the chord

Join $U(\text{bad})$ and $U(\text{good})$. $E(U)$ is the chord's height at $E(I)$.

2 • Fair insurance gives $U(E(I))$

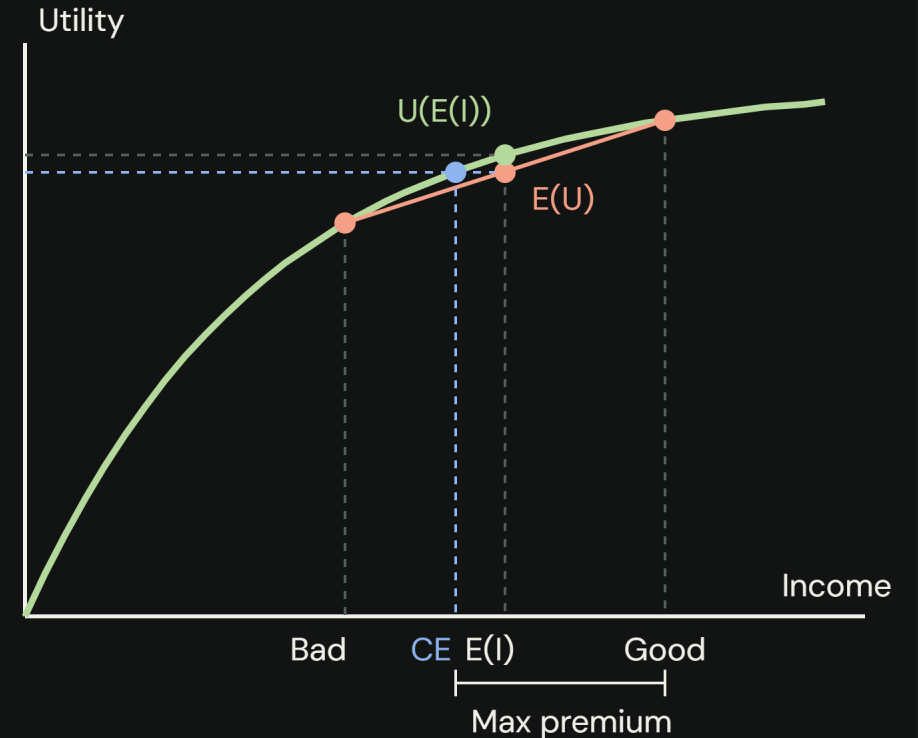
Fair premium = expected loss. Income becomes certain at $E(I)$, on the curve, above $E(U)$.

3 • Certainty equivalent (CE)

Read across from $E(U)$ to the curve. A sure CE gives the same utility as the gamble.

$$\text{Risk premium} = E(I) - \text{CE}$$

$$\text{Max premium} = \text{Good income} - \text{CE}$$



Four ways to reduce uncertainty

1 Insurance

Pay a premium for a certain outcome. Insurers charge above the fair premium to cover costs and profit; the market suffers from adverse selection and moral hazard.

2 Diversification

Spread risk across several options. Same expected value, lower chance of the worst outcome, so higher expected utility. Doesn't work for all-or-nothing choices.

3 Information

Pay for information (e.g. an AA check on a used car) when its benefit exceeds its cost. The more uncertain the situation, the more valuable information is — for every risk type.

4 Flexibility

Avoid being tied to one course of action so you can adjust as the future unfolds — e.g. an options contract: the right, not the obligation, to buy at a set price.

PROSPECT THEORY (KAHNEMAN AND TVERSKY)

People are more sensitive to losses than to gains: risk averse over gains, but willing to gamble to avoid a sure loss.

Dwight the beet grower

Income \$80,000 with no flood

Flood halves the crop → \$40,000

50% chance of a flood

(b) What is Dwight's expected income?

(c, d) Show $U(\$80,000)$, $U(\$40,000)$ and the utility of expected income on the diagram.

(e, f) What would a fair premium cost? Show his utility after paying it, labelled "f".

(g) He grows beets (\$40,000, 50% flood risk halves it) and daffodils (\$40,000, 50% wind risk halves it). Show and explain why he gets more utility than growing only beets.

WORKED SOLUTION · (B)–(F)

Fair insurance moves Dwight from the chord to the curve

(B) EXPECTED INCOME

$$0.5 \times 80,000 + 0.5 \times 40,000 \\ = \$60,000$$

(C, D) ON THE DIAGRAM

Mark $U(40k)$ and $U(80k)$ on the curve and join them. $U(60k)$ is on the curve, above the chord.

(E) FAIR PREMIUM

$$\text{Expected loss} = 0.5 \times 40,000 \\ = \$20,000$$

(F) UTILITY "F"

Certain income $80,000 - 20,000 = 60,000$, so $f = U(60k)$ on the curve: higher than $E(U)$ on the chord.

Diversifying: same expected income, less risk

Outcome	Income	Prob.
No flood, no wind	80,000	0.25
One crop damaged	60,000	0.50
Both damaged	40,000	0.25
Expected	60,000	

EXPECTED UTILITY

Beets only:

$$0.5 \cdot U(80) + 0.5 \cdot U(40)$$

Diversified:

$$0.25 \cdot U(80) + 0.5 \cdot U(60) + 0.25 \cdot U(40)$$

HOW TO DRAW AND EXPLAIN IT

At $E(I) = \$60,000$, mark the new $E(U)$ **halfway between** the old $E(U)$ on the chord and $U(60k)$ on the curve. Half the probability now sits on the certain-looking middle outcome, so the chance of the worst result falls from 50% to 25%. Lower spread with the same mean means higher expected utility for a risk-averse grower.

The game show coin toss

A contestant with a \$1,000 prize pool can toss a fair coin: win and it doubles to \$2,000, lose and they get nothing.

- (i) What is the expected return from tossing?
- (ii) If they choose to toss, what does that say about their attitude to risk?
- (iii) Instead they bet \$500 on each of two independent tosses. Complete the table of outcomes.
- (iv) Why would a risk-averse person prefer two \$500 bets to one \$1,000 bet?
- (v) Distinguish flexibility from diversification.

WORKED SOLUTION

Splitting the bet halves the chance of losing it all

(I) EXPECTED RETURN

$$0.5 \times 2,000 + 0.5 \times 0 \\ = \$1,000 \rightarrow \text{net gain } \$0$$

(II) ATTITUDE

A fair gamble: only a risk-neutral or risk-loving person takes it. A risk-averse person keeps the sure \$1,000.

(IV) WHY PREFER TWO BETS

Same expected value, but the chance of \$0 falls from 50% to 25% (SD \$1,000 $\rightarrow$ \$707). Less variability = higher expected utility.

(III) EACH CELL: PROBABILITY 0.25

Toss 1 ↓ / 2 →	Win	Lose
Win	\$2,000 (EV \$500)	\$1,000 (EV \$250)
Lose	\$1,000 (EV \$250)	\$0 (EV \$0)

Total expected value still \$1,000.

(V) FLEXIBILITY VS DIVERSIFICATION

Diversification spreads risk across several bets now; flexibility keeps options open to adjust later.

Quick-fire questions from both papers

Question	Answer	Why
Coin: heads +\$5, tails -\$1. Expected value?	\$2	$0.5 \times 5 - 0.5 \times 1$
\$15,000 cover, 10% claim chance. Fair price?	\$1,500	$0.1 \times 15,000$
Decreasing marginal utility of income is...	Risk averse	Concave utility
A fair gamble played many times...	Approaches zero	Expected gain is 0
Risk-averse people diversify to...	Reduce variability	Mean unchanged
Prospect theory: people are...	More sensitive to losses	Loss aversion
Risk aversion is rational because...	$EV \neq \text{expected utility}$	Utility is concave

02

Asymmetric information

When one side knows more than the other

ASYMMETRIC INFORMATION

Hidden type before the deal, hidden action after

BEFORE THE CONTRACT

Adverse selection

One side has hidden information about quality or risk. Either buyer or seller can be the better-informed party. Bad types crowd out good ones (lemons; high-risk insurance buyers).

AFTER THE CONTRACT

Moral hazard

Hidden action: once protected, people take less care because they don't bear the full cost. An insured driver who stops maintaining the car.

FIXES

Signalling and screening (next slide) · warranties and reputation · deductibles and co-payments · monitoring · contracts with penalties

ASYMMETRIC INFORMATION

Signals come from the informed side; screens from the uninformed

Signalling

The informed party acts to reveal its type: an applicant's degree.

Screening

The uninformed party acts to sort types: a firm's interview, GPA check or reference.

Signal	Definition	Example
Naive	Costs everyone the same	Asking a seller if the car is good
Weak	Cost differs by type, but the signal is inaccurate	Wearing a suit to an interview
Strong	Cost differs by type, and the signal is accurate	Education

If firms can't tell workers apart they pay everyone the same: a **pooling equilibrium**. Signals can turn it into a **separating equilibrium**, where productive workers earn more.

Hiring a new employee

(a) Describe the information problem for the firm and the employee (2)

Firm: can't see the applicant's true ability before hiring (adverse selection), nor their effort once hired (moral hazard: less incentive to work hard). Employee: doesn't know the true pay prospects or working conditions.

(b) How is an interview a screening device? (2)

The uninformed firm takes the action. Questions and tasks reveal skills and fit that the applicant might otherwise hide, helping sort high-ability from low-ability applicants.

(c) Weak vs strong signal, with examples (2)

Weak: cost differs by type but it's inaccurate — wearing a suit. Strong: costlier for low-ability types and accurate — a degree with good grades.

Oxford's “exceptionally high standards of entry”

Average UCAS score 571; A*A*A* to AAA at A level; most sit a written test or submit work, plus interviews with college tutors.

(I) SIGNAL FOR THE UNIVERSITY

Tells applicants and employers its graduates are high quality, attracting strong applicants and deterring weaker ones.

(II) SIGNAL FOR STUDENTS

Getting in is hard, so admission signals high ability to future employers.

(III) SCREENING DEVICE

The written test or tutor interview: the university gathers information to sort applicants and filter out weaker ones.

(IV) THE DIFFERENCE

A signal is sent by the party with information about its own quality; a screen is used by the party lacking information to identify others' quality.

The contract game with a fine

A buyer and a seller can't trade simultaneously. F is a fine for non-delivery or non-payment. Payoffs are utility in dollars, seller first.

Seller ↓ · Buyer →	Pay	Don't pay
Deliver	$(4, 3)$	$(F - 10, 14 - F)$
Don't deliver	$(12 - F, F - 12)$	$(0, 0)$

- (d) With no fine ($F = 0$), what is the outcome?
- (e) Give a fine that would be effective, and explain.
- (f) How could insurance against non-delivery cause moral hazard for buyers?

WORKED SOLUTION

Without a fine the market fails; above \$12 it works

(D) $F = 0$

Seller: don't deliver is dominant ($12 > 4$ if buyer pays; $0 > -10$ if not).

Buyer: don't pay is dominant ($14 > 3$; $0 > -12$).

(Don't deliver, Don't pay) = (0, 0)

No trade, although (4, 3) would make both better off.

(E) E.G. $F = \$15$

Deliver / Pay (4, 3)

Deliver / Don't (5, -1)

Don't / Pay (-3, 3)

Don't / Don't (0, 0)

Deliver now beats not delivering ($4 > -3$, $5 > 0$); paying beats not paying ($3 > -1$, $3 > 0$).

Any $F > 12$: strong dominant strategy to trade

(F) MORAL HAZARD

Insured buyers bear less of the cost of non-delivery, so they take less care: skipping seller ratings or buying from risky sellers.

Quick-fire questions from both papers

Question	Answer	Why
Adverse selection occurs when...	Either buyer or seller has an information advantage	Hidden type, either side
Moral hazard in auto insurance means...	Owner stops maintaining the car	Behaviour changes after the contract
Best screening device in a moral hazard model?	Reference from a previous employer	Reveals past on-the-job effort
Benefits enjoyed without paying are...	A positive externality	Not adverse selection

03

Transaction costs

Coase, property rights and the Native Land Court

TRANSACTION COSTS

Using a market isn't free

RONALD COASE, 1937

Why firms exist

Trading through the market costs something — searching, and making and enforcing contracts. Firms and other institutions exist to reduce these transaction costs.

e.g. Uber Eats lowers the cost of getting food delivered, so both sides gain.

Transaction costs include

- Locating buyers and sellers
- Information on availability, quality, reliability and price
- Negotiating and concluding a price
- Measurement and contracting costs
- Legal costs
- Monitoring and enforcement

CONTRACTS ARE NEVER COMPLETE

Uncertainty and complexity · bounded rationality (good enough, not best) · asymmetric or hidden information. Courts enforce when “fair and square” breaks down.

Two views of land, one court

Pre-colonial Māori

- A relationship with the land: whenua means land and placenta
- Guardianship rather than ownership
- Land used collectively; no individual could alienate it
- Rights to use resources and preserve them for future generations

European / Locke

- Individual, sole property rights shown by legal title
- Land can be bought and sold (alienated)
- Land not used productively for profit seen as “waste land”

WHAT THE COURT DID

Changed Māori land's legal status to make it easier to sell, lowering transaction costs for buyers. Title went to as few as 10 owners, any of whom could sell. About 95% of NZ's land left Māori hands.

Native Land Court answers

Question	Answer
(a) Asymmetric information (1)	The court was European-centric; Māori were often unaware of the substantial transaction costs of using it
(b) A transaction cost (1)	Travelling to court and staying in town through long hearings; surveying the land
(c) Locke vs Māori (2)	Locke: individuals hold sole, sellable property rights. Māori: collective guardianship; no individual could alienate the land
(d) Second welfare theorem (3)	Any Pareto-efficient outcome can be reached by a lump-sum redistribution, then letting the market work — e.g. Treaty settlements as lump-sum transfers to address the wealth gap
(e) Edgeworth box, no drawing (2)	Redistribution moves the starting endowment towards Māori; trade then ends on the contract curve where Māori are on a higher indifference curve — still efficient

04

General equilibrium

Linked markets, Edgeworth boxes and efficiency

GENERAL EQUILIBRIUM

When markets are linked, solve them together

Partial equilibrium

Price and output in one market, holding other prices fixed.
Still includes both buyers and sellers.

General equilibrium

Prices and outputs in several markets at once. Needed when goods are linked as substitutes or complements.

METHOD FOR THE 8-MARK CALCULATION

1. Set $Q^D = Q^S$ in each market → 2. Rearrange into two equations in the two prices → 3. Solve by substitution → 4. Put prices back into supply for quantities → 5. Check with demand

Sign on the **other** good's price in demand: + substitutes · - complements · none: independent

Potatoes and bread

$$Q^D \text{ potatoes} = 50 - 20P_p + 10P_B$$

$$Q^S \text{ potatoes} = -20 + 20P_p$$

$$Q^D \text{ bread} = 40 - 20P_B + 5P_p$$

$$Q^S \text{ bread} = -10 + 40P_B$$

- (a) Find the equilibrium prices and quantities. (8)
- (b) How do the equations show they are substitutes? (3)
- (c) On the Edgeworth box, why is point I exchange efficient but G not? (3)
- (d) What does the contract curve show? (1)

WORKED SOLUTION · (A) AND (B)

Two equations, two unknown prices

STEP 1 · SET $Q^D = Q^S$

$$50 - 20P_p + 10P_B = -20 + 20P_p$$

$$\rightarrow 70 = 40P_p - 10P_B \quad (1)$$

$$40 - 20P_B + 5P_p = -10 + 40P_B$$

$$\rightarrow 50 = 60P_B - 5P_p \quad (2)$$

STEP 2 · SUBSTITUTE

$$(1): P_p = 1.75 + 0.25P_B$$

$$(2): 50 = 60P_B - 8.75 - 1.25P_B$$

$$58.75 = 58.75P_B$$

$$P_B = 1, P_p = 1.75 + 0.25 = 2$$

STEP 3 · QUANTITIES

$$Q_p = -20 + 20(2) = 20$$

$$Q_B = -10 + 40(1) = 30$$

$$P_p = \$2, Q_p = 20 \cdot P_B = \$1, Q_B = 30$$

(B) SUBSTITUTES

The other good's price enters each demand with a **positive** sign (+10P_B, +5P_p): when bread gets dearer, people buy more potatoes, and vice versa.

Same method, ties and jackets

GIVEN

$$Q^D_T = 410 - 5P_T - 2P_J$$

$$Q^S_T = -60 + 3P_T$$

$$Q^D_J = 295 - P_T - 3P_J$$

$$Q^S_J = -120 + 2P_J$$

SOLUTION

$$\text{Ties: } 470 = 8P_T + 2P_J$$

$$\text{Jackets: } 415 = P_T + 5P_J \rightarrow P_T = 415 - 5P_J$$

$$470 = 8(415 - 5P_J) + 2P_J$$

$$38P_J = 2,850 \rightarrow P_J = 75, P_T = 40$$

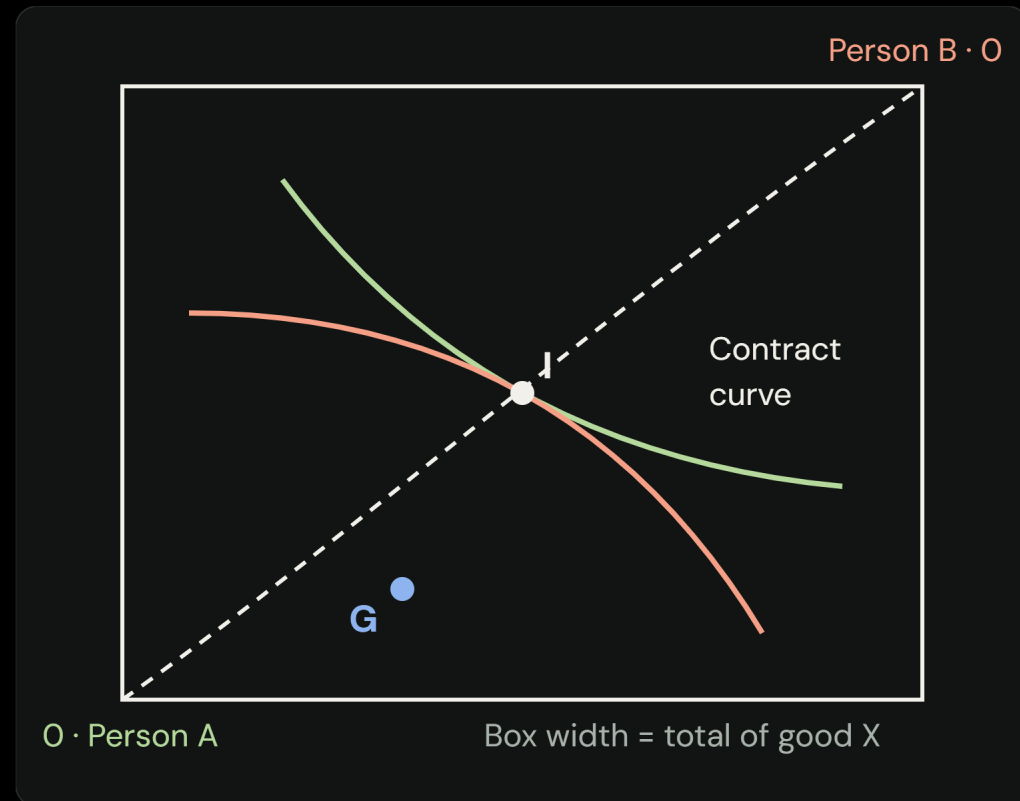
$$Q_T = -60 + 120 = 60$$

$$Q_J = -120 + 150 = 30$$

(II) COMPLEMENTS

Each demand falls when the other good's price rises ($-2P_J, -P_T$): ties and jackets are bought together.

The Edgeworth box and exchange efficiency



Point I: exchange efficient

The two indifference curves are tangent, so $MRS_A = MRS_B$. No trade can make one better off without hurting the other.

Point G: not efficient

Off the contract curve: the indifference curves through G cross, so MRS differ. Moving into the lens between them makes both better off: a Pareto improvement.

(d) The contract curve

The set of all Pareto-efficient allocations: every point where the two people's indifference curves are tangent.

The two welfare theorems

FIRST

Markets are efficient

With no market failures, a competitive equilibrium is Pareto efficient: it lies on the contract curve. Says nothing about fairness.

SECOND

Redistribute, then let markets work

Any Pareto-efficient allocation can be reached as a competitive equilibrium by redistributing initial endowments with lump-sum transfers, then letting people trade.

LUMP-SUM PRINCIPLE

A lump-sum tax (or an income tax) reduces utility less than a tax on a particular good, because it doesn't distort relative prices.

Quick-fire questions from both papers

Question	Answer	Why
A has 3x, 2y, $MRS = 5x/3y$; B has 5x, 6y, $MRS = 3x/y$. Efficient?	Yes	$MRS_A = 15/6 = 2.5 = MRS_B = 15/6$
John has 6 X, Jane 3 X. Box width?	9 units	Total endowment
Totals 20 and 50; one person has 10 of good 1. The other has?	10 of good 1	$20 - 10$
Cobb–Douglas contract curve is...	Tangency points	MRS equal
Exchange efficiency means we...	Cannot make all better off by reallocating	On the contract curve
In a Pareto-efficient equilibrium...	Helping one hurts another	Definition
Many-person Pareto optimum: MRS is...	Identical for all	Tangency for every pair
Lump-sum principle: least-harmful tax is...	A tax on income	No relative price change



Questions?

Good luck in the ECON 207 exam