

Exercise walk-through

5.8

Von Thünen Model

AP Human Geography

Bid rent and competing land uses

Bid-rent theory considers how much users can pay for land at different locations. Agricultural bids depend on expected revenue, production costs and transport costs.

Near a market, reduced transport costs can support higher bids for some products. Expensive land does not itself make every intensive crop profitable.

Compare the competing uses and their cost structures rather than assuming one fixed outcome.

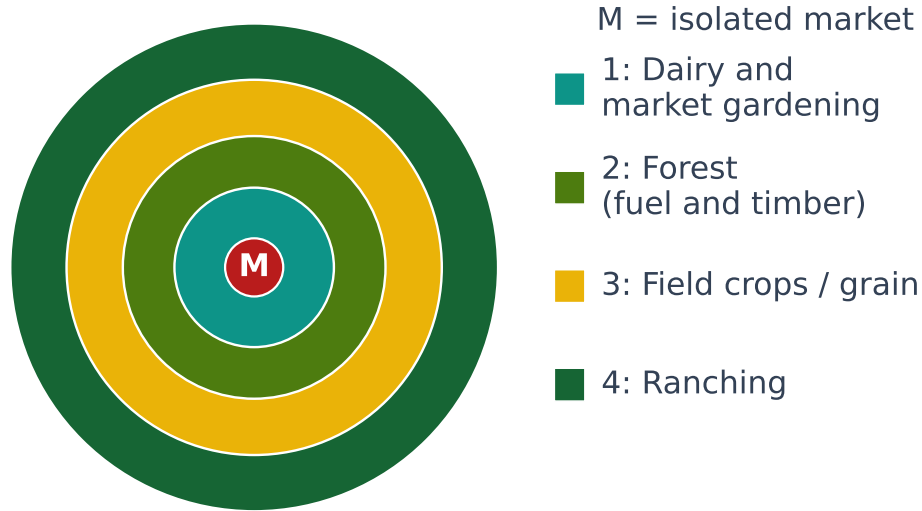
Von Thünen: assumptions before predictions

The simplified **von Thünen model** assumes one isolated market, uniform land and a simplified transport system. Farmers compete for land under those conditions.

Transport costs and perishability help explain the historical arrangement: dairy and market gardening, forest, field crops and ranching.

The rings are a model prediction, not a map that every modern city must match.

Historical land-use rings



Schematic: uniform land and transport; not a modern city map.

Read the rings under the stated assumptions; do not predict land use from distance alone.

Original two-crop model: attempt

Annual bid available for land rent:

$$R = M - td$$

Crop	M (dollars/ha/year)	t (dollars/ha/year/km)
A	600	10
B	360	2

M : margin before transport and land rent; t : transport cost per distance; d : distance in km.
Compare bids at 10 and 50 km. The numbers are invented, not observed dairy-farm data.

Bids at 10 kilometres: worked check

$$R = M - td$$

$$R_A(10) = 600 u - (10 u/\text{km})(10 \text{ km}) = 500 u$$

$$R_B(10) = 360 u - (2 u/\text{km})(10 \text{ km}) = 340 u$$

u = dollars per hectare per year. At 10 km, A can bid more for land. R is the amount available for land rent, not actual profit after paying that rent.

Exercises 2.1-2.2

2.1 State the main factor that determines land use in the Von Thünen model. [2]

2.2 Explain why perishable goods like dairy locate near the market. [2]

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2.1

- transport cost to the central market; perishability/weight of the product
-

2.2 Explain why perishable goods like dairy locate near the market. [2]

2.2

- they spoil quickly and are costly to transport; being close cuts transport time/cost/spoil

Exercise 2.3 (a)

2.3 A modern region uses refrigerated trucks and highways.

(a) State one Von Thünen assumption this breaks.

[1]

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[1]

(a)

- uniform transport / no roads / perishables must be near market

Exercise 2.3 (b)

2.3 A modern region uses refrigerated trucks and highways.

(b) Explain how it changes the ring pattern.

[1]

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(b) Explain how it changes the ring pattern.

[1]

(b)

- perishables can be grown farther out, so the neat rings break down

Exercises 3.1-3.2

3.1 In the Von Thünen model, ranching and livestock are located

[1]

☐

- A nearest the market
- B in the outermost ring
- C in the forest ring
- D at the exact centre

3.2 The Von Thünen model's central assumption is that transport cost rises with

[1]

☐

- A population
- B distance from the market
- C soil quality
- D rainfall

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3.1 B

- cheap-to-move, land-extensive ranching sits in the outer ring

3.2 The Von Thünen model's central assumption is that transport cost rises with

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- A population
- B distance from the market
- C soil quality
- D rainfall

3.2 B

- transport cost increases with distance to market

Exercise 3.3 (a)

3.3 Dairy farms cluster close to a city in the model.

(a) Explain why, using transport cost.

[1]

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3.3 Dairy farms cluster close to a city in the model.

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[1]

(a)

- milk is perishable and costly to move, so it is produced near the market

Exercise 3.3 (b)

3.3 Dairy farms cluster close to a city in the model.

(b) State one real-world factor the model ignores.

[1]

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(b)

- roads/rivers, refrigeration, varied terrain, or multiple markets