

Urban Economics

Prof. J. M. Pogodzinski
Lecture 9

Chapter 6

Land Rent: Introduction

- Smith, 1776. Value determined by cost of production. Land not produced, how is value determined? (Marx continued the tradition.)
 - Ricardo, 1821. Agricultural theory of land rent. Land is another factor of production. Rents determined by fertility of soil.
 - Von Thunen, 1826. Still agricultural, but rent determined by access to market.
 - Alonso, 1964. Theory of urban land rent, determined by access to workplace. Adapted from Von Thunen.
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Land Rent or Land Value?

- Most models are static. Rents do not change over time.

- In general, $Value = \sum_{t=0}^n \left\{ \frac{R_t}{(1+i)^t} \right\}$

- In equilibrium: t is infinite

$$Value = \sum_{t=0}^{\infty} \left\{ \frac{R}{(1+i)^t} \right\} = \frac{R}{i}$$

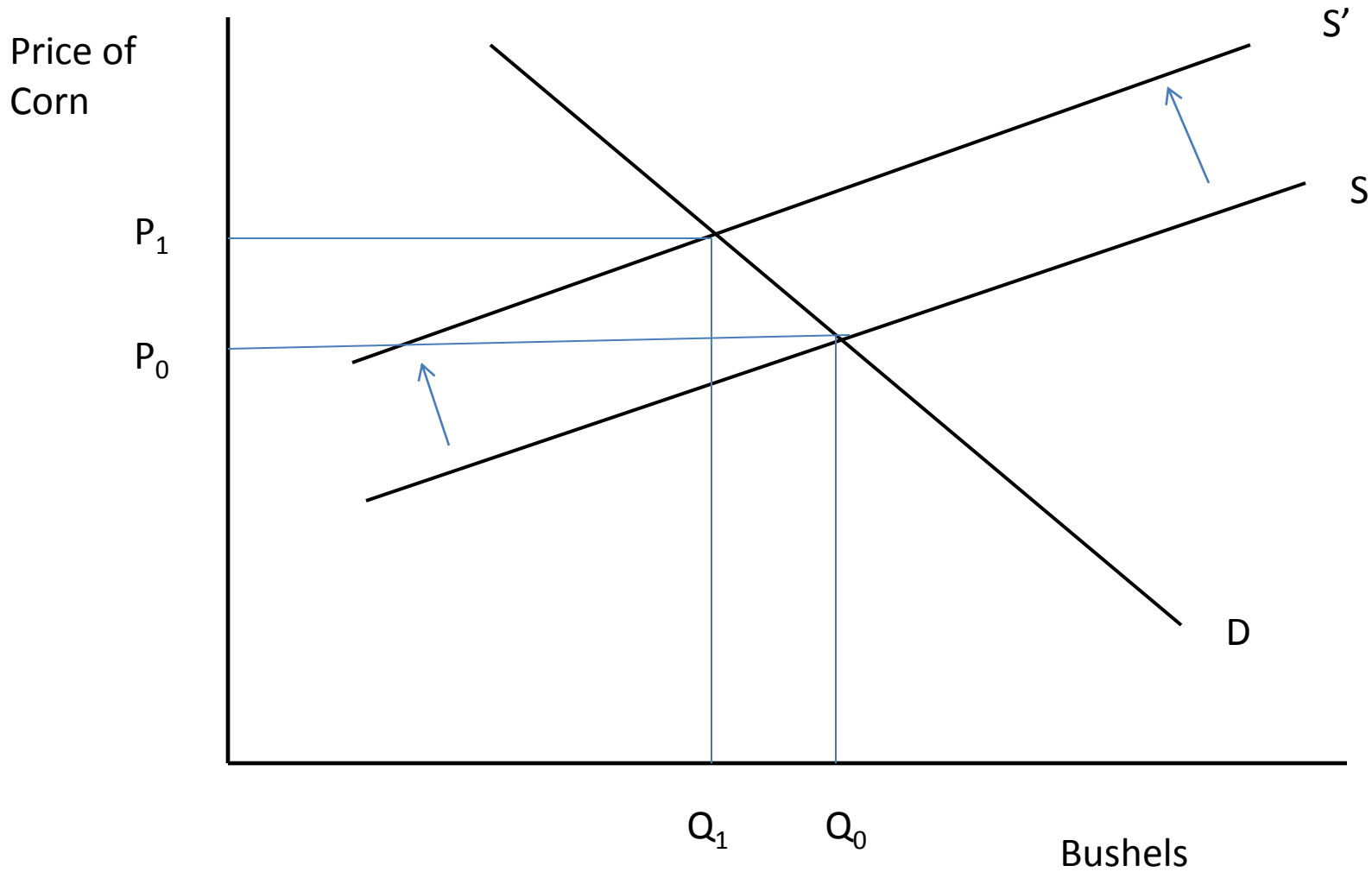
Excel Examples – Present Value (see Excel_Examples.xls)

r=	0.1	
Year	Cost/net return	Present Value
0	-\$1,000.00	-\$1,000.00
1	\$210.00	\$190.91
2	\$210.00	\$173.55
3	\$210.00	\$157.78
4	\$210.00	\$143.43
5	\$210.00	\$130.39
	50	-\$203.93
IRR=	1.6487%	

Ricardo, Land Rent and Soil Fertility

- Corn Laws introduced in England in 1815 when prices dropped after Napoleonic Wars. Tariffs on imported corn (wheat). Farmers were no better off than before, why?
 - Answer: increase in corn prices increased land rents, raised the value of land. Land rent goes up by the amount that assures that farmers – who rented land in England – continued to get zero profits. Only landowners gained.
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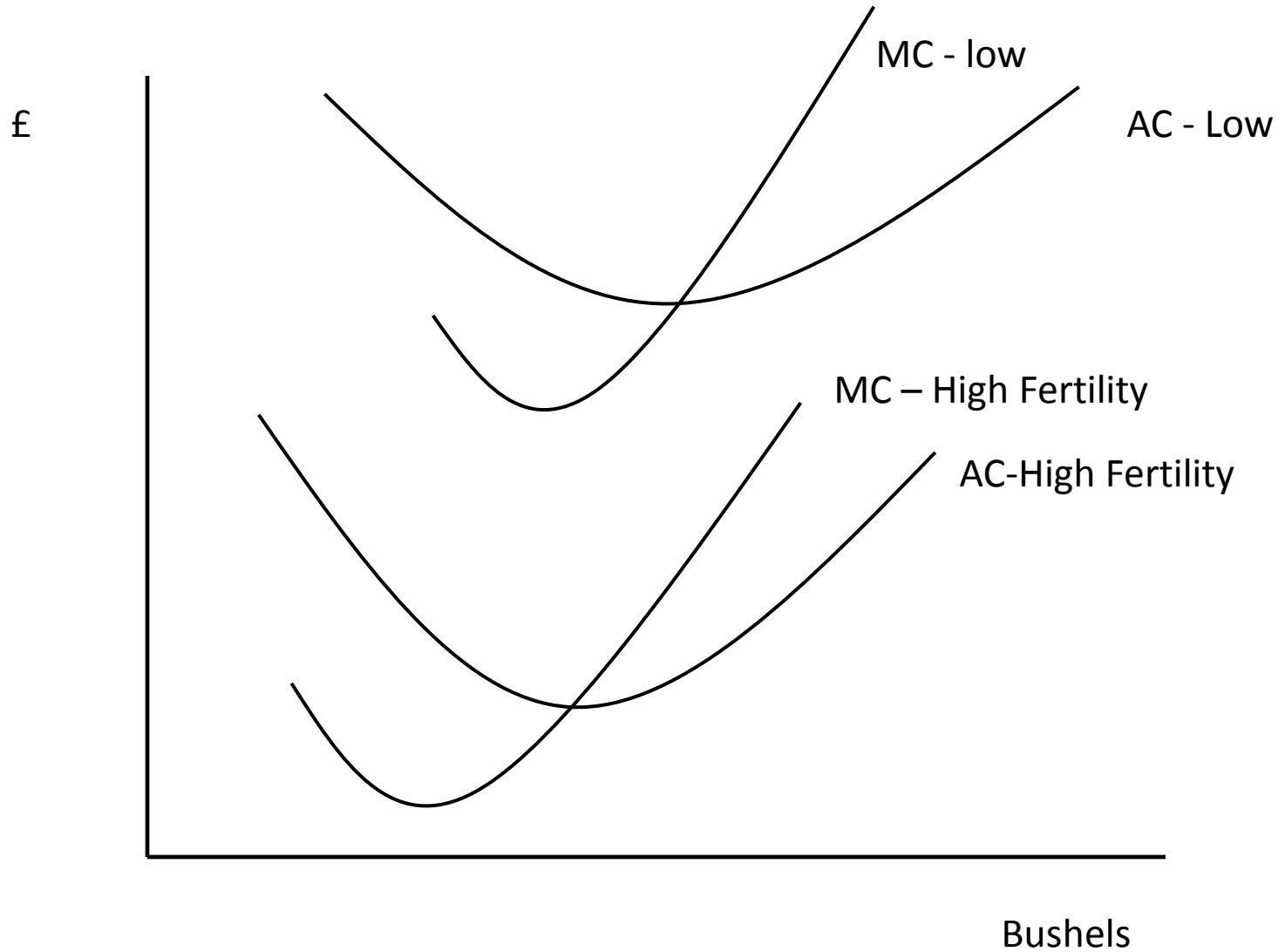
Tariff Raises Corn Prices



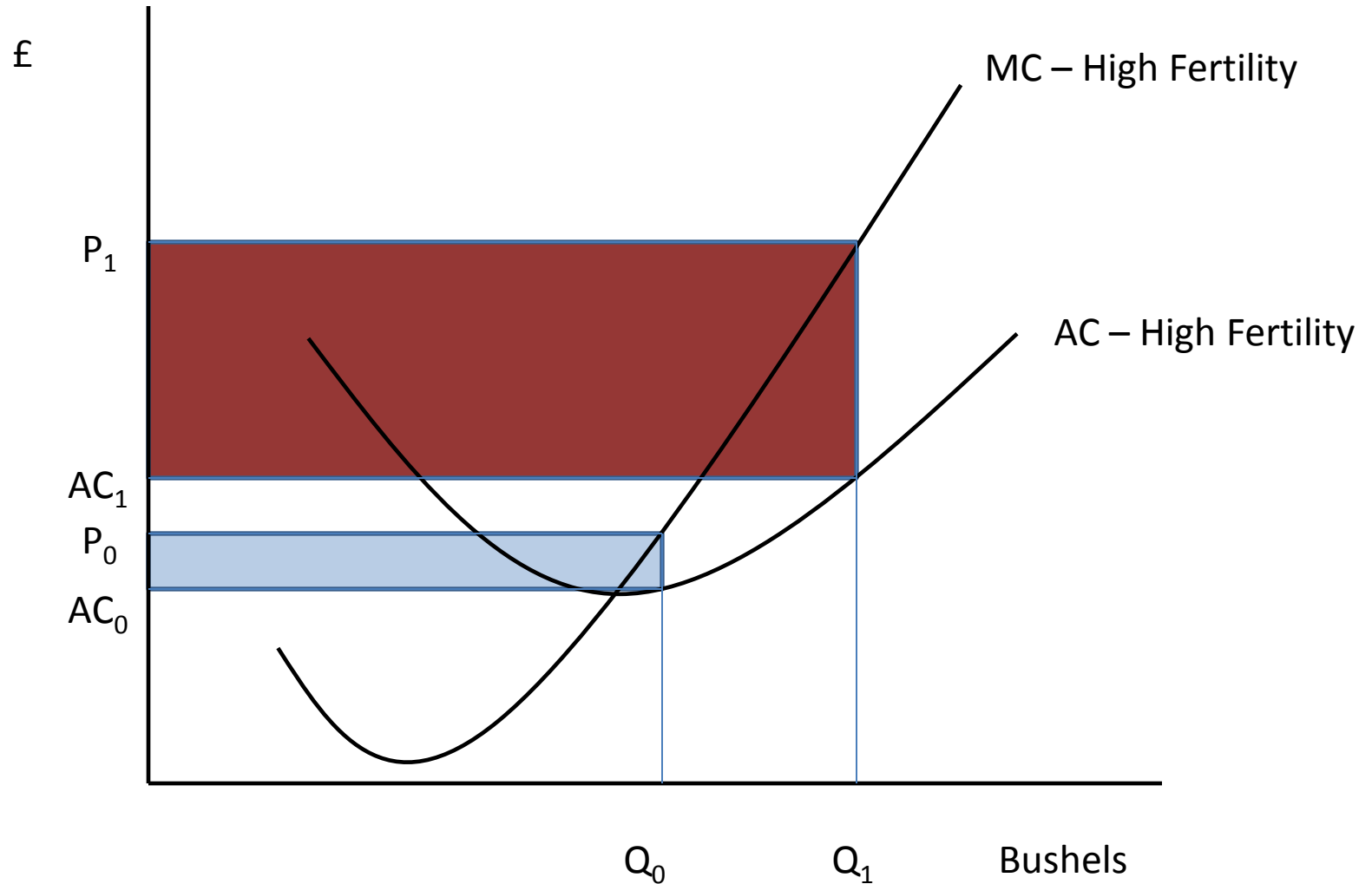
Ricardian Land Rent Model

- ❑ Corn prices determined in national market; taken as given by farmers. Price the same everywhere.
 - ❑ Zero economic profit. Free entry into farming.
 - ❑ Land varies in fertility
 - ❑ Landowners rent land to the highest bidder
 - ❑ Zero transport cost
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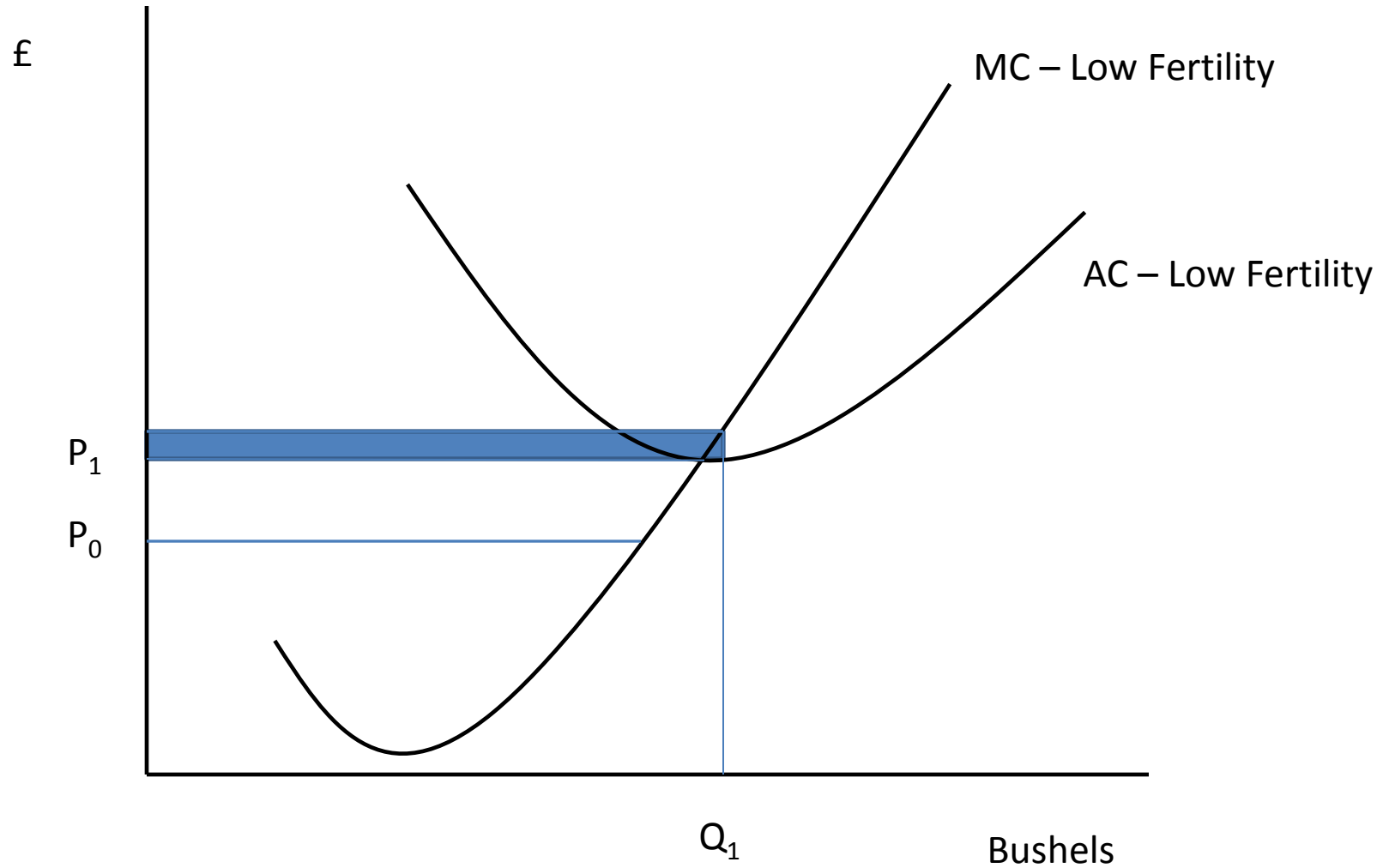
Higher Fertility Lowers Cost of Production



Higher Prices = Higher Land Rent



Higher Prices = More Land Used in Production



Leftover Principle

- In equilibrium, land rent equals the excess of total revenue over non-land costs – landowner gets the leftover
 - Increase in price of corn increases land rent to the point where farmers again have zero profits
 - Increase in price of corn brings more land into production
 - Price of land is high because price of corn is high; high land prices don't cause high corn prices
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Who Gains from Tariffs?

- Not farmers – zero profits before and after
 - Not consumers – they pay higher price for corn
 - Landowners – paid higher rents; land increases in value
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Von Thünen – Land Rent and Accessibility

- ❑ Corn is transported by farmer to central market town, farmer pays shipping cost
- ❑ All land is equally productive
- ❑ Price of corn and inputs is determined in national markets, so farmers take prices as given. Prices are the same in all locations.
- ❑ Free entry; zero profits in equilibrium.

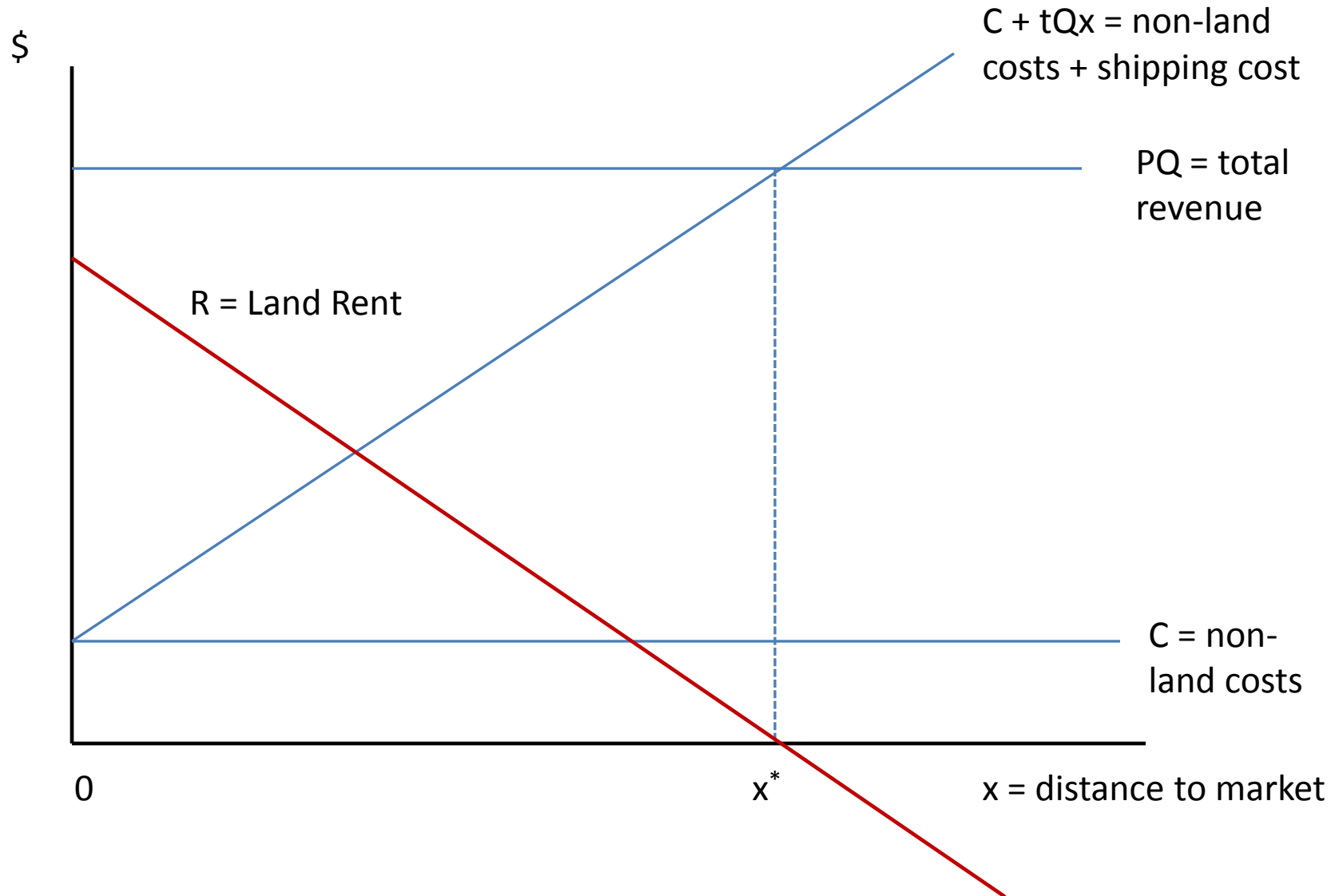
No substitution between land and other inputs in production

- Fixed inputs – one acre of land with fixed number of other inputs produce Q bushels of corn
 - $PQ = \text{Revenue}$
 - $C = \text{costs of non-land inputs}$
 - $R = \text{land rent per acre (use one acre)}$
 - $x = \text{distance to market}$
 - $t = \text{cost of shipping one bushel one mile}$
 - $tQx = \text{transport cost}$
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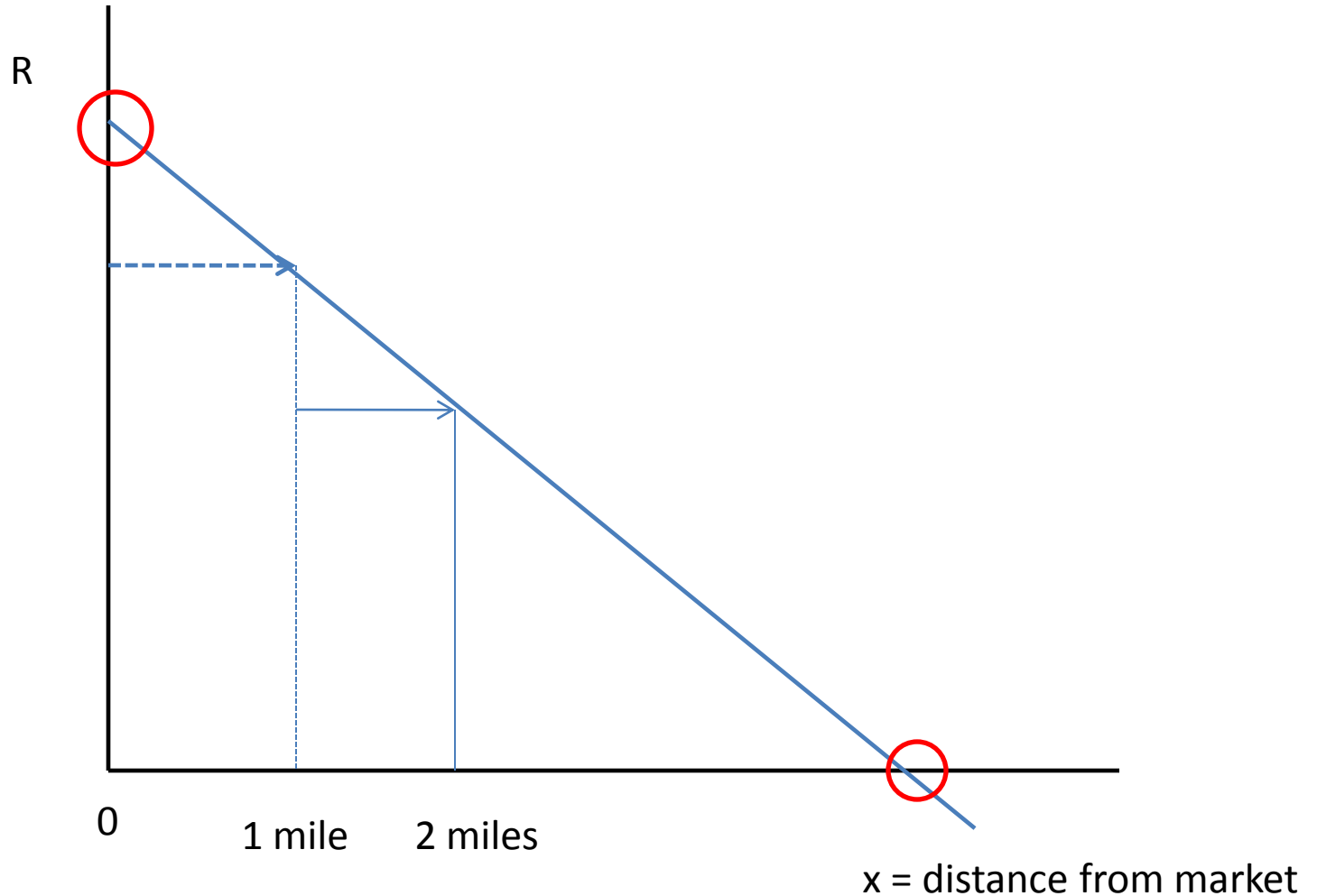
Bid-Rent Function

- The bid-rent function shows the maximum amount that will be paid for a unit of land at a given location
 - Profit = $PQ - C - tQx - R = 0$
 - Bid-Rent Function: $R = PQ - C - tQx$
 - Land rent declines with distance to marketplace because farmers are willing to pay more for land with lower shipping costs.
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Market Area = x^*



Bid-Rent Function Interpretation

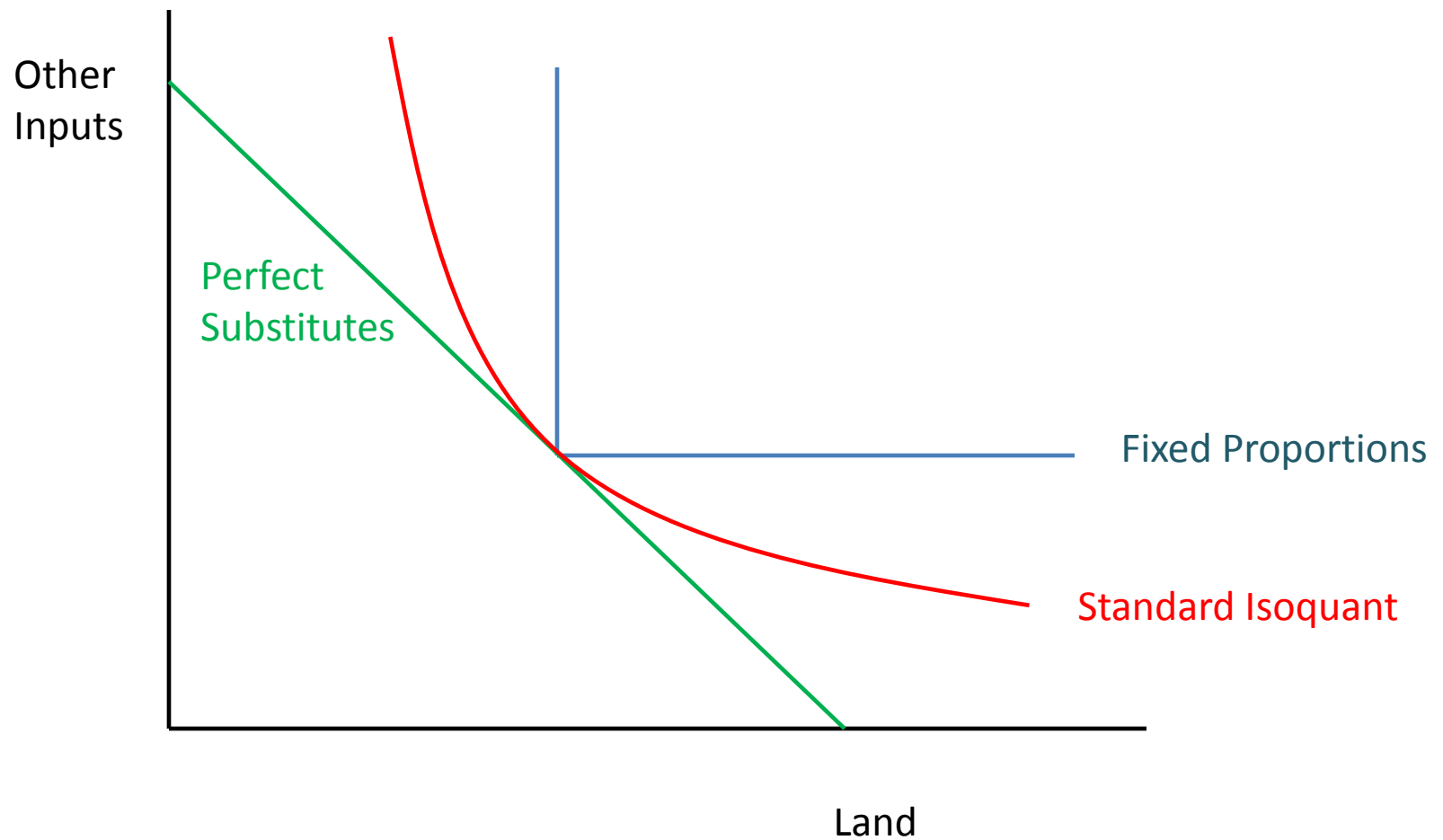


Bid-Rent Function with Substitution between Land and Other Inputs

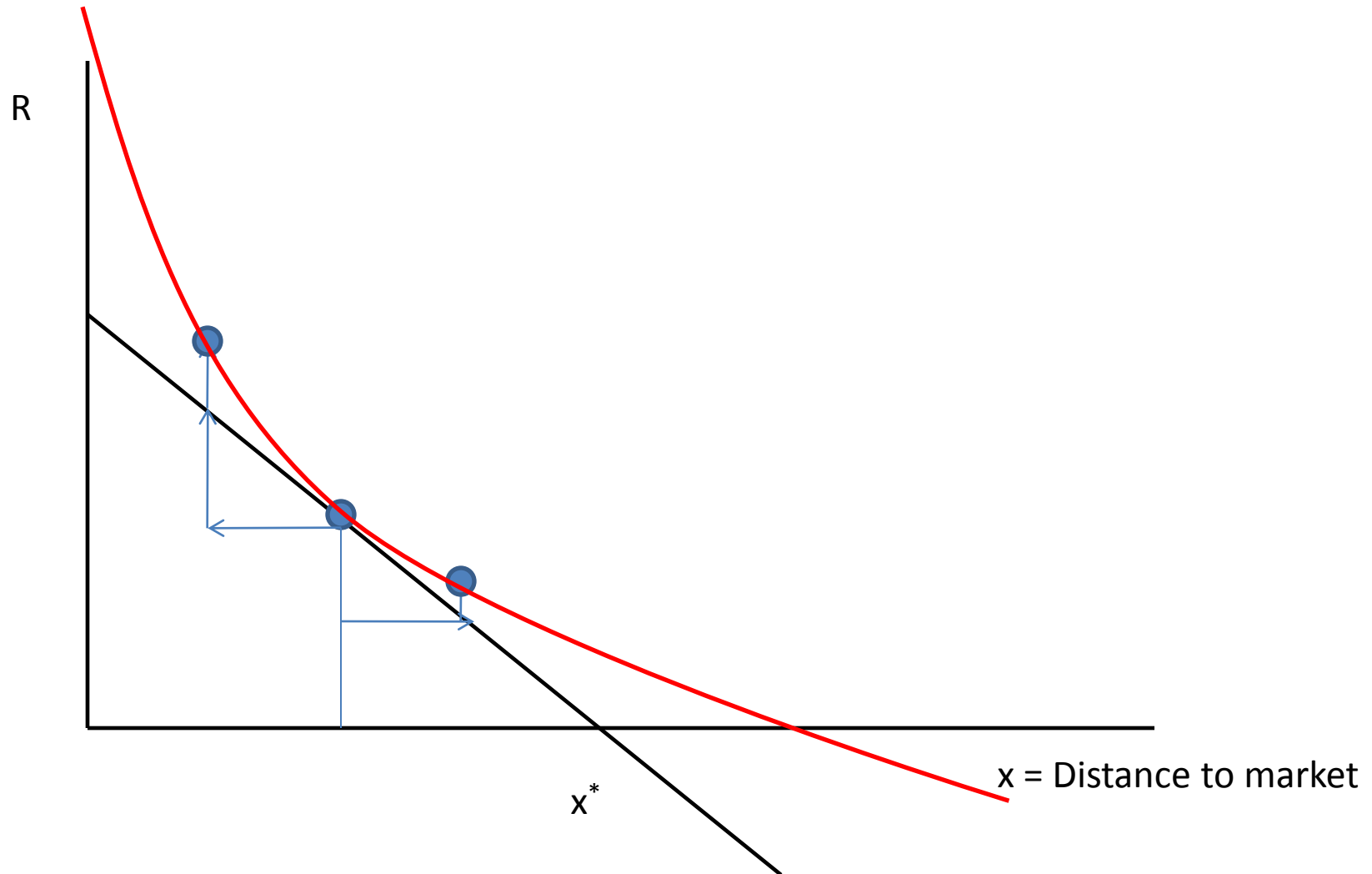
- L = Acres of Land
- Profit = $PQ - C - tQx - RL$
- Bid-Rent Function =

$$R = \frac{PQ - C - tQx}{L} = \left(\frac{PQ - C}{L} \right) - \left(\frac{tQ}{L} \right) x$$

Substitution between Land and Other Inputs in Production



Effect of Substitution Possibilities on Bid-Rent Function

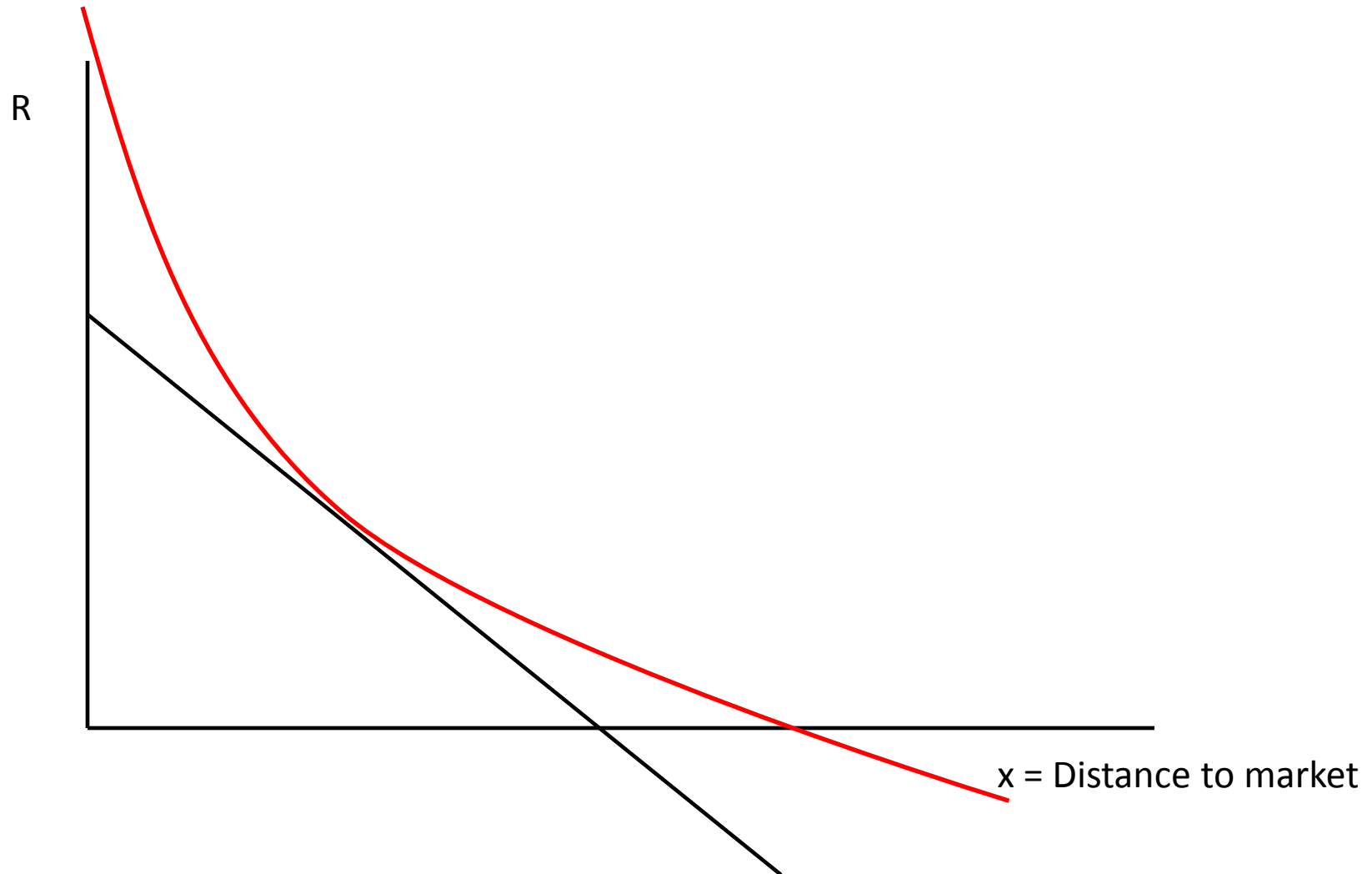


Bid-Rent Function with Substitution between Land and Other Inputs

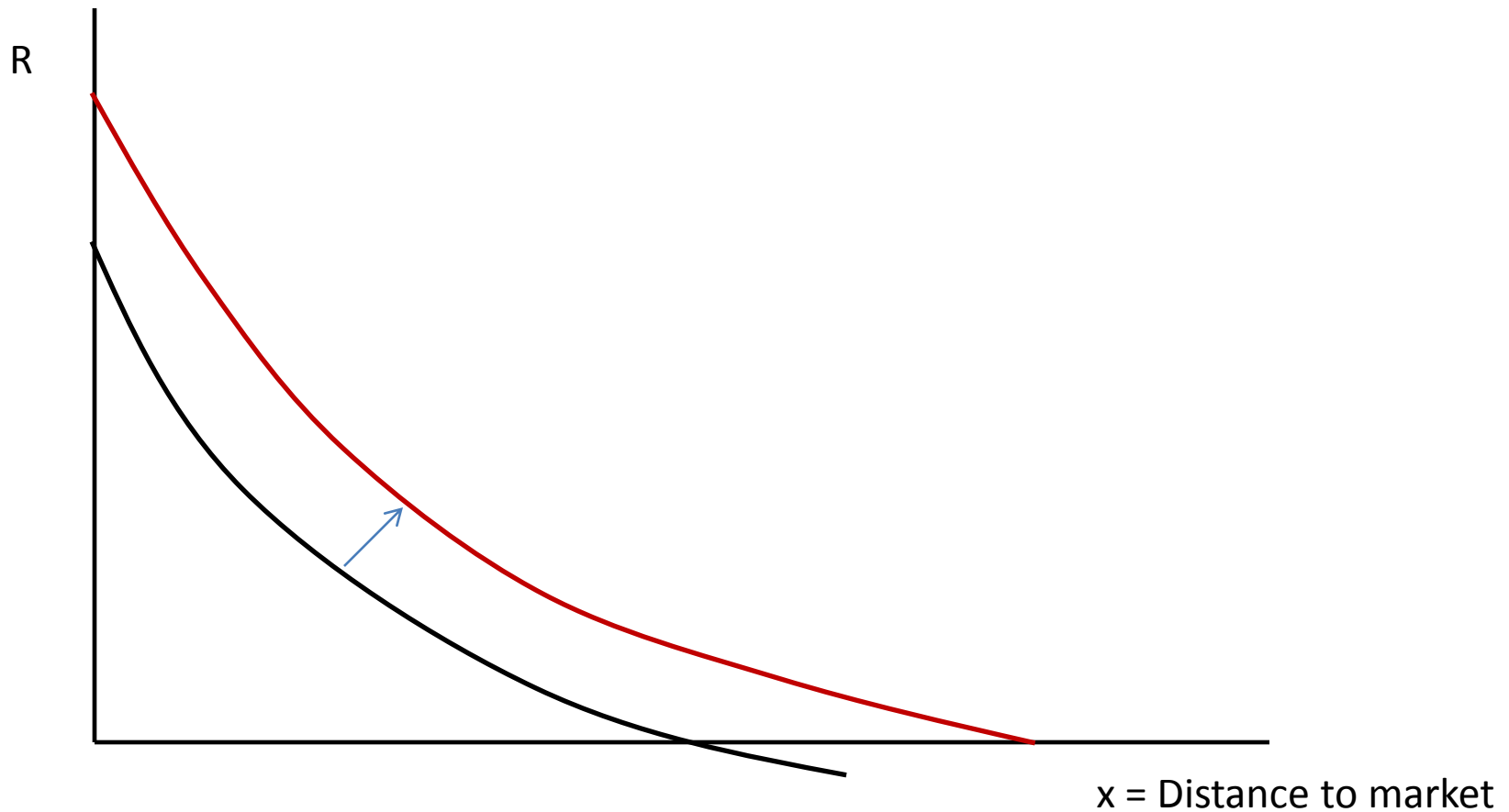
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Effect of Substitution Possibilities on Bid-Rent Function



Increase in Output Price (P) or Decline in Other Input Cost (C)



Decrease in Shipping Cost (t)

