Lecture 2

Early Concepts: Chicago School of Sociology and Classical Models of Economic Geography

2.3 Classical Models of Cities in Geography and Economics

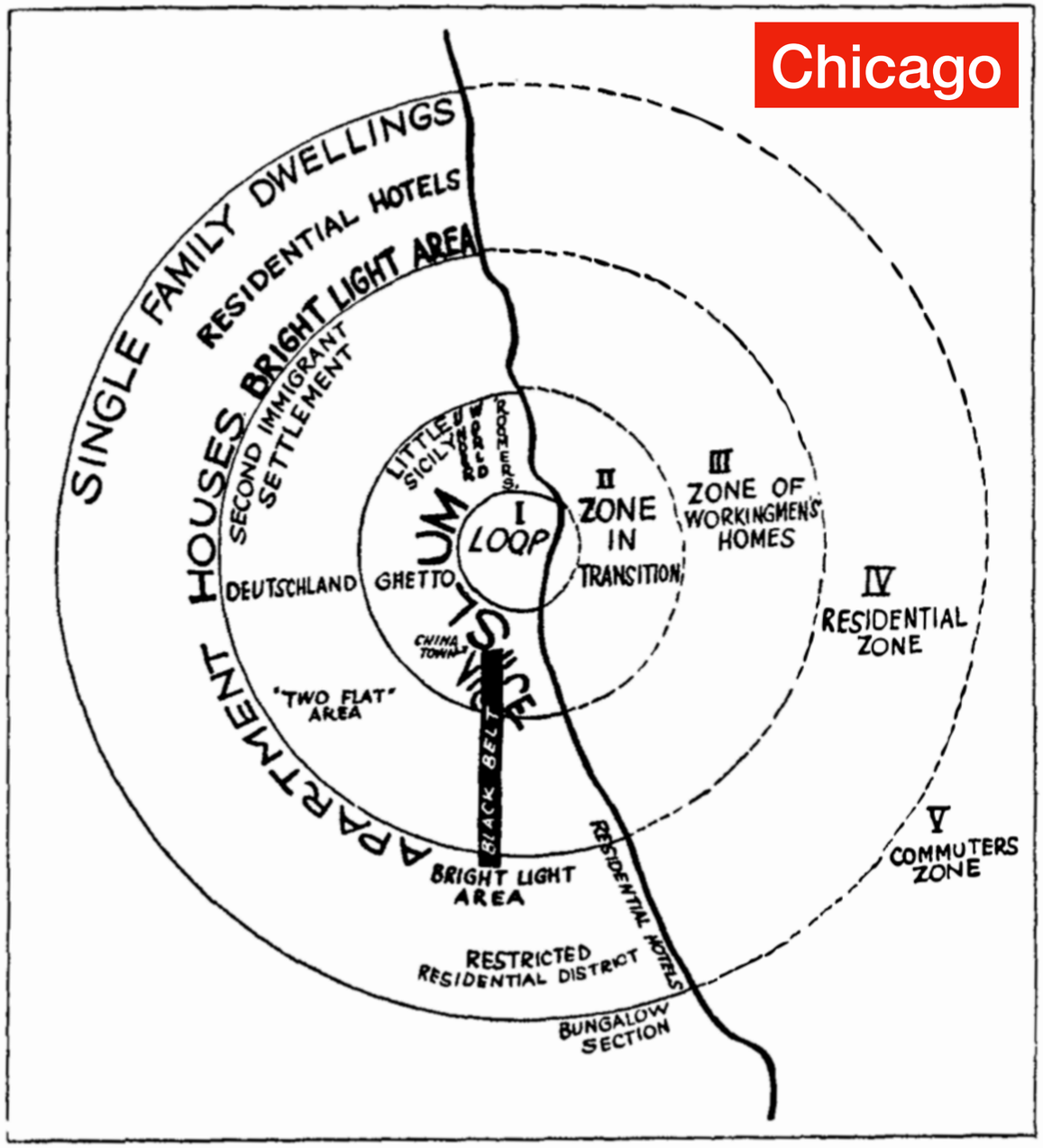


CHART II. Urban Areas

This paper will treat first of the expansion of the city, and then of the less-known processes of urban metabolism and mobility which are closely related to expansion.

The metropolitan area may be taken to include territory that is physically contiguous, but it is coming to be defined by that facility of transportation that enables a business man to live in a suburb of Chicago and to work in the loop.

The tendency of each inner zone to extend its area by the invasion of the next outer zone. This aspect of expansion may be called succession

Besides extension and succession, the general process of expansion in urban growth involves the antagonistic and yet complementary processes of concentration and decentralization

This differentiation into natural economic and cultural groupings gives form and character to the city

The division of labor in the city likewise illustrates disorganization, reorganization, and increasing differentiation, movement and mobility

Ernest W Burgess 1925

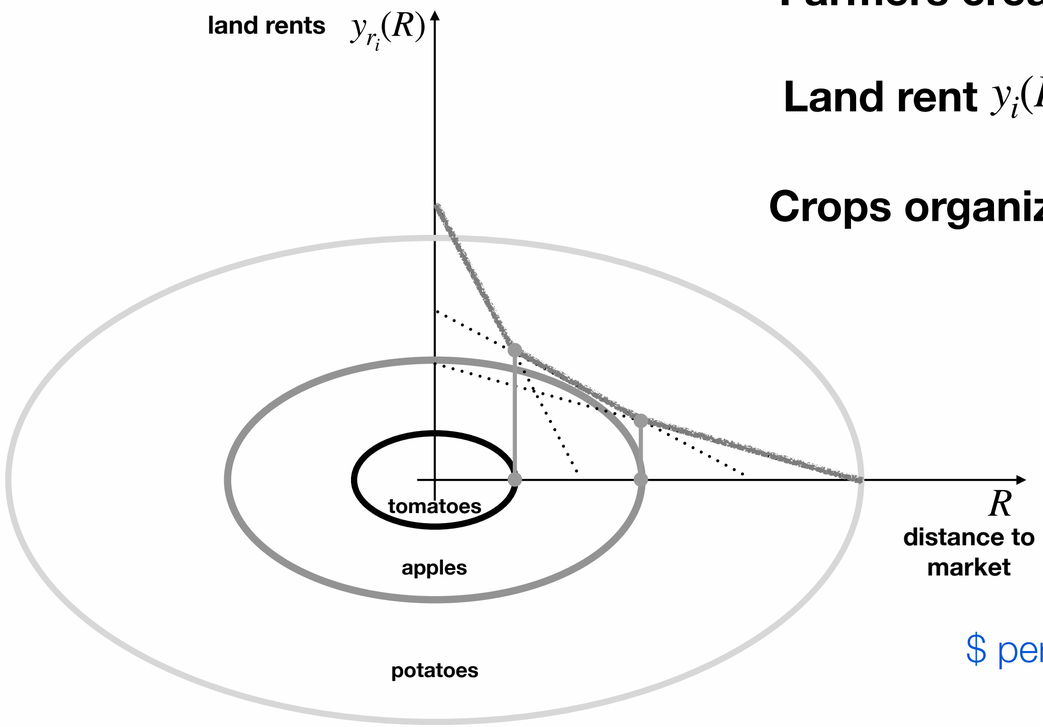
The first mathematical model

Johann Heinrich von Thünen 1783-1850

Canarienhausen, Wangerland. State of Mecklenburg-Vorpommern, Germany.

Spatial Equilibria in the “Isolated State”

von Thünen Model [1826, beginnings Central Place & Locational Theory]



credit: Fujita 2010 The Evolution of Spatial Economics

Farmers create incomes by selling goods *i* at a central market

Land rent $y_i(R)$ of crop *i* at *R* should equal farmers net profits

Crops organize themselves to maximize profits

(and land rents) “invisible hand”

net income per unit *i sold*
price (p) - production costs (s)

$$y_i(R) = Q_i[(p_i - s_i) - c_{T_i}R]$$

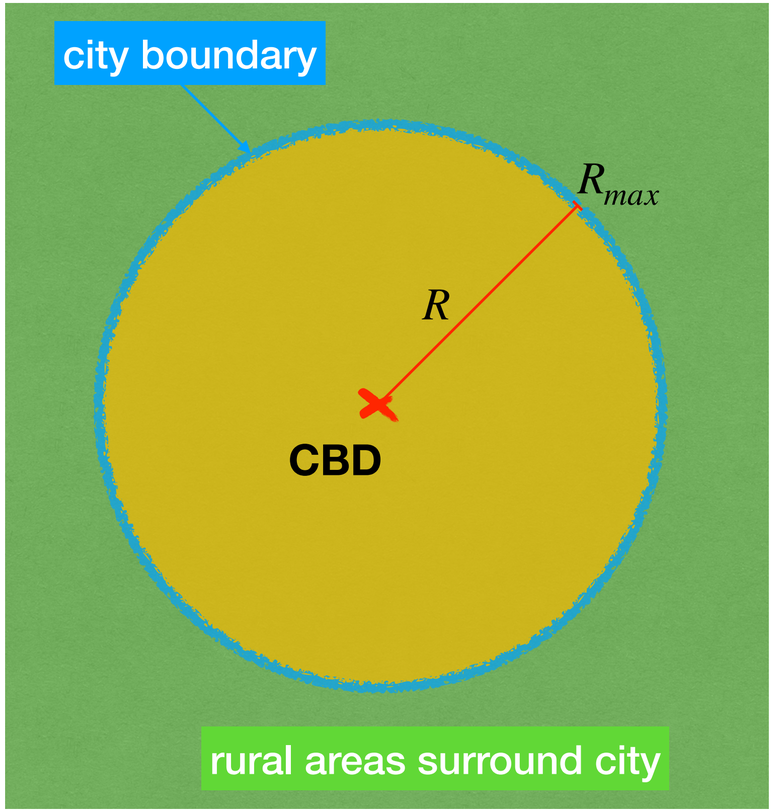
land rent:
$ per unit land area

crop *i* quantity
per unit land area

transportation costs for *i*
assumed proportional to distance

Alonso Model of the Monocentric city

Central Market for Labor



Extent of City is determined by Budget Constraint

Idea: each person has a budget:

$$y = c_r(R) + c_T(R)$$

net income
(from work at CBD)

land rent expense
(at home)

commuting costs
(home ⟷ work)

At CBD:

$c_T(R = 0) = 0$ minimum commuting costs

$c_r(R = 0) = c_{r_{max}}$ maximum rent

$y = c_{r_{max}}$

At the city boundary:

$c_T(R = R_{max}) = c_{T_{max}}$ maximum c. costs

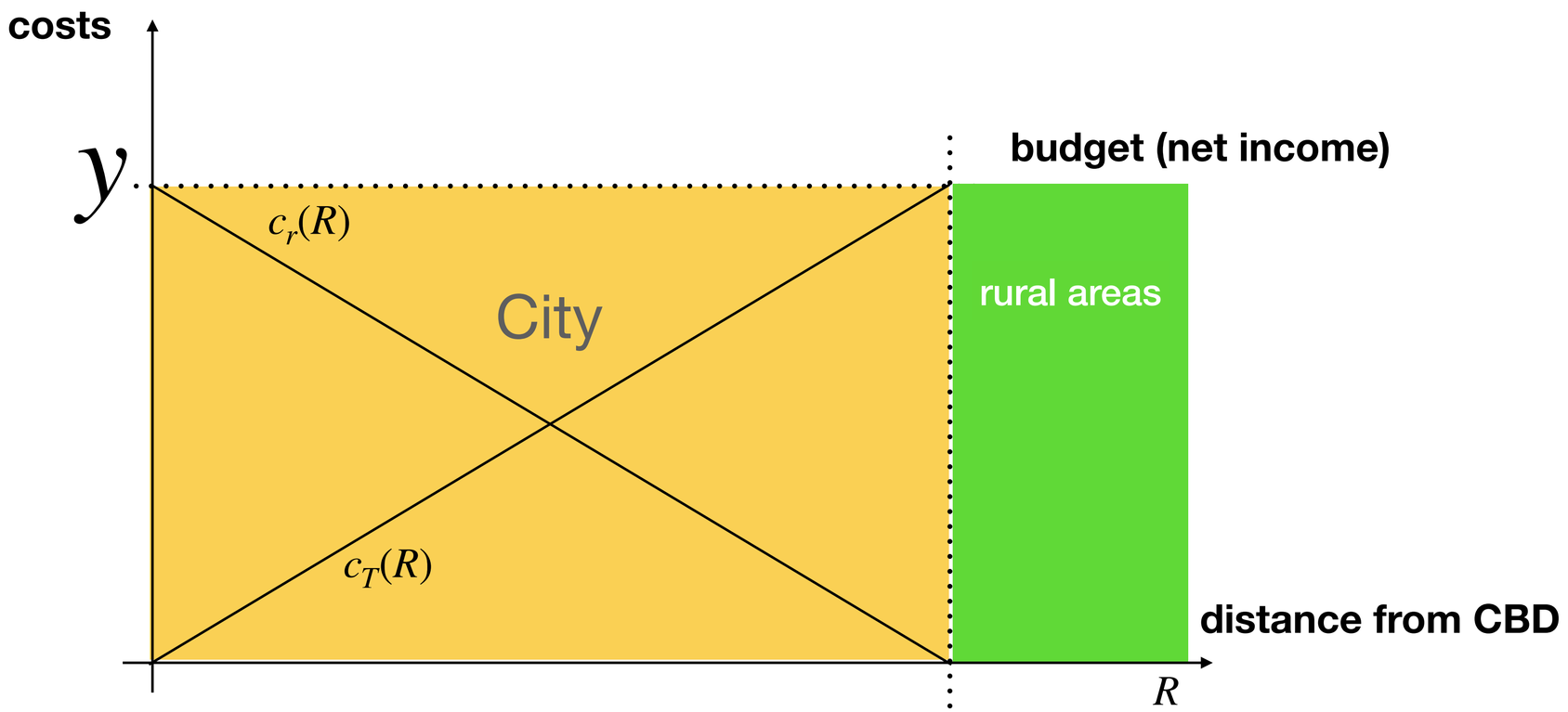
$c_r(R = R_{max}) = c_{r_{rural}} = c_{r_{min}}$ minimum rent

$y = c_{r_{min}} + c_{T_{max}}$

$c_T(R) = c_{T_0} R, \quad c_{T_0} = \frac{c_{T_{max}}}{R_{max}}$ **cost/time/distance travelled**

$c_r(R) = y - c_T(R)$

Individuals tradeoff lower rent and higher commuting costs



$$R_{max} = \frac{y - c_{r_{rural}}}{c_{T_0}}$$

Questions:

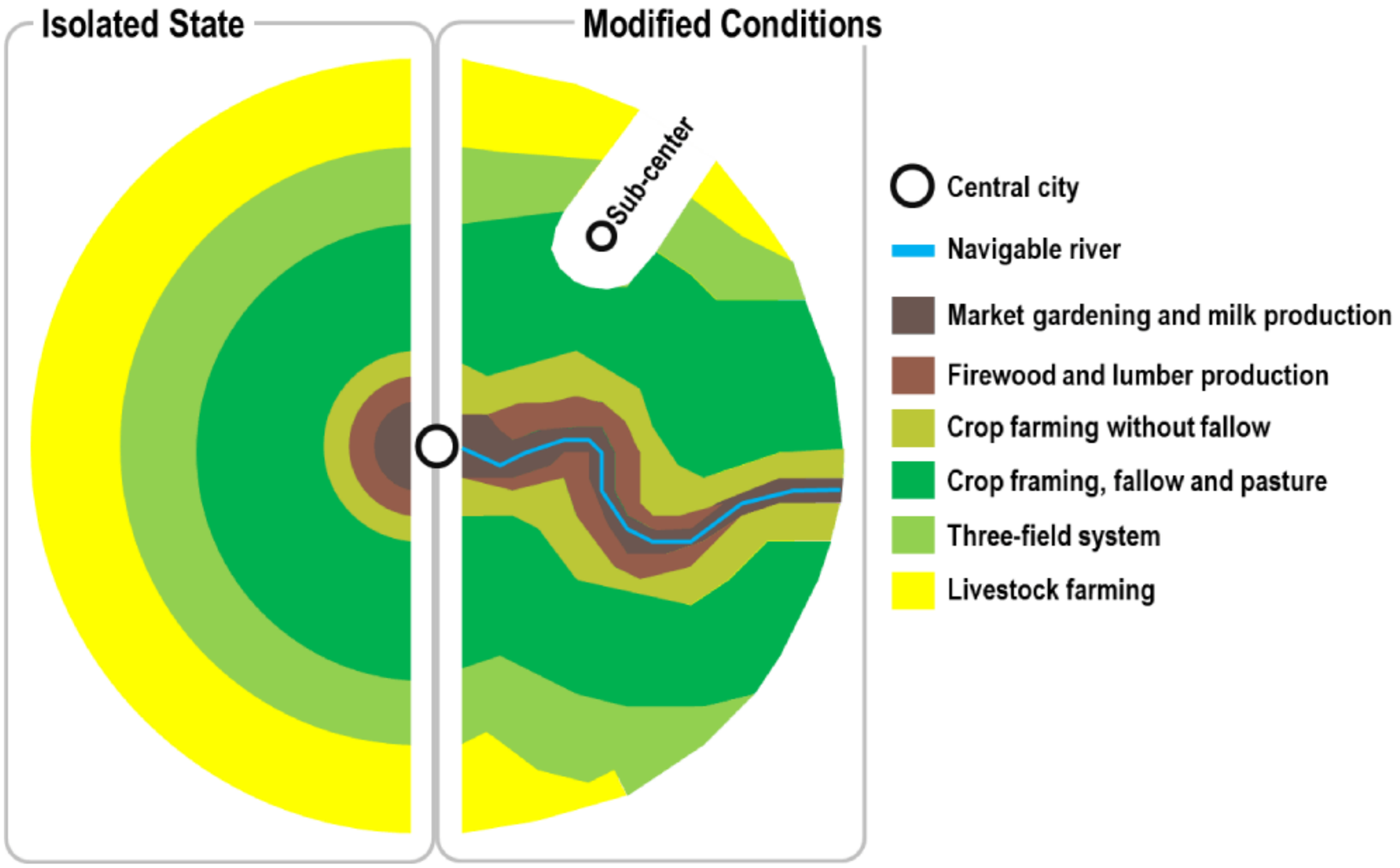
where do people choose to live?

how much space should they use?

what happens if incomes or transportation costs go up/down?

Size of city depends on income, commuting cost technology and rural productivity

Generalizations:



https://transportgeography.org/contents/chapter8/urban-land-use-transportation/von-thunen-regional-land-use/