Housing Price Function

Assumptions:

1. One member of each household commutes to a job in the CBD.
2. Non-commuting travel is insignificant
3. Public services and taxes are the same at all locations.
4. Air quality is the same at all locations.
5. All households have the same income and the same tastes for housing.
6. The opportunity cost of commuting time is zero.

Linear Housing Price Function Assumes:

1. Identical Dwellings - Every dwelling in the city has the same number of square feet.
2. Fixed Budget - Each household has the same budget for housing plus commuting.
3. Commuting Cost - The monthly cost of commuting is a given amount per mile per month.

Example:

Dwelling Size - 1,000 square feet
Fixed Budget - $300 per month
Commuting Cost - $20 per mile per month

Distance From City Center (miles)	Commuting Cost (dollars)	Housing Expenditure (dollars)	Housing Price per Square Foot
0	$0	$300	$0.30
6	120	180	0.18
12	240	60	0.06
15	300	0	0

The housing price function is an equilibrium function because it makes households indifferent between locations because increases in commuting costs are exactly offset by declines in housing expenditure. Thus if a household moves one mile closer to the center, commuting costs decline by $20. The slope of the housing price function is 2 cents per square foot ($20/1,000 square feet). So by moving one mile closer to the center, housing prices increase by 2 cents a square foot or $20 for a 1,000 square foot dwelling.

The housing price line is linear because everybody consumers the same amount of housing (1,000 square feet) regardless of the price per square foot of housing.

Convex Housing Price Function

   If households obey the law of demand, they will purchase smaller dwellings close to the city center. Suppose we have the following data that reflects the law of demand

Distance From City Center (miles)	Commuting Cost (dollars)	Housing Expenditure (dollars)	Housing Consumption (Sq. Ft.)	Housing Price per Square Foot
0	$ 0	$ 300	300	$ 1.00
3	60	240	400	0.60
6	120	180	600	0.30
9	180	120	750	0.16
12	240	60	1000	0.06
15	300	0		0

   Suppose a household moves from a distance of 12 miles (where the price of housing is 6 cents per square foot) to 9 miles. If housing consumption had remained at 1000 square feet, the household would have been willing to pay an additional $60 for housing (the decrease in commuting cost). Or an additional 6 cents per square foot for a total of 12 cents per square foot at 9 miles. But because housing consumption falls to 750 square feet, the household is willing to pay more than an additional 6 cents per square foot to offset the decline in commuting cost. In fact, the household is willing to pay an additional 10 cents per square foot, not 6 cents. In general, if households obey the law of demand, the housing price function is convex (steeper slope as approach city center).