

The Four-Quadrant Model of Real Estate Markets

RE420: URBAN AND REGIONAL ECONOMICS

Introduction

- Any market (stock, automobile, etc.) is characterized by the interaction between buyers and sellers
- The complication of real estate market (especially commercial) comes from the fact that there are two distinguished markets
 1. Space market (a.k.a. usage market and/or rental market)
 2. Asset market

Introduction

- Need for an integrated framework to understand real estate market
- DiPasquale and Wheaton's Four-Quadrant Model provides a useful tool for analyzing a specific segment of real estate market, for example, offices in Chicago

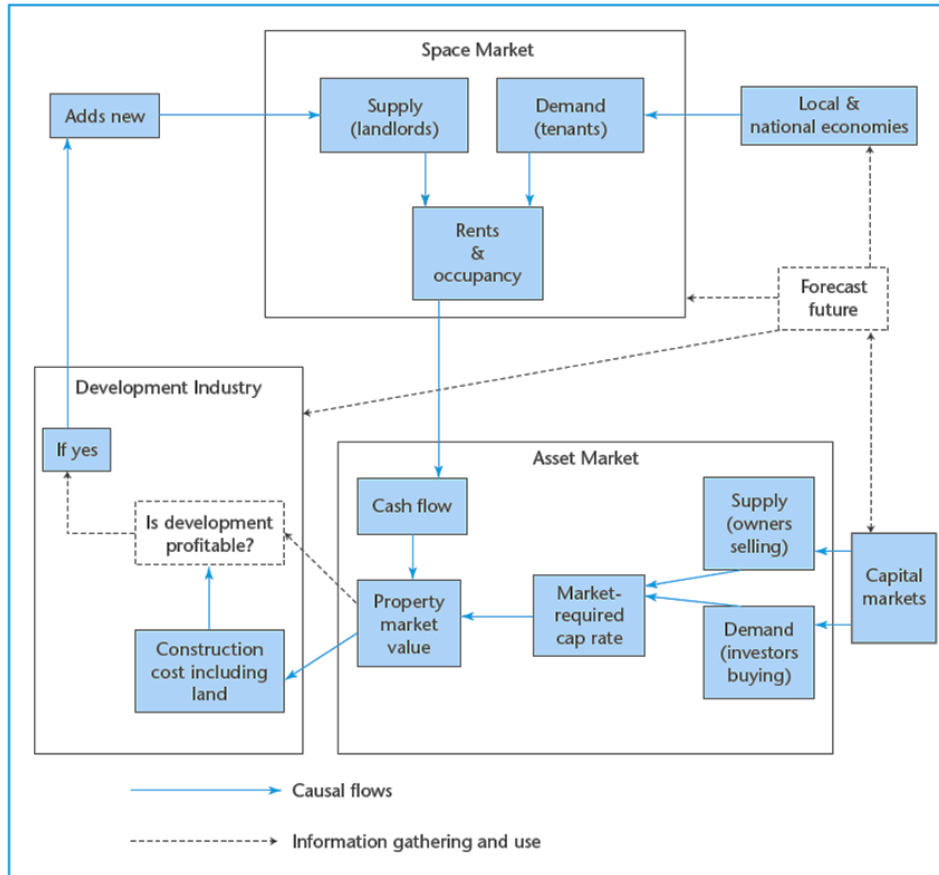
Two Markets: Space Market

- Space market determines the “fundamentals”:
 - Rent: the price of right to use space for a specified period of time
 - Occupancy Rate: the ratio of rented space to the total amount of available space.
Related variables
- Rent and occupancy are two main components of net income from a real estate asset

Two Markets: Asset Market

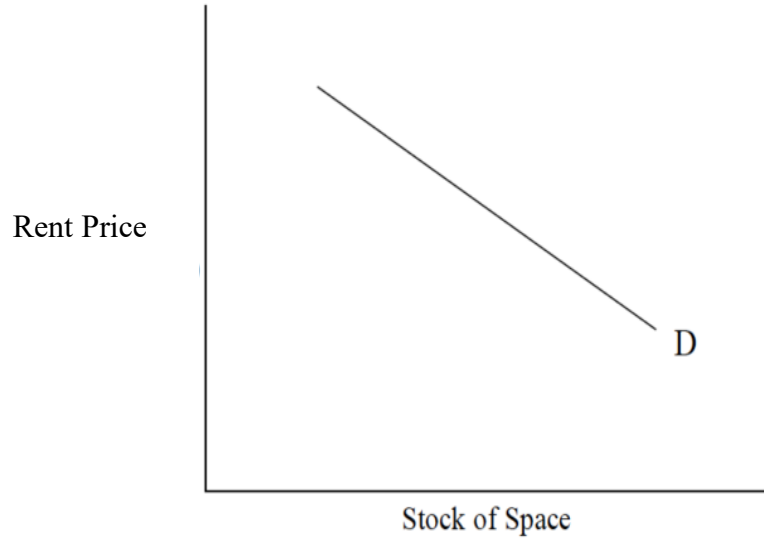
- The market of ownership of real estate assets:
 - Assets include real property, e.g., office space
 - Ownership allows enjoyment of the asset, right to earn the income from leasing it out, and/or right to sell and get proceeds from sale
 - Real estate asset market is part of a bigger capital market, the market for capital assets of all types

The Real Estate System: Interaction of the Space Market, Asset Market, and Development Industry



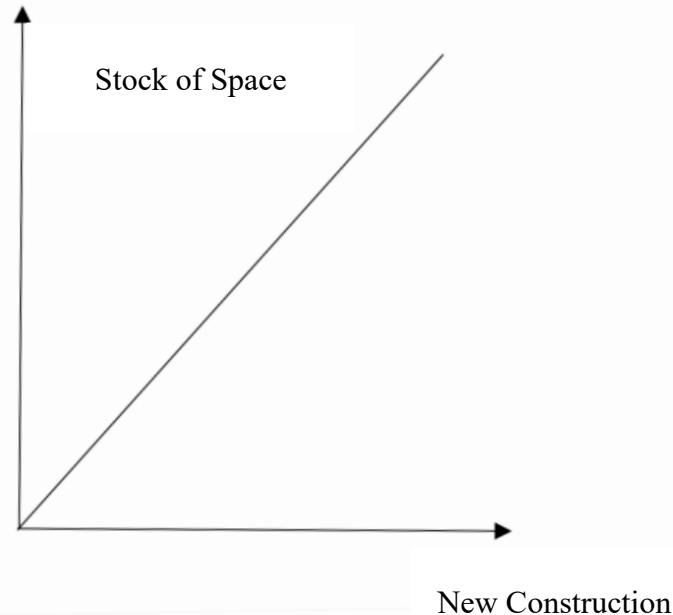
Let's plot the four quadrants
one by one

1. Demand for Space



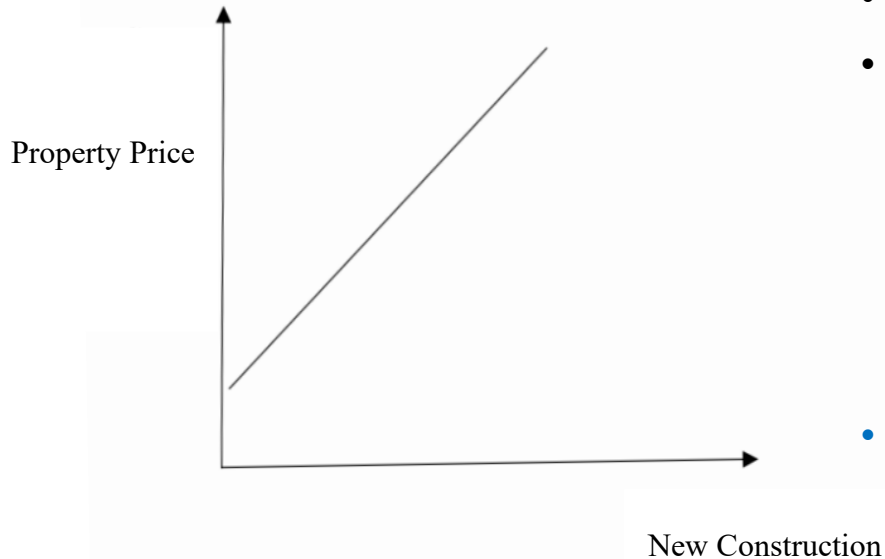
- Demand curve for space is downward sloping
- Demand curve shifts rightward when the Economy is booming
- ***Stock of Space = D(Rent, Economy)***

2. Construction and Stock of Space



- In the steady state (i.e., the stock of space doesn't change), new construction will exactly offset the space amount depreciated
- ***New Construction = Stock of Space × Depreciation Rate***

3. Supply of New Space by Developers



- Supply curve is upward sloping
- Which factors beyond price affect housing supply?
 - Construction cost
 - Zoning policies
 - Economic condition
 - Future expectation
 - Etc.
- ***Property Price = $f(\text{New Construction})$***

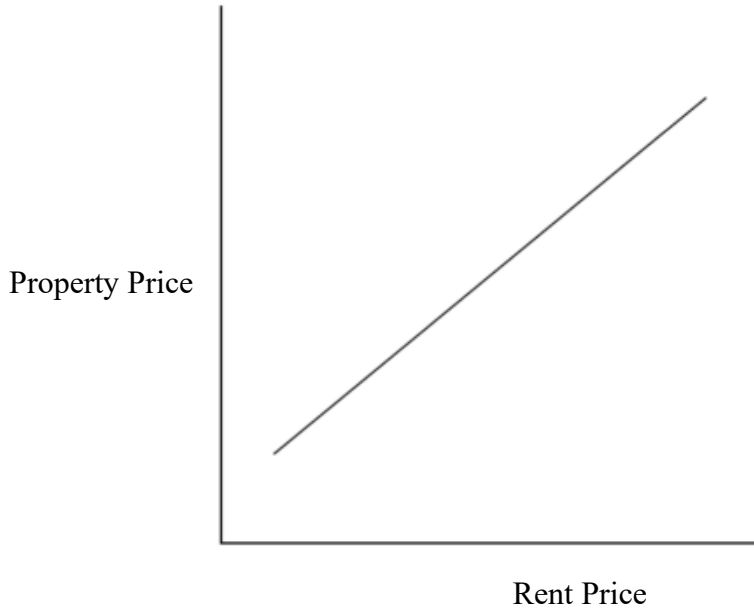
4. Asset Market Valuation

- Cap rate shows relationship between net operating income (NOI) and property value:
 - NOI: net income from the property (= rent income)

$$\text{Cap Rate} = \frac{\text{NOI}}{\text{Property Value}} \Rightarrow \text{Property Value} = \frac{\text{NOI}}{\text{Cap Rate}}$$

- Factors that increase capitalization rate
 - Rise in opportunity cost of capital:
 - Borrowing becomes more expensive if interest rates rise
 - Attracting equity is more difficult if other forms of investment in the capital markets start to earn higher equity return
 - Expectation of decrease in the growth rate in the property's net income
 - Perception of higher risk of future net income from the property

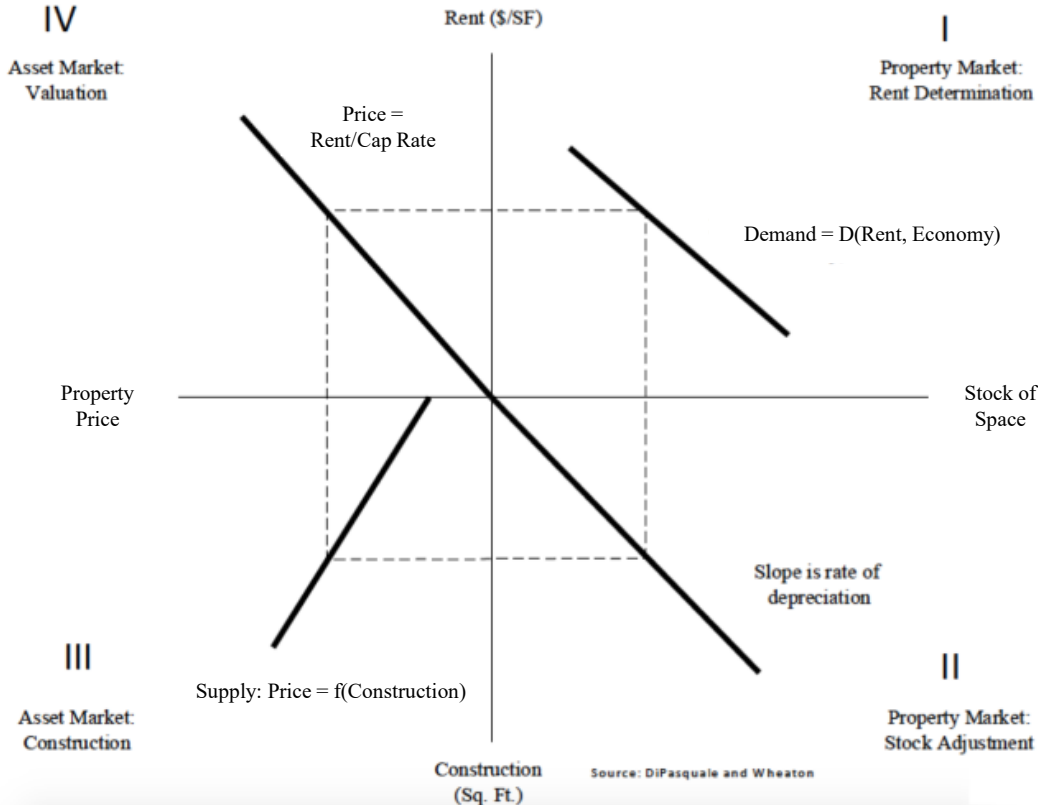
4. Asset Market Valuation



- $$\text{Property Price} = \frac{\text{Rent Price}}{\text{Cap Rate}}$$

Four Quadrant Model

Markets for the Use of Property, and Asset Markets

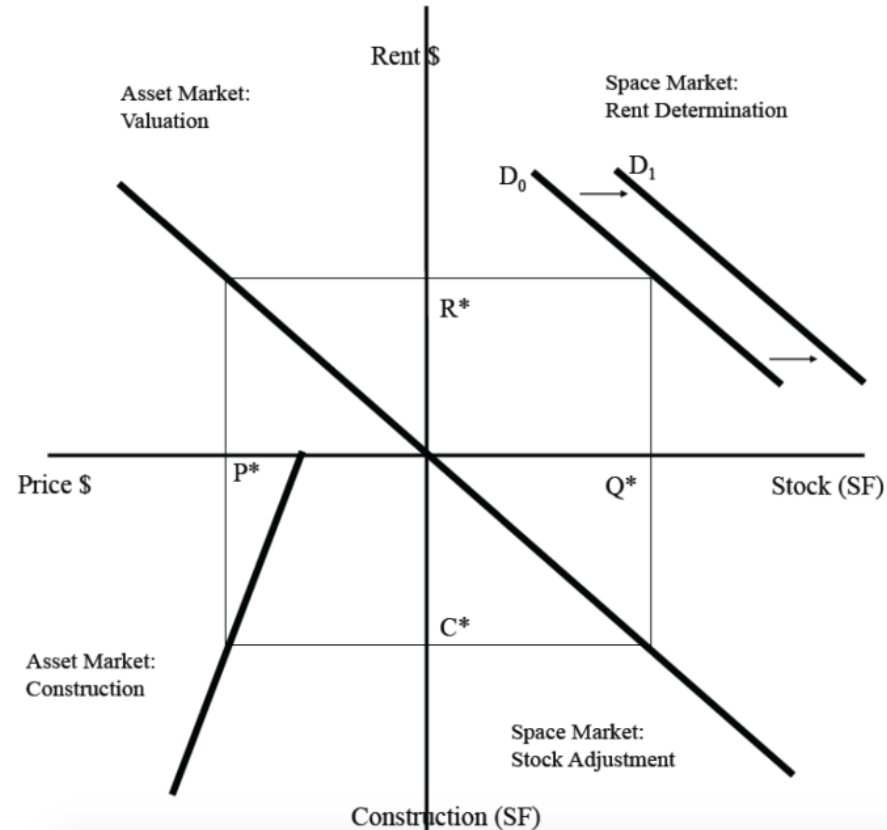


4 Equilibrium Conditions

1. Space Market: $\text{Stock of Space} = D(\text{Rent}, \text{Economy})$
2. Asset Market: $\text{Property Price} = \frac{\text{Rent Price}}{\text{Cap Rate}}$
3. Developers: $\text{Property Price} = f(\text{New Construction})$
4. Stock Adjustment: $\text{New Construction} = \text{Stock of Space} \times \text{Depreciation Rate}$

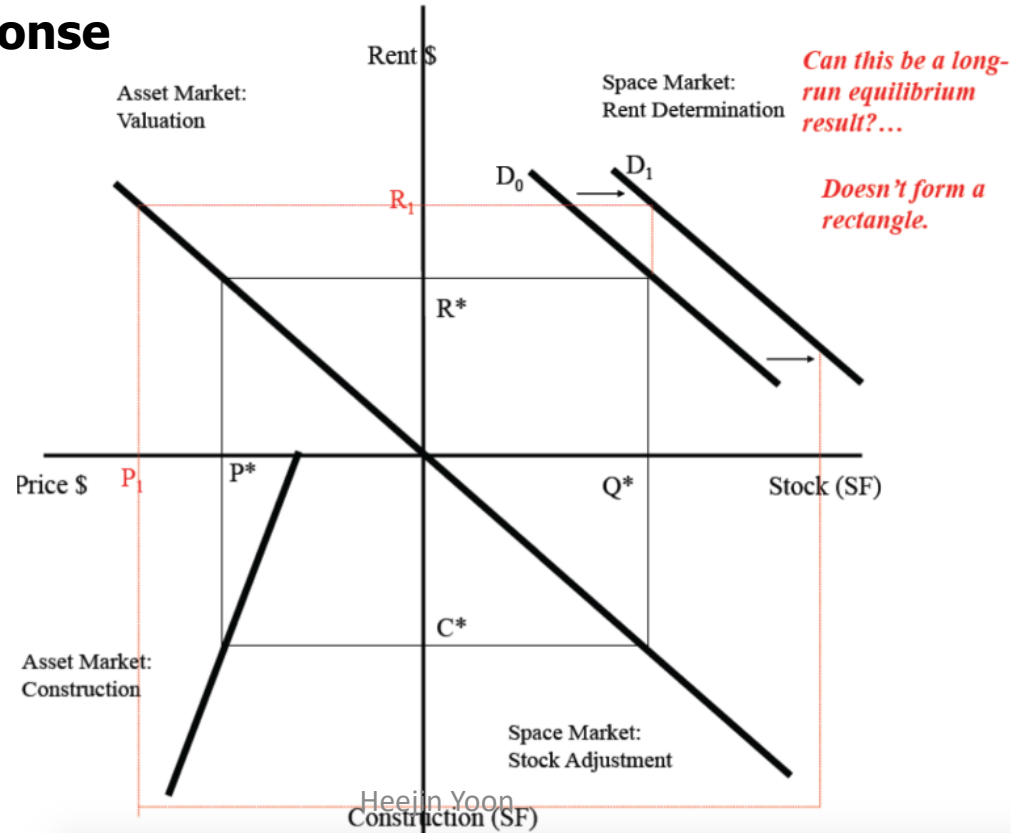
Analyzing the Real Estate Markets

Scenario 1: Impact of Economic Growth



Scenario 1: Impact of Economic Growth

Short-Run Response



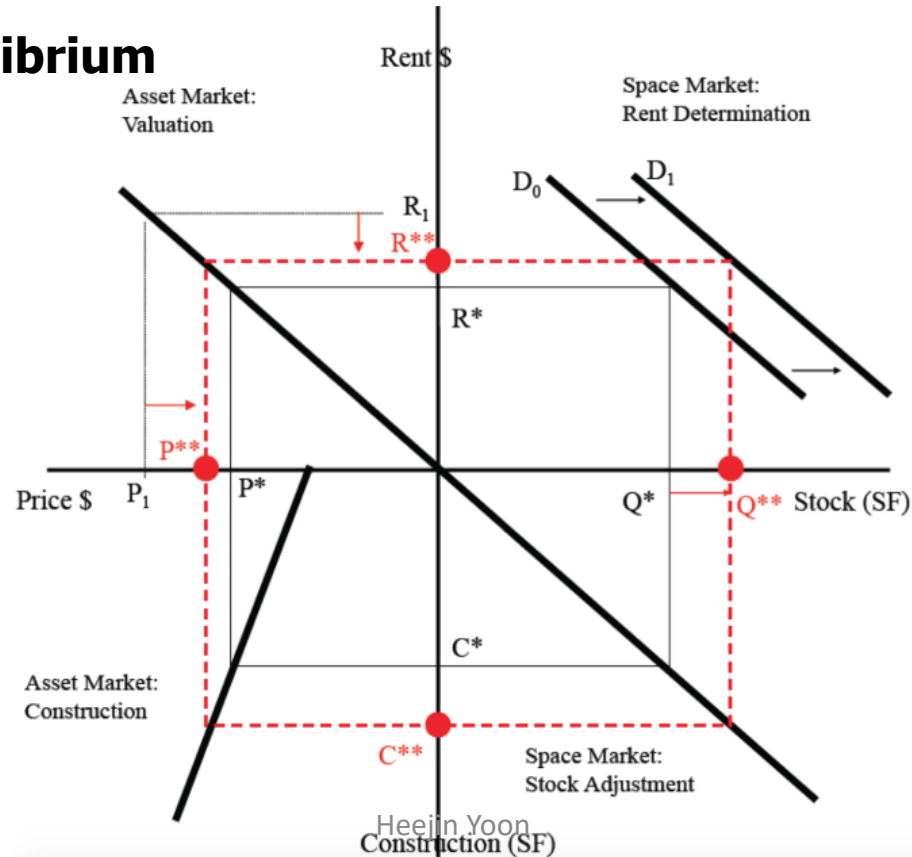
Scenario 1: Impact of Economic Growth

Short-Run Response

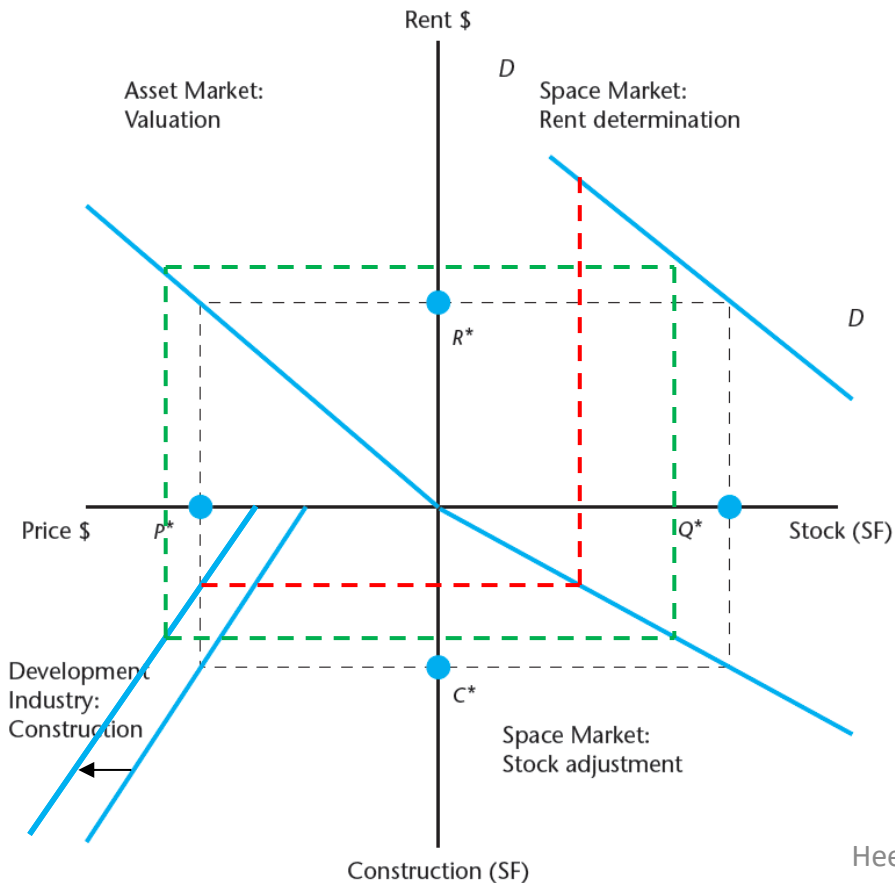
- Economic growth leads to a positive demand shock in the space market (Quadrant 1)
- Given quantity supplied at Q^* , rent prices jump up to R_1
- Property value in the asset market has been pushed up to P_1
- Developers cannot provide new constructions in Quadrant 3, because it will lead to stock of space not equal to Q^*

Scenario 1: Impact of Economic Growth

Long-Run Equilibrium

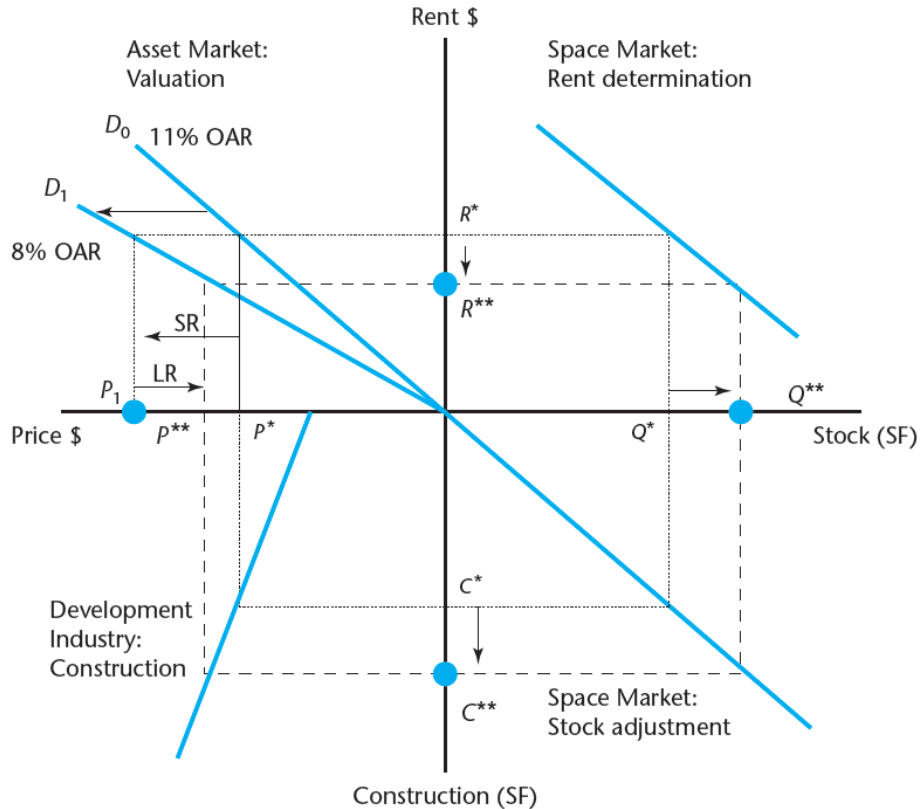


Scenario 2: Increase in Construction Costs



- The red dotted lines reflect the short-term market responses
- The green dotted lines reflect the long-term equilibrium

Scenario 3: Interest Rate Drop



- Cap rate goes down when interest rate decreases
- Think about **short-run response** vs. **long-run equilibrium** on property value (P)

Key Takeaways

- Understand two different markets of real estate: space and asset markets
- Understand how the four-quadrant model works
- Understand the short-run response and long-run equilibrium impact in the four-quadrant model when there is a change in market conditions
- (Optional) Readings
 - DiPasquale, D. and Wheaton, W.C., 1992. The markets for real estate assets and space: A conceptual framework. *Real Estate Economics*, 20(2), pp.181-198.