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

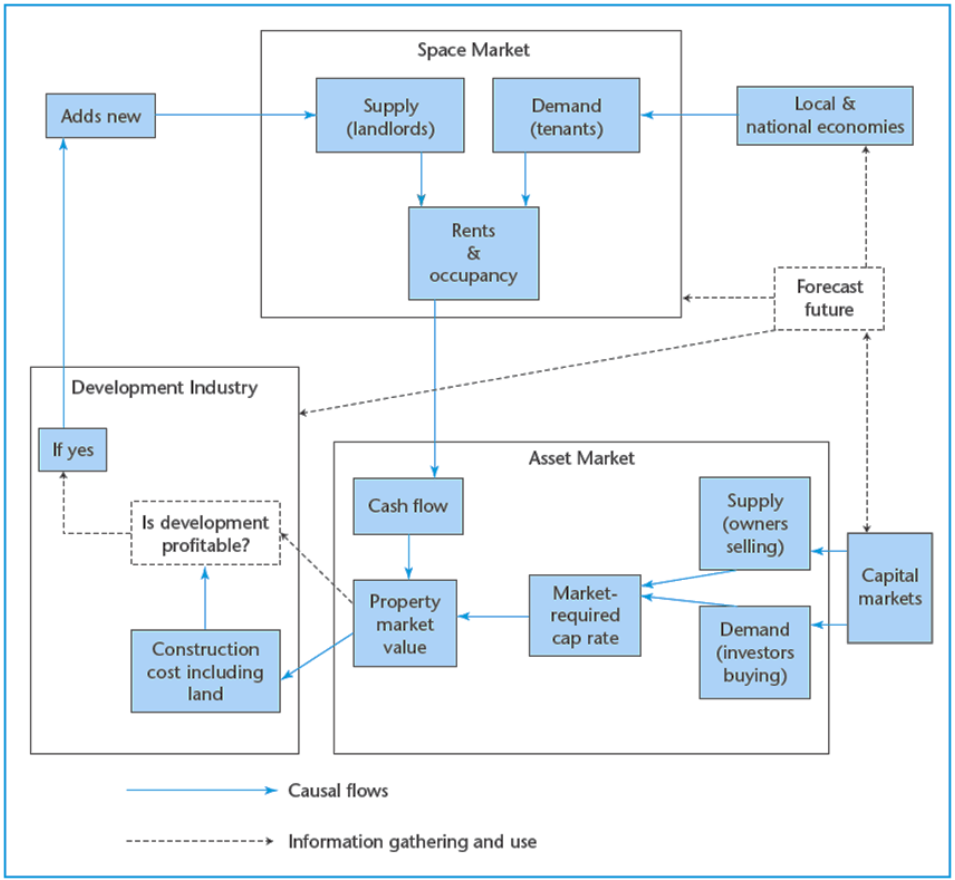
- Need for an integrated framework to understand real estate market
- DiPasquale and Wheaton's Four-Quadrant Model provides a useful tool for analyzing a specific segment of real estate market, for example, offices in Chicago

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

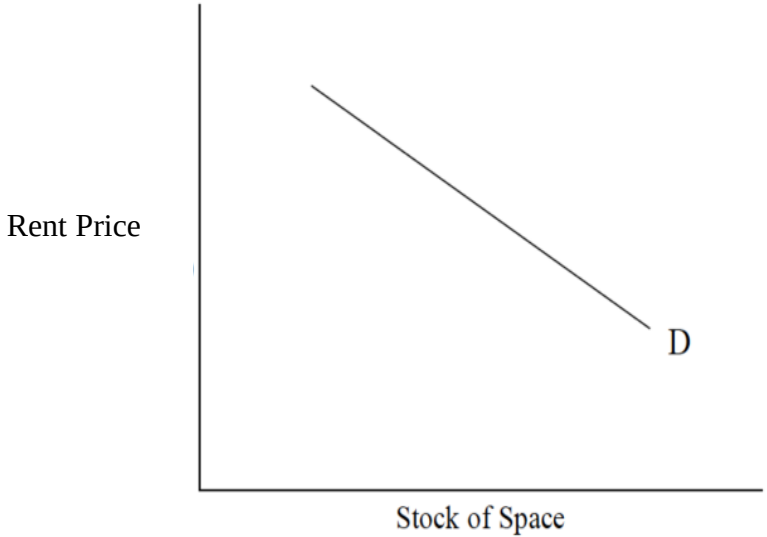
- The market of ownership of real estate assets:
  - Assets include real property, e.g., office space
  - Ownership allows enjoyment of the asset, right to earn the income from leasing it out, and/or right to sell and get proceeds from sale
  - Real estate asset market is part of a bigger capital market,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



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

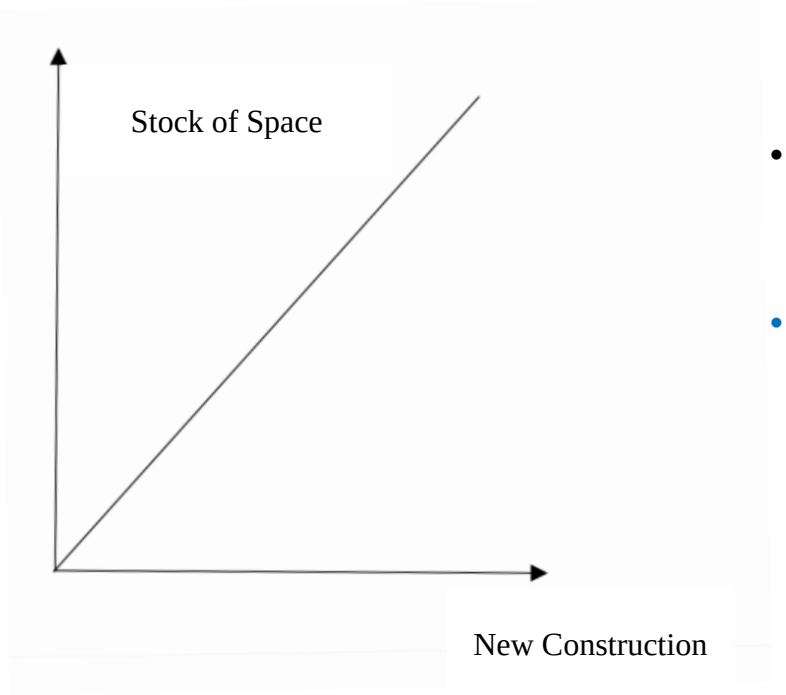
Let’s plot the four quadrants one by one

1. Demand for Space



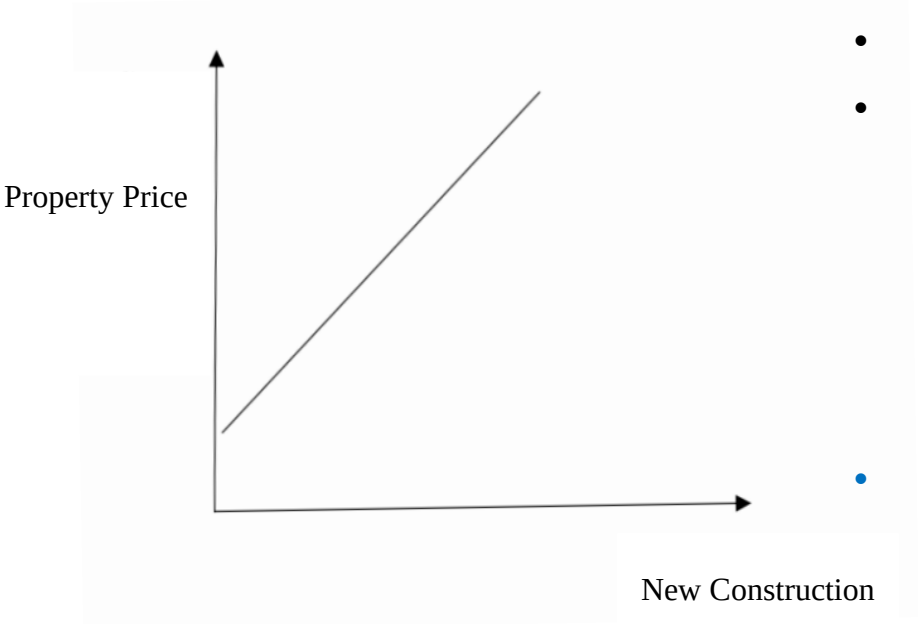
- Demand curve for space is downward sloping
- Demand curve shifts rightward when the Economy is booming
- $\boldsymbol{Stock\ of\ Space\ = D(Rent, Economy)}$

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
- $$\textit{New Construction} = \textit{Stock of Space} \times \textit{Deprecation Rate}$$

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.
- $\boldsymbol{Property\ Price\ = f(New\ Construction)}$

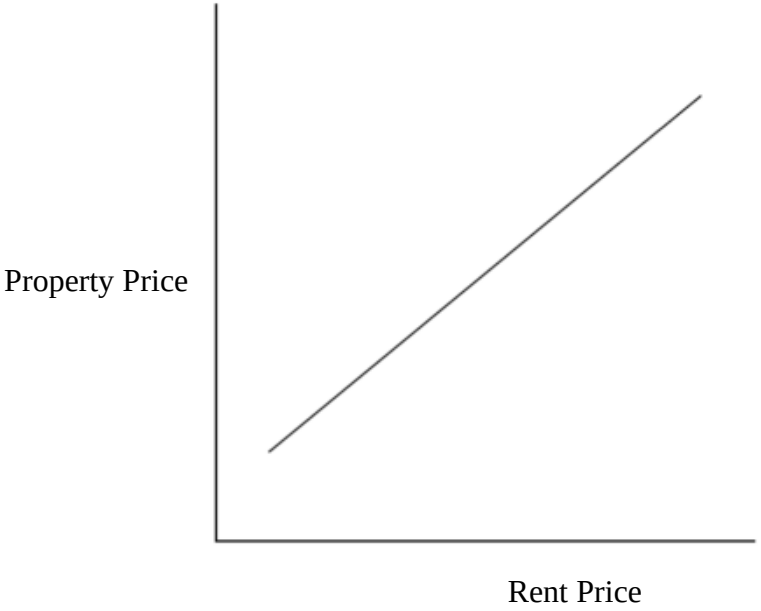
4. Asset Market Valuation

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

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

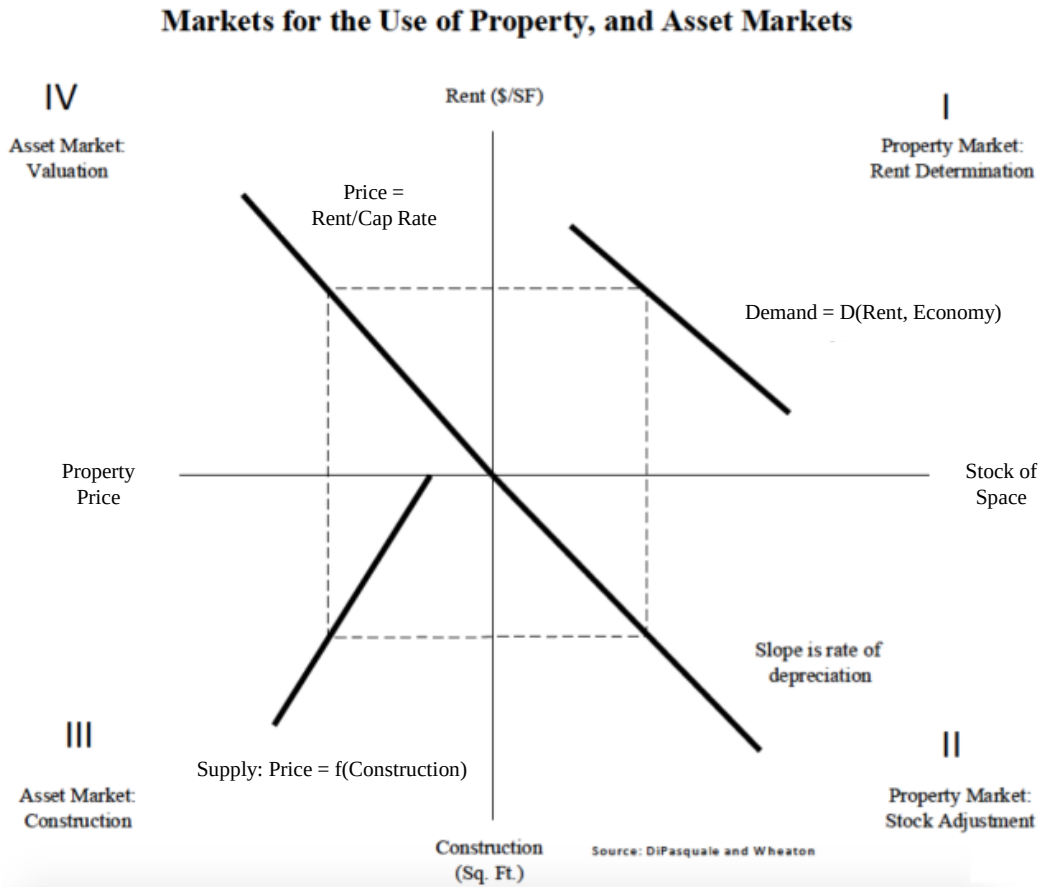
- Factors that increase capitalization rate
  - Rise in opportunity cost of capital:
    - Borrowing becomes more expensive if interest rates rise
    - Attracting equity is more difficult if other forms of investment in the capital markets start to earn higher equity return
  - Expectation of decrease 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



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

Four Quadrant Model



4 Equilibrium Conditions

1. Space Market: $Stock\ of\ Space = D(Rent, Economy)$

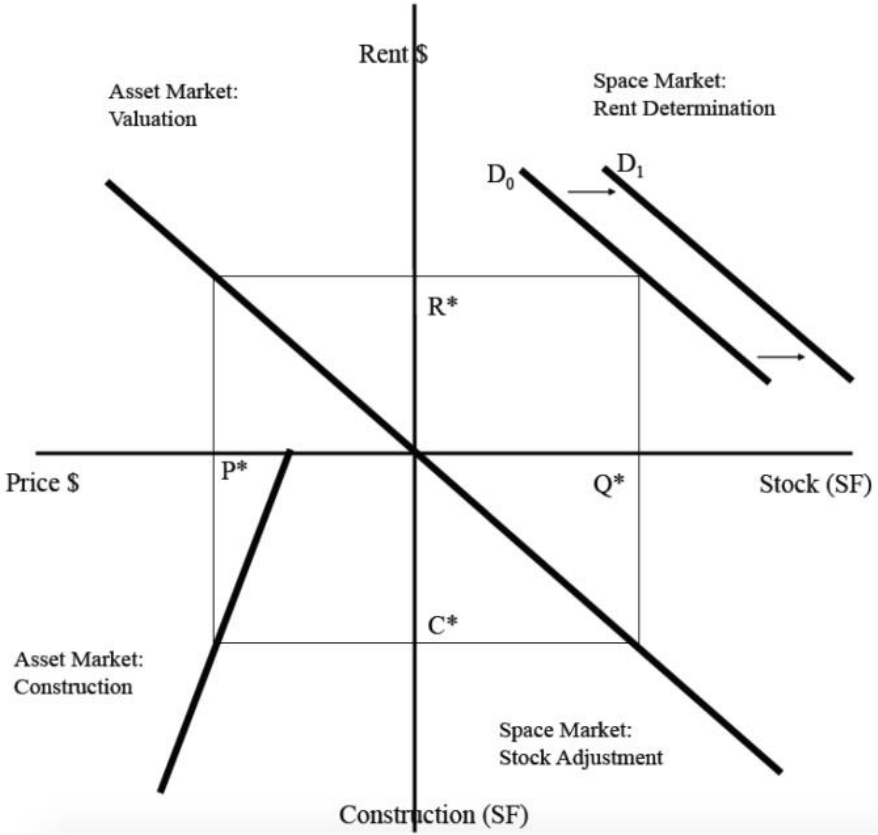
2. Asset Market: $Property\ Price = \frac{Rent\ Price}{Cap\ Rate}$

3. Developers: $Property\ Price = f(New\ Construction)$

4. Stock Adjustment:
$New\ Construction = Stock\ of\ Space \times Deprecation\ Rate$

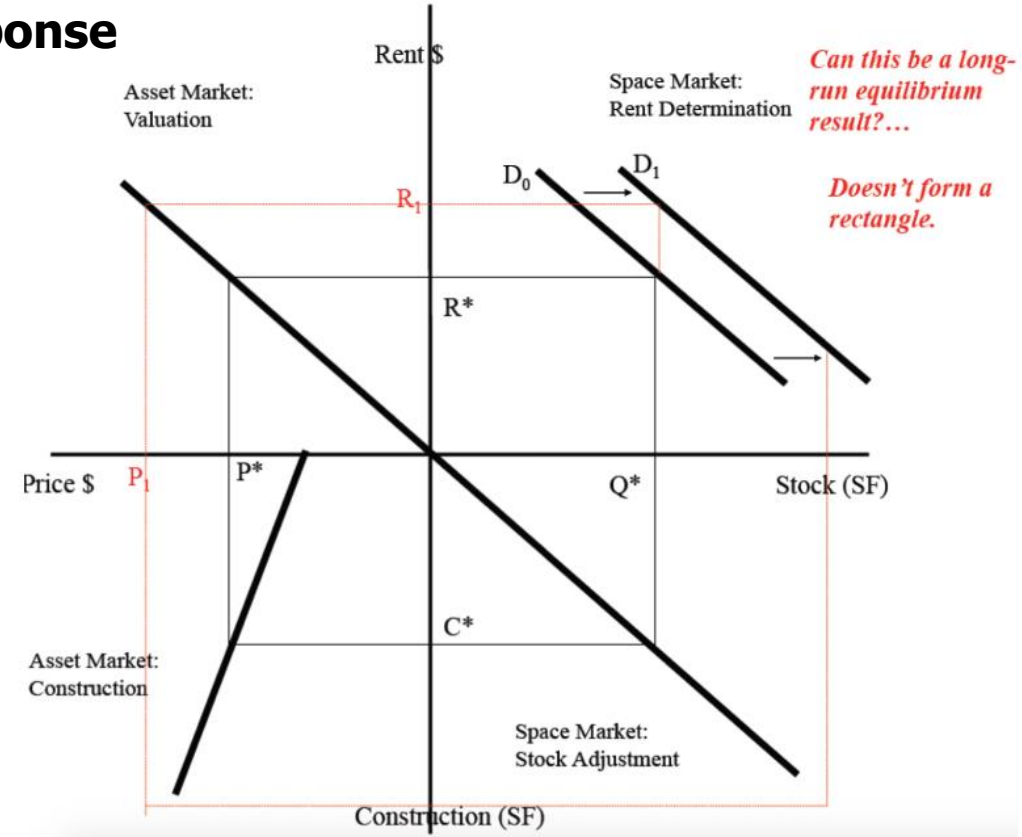
Analyzing the Real Estate Markets

Scenario 1: Impact of Economic Growth



Scenario 1: Impact of Economic Growth

Short-Run Response



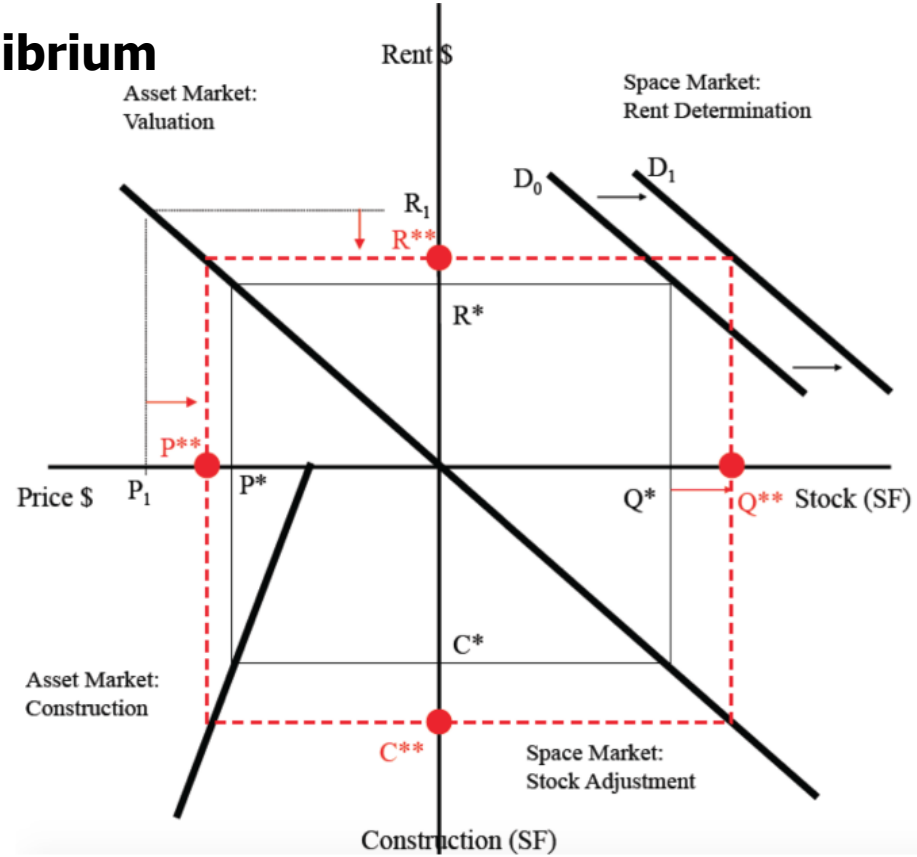
Scenario 1: Impact of Economic Growth

Short-Run Response

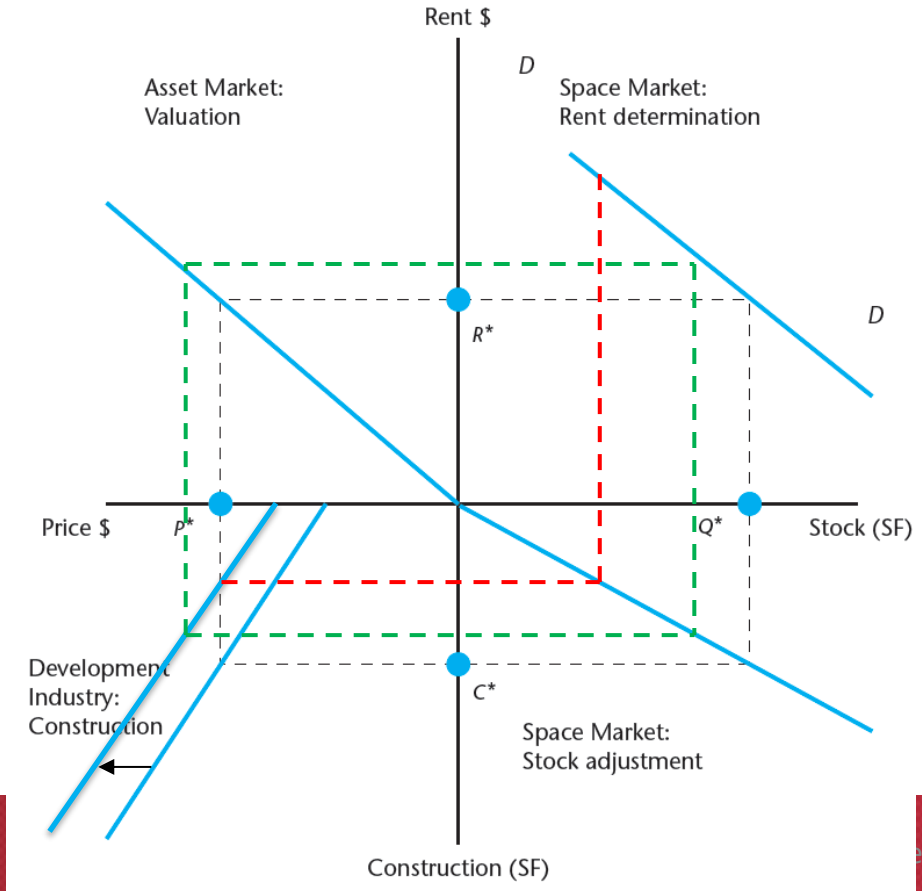
- Economic growth leads to a positive demand shock in the space market (Quadrant 1)
- Given quantity supplied at Q^*, rent prices jump up to R_1
- Property value in the asset market has been pushed up to P_1
- Developers cannot provide new constructions in Quadrant 3, because it will lead to stock of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

Scenario 1: Impact of Economic Growth

Long-Run Equilibrium

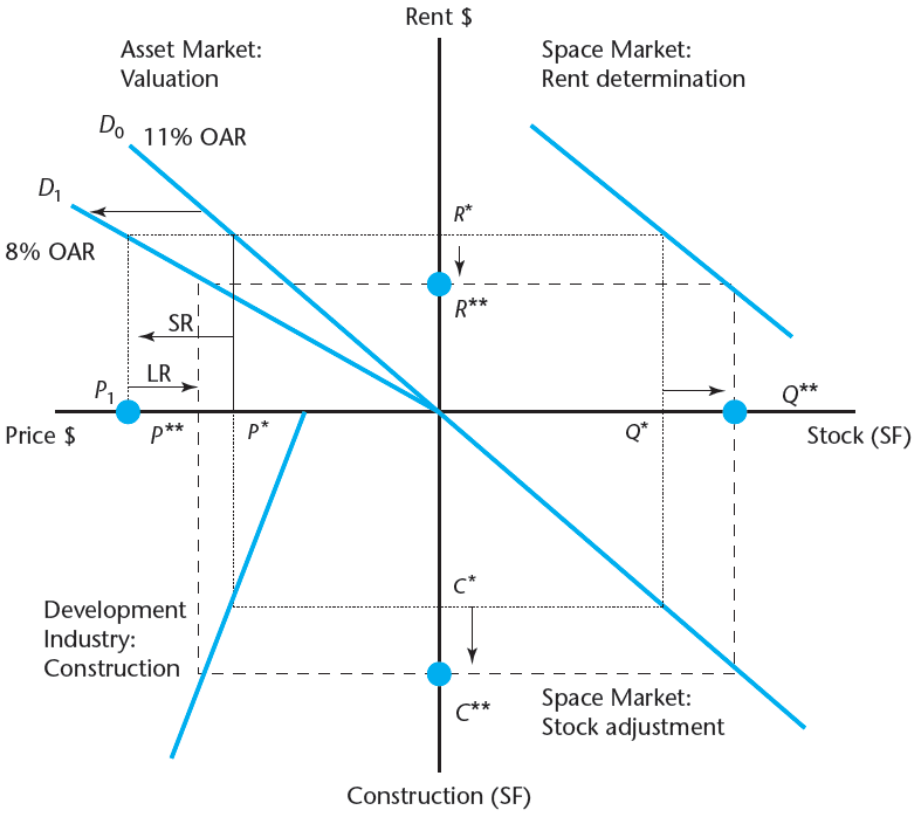


Scenario 2: Increase in Construction Costs



- 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.