Housing & Economy:

Property Price Dynamics
—*Lecture 1*

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SERC
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CENTRE for ECONOMIC PERFORMANCE

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Overview

1. Real estate cycles: some stylized facts
2. Exogenous cycles
   - Theoretical considerations
   - Long-term supply constraints and price dynamics: the case of England
   - Preliminary conclusions

3. Some further stylized facts and puzzles
4. Endogenous cycles and behavioural explanations: theories and evidence
5. Conclusions and policy implications

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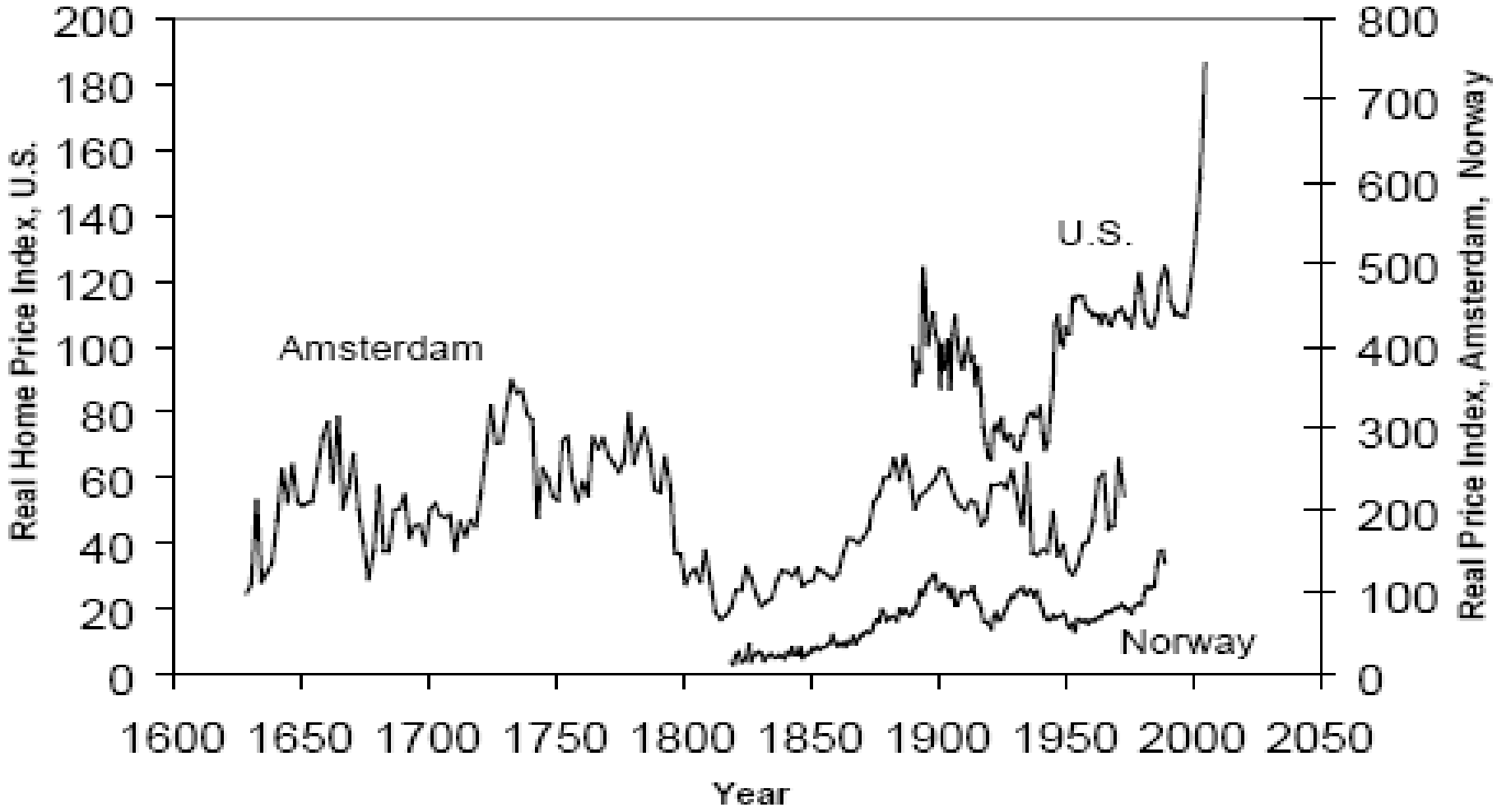
Overview

Stylized Fact 1

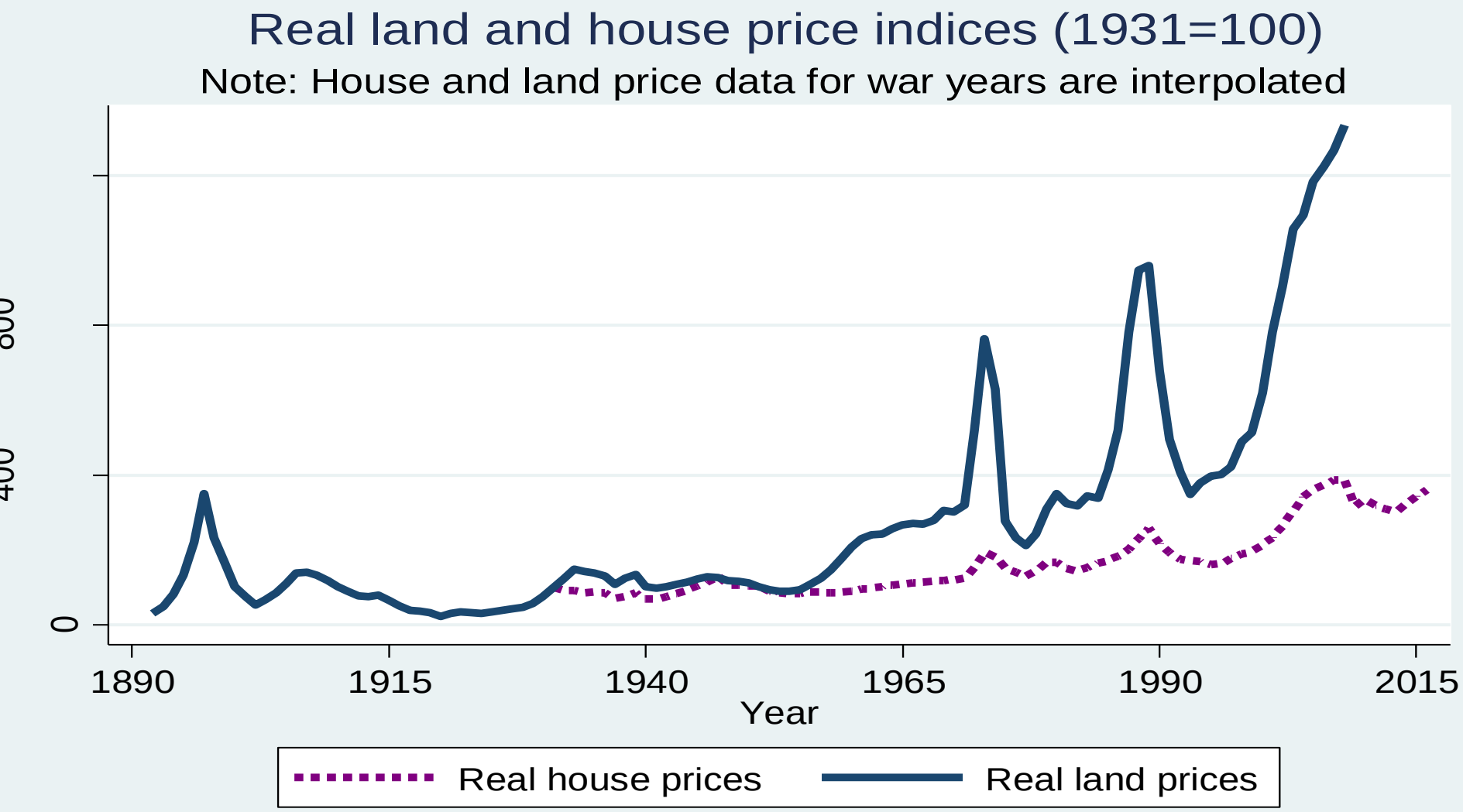
Real estate has ‘always’ been subject to strong **price volatility**.

Historical real house price indices in Amsterdam, Norway and the U.S.



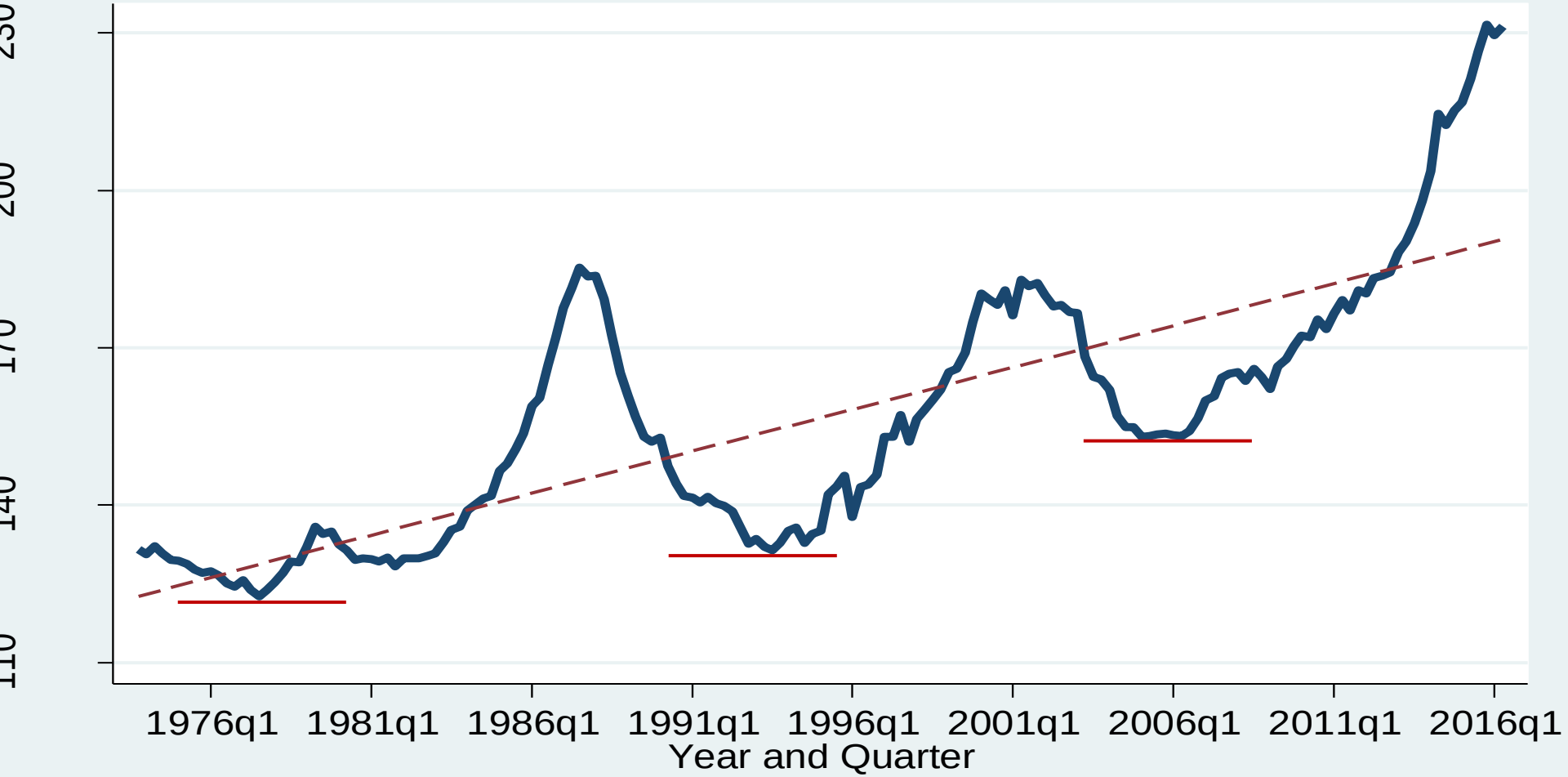
Source: Shiller (2006) based on Shiller (2005), Eichholtz (1997), Eitrheim and Erlandsen (2004)

Volatility has increased in recent decades (…at least in UK)



Source: Cheshire (2009) and own calculations for 2008 onwards / Land Registry & Nationwide

House prices in London increase more strongly and are more volatile (1973q4-2016q2)



Source: Nationwide, own calculations

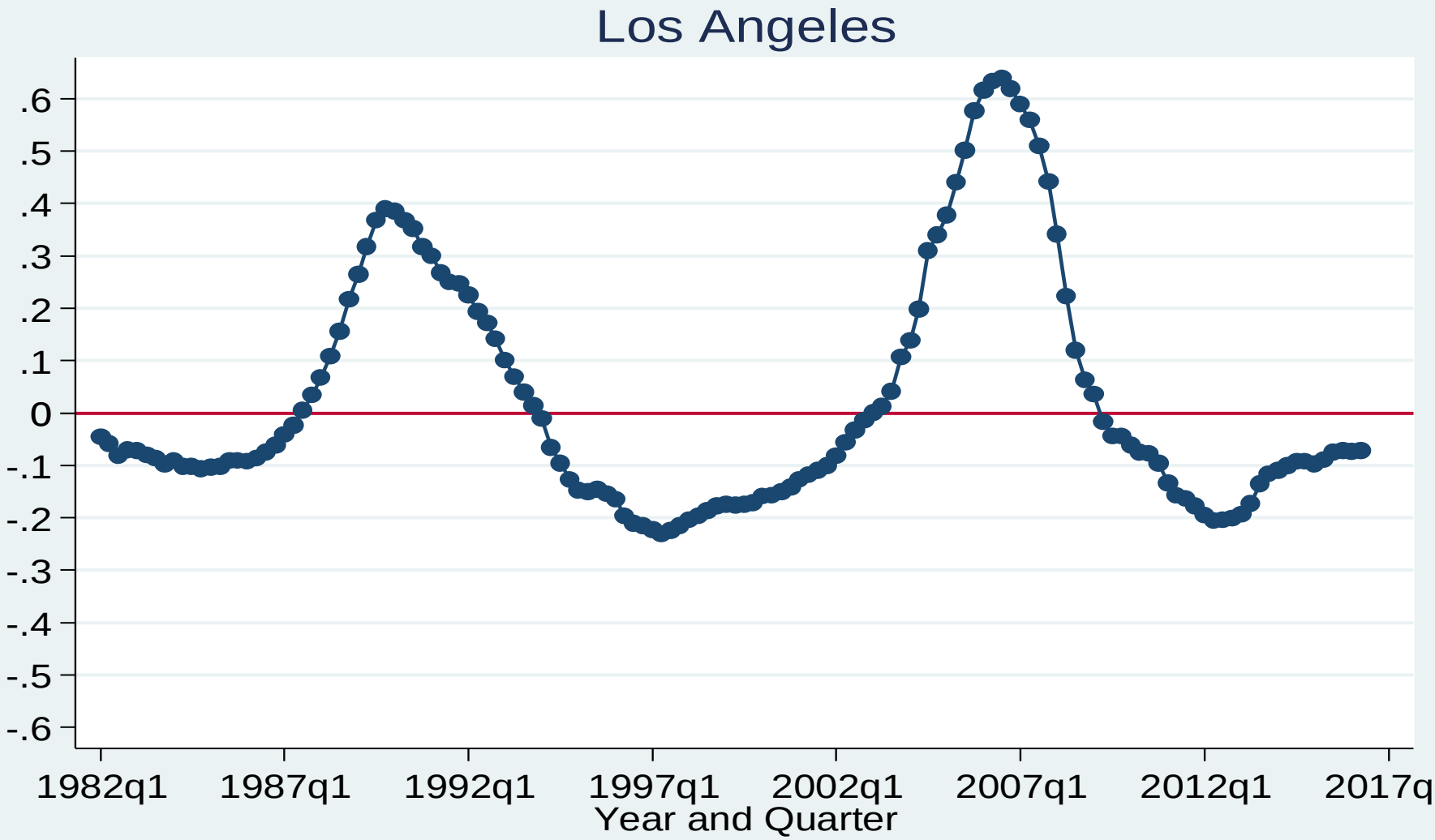
Overview

Stylized Fact 2

Various key measures of residential and commercial property markets behave **cyclically**.

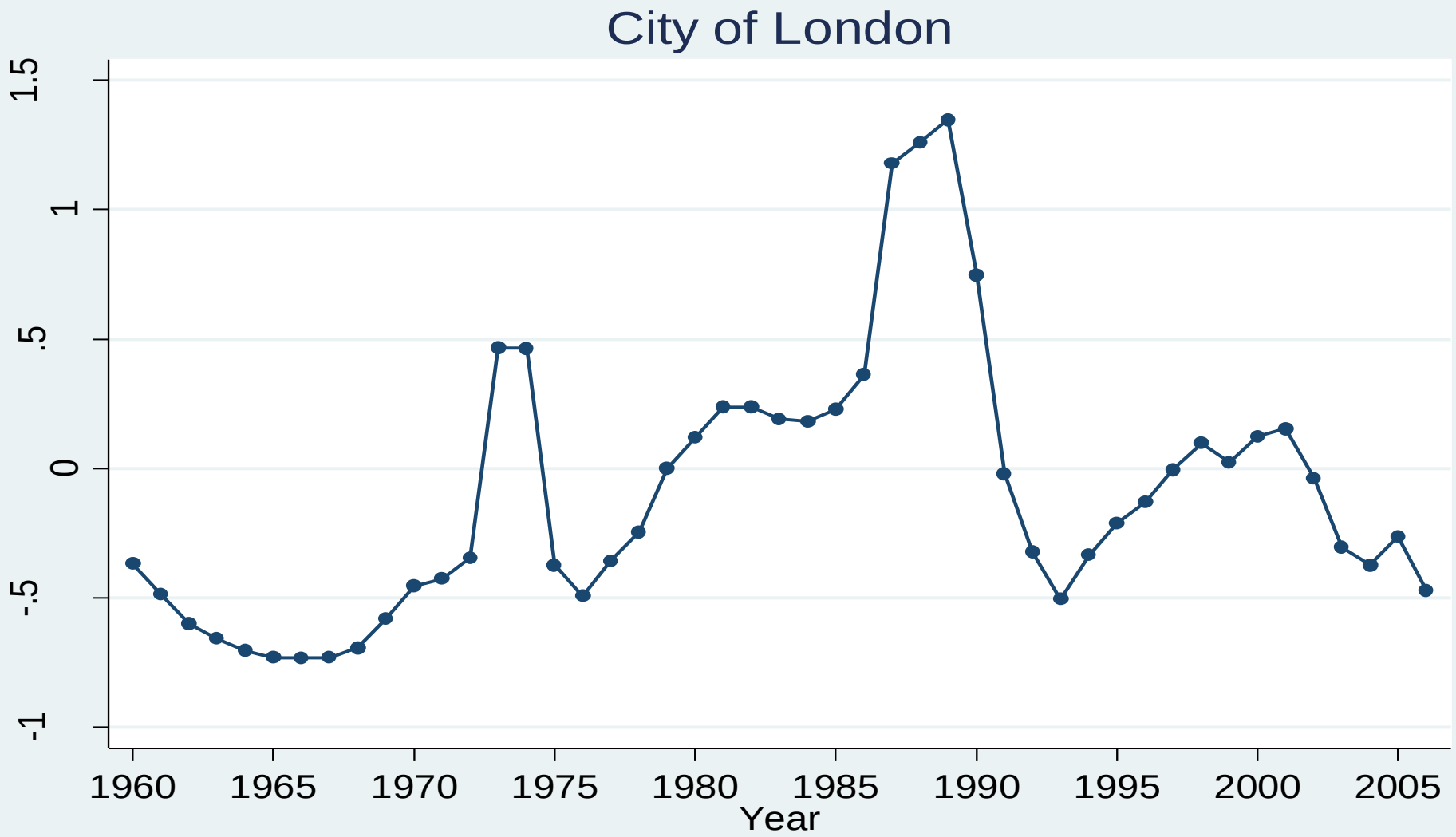
(i.e., measures are serially correlated and mean-reverting)

Example: Deviation of house prices from long-run trend in LA (1980q1-2016q2)



Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)

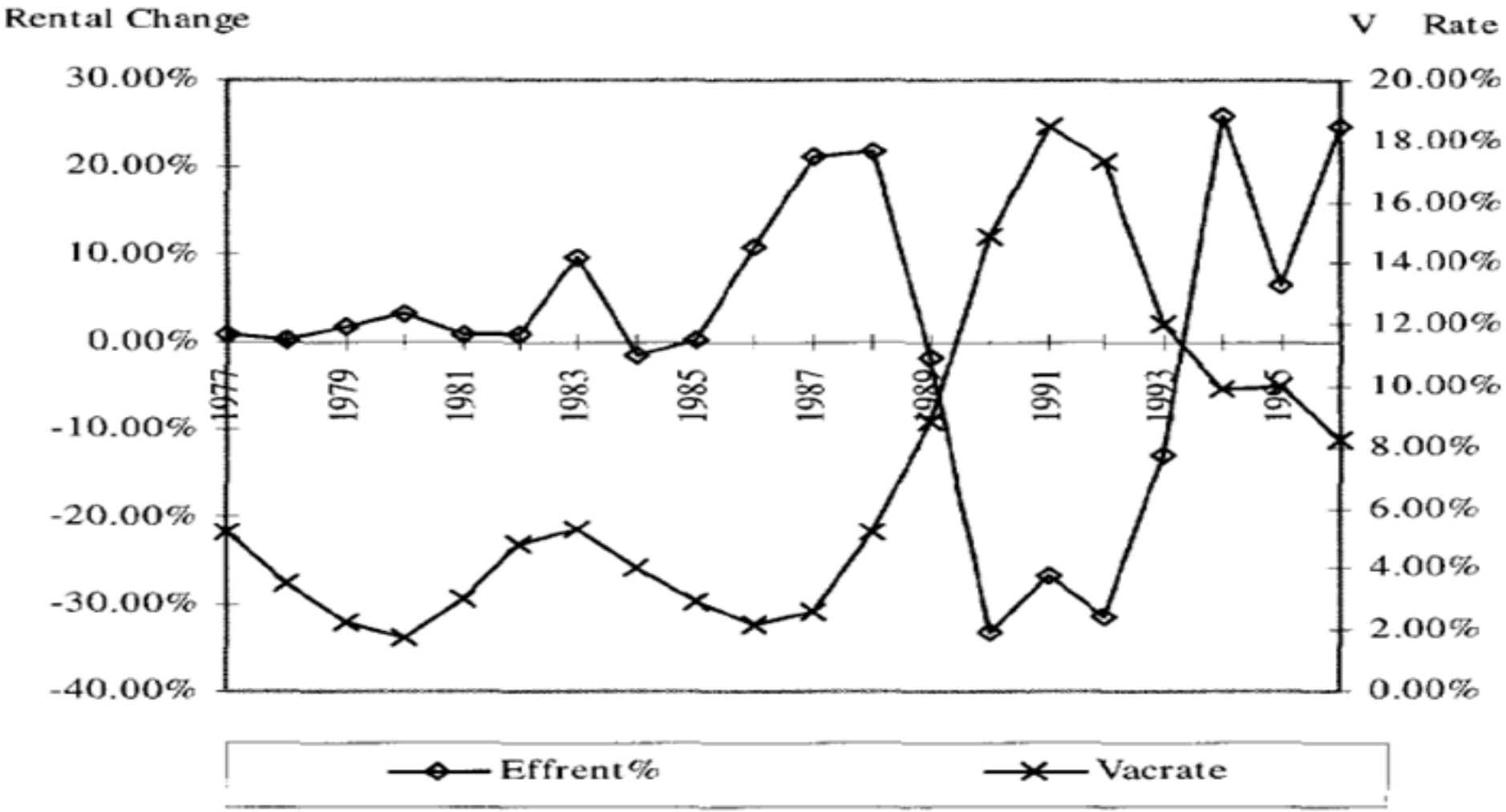
Example: Deviation of office prices from long-run trend in City of London (1960-2006)



Source: CBRE & Own Calculations, Hilber (2006)

Example: London office vacancy rates and effective rents

Figure 1 ■ Change in real effective rent and the vacancy rate.



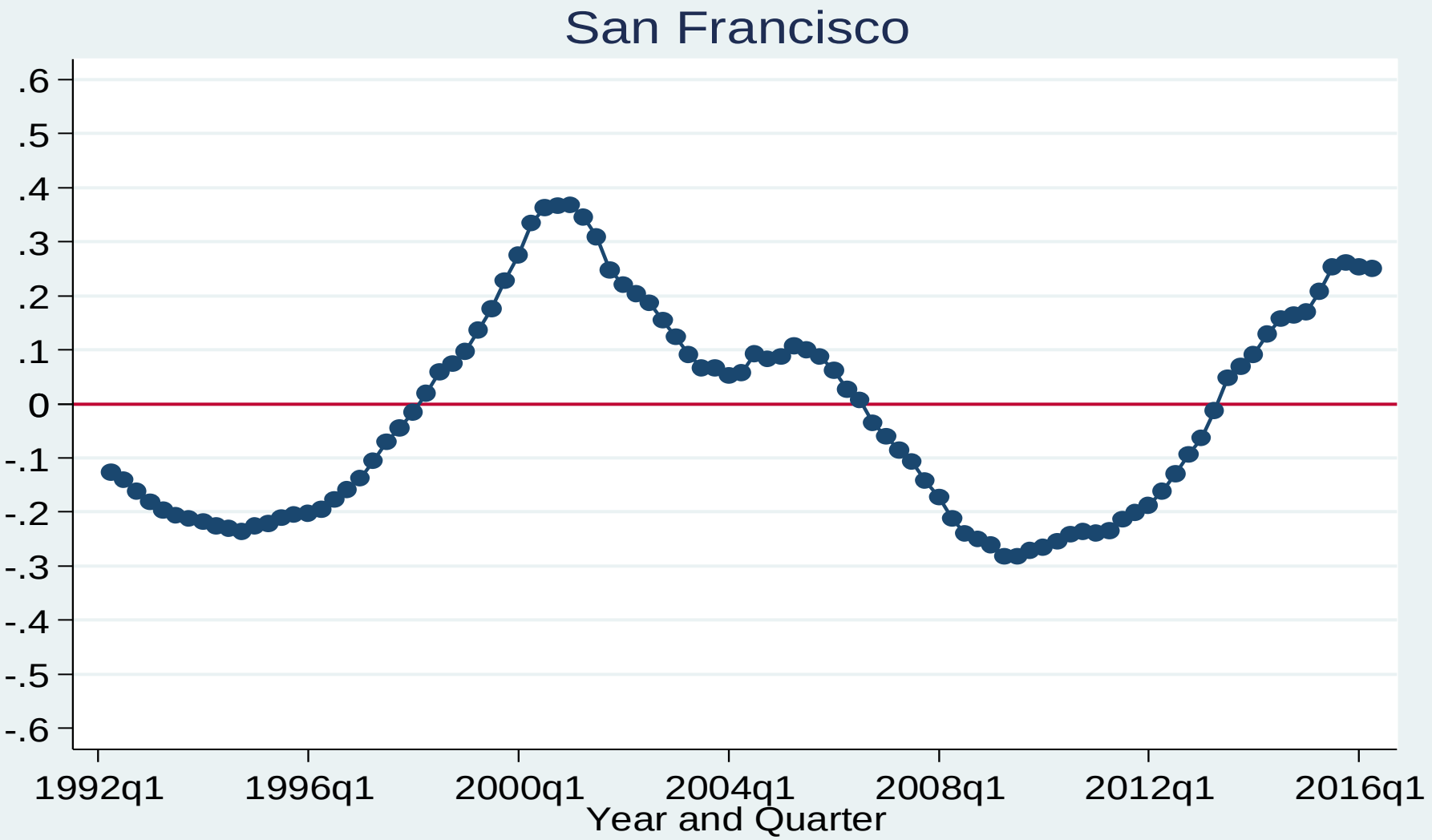
Source: Hendershott *et al.* (1999)

Overview

Stylized Fact 3

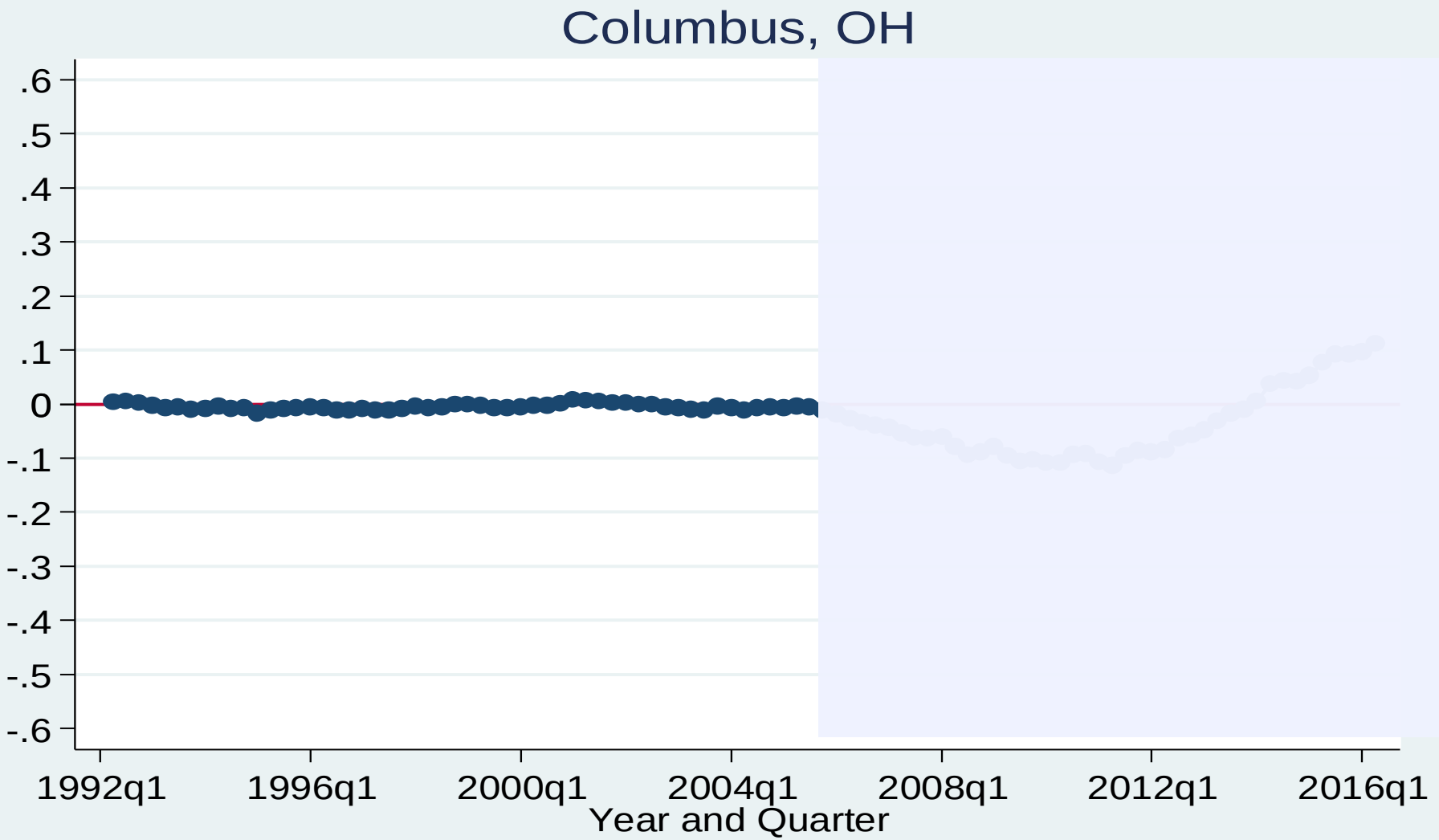
The volatility and duration of property cycles varies substantially **across markets** and **property types**.

Example: Housing market of SF (CA) – Deviation from 50q moving trend price



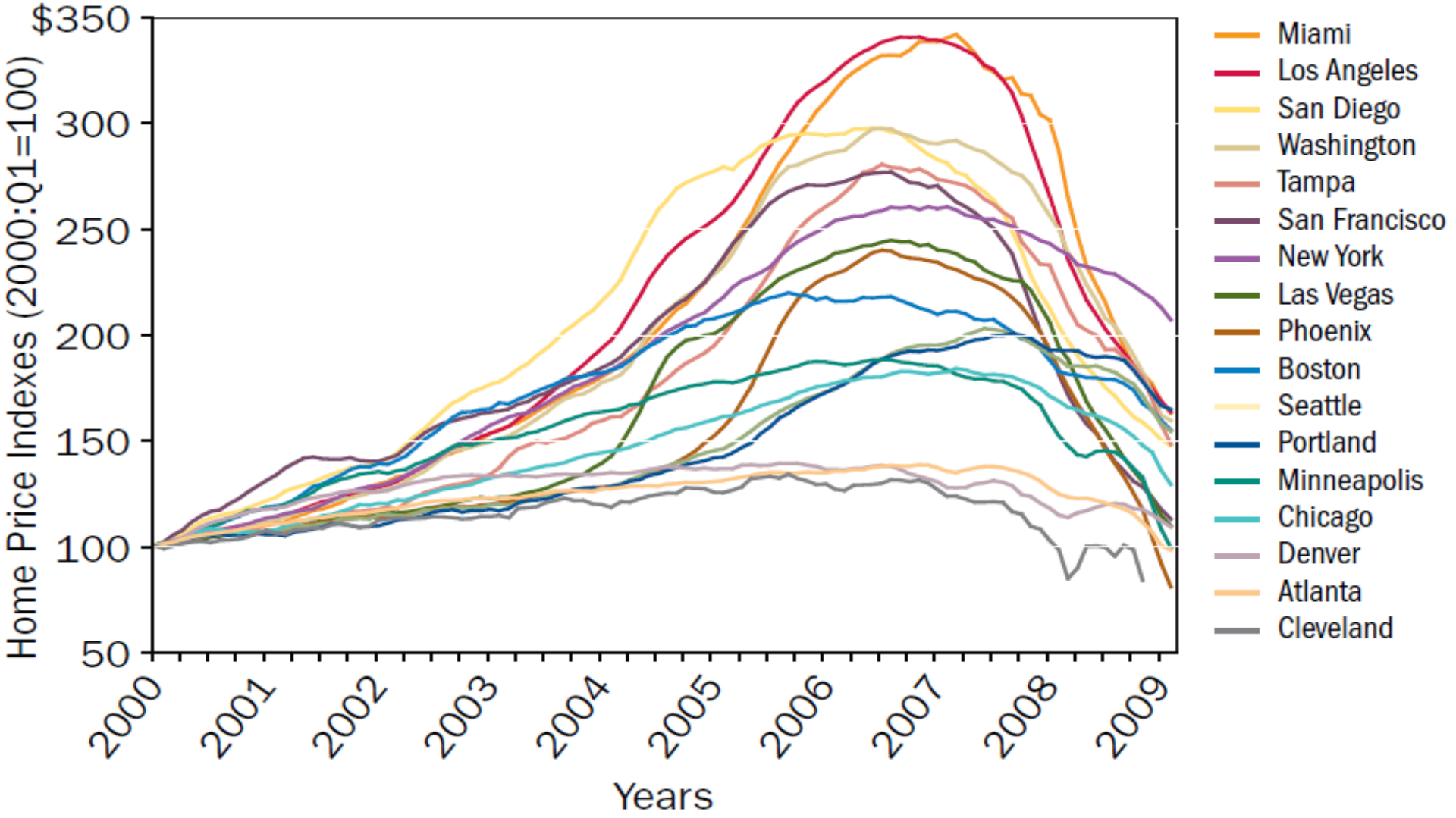
Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)

Example: Housing market of Columbus (OH) – Deviation from 50q moving trend price



Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)

Housing transaction prices in 17 MSAs



Source: K.E. Case, Land Lines (Lincoln Institute), pp. 8-13, http://www.lincolninst.edu/pubs/1743_Land-Lines-January-2010

Example: Cycle duration

- Duration of full house price cycle based on most recent full and clearly defined cycle

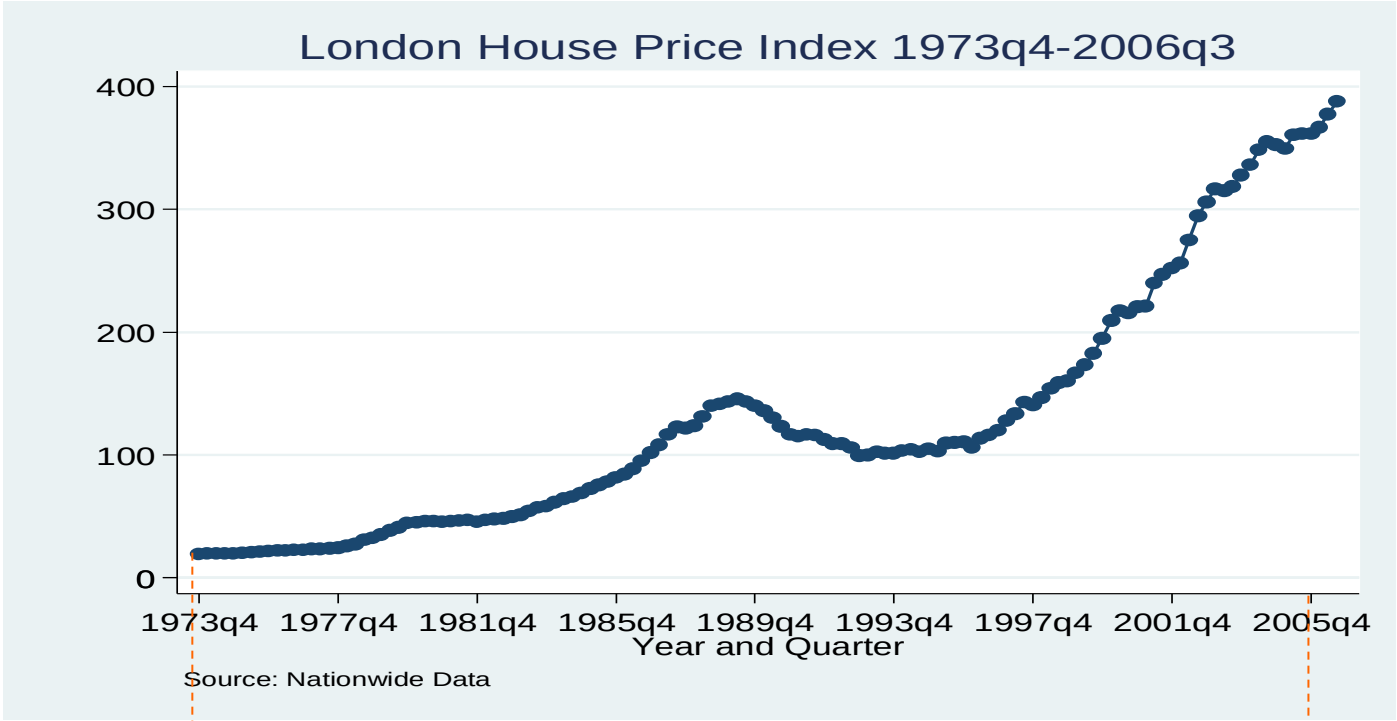
MSA	Start Date of 1st Boom/Bust Cycle	Start Date of 2nd Boom/Bust Cycle	Duration in Years
Phoenix	1980	1998	18
Fort Worth	1982	1999	17
Dallas	1982	1999	17
…	…	…	…
San Diego	1988	2000	12
Grand Rapids	1988	1999	11

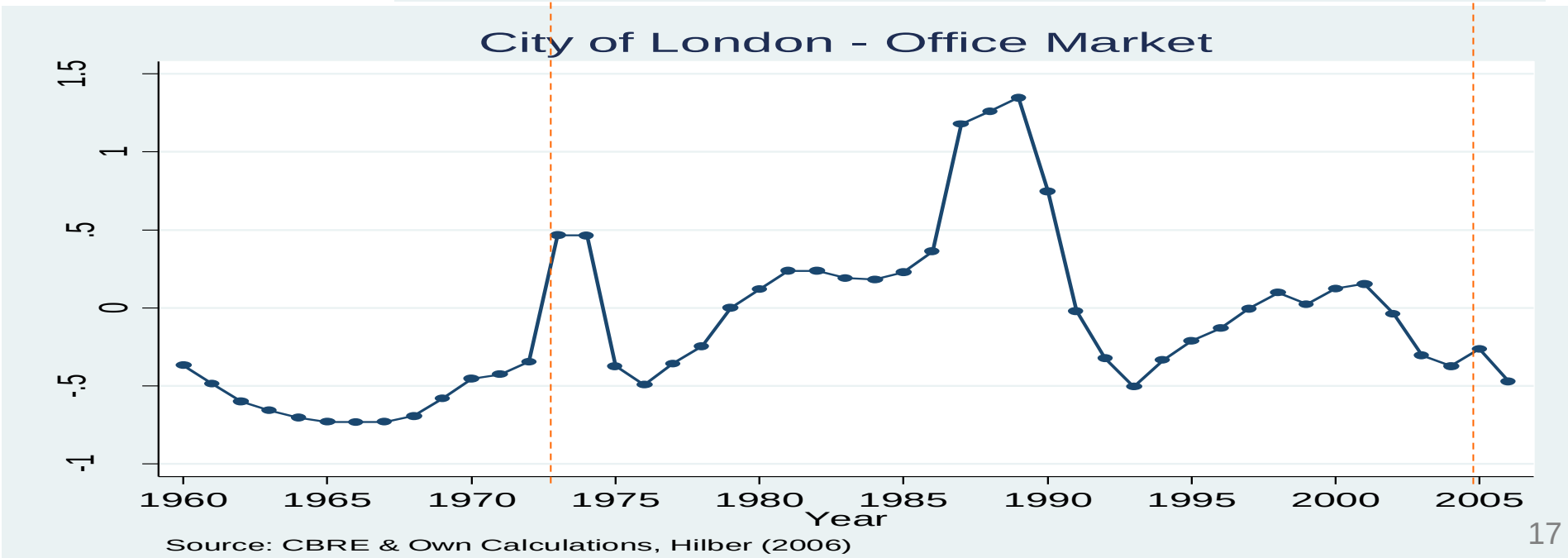
Source: Hilber (2003), own calculations based on OFHEO data, N = 39

- Cycle duration (in q.) across 19 OECD countries (Bracke 2013)

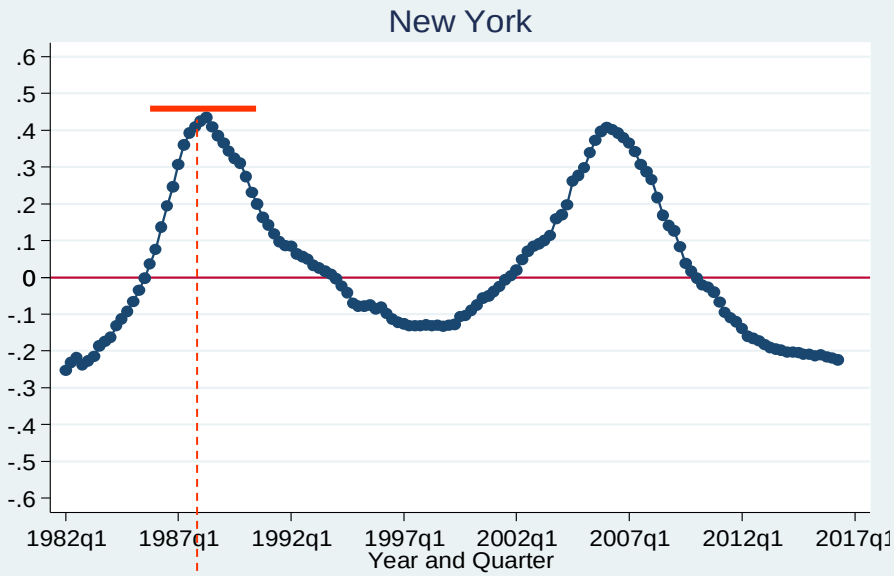
	Pct10	Pct25	Median	Pct75	Pct90
Completed upturns	8	12	21	32	47
Completed downturns	7	13	17	23	32

Residential vs. office market in London





Housing cycles are local in nature



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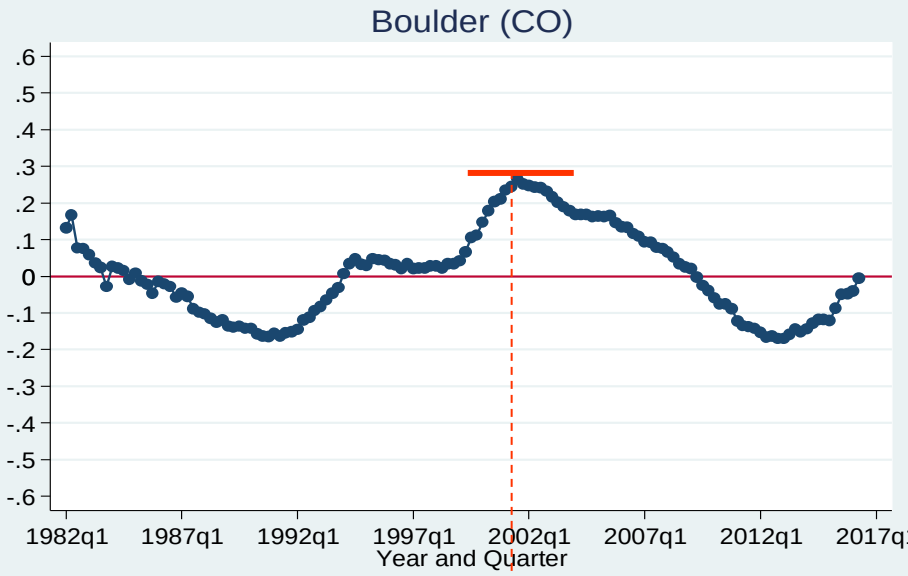

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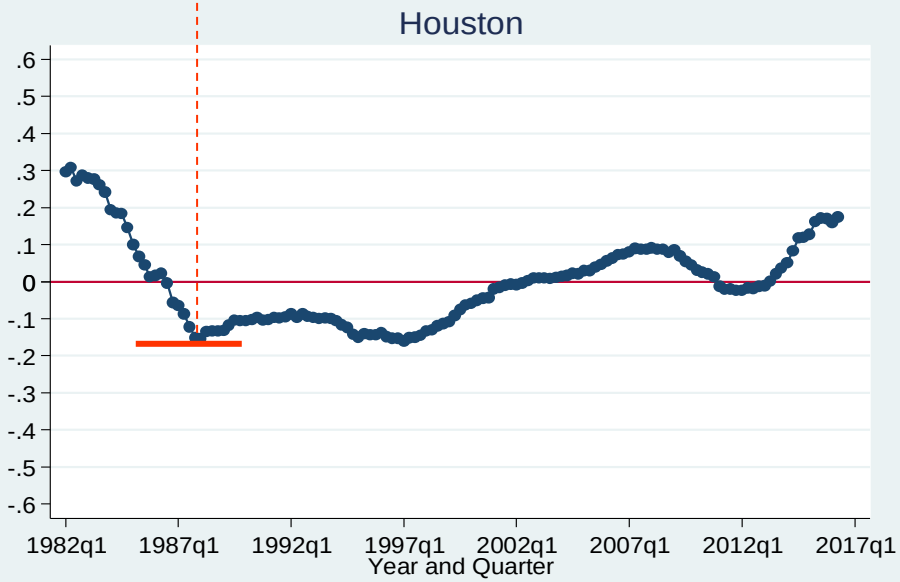

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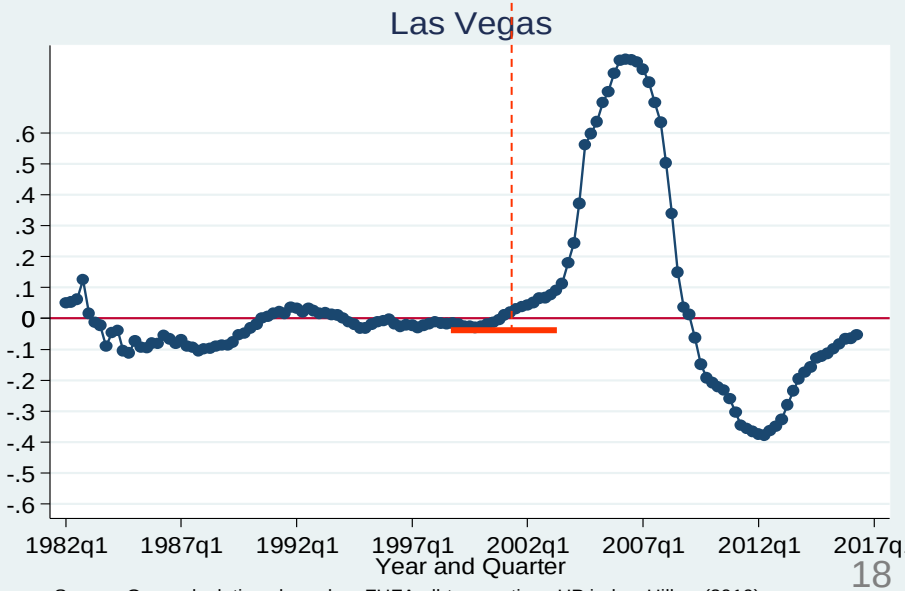

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Some theoretical considerations…

- Consider a metro area with a large number of small local jurisdictions *j=1,…,J*
  - All jurisdictions are perfect substitutes (same amenities, same LPGs and taxes)
  - Households have identical preferences (same WTP)
  - Households relocate without cost (no attachment)
- **Question:** Should the availability of land in jurisdiction *j* matter for capitalization of demand shocks? **(DISCUSS)**

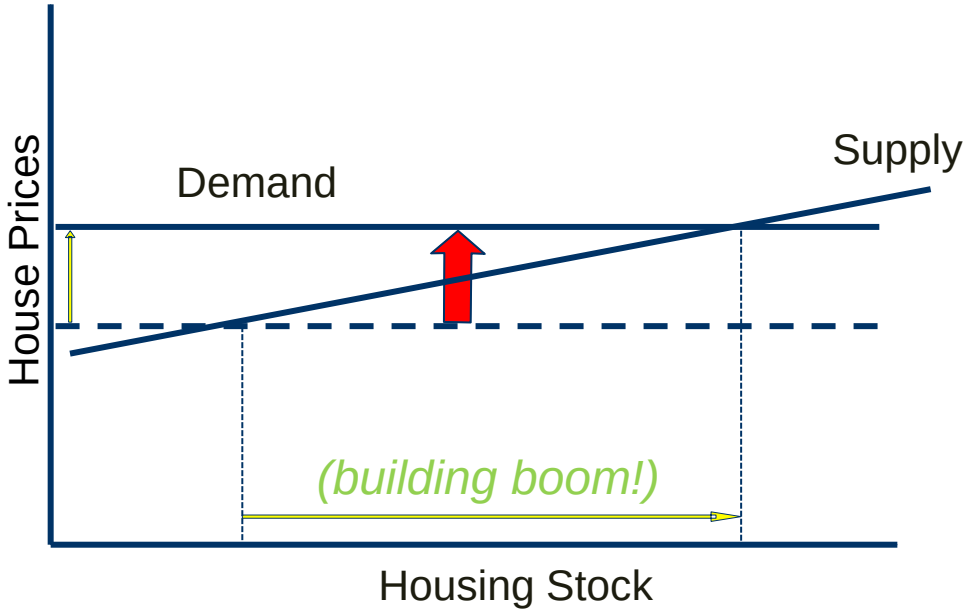
Intuitive explanation

- Under these assumptions: **demand is perfectly elastic!**
  - If jurisdiction *j* receives a grant of 1000£ per household ⇨ Households from other jurisdictions will want to move to *j* until house values in *j* increase by exactly 1000£

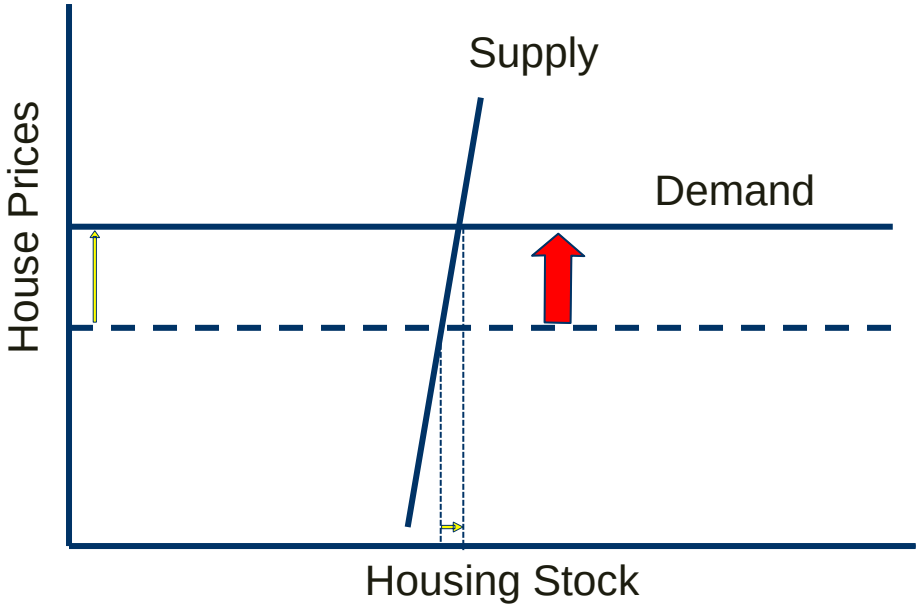
⇨ Slope of supply curve should not matter for price capitalization under these assumptions (only quantity adjustment affected)…

The case of perfectly elastic demand

Unconstrained location
(small town A)



Constrained location
(neighboring small town B)



- ⇨ Slope of supply curve does not affect extent of price capitalization (<u>always 100%</u>) but matters greatly for new construction!
- ⇨ Hedonic model assumes perfectly elastic demand!

Glaeser and Ward (2009, JUE)

"There are so many close substitutes for most towns [in Greater Boston] that we would not expect restricting of housing supply in one town to raise prices in that town relative to another town with similar demographics and density levels. Restrictions on building in one suburban community should not raise prices in that community relative to another town with equivalent amenities, any more than restrictions on the production of Saudi Arabian crude will raise the price of Saudi Arabian crude relative to Venezuelan crude. Of course, Saudi Arabia's quantity restrictions will still raise the global price of oil, but this cannot be seen by comparisons of prices across oil producers."

How realistic is this case?

- **Two neighboring small towns**
  - Often *close substitutes* but not always (school quality often very different; each town has *some* unique features)
- **City centre vs. small town at edge**
  - *Poor substitutes*: very different amenities, local public services, commuting times
- **Two metro areas in same country**
  - *Very poor substitutes*: NYC very different from Columbus (Ohio)

How realistic is this case? (Cont.)

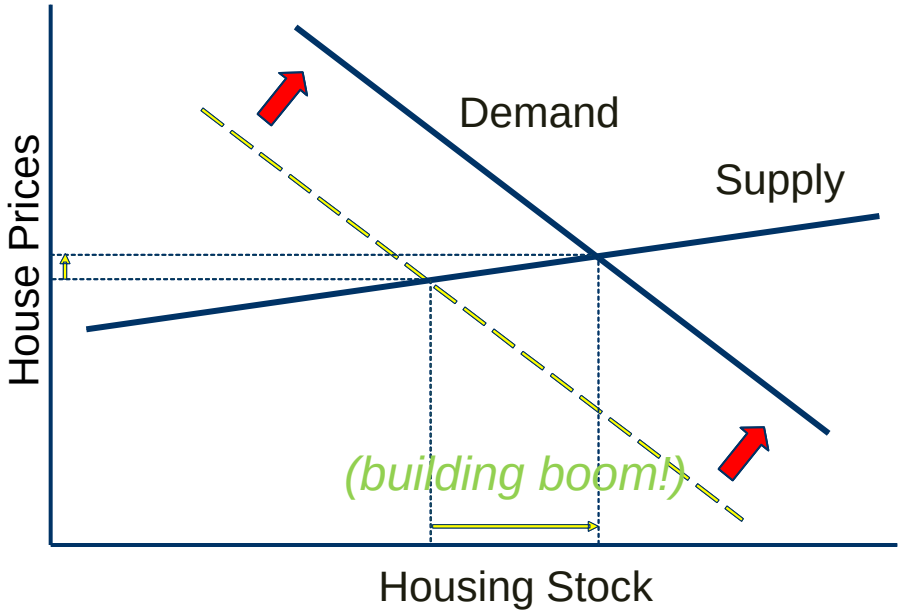
- In world with imperfect substitutability of land
  - Relocation costs matter
  - Preferences (tastes) matter (e.g. attachment to place of birth; love for mountains/solitude)
- **Why?**
  - Take grant example: If relocation costs are > 1000£, no household will move, unless HHs experience ‘mobility shock’!
  - More generally: heterogeneous preferences & imperfect substitutability make **local demand curves downward sloping** (because each HH has different WTP for attributes of location!)

The role of supply constraints

- **Consider labour demand shock in two locations that are <u>not perfect substitutes</u> & <u>HH differ in tastes</u> for amenities and local public services…**

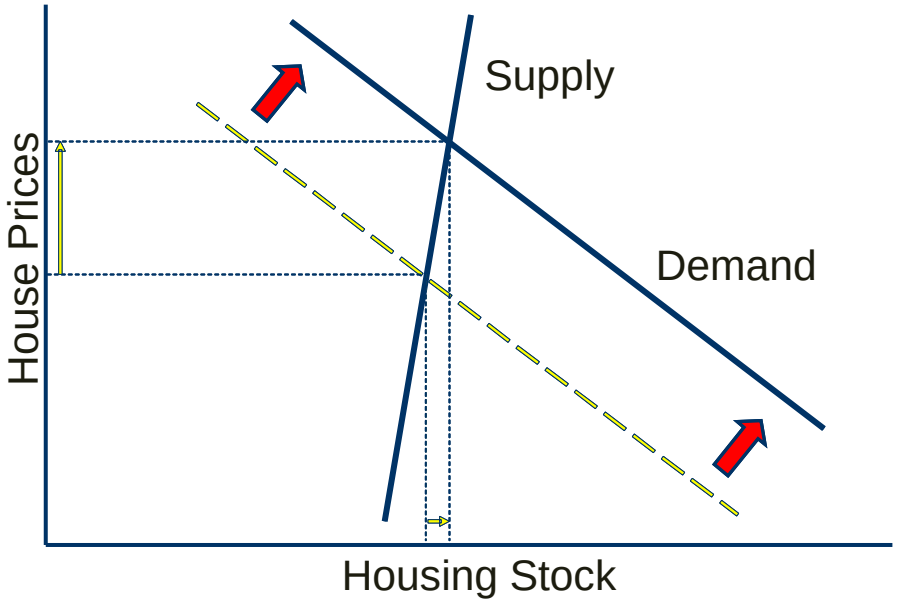
Unconstrained location

(Phoenix, LV)



Constrained location

(SF, LA, London)



Just in Theory?

- Look at
  - **city that has very little undeveloped land & is tightly regulated** and compare with
  - **city with plenty of open land** in the surrounding area **& few land use restrictions**

A prime example of a city with inelastic land supply

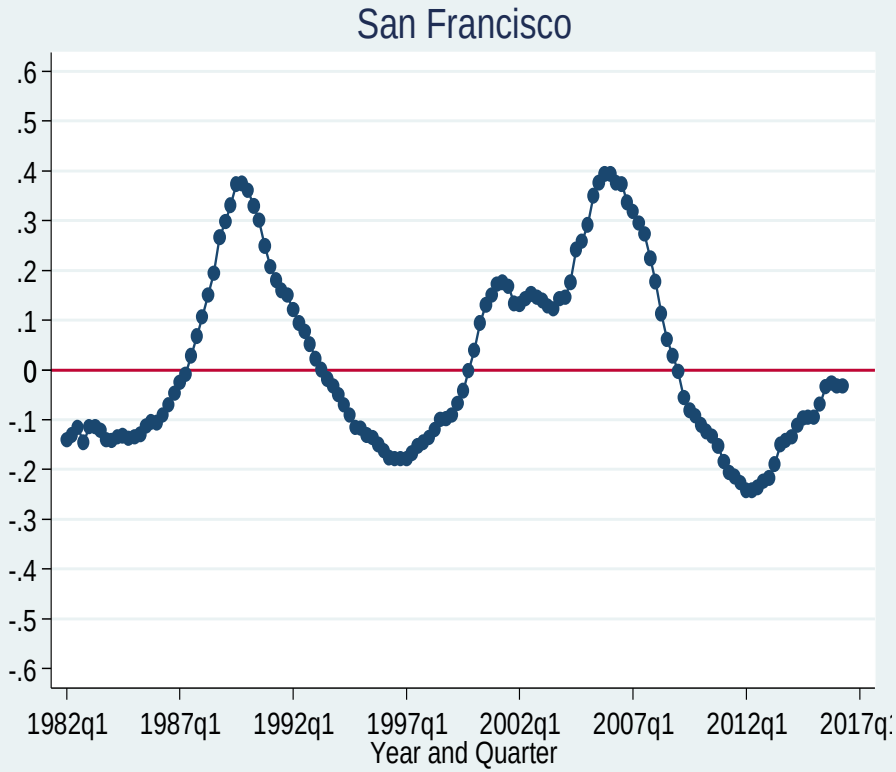
A prime example of a city with plenty of open land

Columbus (OH)

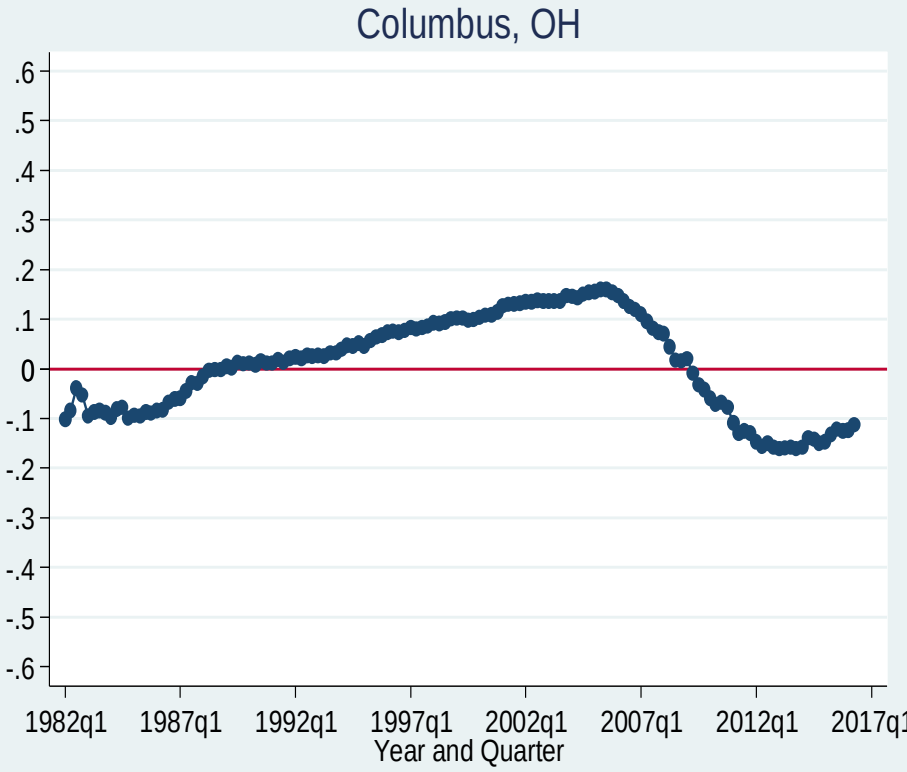
Plenty of open land surrounding city +
no geographical constraints +
lax land use controls

San Francisco (CA) vs. Columbus (OH)

Deviation of house price index from long-run trend (1982q1-2016q2)



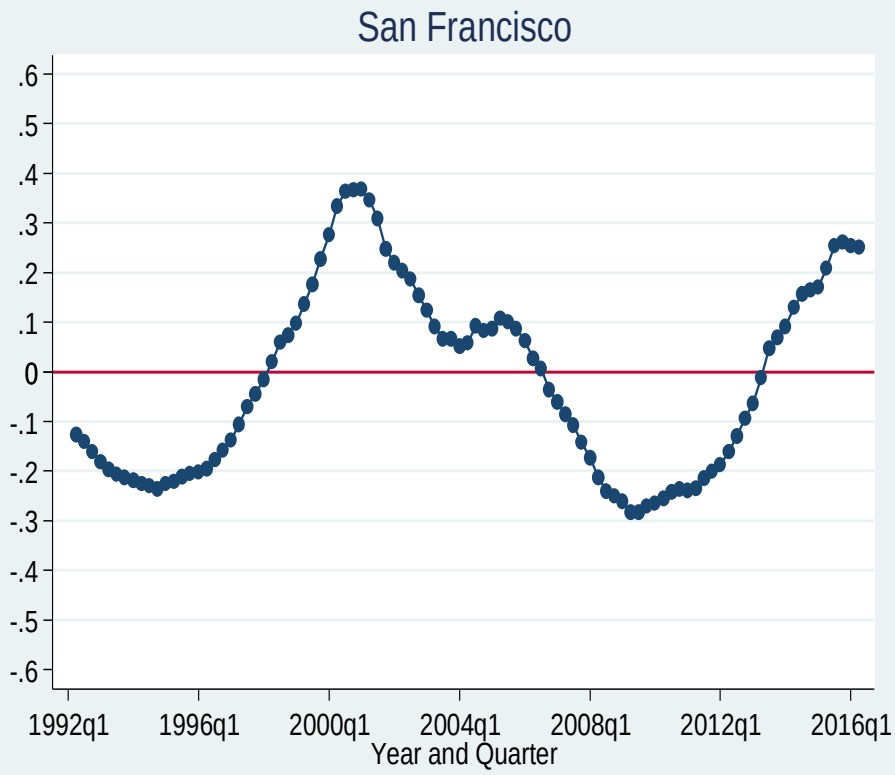
Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)



Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)

San Francisco (CA) vs. Columbus (OH)

Deviation of house price index from moving average (last 50 quarters, until 2016q2)



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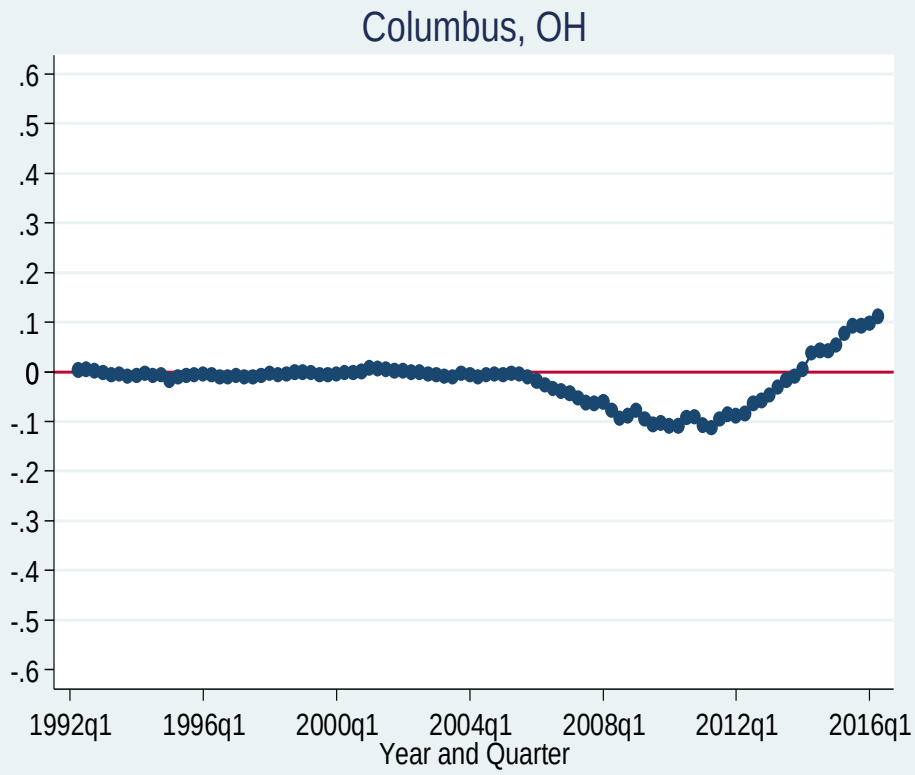
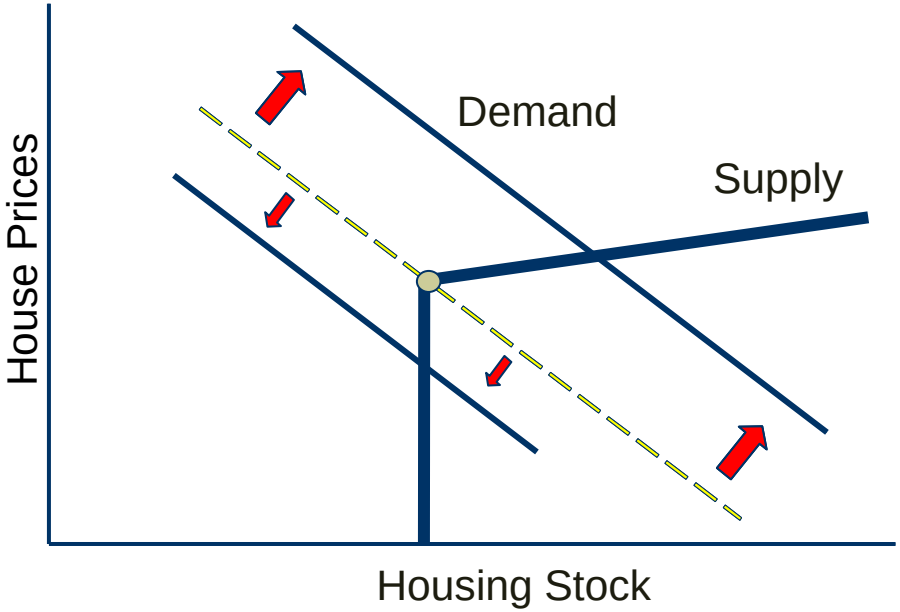


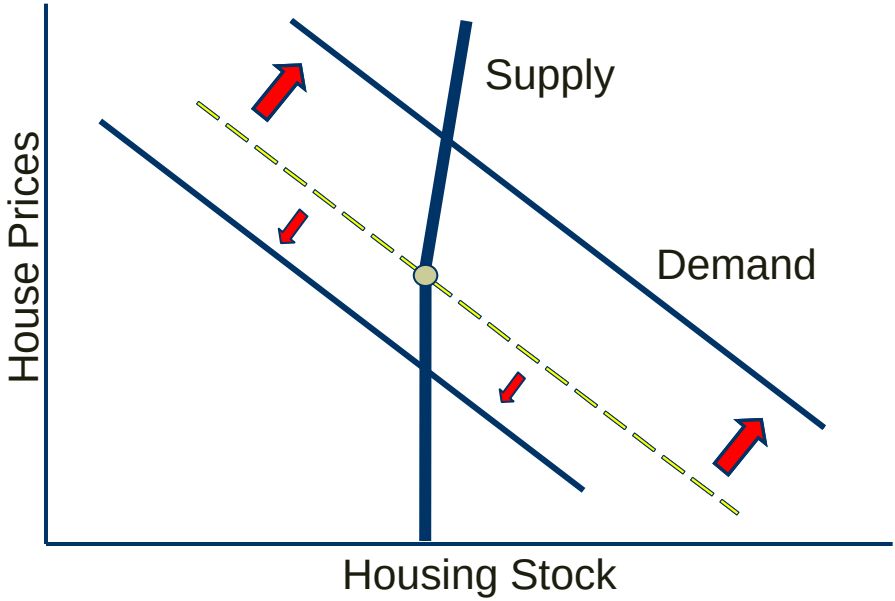
Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)

Excursus: The housing supply curve is 'kinked downwards'

Unconstrained location
(Phoenix, LV)

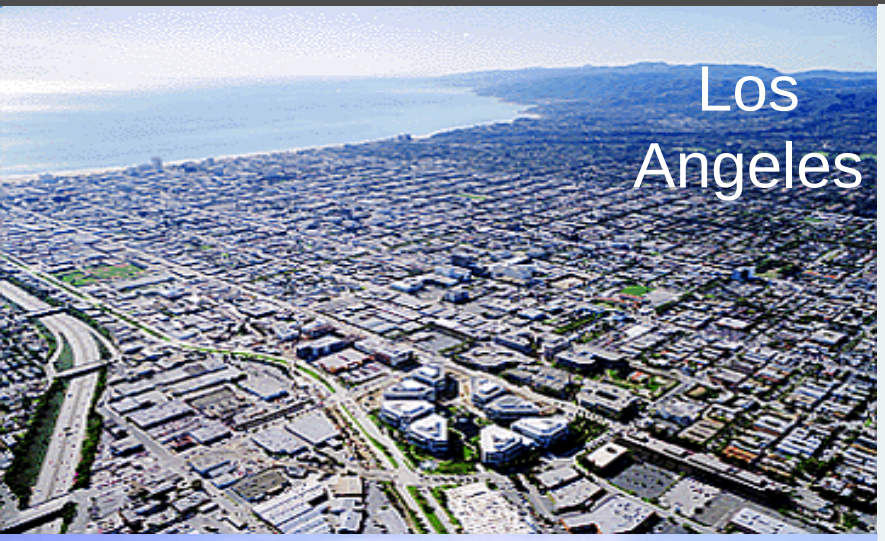


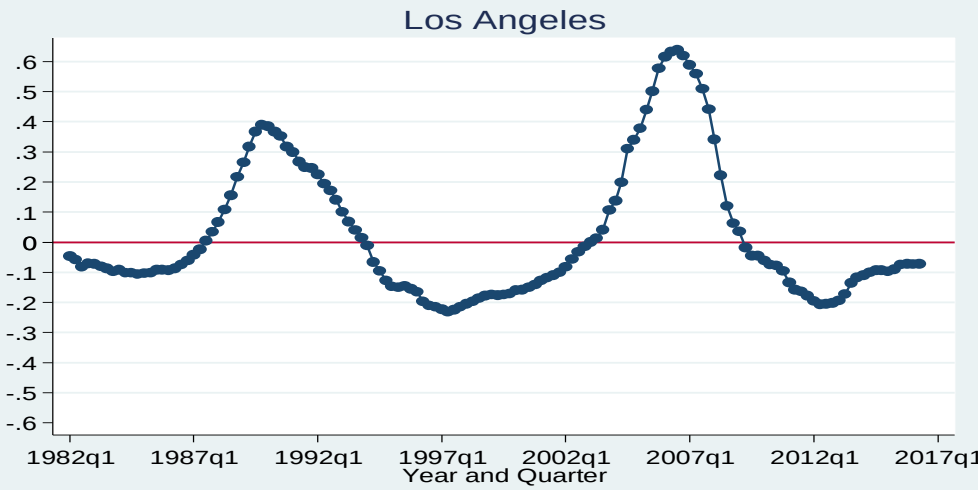
Constrained location
(SF, LA, London)



⇨ Housing stock is durable!

Other examples…





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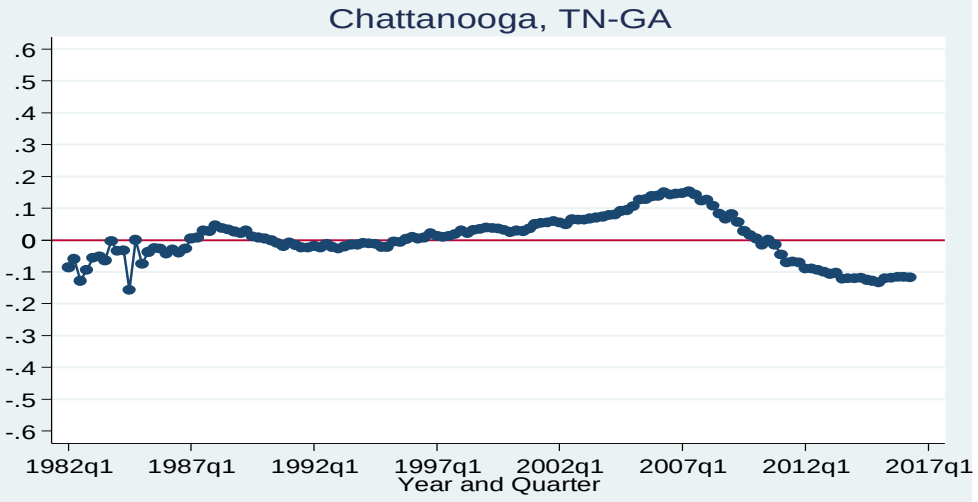


Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)

Open question

⇨ What **types of constraints** make supply inelastic?

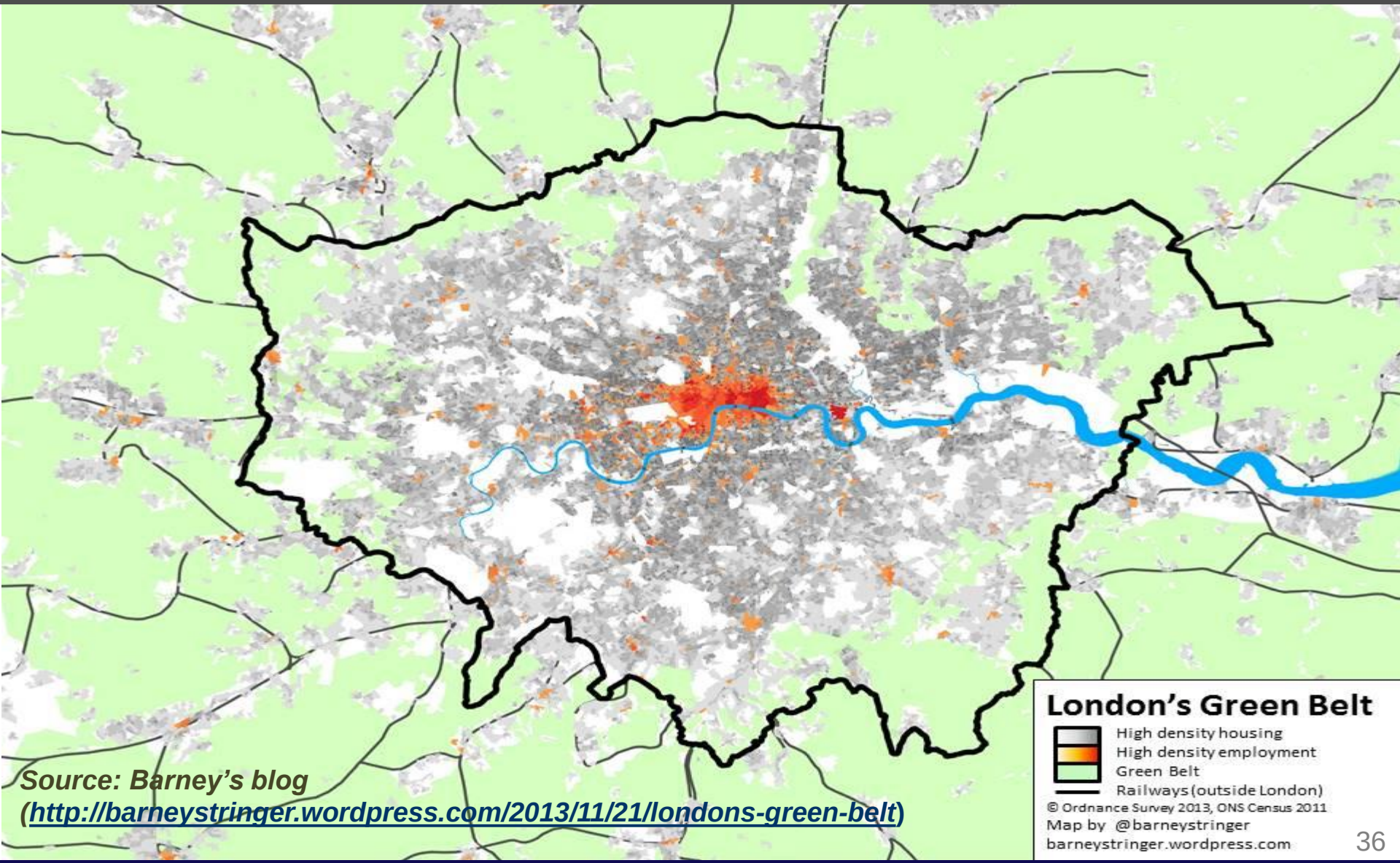
⇨ Consider the case of England…

(Based on Hilber & Vermeulen, 2016)

Candidate #1: Regulatory supply constraints

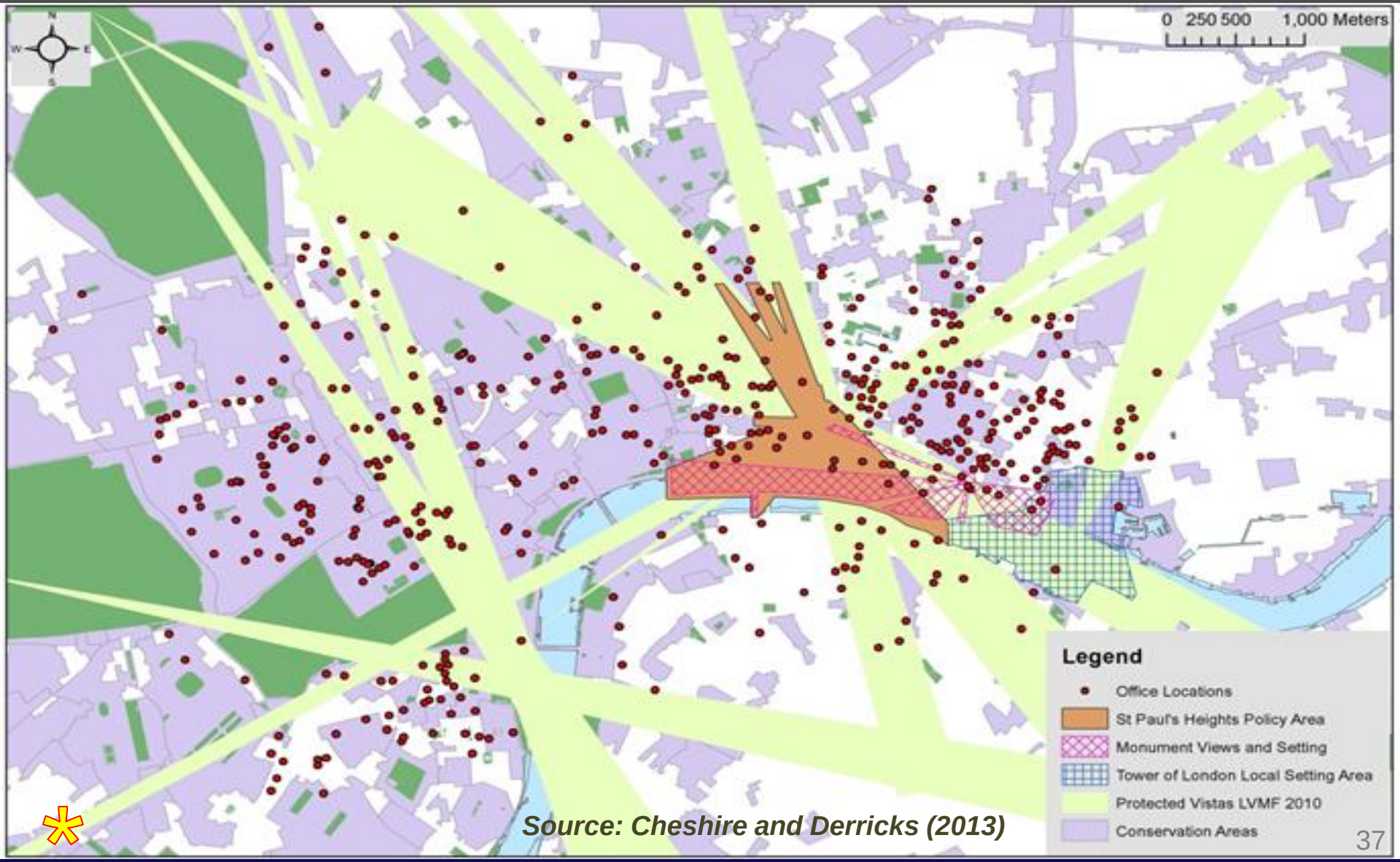
- English planning system widely viewed as inflexible
  - Since 1947: virtually no fiscal incentives at local level to permit development
  - 'Development control system' (catering to NIMBYs) particularly near green belts
  - 'Horizontal' constraints: Green belts surrounding major cities
  - 'Vertical' constraints: height restrictions & protected vistas
  - Other regulations: preservation policies (conservation areas, listed buildings) & codes

An illustration of London's restrictiveness: 1. London's green belt



Source: Barney's blog (http://barneystringer.wordpress.com/2013/11/21/londons-green-belt)

2. London's height restrictions, preservation policies &protected vistas



Source: Cheshire and Derricks (2013)

* Protected view from King Henry VIII's Mound (Richmond Park)

Backdrop: Liverpool Street Station area

Distance to…

- Silicon roundabout: 850m
- BoE (City): 600m
- St. Paul's: 1km

Candidate #1: Regulatory supply constraints (cont.)

- Barker-review (2004, 2006) suggested that regulatory constraints *may be* important *causal* driver of high house prices and volatility

⇨ **To be tested…**

Candidate #2: Physical supply constraints

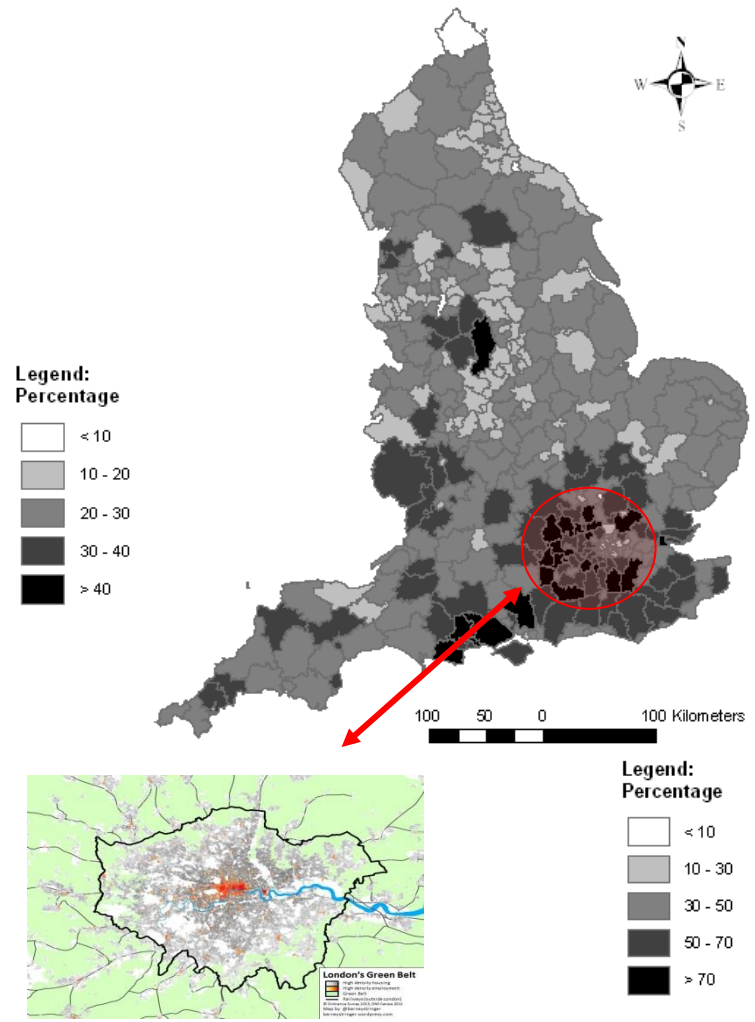
- Could also be physical supply constraints
  - a) **Limited local availability of open developable space** (very high opportunity costs)
  - b) **Steep slopes** (difficult + costly to build)

⇨ **To be tested…**

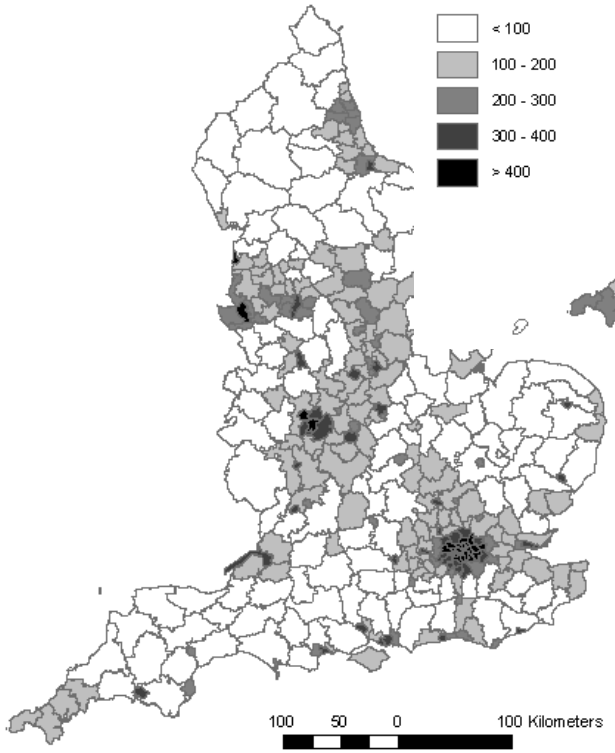
How to test in practice?

- Proxy for regulatory constraints
  - Use direct measure of how restrictive Local Planning Authorities (LPAs) are: **Refusal rate for major residential projects** (1979-2008)
- Proxies for physical constraints
  - Use land cover satellite date to calculate **share developable land that is developed** (in 1990)
  - Use raster grid data to derive measure of slope related constraints: **range in elevation** (or alternatively: standard deviation of slope)

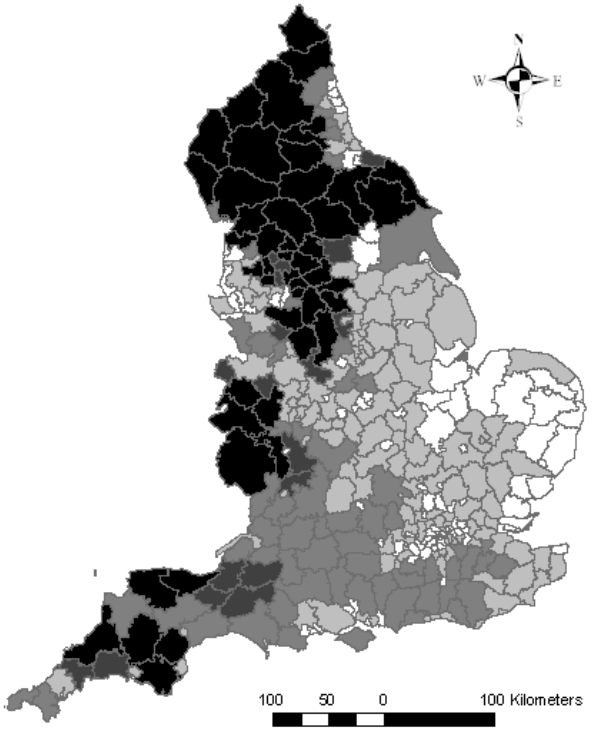
Average refusal rate (major residential projects) 1979-2008



Share developable land developed, 1990

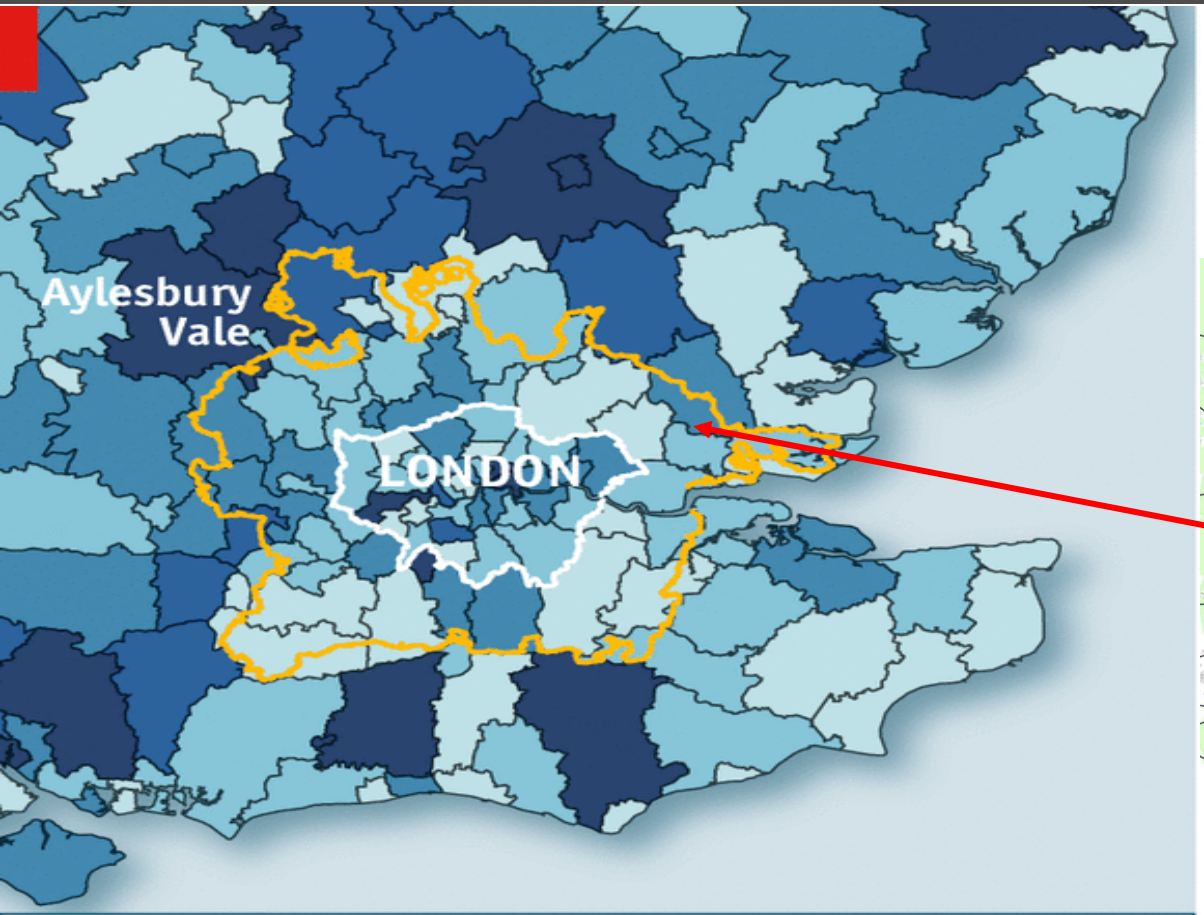


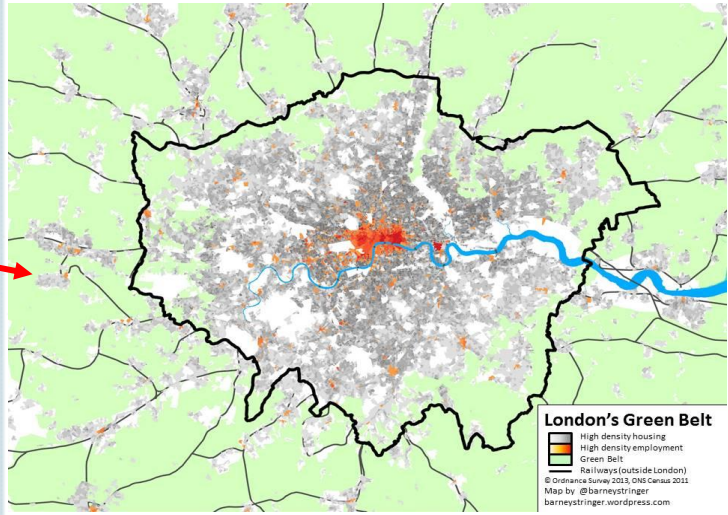
Elevation range



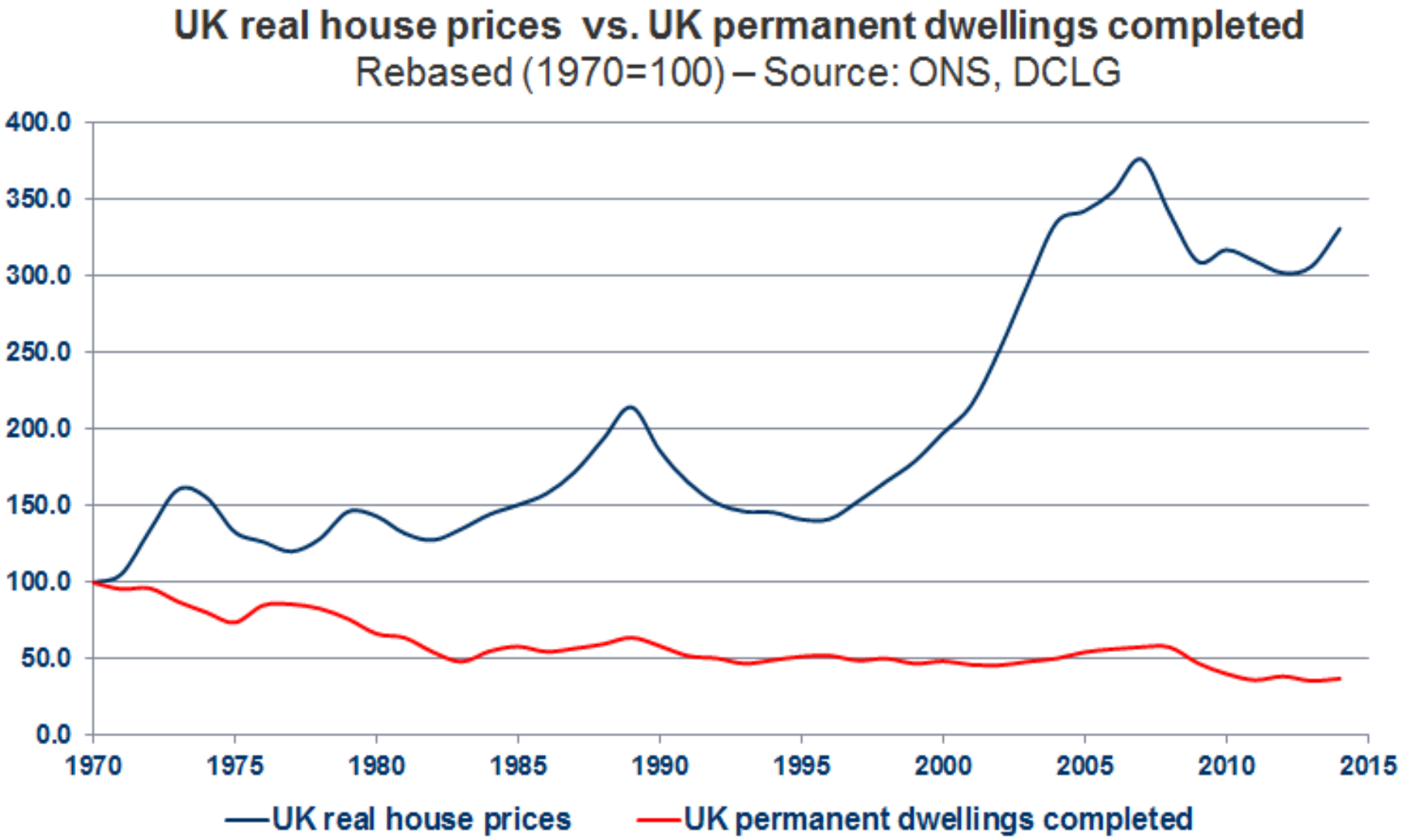
Source: Hilber and Vermeulen (2016)

Some circumstantial evidence regulatory constraints may be important…

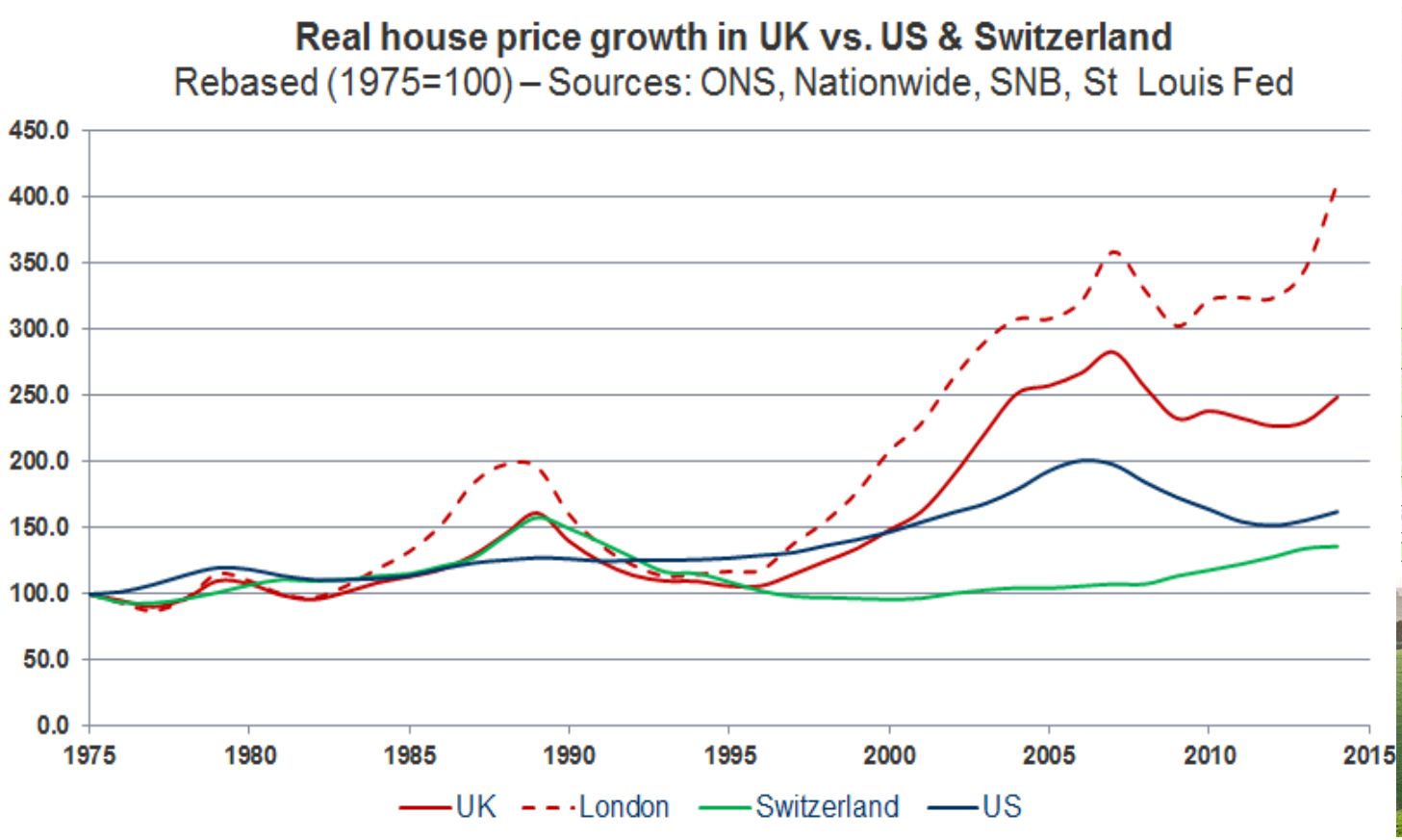


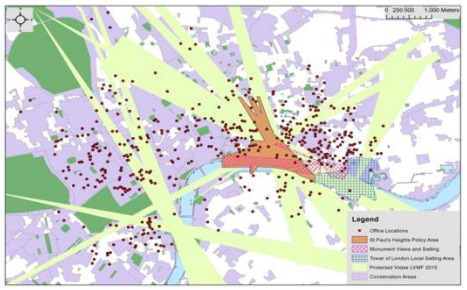


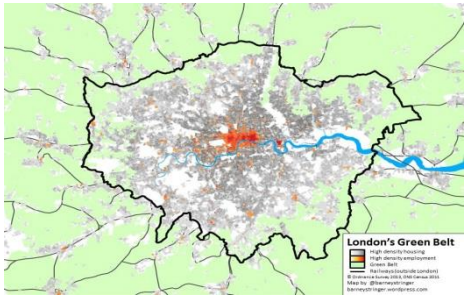
Circumstantial evidence… (cont.)



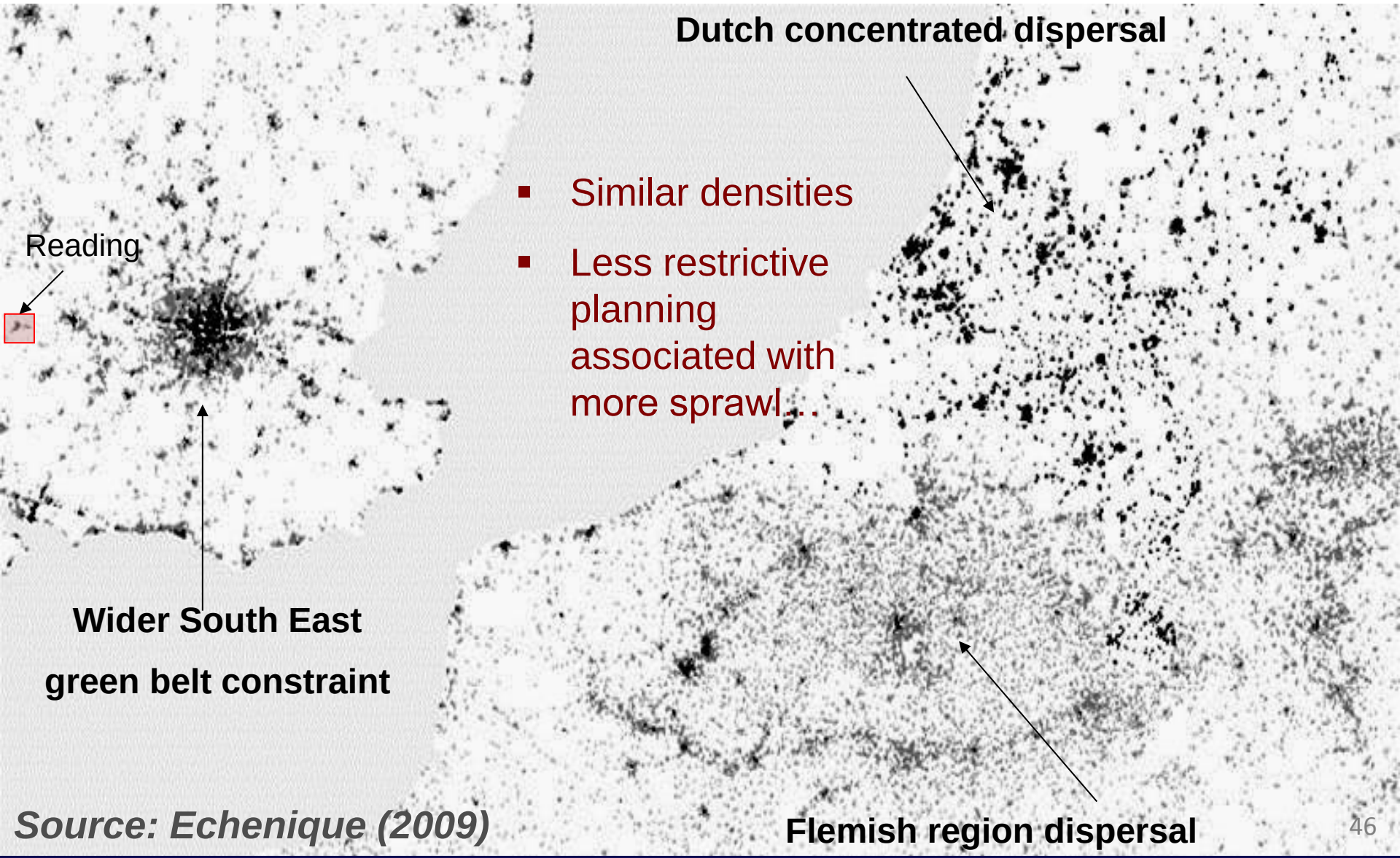
Circumstantial evidence… (cont.)







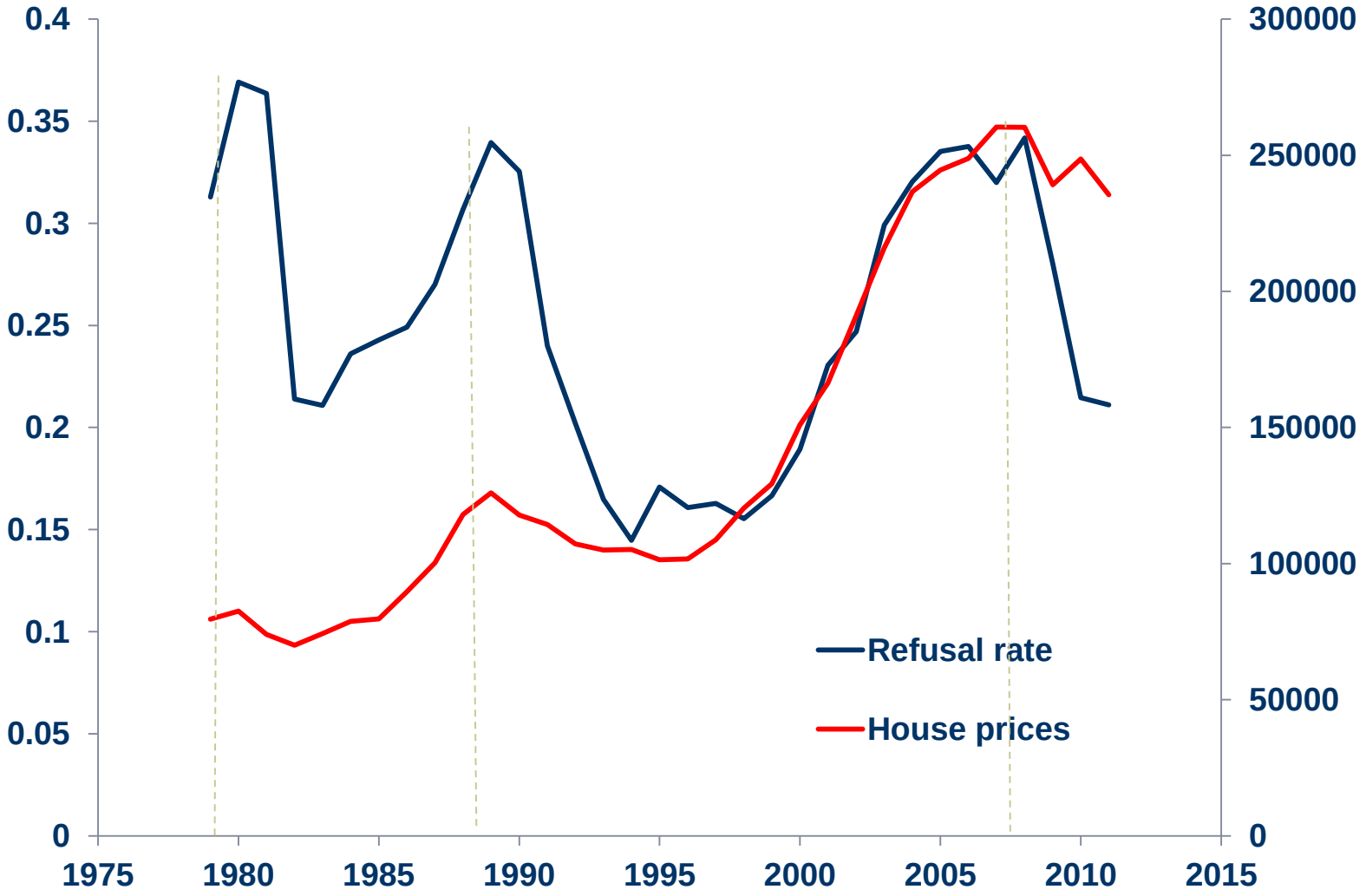
Planning appears to affect urban form…



- Similar densities
- Less restrictive planning associated with more sprawl…

Source: Echenique (2009)

Restrictiveness strongly correlates with house price cycles—but is this causal?



Source: DCLG (raw data), own computations – Hilber (2014)

How to test rigorously?
Empirical strategy

- Estimating equation:

j = 1,…, 353
t = 1974, ..., 2008

$$\log\left(house\ price_{jt}\right) = \beta_0 + \beta_1 \log\left(earnings_{jt}\right) +$$
$$\beta_2 \log\left(earnings_{jt}\right) \times \overline{\textbf{refusal rate}_j} +$$
$$\beta_3 \log\left(earnings_{jt}\right) \times \textbf{\%developed}_j +$$
$$\beta_4 \log\left(earnings_{jt}\right) \times elevation_j + year\text{-}FE + LPA\text{-}FE + \varepsilon_{j,t}$$

β_2 ,β_3 ,
β_4 >0

Empirical strategy (cont.)

- Three potential endogeneity concerns:
  - ***Refusal rate***: Refusal rate may be endogenous to demand conditions & developers may not apply if likely rejected
  - ***Share developed***: Contemporaneous D & S factors (incl. regulation) may affect share developed
  - ***Earnings:*** Local earnings can be influenced by house prices (via sorting) and therefore may reflect housing supply as well as housing demand

⇨ Problem: Estimates of ordinary regressions are likely biased

⇨ Luckily, instrumental variables (IV) approach (2SLS) allows us to address this problem & identify unbiased causal effects…

Basic idea of IV (2SLS) approach

- Find 'instrumental variables'
  - Ideally strongly correlated with endogenous RHVs (here: **refusal rate, share developed & earnings**), conditional on other covariates
  - But do not directly impact the LHV (here **house prices**) (uncorrelated with error term)
- Use exogenous variation from instruments to predict endogenous RHVs (**refusal rate, share developed & earnings**) in **1st stage**
- Then use predicted RHVs in **2nd stage** to identify the causal and unbiased effect of these RHVs on the LHV (**house prices**)

Excursus: IVs to identify causal effect of refusal rate

Two instruments:

1. **Change in delay rate** (pre-/post-policy reform in 2002) [IV#1]
   - Labour government introduced delay rate targets in 2002, but no refusal rate targets!
   - Restrictive LPAs had strong incentive to substitute delays with refusals
   - Most restrictive LPAs will be ones with greatest decrease of delay rate post-reform
   - **Identifying assumption:** Conditional on location FEs, change in delay rate affects impact of earnings on house prices only through planning restrictiveness

IVs for refusal rate (cont.)

2. Local vote share [IV#2]

- Middle income Labour voters have traditionally cared more about housing affordability and less about protecting house values (fewer own homes!)
- **Identifying assumption**: Conditional on location FEs, local vote share affects impact of earnings on house prices only through planning restrictiveness

IV to identify causal effect of land scarcity

- Instrumental variable: **Historical density from 1911** [IV#3]
  - Instrument pre-dates 'birth' of modern British planning system (TCPA of 1947) by several decades
  - **Identifying assumption**:
    - Density almost 100 years ago will be indicative of early forms of agglomeration & local amenities, so should be strongly correlated with share of developed land today
    - But, controlling for LPA FEs, historic density should not directly explain *changes* in contemporaneous HPs

IV to identify causal effect of earnings

- Instrumental variable: **'Labour demand shock' measure** (Bartik 1991) [IV#4]
  - Use local industry composition in 1971 and national employment growth in the industries to predict local employment growth (shift-share approach)
  - Local industry composition in 1971 pre-dates our regression sample
  - Ideally: would instrument earnings but leads to weak identification
    - Replace earnings with plausibly exogenous demand shock measure (can no longer interpret coefficients as price-earnings elasticity)

Empirical strategies

- **Strategy 1**: Use TSLS and instruments #1 to #3 to identify causal effects of supply constraints measures / ignore concern that local earnings might be endogenous

- **Strategy 2**: Replicate this specification but replace earnings with instrument #4
  - Can no longer interpret coefficient as price earnings elasticity
  - But yields plausibly unbiased estimates

Excursus: Data

- **House price** index
  - **Land Registry** (1995 - 2008), **CML** (1974 - 1995)
  - Index adjusts for mix of housing types
- Real weekly **earnings** of FT working men
  - **ASHE / NES**

\+ Regulatory data **(DCLG)**, satellite data **(various sources)**, historic data **(Census)**

⇨ All geographically matched to 2001 LPA boundaries (353)

Results: naïve OLS

LHV: Log(real house price index)	
	Coefficient
Log(earnings)	0.32***
Log(earnings) x *average refusal rate*	0.067***
Log(earnings) x *share developed*	0.094**
Log(earnings) x *elevation range*	-0.00047
Year-FEs	Yes
LPA-FEs & constant	Yes

House price-earnings elasticity of LPA with average constraints

Refusal rate +1 std. dev. (+8.7%) → price-earn. elasticity increases by +0.067 (~+21%)

Endogenous!

Results of IV: 1st stage (validity of instruments)

- All three ‘instruments’ (#1 - #3) have the predicted sign and are highly statistically significant (at 1%-level)

- Test-statistics suggest that instruments may be valid and strongly identify the causal effects of regulatory and scarcity related supply constraints

Results of IV: 2nd stage

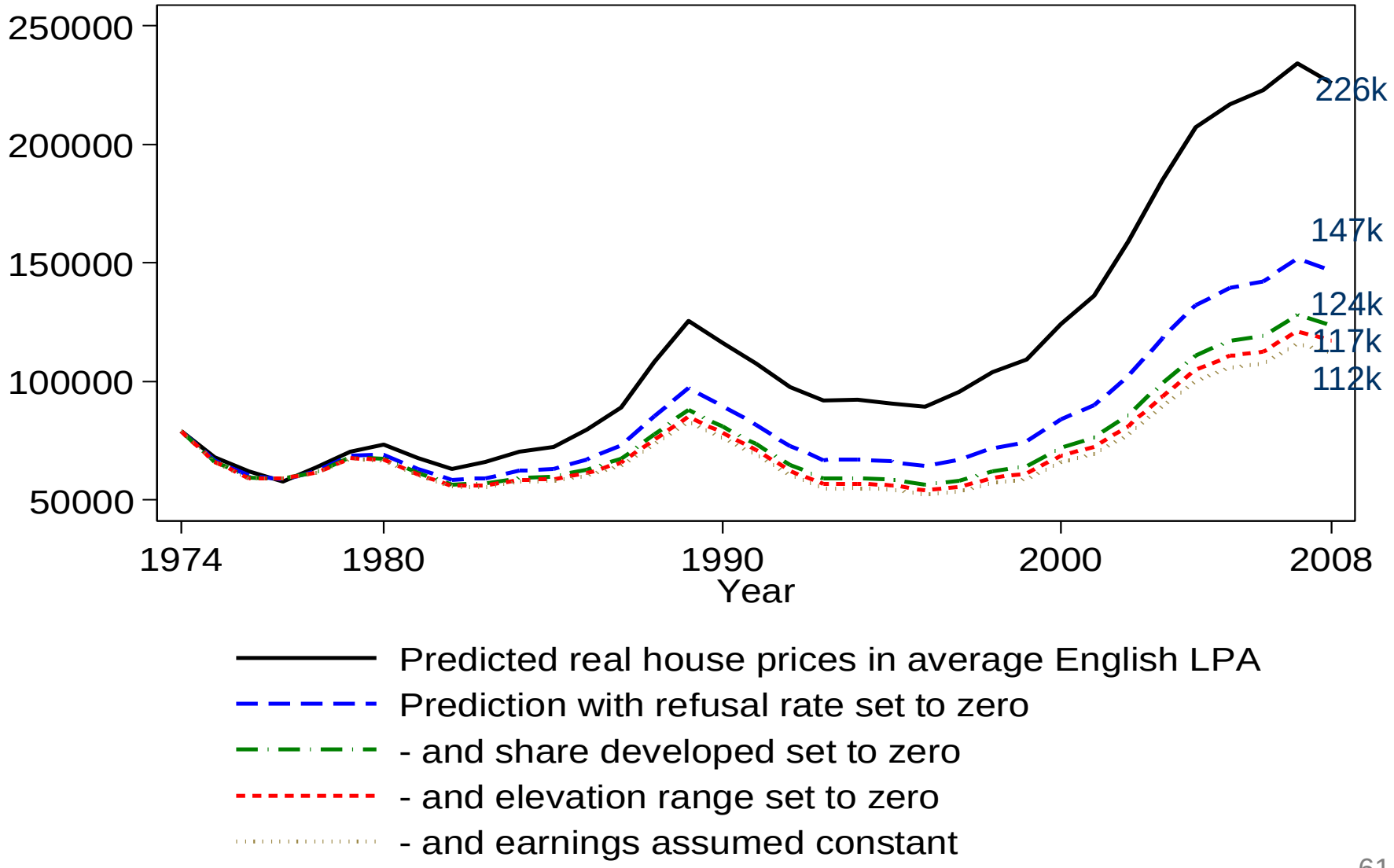
LHV: Log(real house price index)	
Log(earnings)	0.089
Log(earnings) x ***average refusal rate***	**0.29*** **
Log(earnings) x ***share developed***	**0.30*** **
Log(earnings) x *elevation range*	0.095**
Year-FEs	Yes
LPA-FEs & constant	Yes
Kleibergen Paap F-stat	11.8

Quantitative effects (based on IV with instruments #1-3)

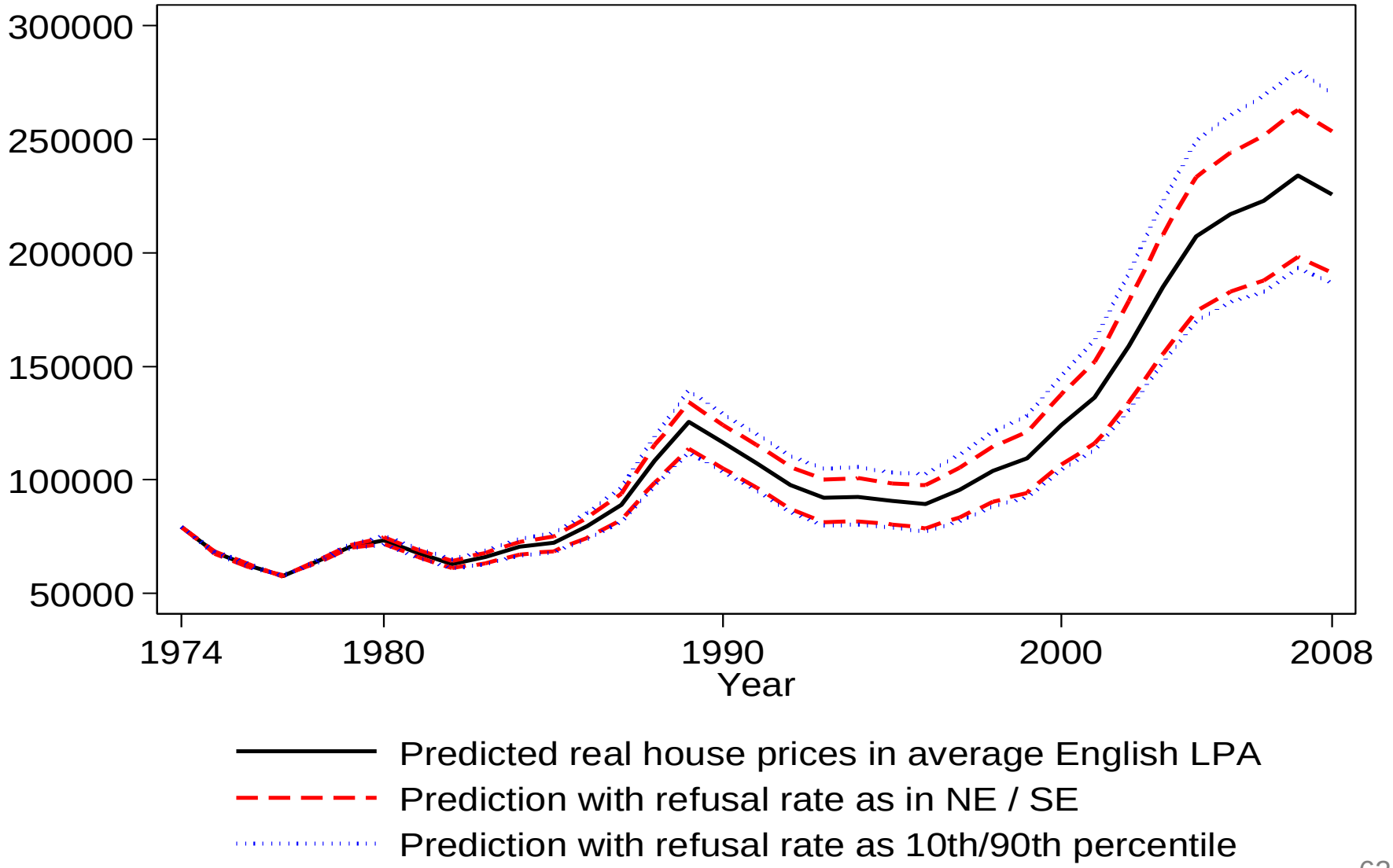
- **If planning system were relaxed in *av. LPA*:**
  - House prices in *av. LPA*: -35%
- ***and* developable land were abundant:**
  - House prices in *av. LPA*: -45%
- ***and* LPA were completely flat:**
  - House prices in *av. LPA*: -48%

Note: These are likely lower bound estimates for a number of reasons (see paper for details)

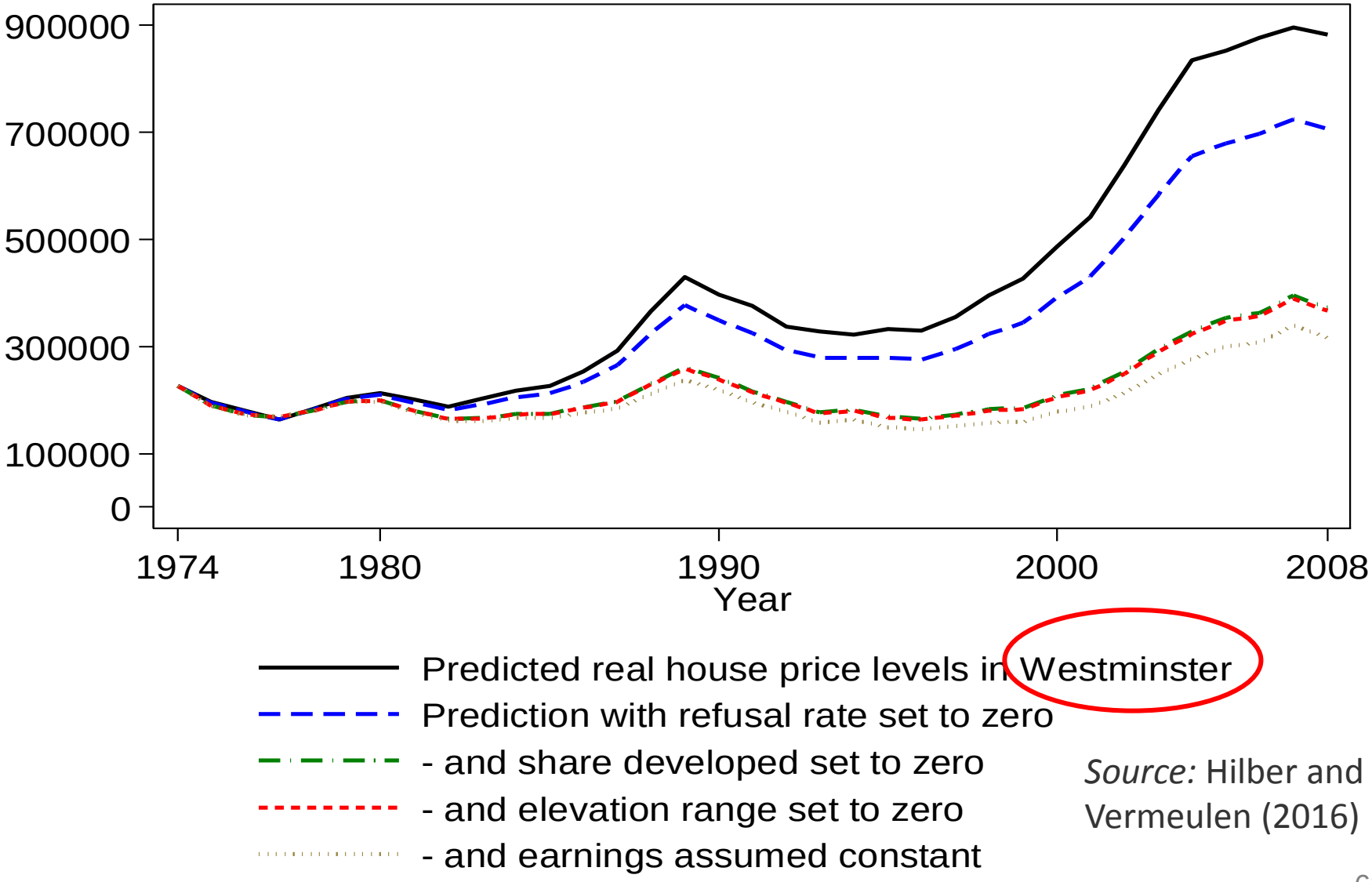
What would house prices in average English LPA be if…



North East *vs.* South East & 90th *vs.* 10th percentile

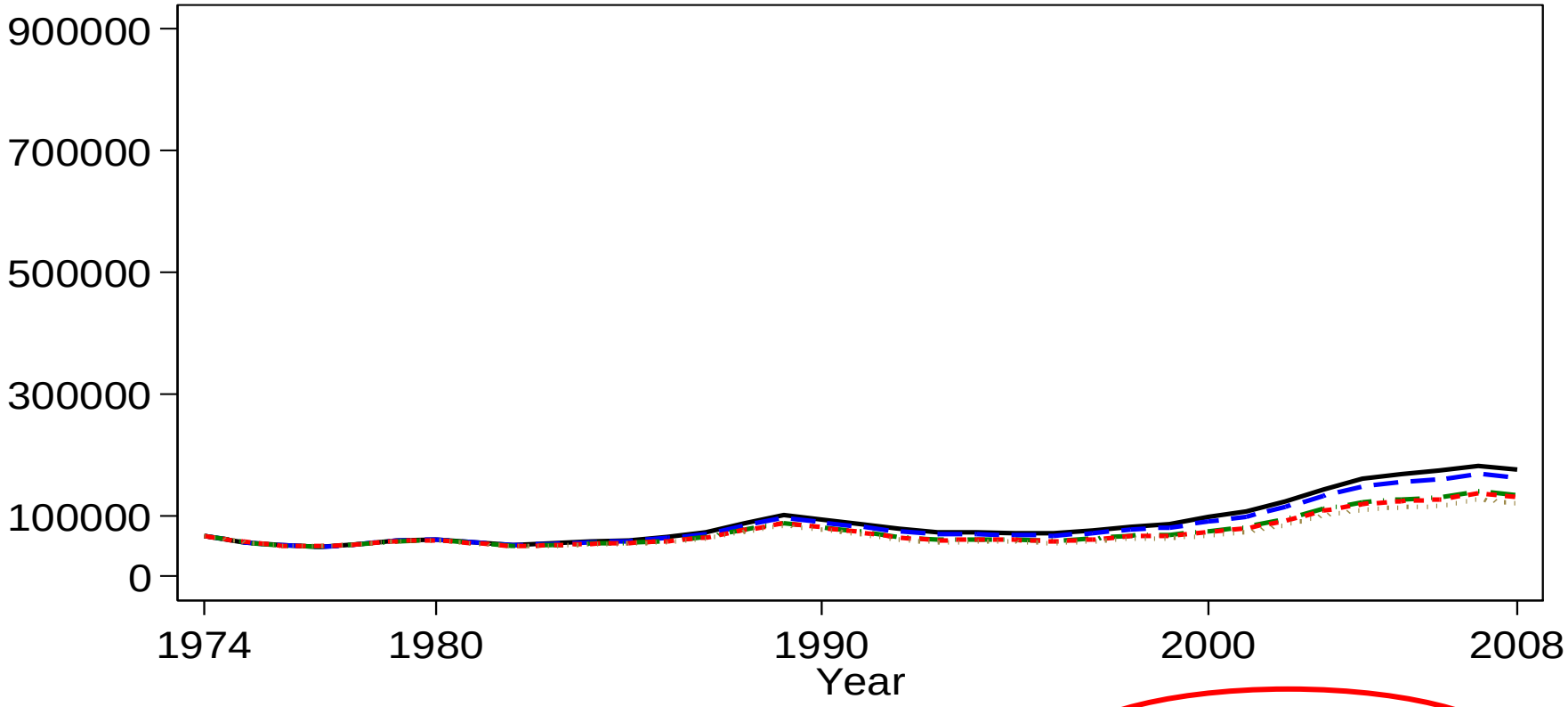


The importance of supply constraints varies across markets: Westminster (London)



Source: Hilber and Vermeulen (2016)

House price dynamics in Newcastle



Source: Hilber and Vermeulen (2016)

Use labour demand shock instead of earnings (IV 2nd stage)

LHV: Log(real house price index)		
	LPA	TTWA
Log(labour demand shock)	0.31**	0.24**
Log(LDS) x ***average refusal rate***	**0.66*** **	**0.59*** **
Log(LDS) x ***share developed***	**0.92*** **	**0.39*** **
Log(LDS) x *elevation range*	0.33**	0.12
Year-FEs	Yes	Yes
LPA-FEs & constant	Yes	Yes
Kleibergen Paap F-stat	5.2	65.7

Excursus: Other results & robustness checks

- Differential impact of supply constraints significantly **larger during boom than during bust**
- Impact of **local land scarcity confined to highly developed locations** (GLA)
- Main results hold for **alternative definitions of 'local housing markets'** (TTWAs, urban TTWAs, FUR, Pre-1996 counties)

Robustness checks (Cont.)

- Results not sensitive to **using alternative measures of share developed** (excl. semi-developable land; flood risk areas)
- Results not sensitive to **using alternative proxies for elevation/ruggedness**
- Results hold for **alternative IV-strategies** and **alternative measure for regulatory restrictiveness** (shadow price)

Preliminary conclusions

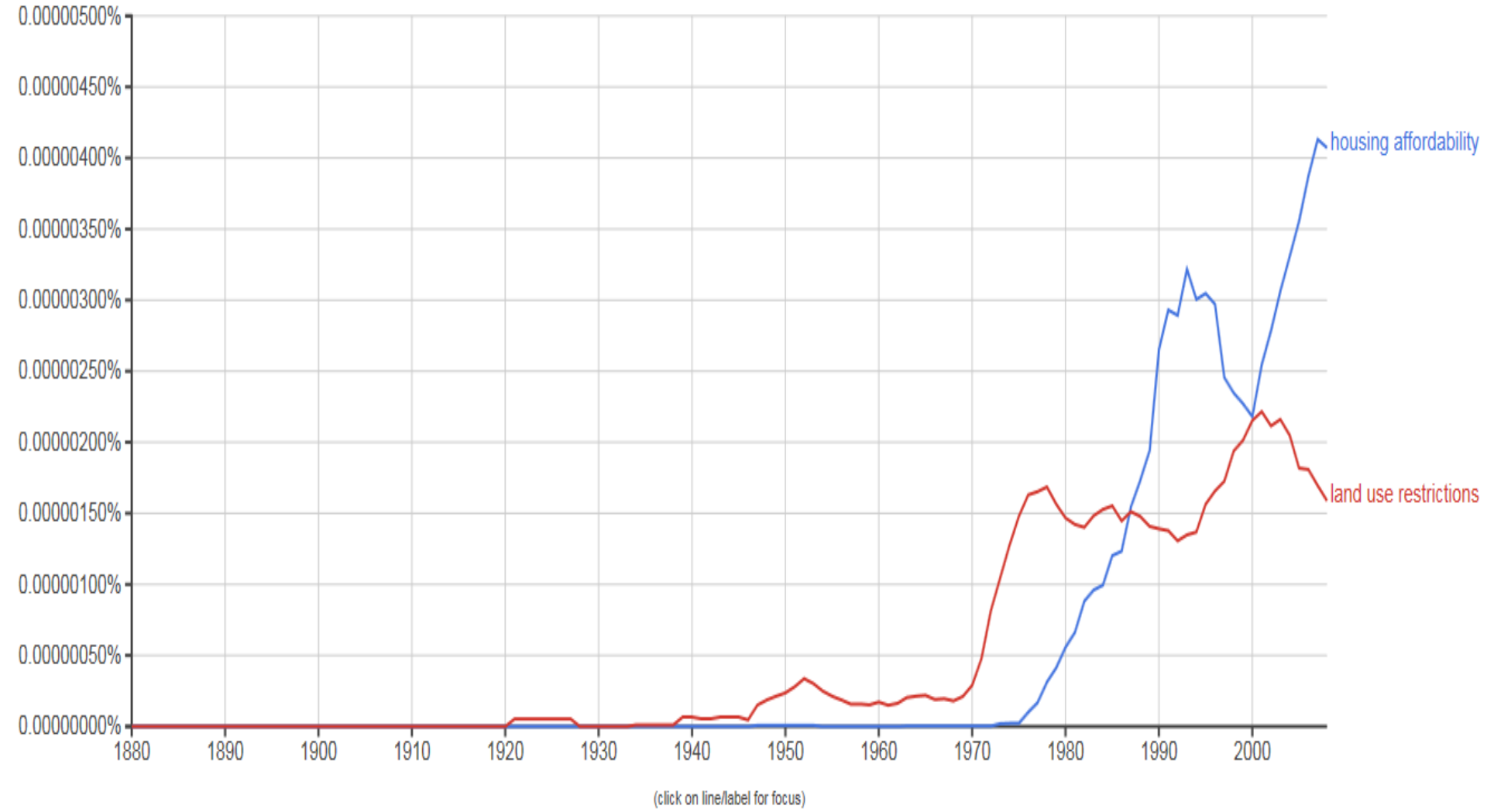
1. Real estate markets are **'cyclical'** and **'local'** in nature
2. HPs respond much more strongly to repeated local demand shifts (business cycles) **in more supply constrained markets**
3. **Regulatory constraints** in conjunction with strong demand in desirable areas (London!) are main causal driver of severe UK **housing affordability crisis & volatility**
4. **Physical constraints** matter too but impact is very non-linear
5. All local supply constraints and earnings fluctuations jointly still cannot explain all cyclicality—**role for macro-economic factors** + **supply constraints at aggregate level**!
6. Tight regulation **reinforces wealth inequality** – elderly and wealthy homeowners benefit (and thus support tighter regulation), the younger renters lose out

Google Books Ngram Viewer

Graph these comma-separated phrases: housing affordability,land use restrictions case-insensitive

between 1880 and 2008 from the corpus English with smoothing of 3 .

Search lots of books



(click on line/label for focus)

Housing & Economy:

Property Price Dynamics
—*Lecture 2*

Christian Hilber
London School of Economics

15 September 2016

SERC
Spatial Economics Research Centre

CENTRE for ECONOMIC PERFORMANCE

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Overview

1. Real estate cycles: some stylized facts
2. Exogenous cycles
   - Theoretical considerations
   - Long-term supply constraints and price dynamics: the case of England
   - Preliminary conclusions

3. Some further stylized facts and puzzles
4. Endogenous cycles and behavioural explanations: theories and evidence
5. Conclusions and policy implications

Overview

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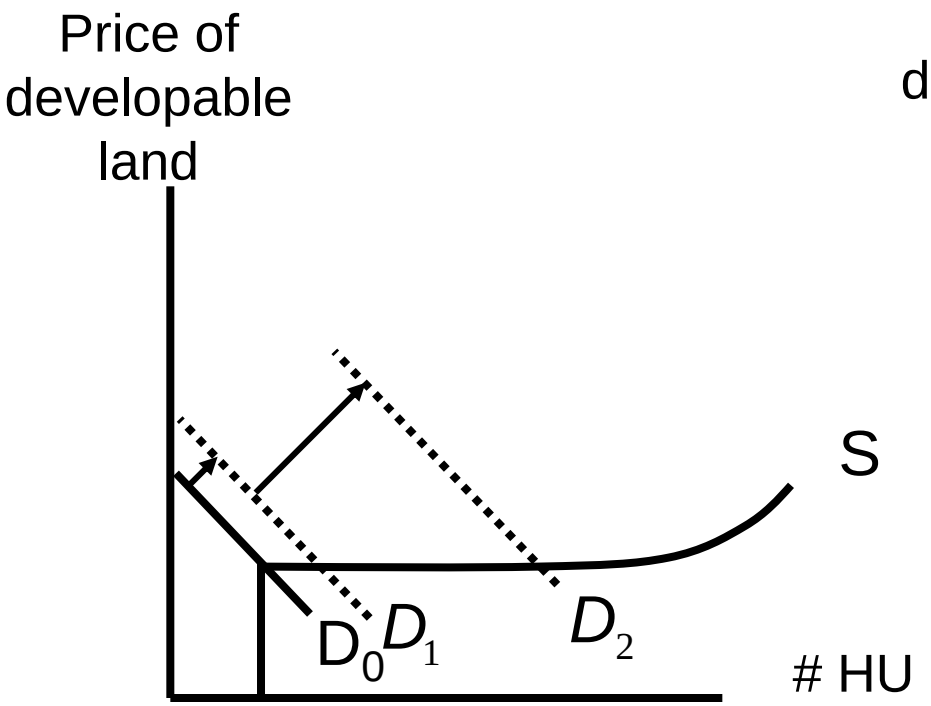
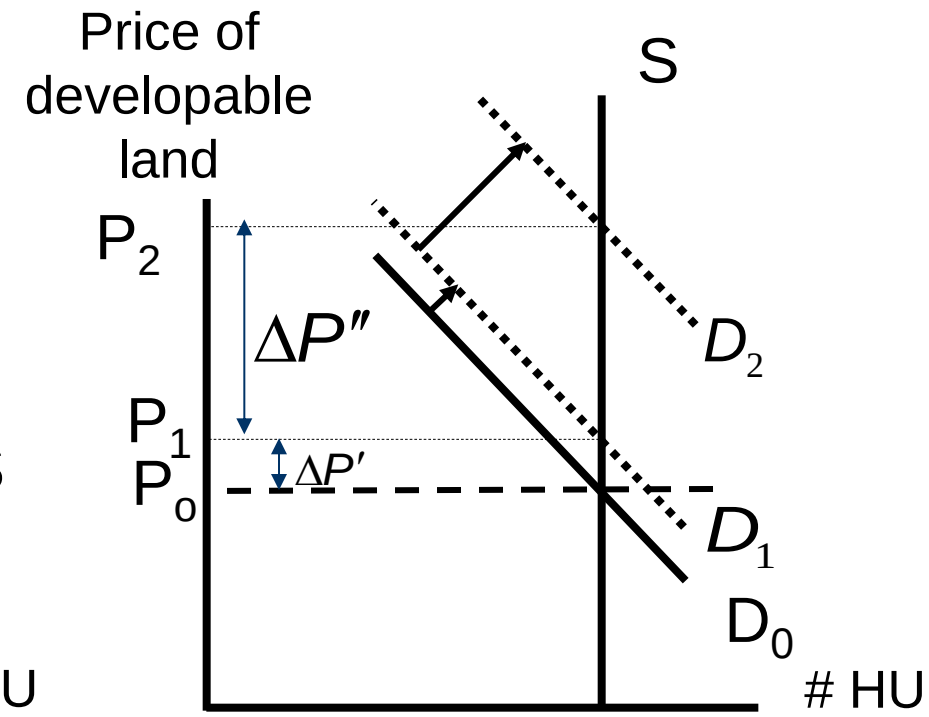
Lecture 1 in a nutshell…

- Effect of demand volatility on land and house prices…

City with elastic supply

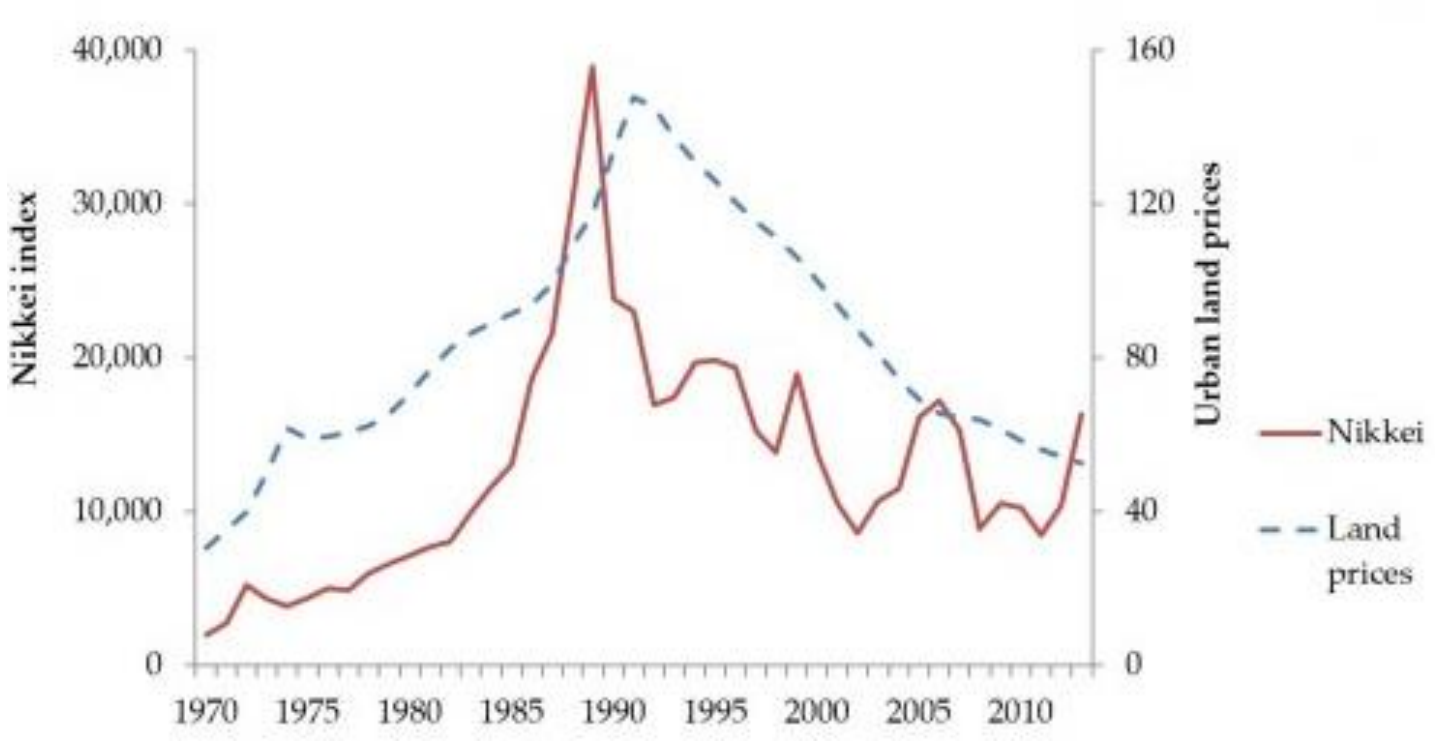


City with inelastic supply



Many puzzles remain!

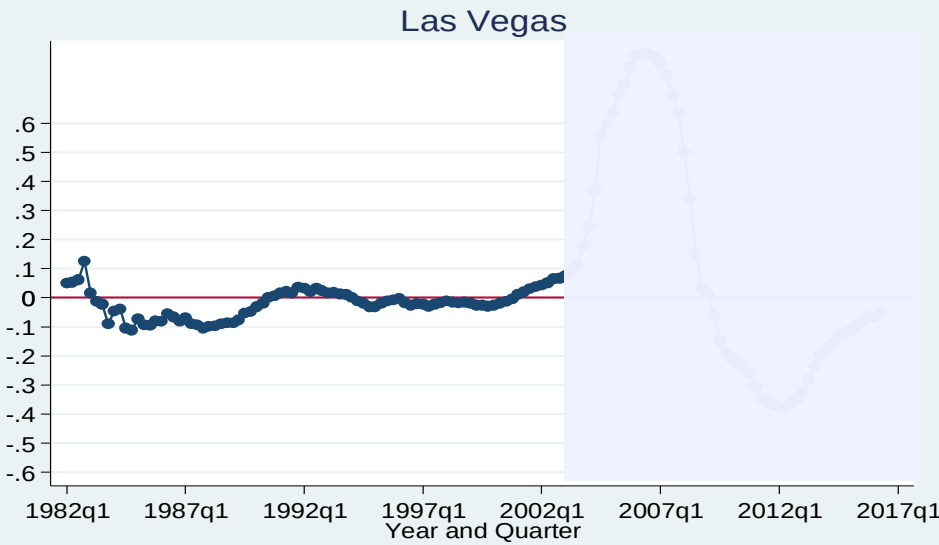
- **Example: Japanese (property) asset bubble**



Sources: Nikkei and Japan Real Estate Institute (http://inflationmatters.com/japanese-deflation-myth/)

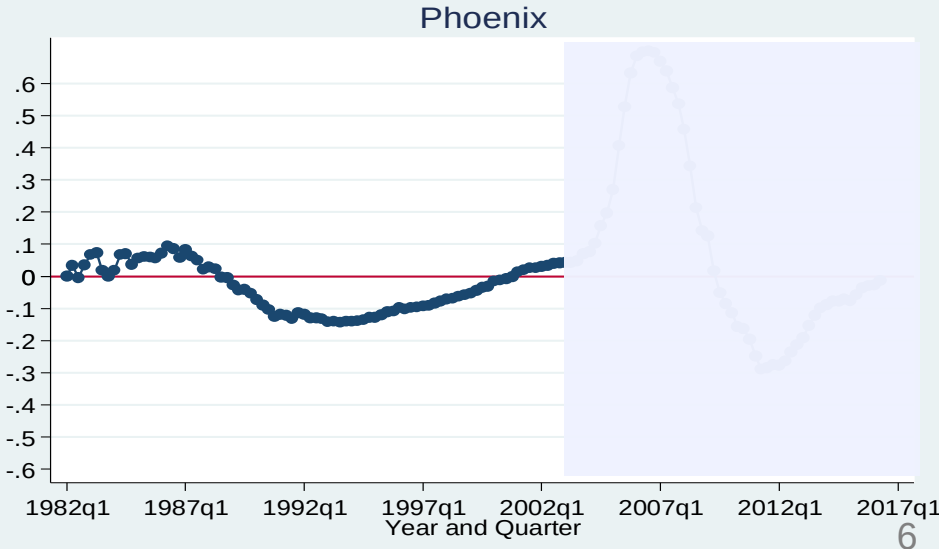
Some more puzzles…

Las Vegas (supposedly elastic supply)



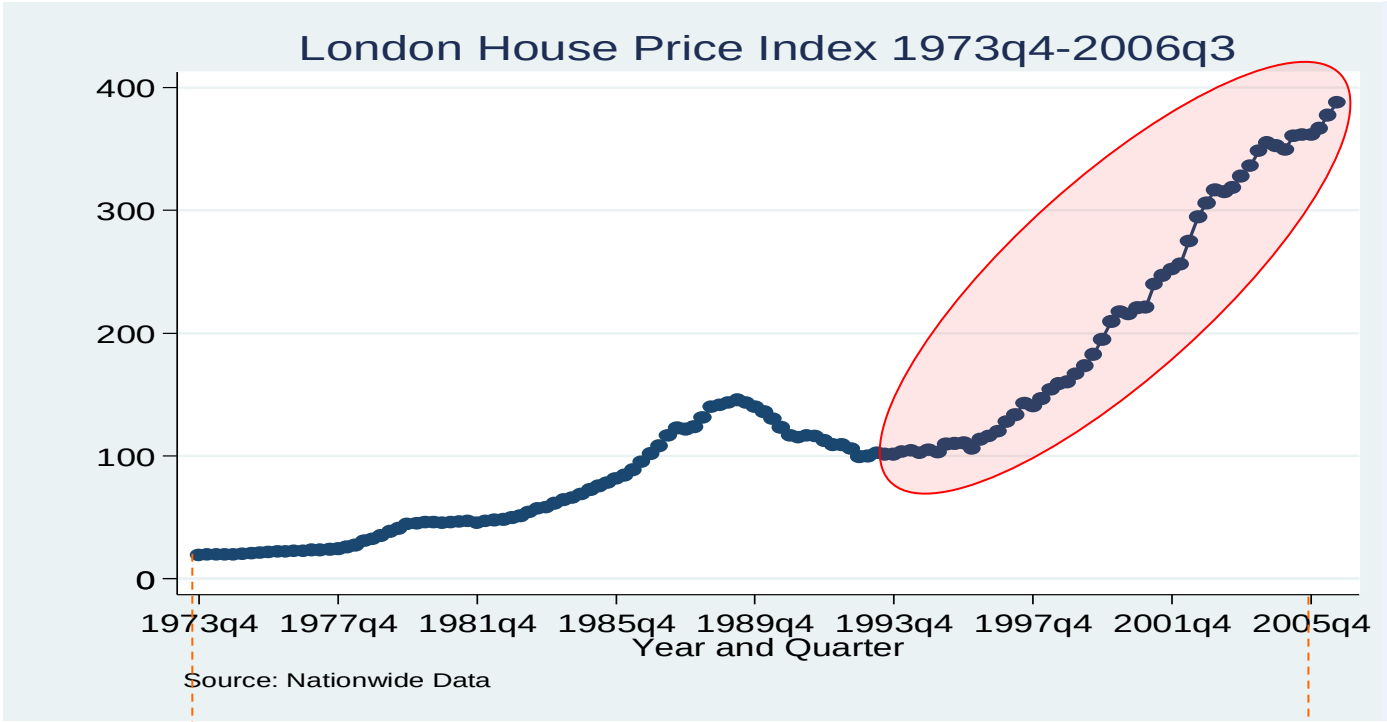
Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)

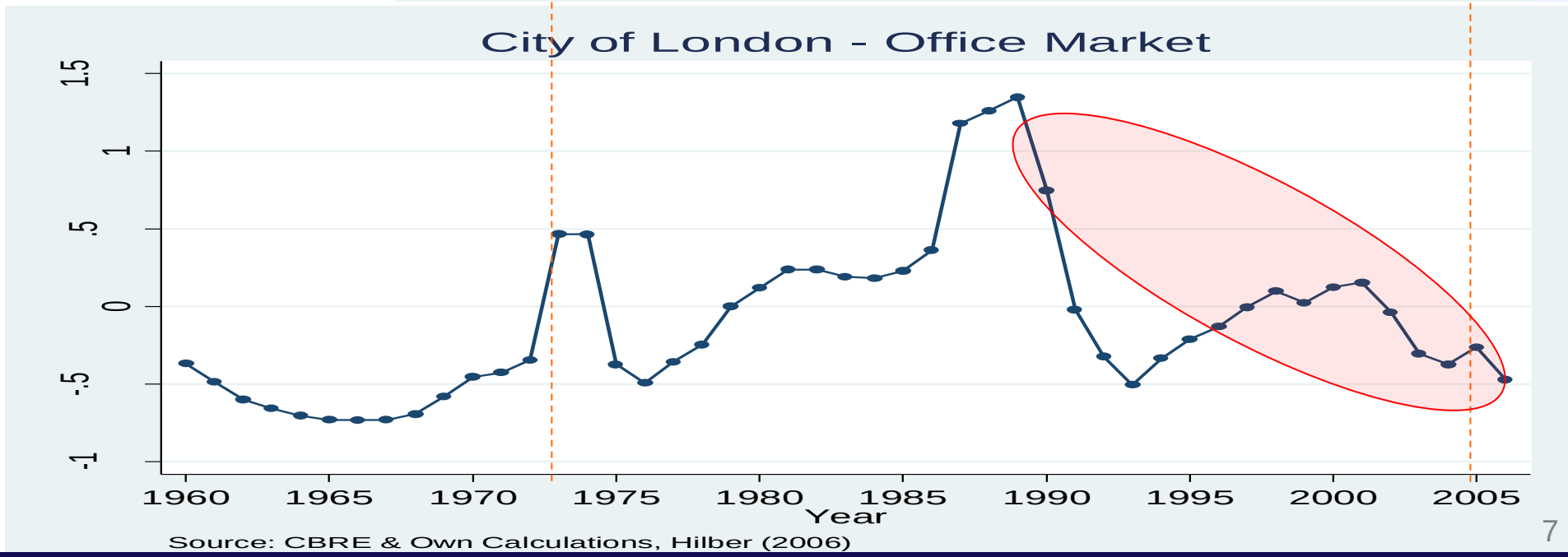
Phoenix (supposedly elastic supply)



Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)

Residential vs. office market in London





How can we explain?
Revisit phenomenon of real estate cycles…

- What do **house prices** measure?
  - Forward looking concept
  - If market participants have perfect foresight:

  Price = Sum of discounted future rents (and costs) associated with property/land

- So far assumed cycles are driven by **repeated exogenous demand shifts** (=business cycles)
  - Economic boom ⇨ property price boom
  - Recession ⇨ property price bust
  - Magnitude of **'exogenous cycles'** depends on supply price elasticity

But we ignored existence of…

- **Lags** (planning, development, construction) ⇨ Often lagged adjustment
- Evidence of '**disequilibrium**': 'overbuilding' & high vacancy rates + cycles in transaction volume and 'time on market'
- **Mortgage markets** ⇨ downpayment & liquidity constraints
- Existence of **myopic agents, unrealistic expectations** & other **'behavioural aspects'**
- **Transaction costs** and other market imperfections (i.e. assumed efficient markets)

⇨ May give rise to '**endogenous cycles**' – initial shock may trigger endogenous oscillations (=cycles independent of exogenous shocks)…

Alternative explanations

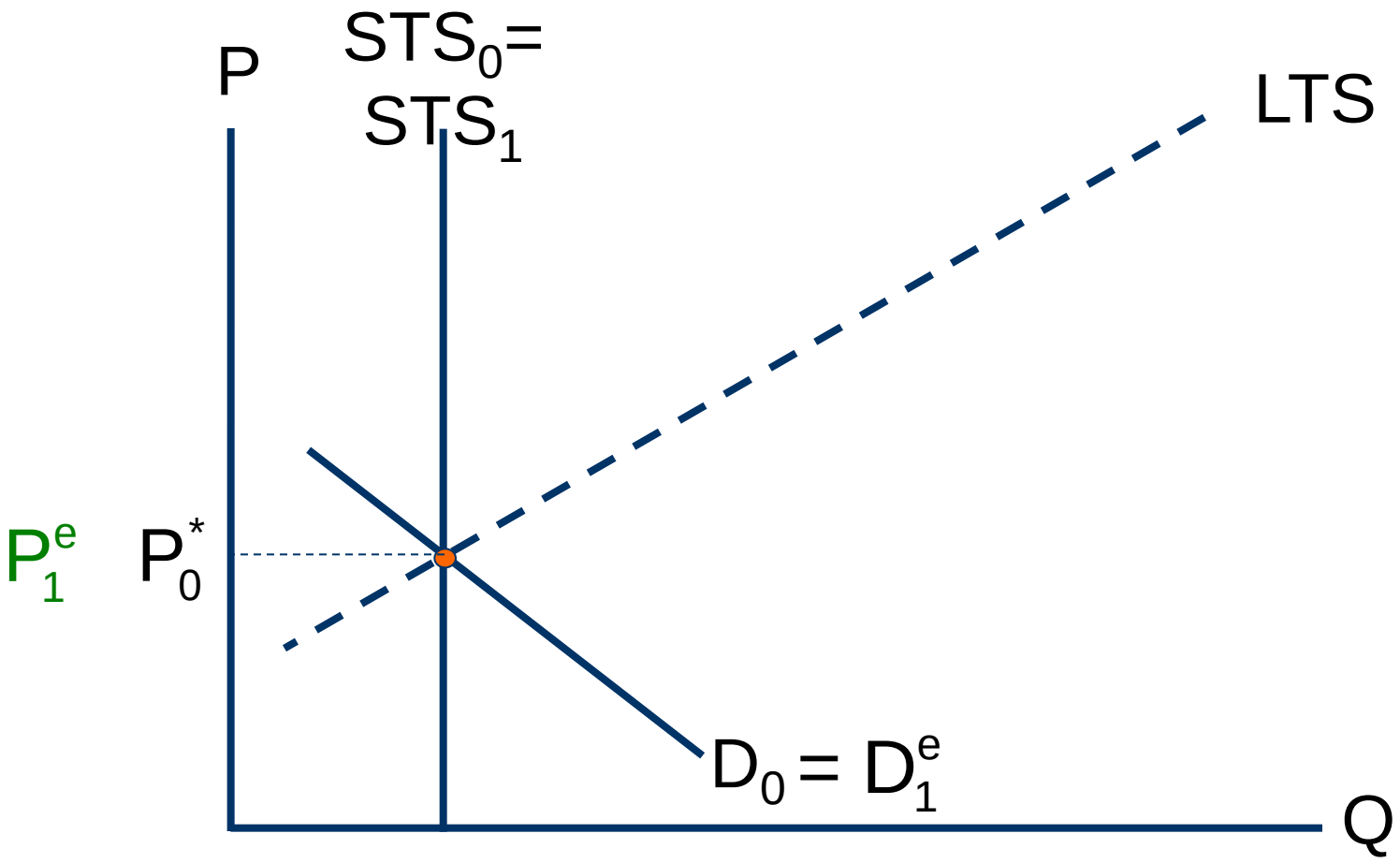
1. Myopic agents (developers & lenders) + lags
2. Irrational exuberance (euphoria of investors)
3. Liquidity constraints
3. Loss aversion
4. Option theory and investment lags
5. Search theory & matching

1. Myopic agents & lags (Hog cycle, stock flow models)

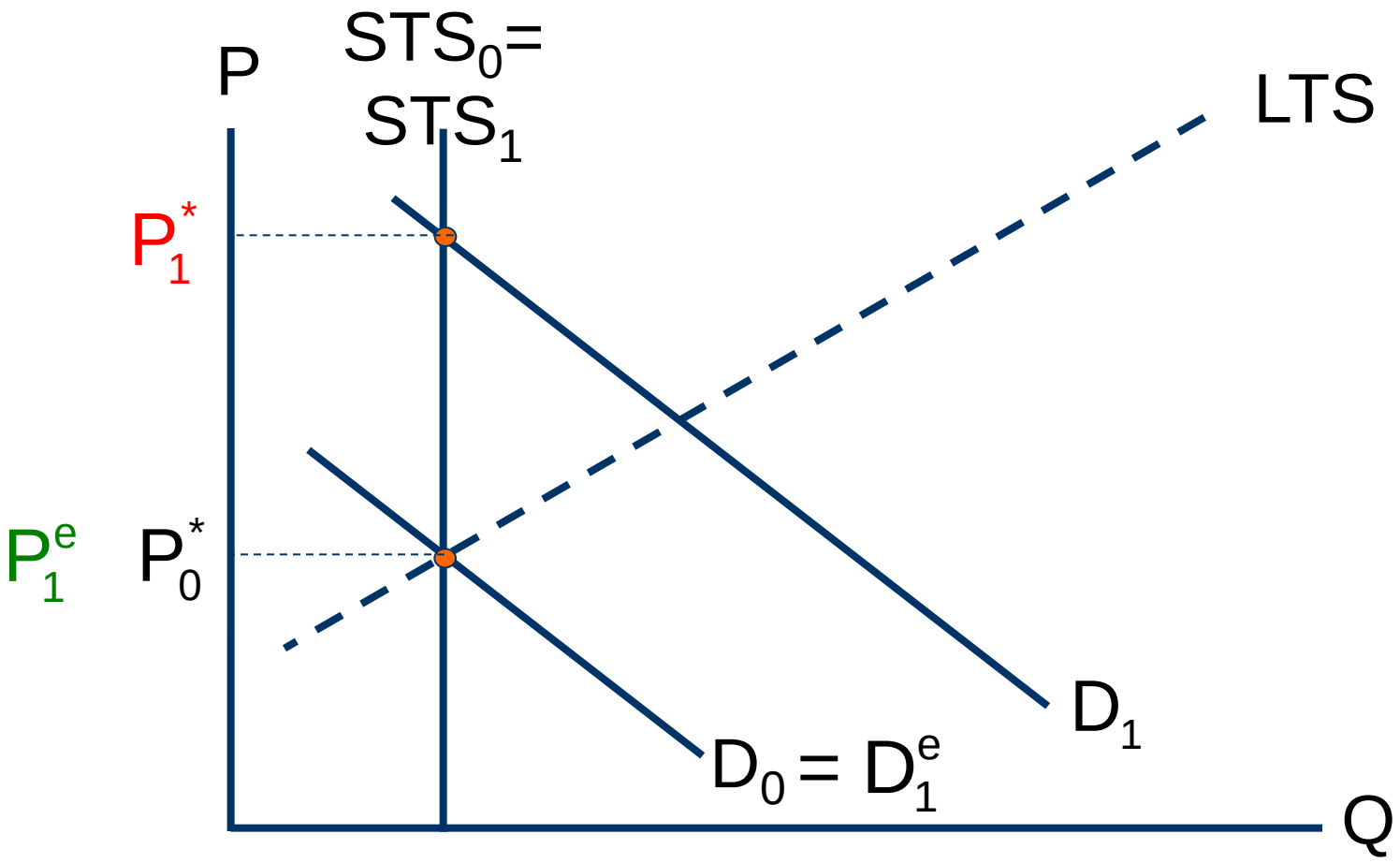
- Idea
  - Starting point: Unanticipated increase in demand
  - Strong increase in prices due to (short-term) supply shortage
  - **Myopic developers and mortgage lenders** base decisions on observed prices

➔ **Consequence?**

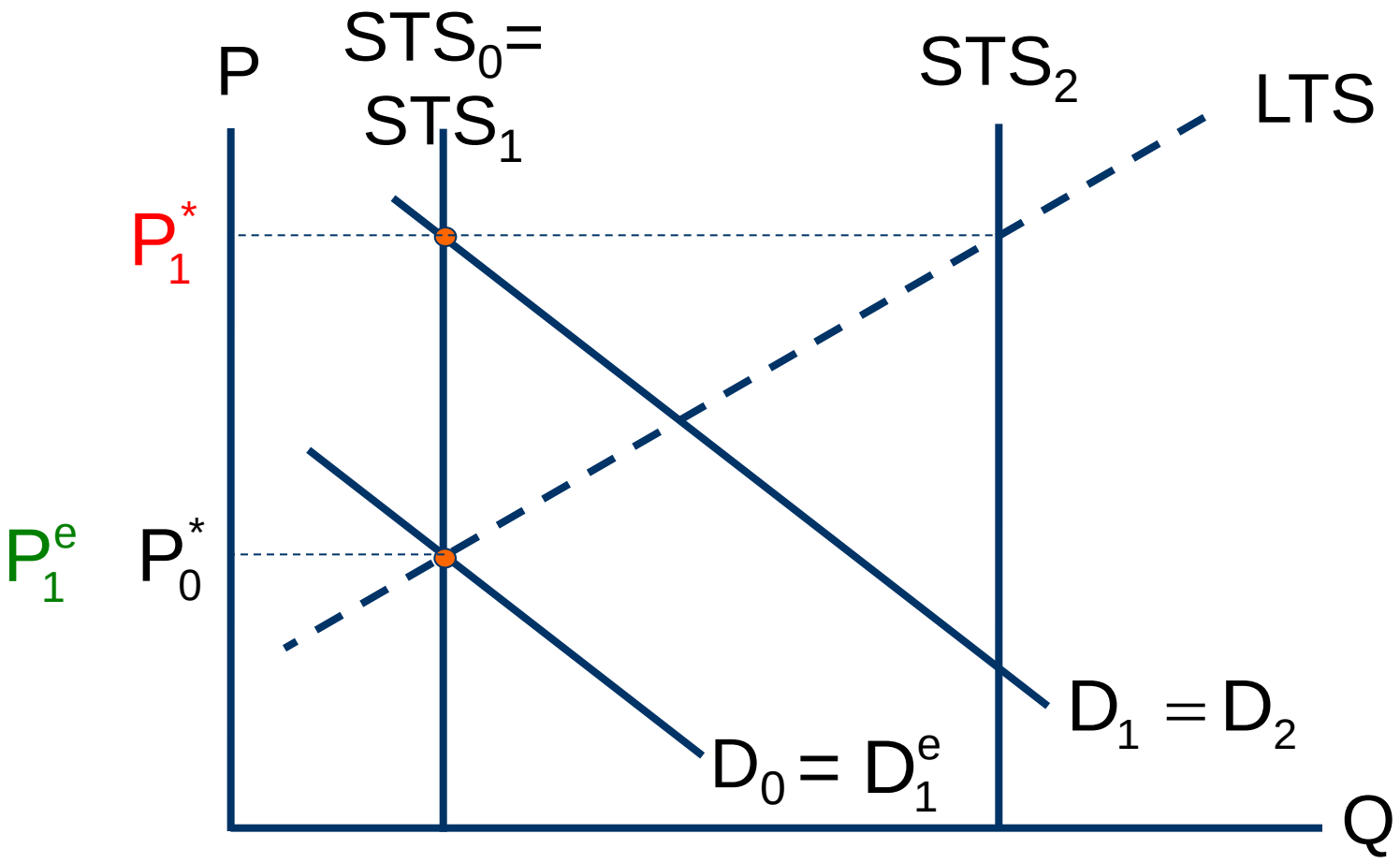
Myopic agents & lags (cont.)



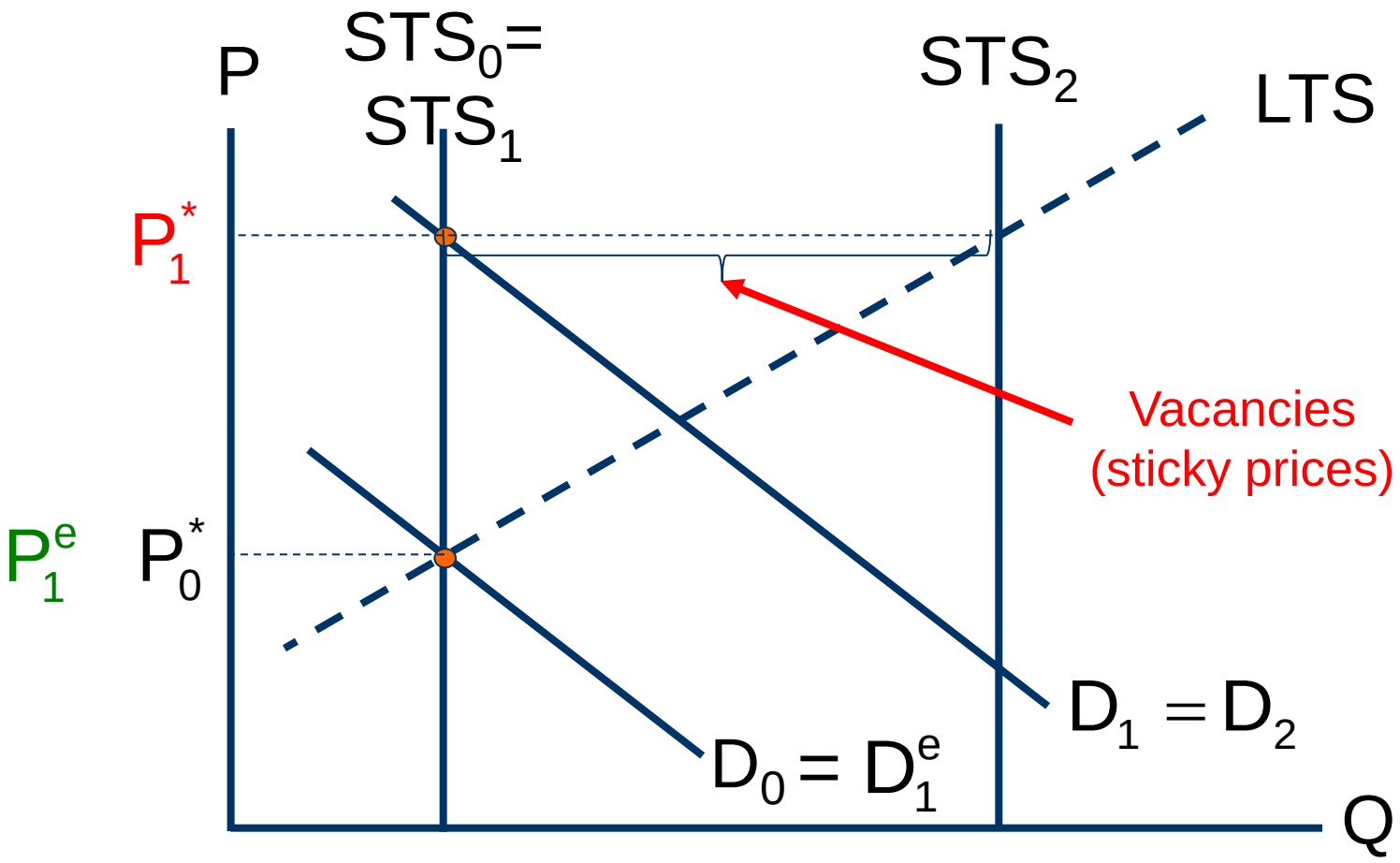
Myopic agents & lags—*Continued*



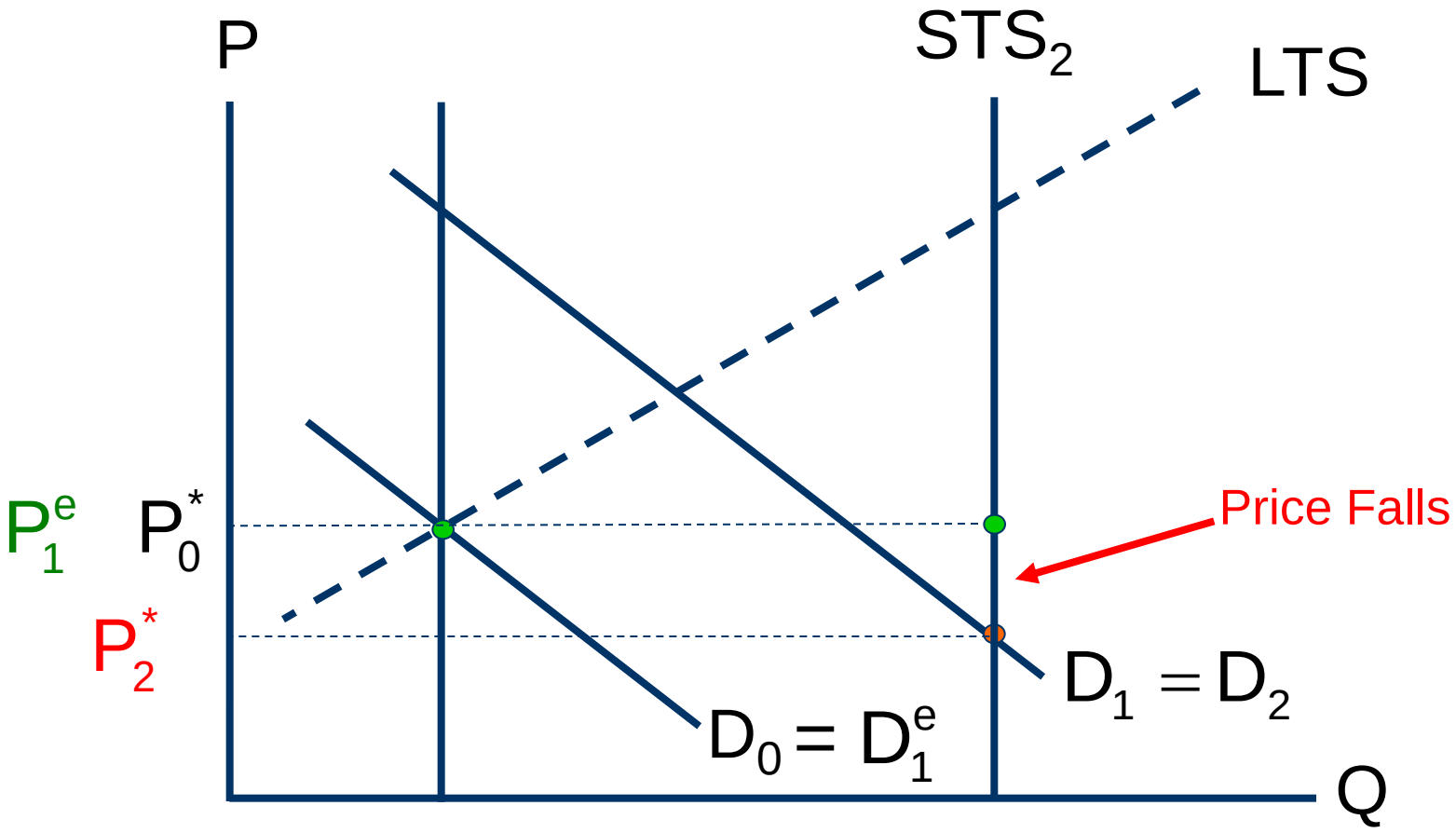
Myopic agents & lags—*Continued*



Myopic agents & lags—*Continued*



Myopic agents & lags—*Continued*



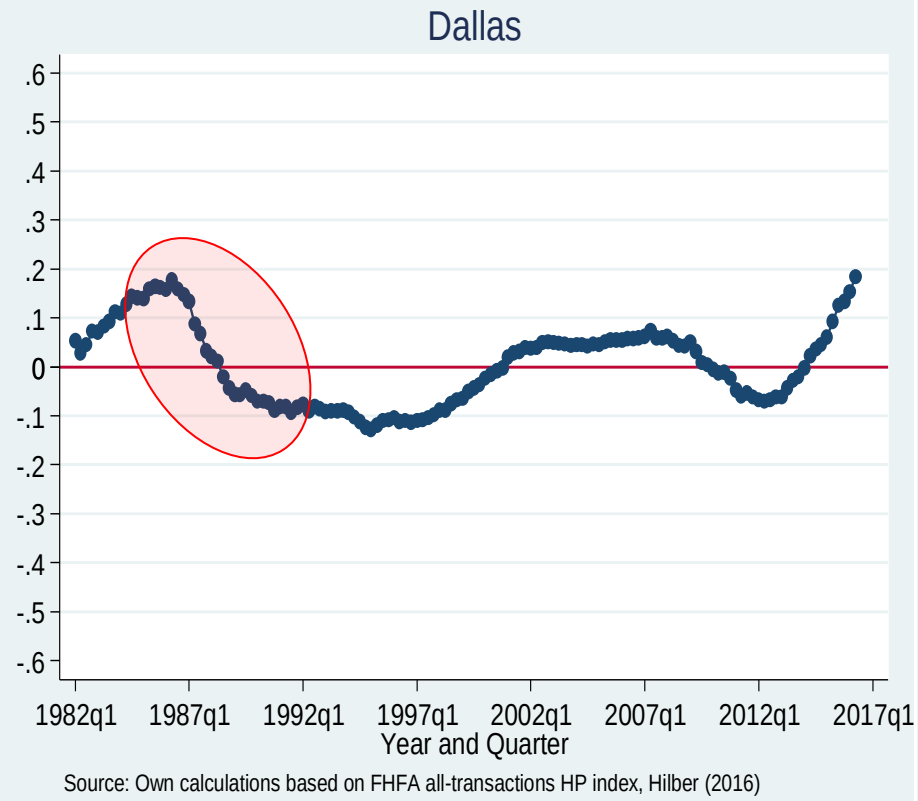
Predictions

- In places with elastic long-term supply, unexpected positive demand shocks lead to
  - Significant overbuilding (high vacancy rates) if prices are sticky or
  - Drop in property prices or
  - Both
- In commercial RE: Excess supply greater if existing tenants have long term leases

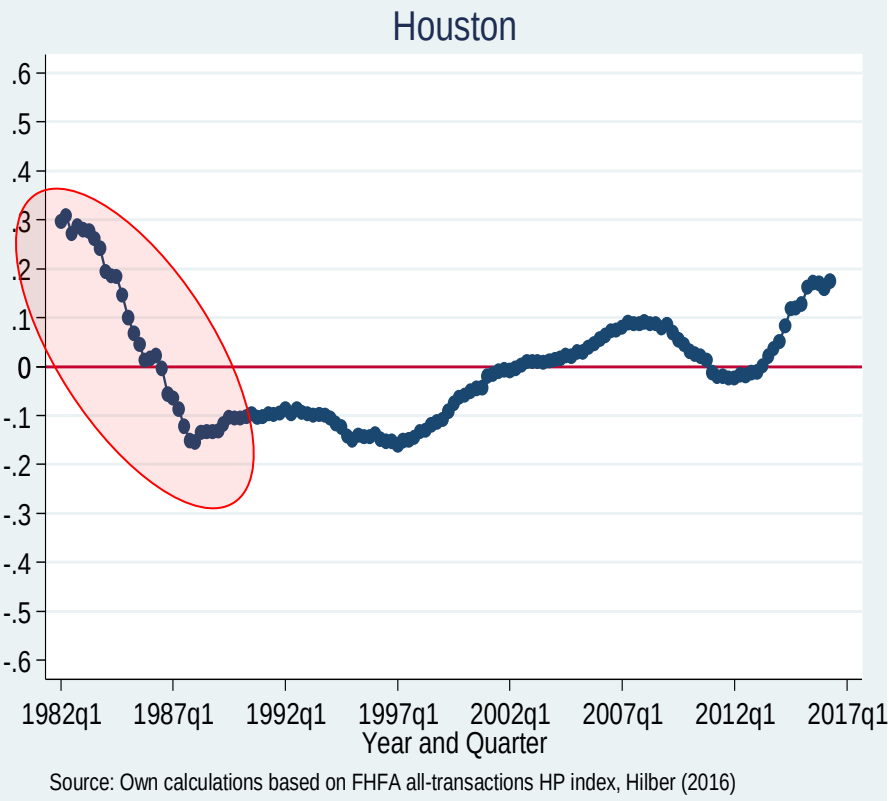
Empirical evidence

- Dallas & Houston (TX) in 80s
  - Unexpected boom in late 70s lead to **severe overbuilding** caused by myopic developers & mortgage lenders
  - Subsequent oil price shock and recession lead to **price collapse**

1980s Bust in Dallas and Houston



Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)



Source: Own calculations based on FHFA all-transactions HP index, Hilber (2016)

⇨ **Why Dallas and Houston?**

Critique

- Relies on expectation errors on the part of **supply actors** (developers, bankers)
- Even if supply actors are myopic, are they likely to constantly repeat mistakes?
- Merely anecdotic evidence

2. Irrational exuberance (euphoria)

- Idea
  - Investors observe strong **past** price increases
  - "Plausible story" tells them that price increases will go on forever
  - **Excessive/unrealistic public expectations** of future price increases start to form
  - Buyers **become euphoric** and increase their reservation prices

⇨ **Herding behaviour of investors** further spurs demand which raises prices (vicious cycle) ultimately creating 'bubble'

⇨ Refers to a situation in which **excessive** public expectations of future price increases cause prices to be temporarily elevated (Case and Shiller 2003)

Predictions

- Property prices can strongly deviate from values that are supported by fundamentals
- "Bubbles" ultimately end in price crash

  (Definition of "bubble" according to Case & Shiller (2003): *Refers to a situation in which* ***excessive*** *public expectations of future price increases cause prices to be temporarily elevated*)

Empirical evidence

- Tulip Bubble in 17th Century (controversial)
- Internet equity-bubble in late 1990s
- **In real estate?**
  - Asset bubble in **Japan** (incl. RE) **during late 1980s**
  - **Indirect evidence** from survey results (Case & Shiller 1988, 2003, Case, Shiller & Thompson 2012)
  - Capozza *et al.* (2004): Show that **serial correlation is stronger in booming markets** consistent with 'euphoria' and backward-looking expectations

Critique

- **Non-falsifiable:** Theory is long on predictions but short on testable hypotheses
  - Can look at residuals (actual price minus fundamental price) ⇨ But is this evidence for euphoria or OVs / model misspecification?
  - Survey evidence only very indirect
- Theoretical arguments
  - Are purchases and sales in housing markets really mainly driven by investment (rather than consumption) motives? And are homebuyers really ‘euphoric’
  - High transaction costs should reduce speculative incentives

3. Liquidity constraints

- Developed by Stein (1995) & Ortalo-Magne & Rady (2005)
- Idea
  - Income shock strongly affects ability of potential first-time buyer to afford down-payment on a starter home
  - If income ↑ ⇨ demand ↑ ↑ ⇨ HP↑↑ ⇨ capital gain for existing owners ↑↑ ⇨ demand for trade-up home ↑↑ …
  - Can have dramatic impact on overall housing market

Empirical evidence

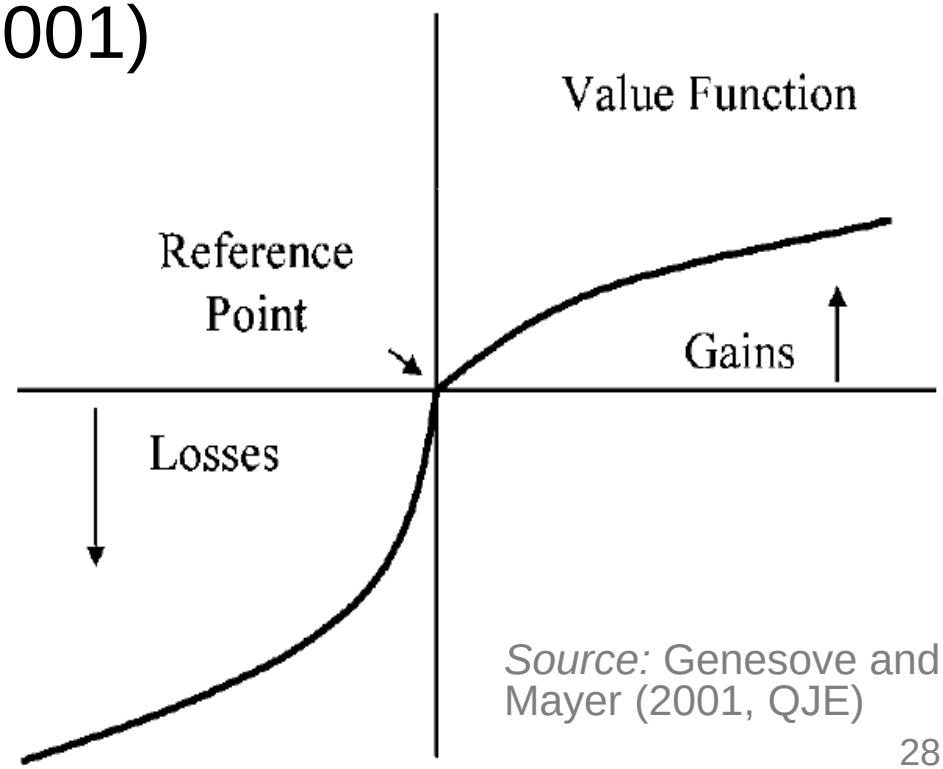
- Lamont & Stein (1999)
  - In cities with a large fraction of highly leveraged homeowners (first-time buyers), HP react more sensitively to city-specific shocks
- Genesove and Mayer (1997 AER)
  - High LTV homeowners set higher asking prices (because need to be able to buy next home)
  - Have longer expected time on market &
  - Ultimately sell at higher price

Critique

- Only applies to residential RE
  - Cannot explain commercial RE cycles, yet they are even more pronounced
- Assumes no role for developers—cannot explain overbuilding phenomenon
- Alternative explanations
  - ‘Leveraged cities’ might also be places with more inelastic supply of housing (untested)
  - Findings might be due to ‘loss aversion’….

4. Loss aversion

- Theory developed by Kahneman & Tversky (1991)
- Applied to real estate by Genesove & Mayer (2001)
- Idea
  - Property owners are loss averse and are not willing to sell with loss in downturn



Source: Genesove and Mayer (2001, QJE)

Predictions

- Sellers' reservation prices are less flexible downward than buyers' offers
  - Seller characteristics (loss aversion) affects transaction prices
  - Transaction volume falls and time on market increases when prices decline

Empirical evidence

- Genesove & Mayer (2001, QJE)
  - Loss aversion matters a lot
  - Liquidity constraints still matter, but much less than thought previously
  - Listing price only affected if seller is severely downpayment-constrained (LTV>0.8)

Critique

- Similar to liquidity constraints
  - Also cannot explain overbuilding phenomenon: no role for developers
  - Can it explain commercial cycles? Are profit maximizing developers loss averse?

5. Option theory and investment lag

- Theory developed by Grenadier (1995)
- Key idea
  - Consider profit maximising owner of land
  - What is the optimal timing to exercise the option to develop and the option to rent out extra units?

Prediction

- Increase in demand volatility
  - Increases value of **option to wait**
  - Makes **excess capacity** more profitable

Empirical evidence

- Real estate markets with most volatile demand (office) display greatest degree of vacancy rate stickiness
- Existence of building booms in times of declining demand

Critique

- Does good job explaining sticky vacancy rate and overbuilding phenomena but less good at explaining other phenomena
- Evidence is largely consistent with theory but not absolutely conclusive

6. Search theory and matching

- Builds on work by Mortensen, Diamond & Pissarides, first applied to real estate by Wheaton (1990), refined by Head *et al.* (2014)
- Idea
  - Buyers expend costly search effort to find better house, while sellers hold two units until buyer is found

Mechanism

- Income shock spurs immediate increase in house search as HHs (buyers) enter
- It takes time for buyers to find suitable houses and for construction to respond
- To meet immediate housing demand, vacant houses are shifted to rental market ⇨ tightness of owner-occupied market rises ⇨ Sales price ↑
- Eventually: Construction ↑ ⇨ vacant homes ↑
- As income reverts to long-run level, stock of buyers declines ⇨ buyer-to-seller ratio falls ⇨ price reverts to steady-state

Evidence

- Diaz & Jerez (2013) & Head *et al.* (2014)
  - Income shocks cause prices, construction levels and vacancy rates to respond cyclically, consistent with search & matching mechanism
- Ngai & Tenreyro (2014)
  - Seasonal moving patterns and weather fluctuations cause “hot” and “cold” seasons in housing market, consistent with search & matching

Critique

- Mainly applies to residential RE
  - Cannot really explain commercial RE cycles, yet they are even more pronounced
  - Some price cycles are not associated with strong cyclicality in vacancy rates or construction

Conclusions & policy implications

1. **Housing cycles** can often be explained by altering economic demand shocks (business cycles) in conjunction with **inelastic long-run supply**
2. **Policy implication**: In places with inelastic supply – be cautious with place-based policies ⇨ 'help people—not places'
3. Many cycles – especially commercial ones – are '**endogenously driven**'

Conclusions & implications (cont.)

4. Office and retail cycles often bear almost no relation to broader economic cyclicality
   - Cycles triggered by initial economic shock
   - Causes oscillations to eventually revert to long-run trend
   - Cycles often very pronounced

5. Residential and commercial RE differ because involved agents and underlying assets differ
   - Investment vs. consumption motives
   - Importance of liquidity constraints & loss aversion
   - Demand volatility & durability of assets differ
   - Time lags differ (planning & construction lags, lease length)

⇨ No single theory can explain all phenomena; many factors drive real estate cycles!

Thank you!

Q&A

I. Key readings

LECTURE 1 (EXOGENOUS CYCLES)

Hilber, C. and W. Vermeulen, 2016, "The Impact of Supply Constraints on House Prices in England," *Economic Journal* 126, 358-405.

LECTURE 2 (ENDOGENOUS CYCLES)

Case, K., R. Shiller and A.K. Thompson, 2012, "What Have They Been Thinking? Homebuyer Behavior in Hot and Cold Markets," *Brooking Papers on Economic Activity* Fall 2012, 265-315.

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