



# PREDICTING REDEVELOPMENT: MODELING BUILDING DEMOLITION

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# Building Demolition



- An understudied topic
- Means to an end, not an end in itself
- Negative aspects: can destroy history and architecture, impact neighborhood character

# Why study building demolitions?

- Contribute to a model of the **redevelopment** process in already-urbanized areas
- Better understand neighborhood level opposition to redevelopment
- Gauge the impact of public policies on the likelihood of redevelopment



# Real Estate Development in UrbanSim

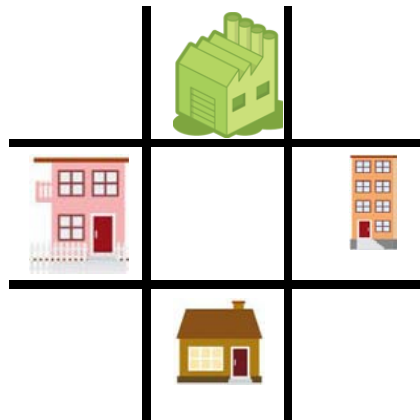
## Building Transition Model

-creates new buildings based on vacancy by land use sector



## Building Location Choice Model

-places new buildings in most favorable available site



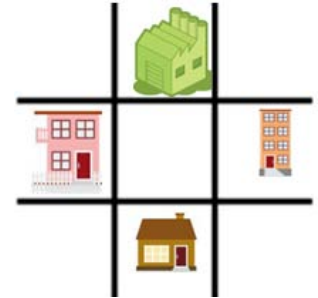
# What parcels can buildings be assigned to?

Sites available for development

Parcels with remaining capacity

Parcels with lowest improvement-to-land-value-ratio

Redevelopment



## Building Demolition Model

-models building owner's decision whether to demolish

# Why would a building owner decide to demolish?

- Make a profit: newer, bigger building
- Building is falling apart and is a liability
- Government order



# Demolition Permits and Building Permits

- Data on demolition permits and building permits from excel files on SF Building Department website
  - ▣ 2004-2009
- Deleted all demolition permits involving anything less than the demolition of an entire building
- Deleted demolition permits for Hunters Point Shipyard



# Demolition Permits matched with Building Permits

DEMO DESCRIPTION	BUILDING DESCRIPTION
DEMOLISH A 1 STORY OFFICE BLDG.	ERECT A FOUR STORY FIVE UNIT RESIDENTIAL BLDG
DEMOLISH 1 STORY RETAIL BUILDING	ERECT A NEW RESIDENTIAL/RETAIL/PARKING
DEMOLISH 3 STORIES OF SINGLE FAMILY.	ERECT A FOUR STORY SINGLE FAMILY DWELLING.
DEMOLISH 3 STORIES 2 DWELLING UNITS BUILDING.	ERECT 5 STORIES OF 3 RESIDENTIAL CONDOMINIUMS BUILDING.
DEMOLISH 2 STORY COMMERCIAL BUILDING.	ERECT A 4-STORY 23 UNITS CONDO BUILDING.
DEMOLISH A THREE STORY TWO UNIT RESIDENTIAL BLDG	ERECT A 4 STORIES 9 DWELLING UNITS BLDG.
DEMOLISH SINGLE FAMILY DWELLING 2 STORIES NO BASE	ERECT A NEW FIVE STORY EIGHT UNIT RESIDENTIAL BLDG
TO DEMOLISH ONE 1-STORY VACANT RETAIL STRUCTURE.	ERECT A 5-STORIES 8 DWELLING RESIDENTIAL UNITS STRUCTURE
DEMOLISH 2 STORIES COMMERCIAL / RETAIL BUILDING.	TO ERECT 8 STORIES 26 DWELLING RESIDENTIAL & COMMERCIAL
TO DEMOLISH A 5 STORY RESIDENTIAL HOTEL BUILDING	TO ERECT NEW 109 DWELLING UNIT 8 STORIES MIXED USE RESIDENTIAL
DEMOLISH A TOURIST HOTEL OF 2 STORIES.	ERECT A NEW 4 STORY 89 UNIT TOURIST HOTEL W/ GARAGE
DEMOLISH ONE STORY RESTAURANT.	ERECT NEW ONE STORY KFC RESTAURANT.
TO DEMOLISH 2 STORIES 1 DWELLING UNIT BUILDING.	TO ERECT 3 STORIES 2 DWELLING UNITS NEW BUILDING.
TO DEMOLISH 3 STORY PRIVATE HEALTH CLUB	TO ERECT 6 STORY 31 UNITS RESIDENTIAL BUILDING WITH COMMERCIAL
DEMOLITION OF 3-STORY 2 FAMILY DWELLING UNITS STRUCTURE	ERECT ONE 4-STORY 2 UNIT RESIDENTIAL STRUCTURE.
TO DEMOLISH 2 DWELLING UNITS 3-STORY BLDG.	TO ERECT 3 DWELLING UNITS WITH 4 STORY NEW BLDG
TO DEMOLISH 1 STORY AUTO REPAIR.	TO ERECT 4 STORIES 6 DWELLING UNITS 1 BASEMENT WITH COMMERCIAL
TO DEMOLISH 1 STORY RESTAURANT	TO ERECT 12 DWELLING UNITS, 4 STORIES, RESIDENTIAL & COMMERCIAL
TO DEMOLISH 1 STORY CONTRACTOR OFFICE COMMERCIAL BUILDING	TO ERECT 8 STORIES 26 DWELLING UNITS OF CONDOMINIUMS.
TO DEMOLISH 1 STORY CANOPY (SERVICE STATION)	TO ERECT 8 STORIES 35 DWELLING UNITS OF RESIDENTIAL & RECREATION
TO DEMOLISH CHURCH	ERECT A FIVE STORY SIXTEEN UNIT RESIDENTIAL BLDG
DEMOLISH A ONE STORY FOR RETAIL BLDG.	ERECT A FOUR STORY SIXTEEN UNIT RESIDENTIAL BLDG WITH COMMERCIAL
TO DEMOLISH 2 STORIES 2 RESIDENTIAL UNITS.	TO ERECT 3 STORIES 2 UNITS RESIDENTIAL BUILDING.
DEMOLISH A 2 STORY AUTO SALES AND SERVICE GARAGE	ERECT A 13 STORIES 69 RESIDENTIAL UNIT & COMMERCIAL BUILDING

# Demolition Permits matched with Building Permits

- Post-demolition construction on average 2.5 stories higher than what was demolished
- Residential component
  - ▣ 50% of demolished structures
  - ▣ 90% of post-demolition construction
- Mixed use
  - ▣ 2% of demolished structures
  - ▣ 20% of post-demolition construction

# Demolition Permits matched with Building Permits

- Of parcels authorized to demolish an entire building 25.5% experienced no post-demolition construction of a building in this time period
- Of parcels experiencing post-demolition construction, about 10% involved the aggregation or subdivision of parcels.
- Timing of redevelopment:
  - 68% of demolition permits were issued on the same day as building permits
  - On average, 50 days between demolition permit being issued and building permit being issued

# Binary Logit Model of Building Demolition

- Dependent variable equals 1 if parcel was issued a demolition permit
- Explanatory variables:
  - Parcel and building data from the 2001 base-year
  - Census tract demographic data collected for 1990 and 2000

# Weber et al. 2006- Journal of Urban Affairs

- Binary logit model of building demolition in three Chicago neighborhoods
- Building has higher probability of being demolished if:
  - Older
  - Smaller
  - Wood-frame building
  - Less lot coverage
- Socioeconomic variables insignificant



# Independent Variables:

## Building/Parcel Characteristics

- Building age (+)
- Building square footage (-)
- Floor area ratio (-)
- Number of residential units (-)
- Building use: production/distribution/repair (+)
- Structure value to land value ratio (-)
- Structure value per sq. ft. (-)
- Single-family residential zoning (-)
- Zoning allows retail (+)

# Estimation Results (building/parcel characteristics)

- All variables enter the utility for demo = 1 (demolish)

	Coefficient	t-stat
Building Age	0.013	6.17
FAR	-0.073	-1.88
Building SqFt	1.44 e-06	2.56
SL Value Ratio	-0.293	-7.08
LN(Res. Units)	-0.63	-6.20
LN(Price/sqft)	-0.116	-7.61
RH-1 Zone	-0.192	-1.79
Retail allowed	1.072	7.96
PDR use	0.876	5.73

# Estimation Results cont.

## (neighborhood demographics)

	Coefficient	t-stat
Med. HH Income	1.45 e-08	.002
%Change Income	-0.007	-1.73
%Owner-Occ.	-0.007	-1.28
%Change Owner	4.91 e-05	.61
% Seniors	-0.031	-3.25
%Change Seniors	0.001	.47
%White	0.0002	.037
%Change White	-0.0004	-.120
%Vacant	0.004	.387
%Change Vacant	-0.005	-2.27

# Model Estimated Outside of Urbansim

	Coefficient	t-stat
%seniors	-0.021929	-2.12
%white	0.0019419	0.33
%vacant	-0.000315	-0.02
%owner-occupied	-0.014853	-2.57
Med. HH Income	9.73E-07	0.13
%change seniors	0.000546	0.25
%change white	0.0009814	0.22
%change vacant	-0.005727	-2.2
%change owner-occupied	0.0001433	1.45
%change income	-0.007243	-1.92

Final log likelihood  
-2256.01

Likelihood ratio test  
589.13

N= 145,659

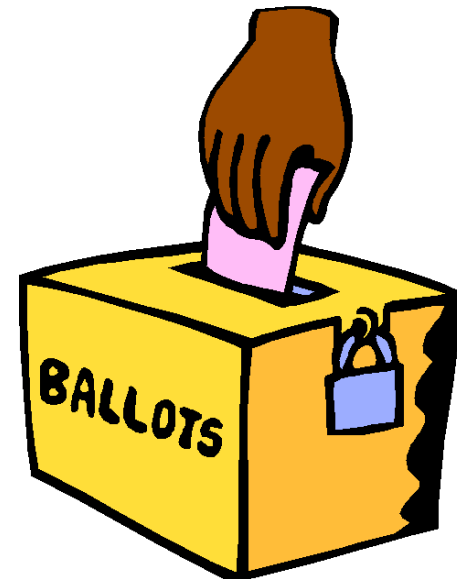
# Some probabilities (all very low)

- With other independent variables at their mean value:

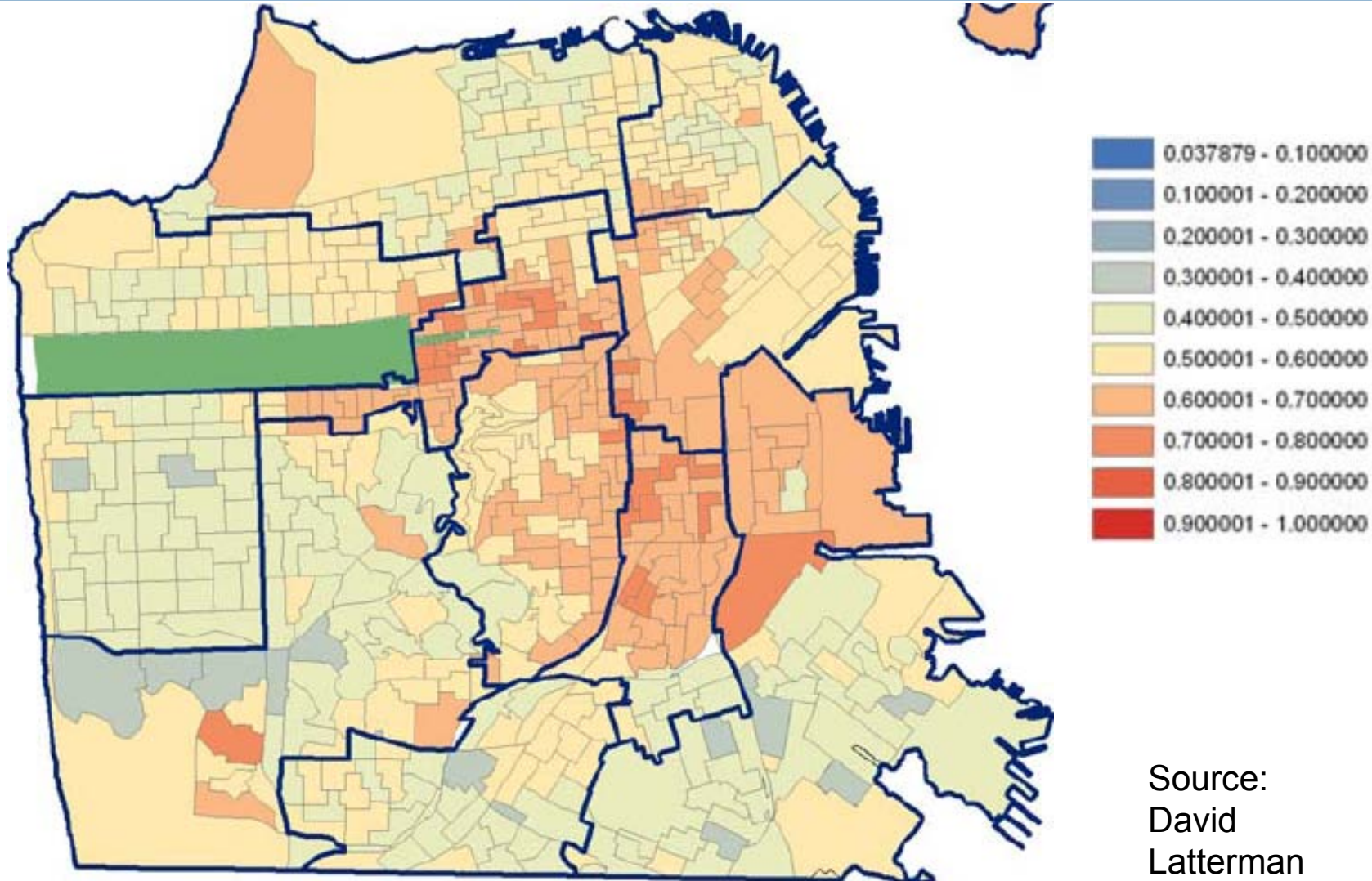
	<b>Prob. Of Demolition</b>
Not PDR	0.0012
PDR	0.003
Retail not allowed	0.0011
Retail allowed	0.0038
10% Owner Occupancy	0.0011
90% Owner Occupancy	0.0003

# Neighborhood Opposition to Growth and Redevelopment

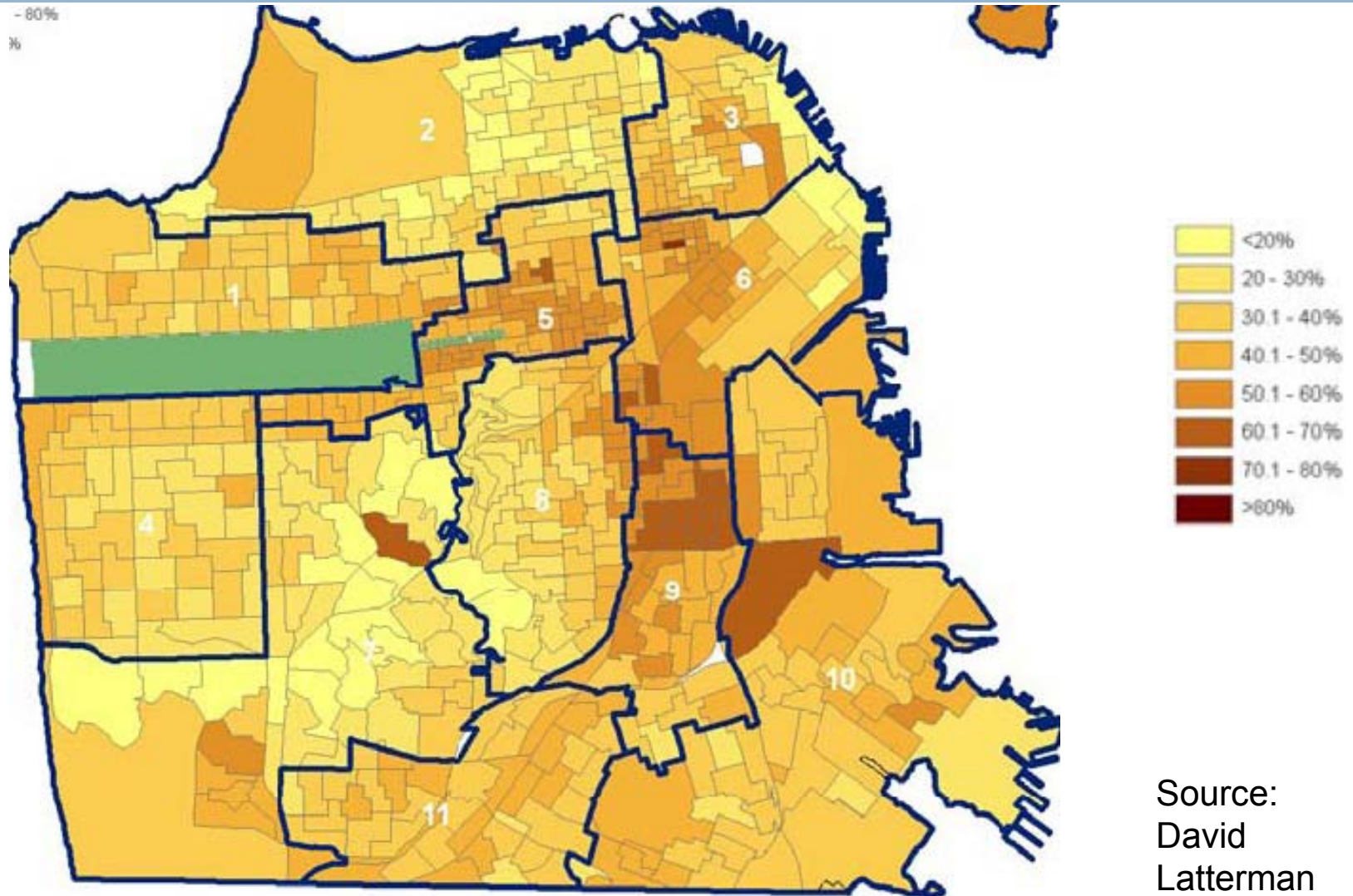
- Account for neighborhood attitudes toward growth
- Combine demographic data with data from **voting records**
  - ▣ Specific ballot measures that may reflect views on land use issues
  - ▣ Voter turnout
  - ▣ Political ideology



# Proposition J: Historic Preservation Commission

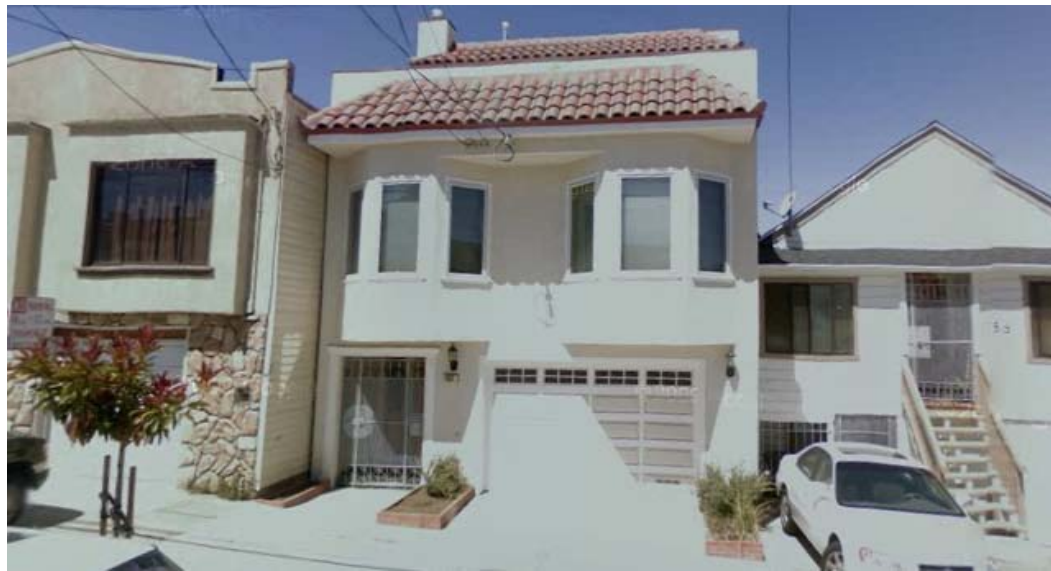


# Proposition F: 50% Affordable Housing in Bayview/HP Redev Area

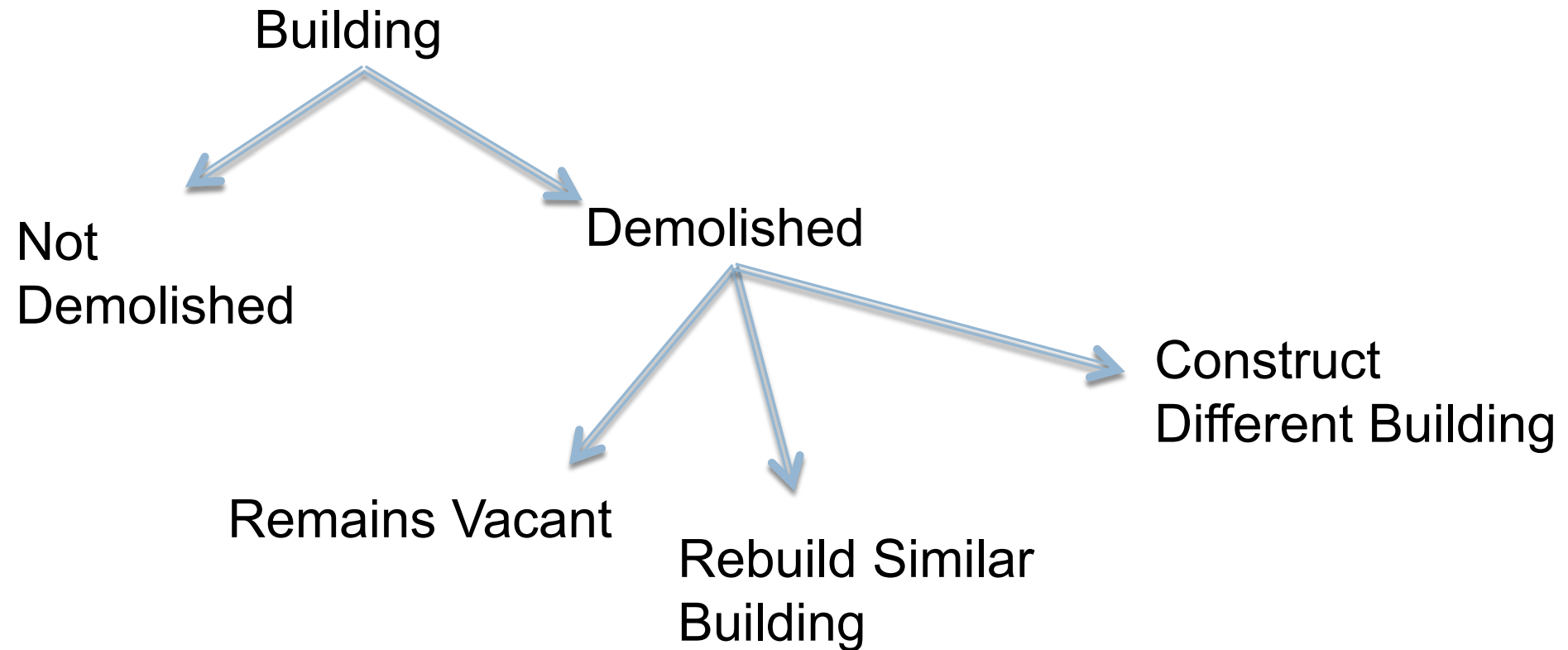


# Reconstruction of Similar Buildings

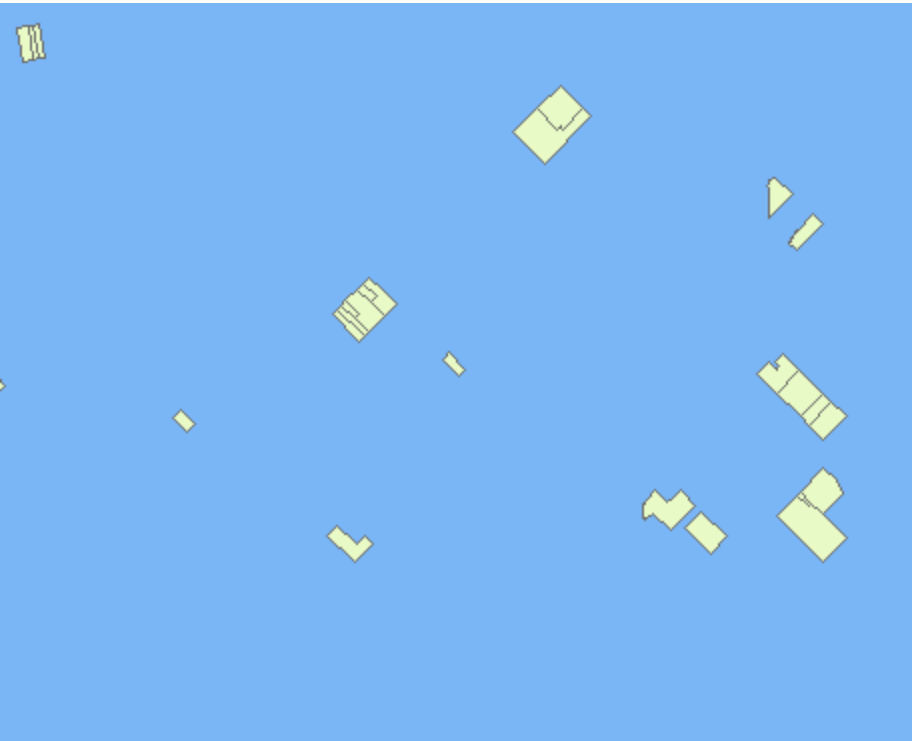
- Demolishing a building only to reconstruct a similar building
  - ▣ An extreme form of remodeling
- A different sort of redevelopment
  - ▣ Different reasons why a building owner would do it



# Nested Model that includes Post-Demolition Outcome

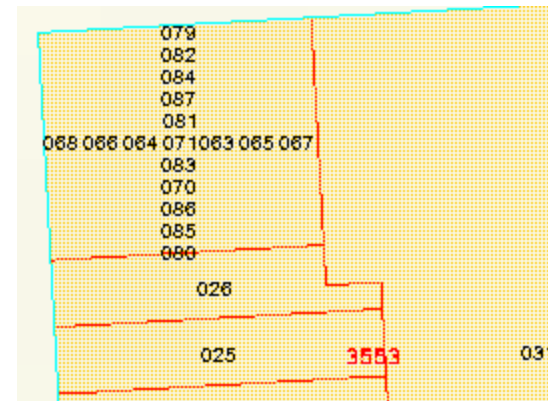
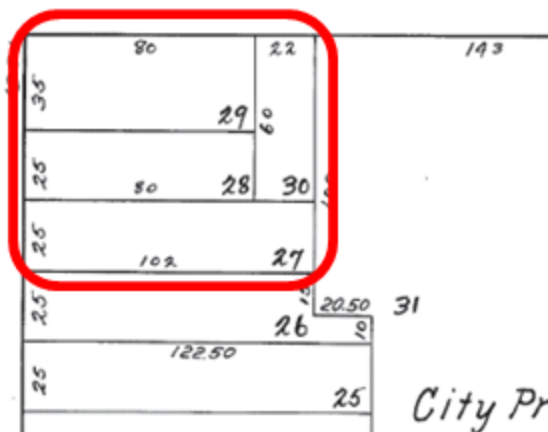


# Demolitions sometimes cluster

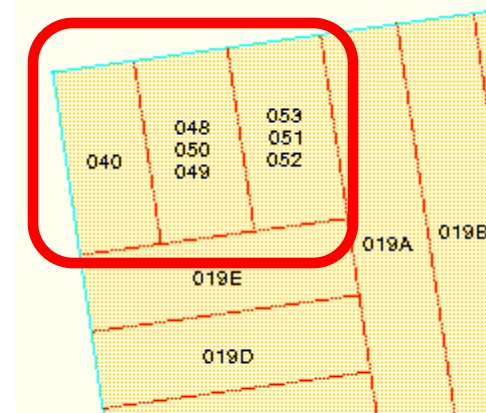
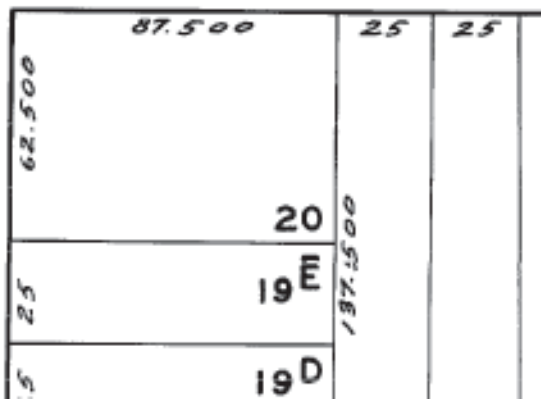


# Subdivision and Aggregation of Parcels

- Aggregation: many parcels issued identical building permits

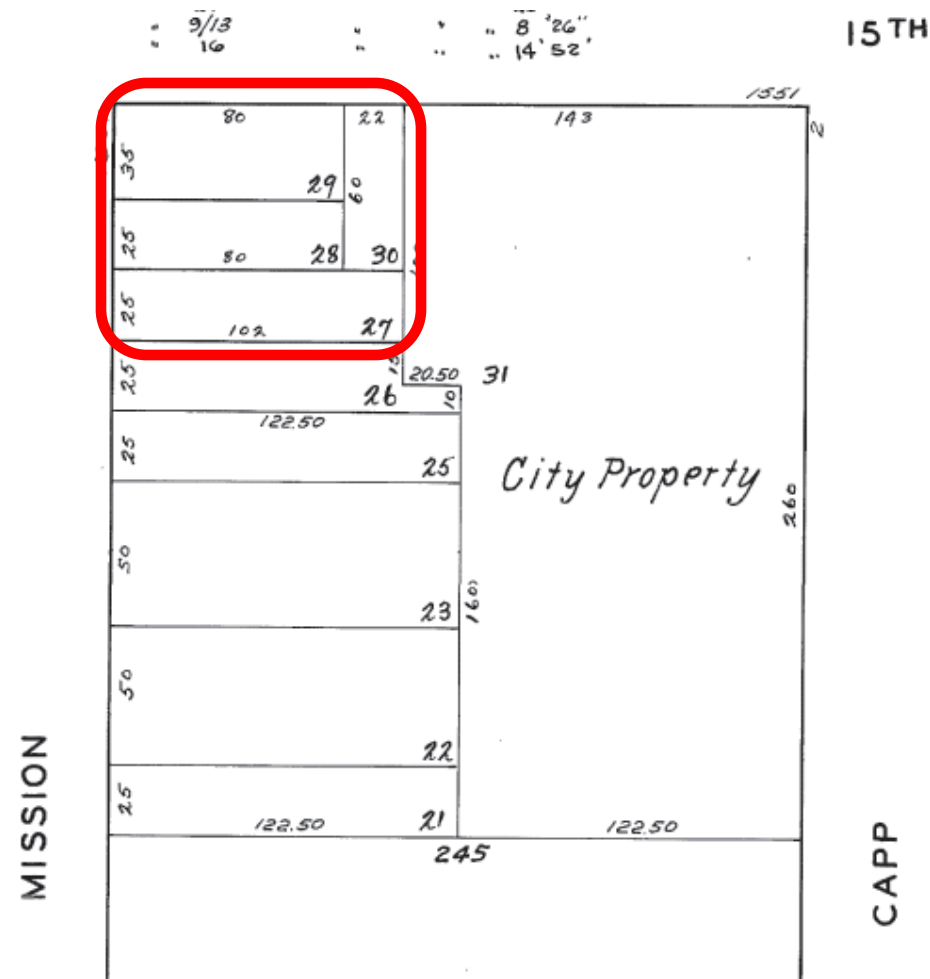


- Subdivision: one parcel issued many different building permits



# 1905 Mission Street: Aggregation

- “ERECT A FIVE STORY 24 UNIT RESIDENTIAL BLDG WITH COML”





# Real Estate Development Model

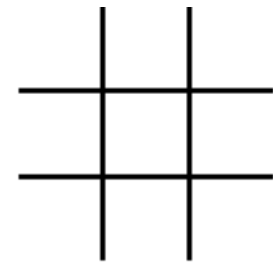
Building Transition Model



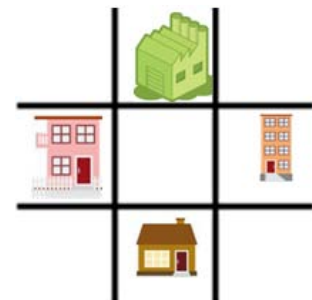
Building Demolition Model



Parcel Subdivision/Aggregation Model



Building Location Choice Model

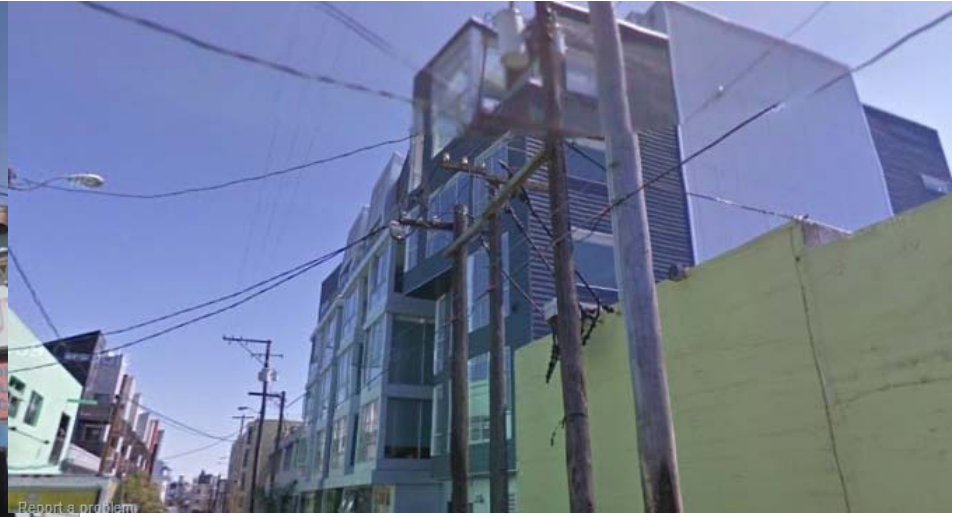


# Concluding Thoughts

- Bring in pre-2004 permitting data to increase sample size
- Improve specification of demolition model
- Building permits include estimates of the hard costs of a project
  - ▣ Indicator: Price of housing unit – Marginal cost of housing unit
  - ▣ Price markup over construction cost as indicator of the extent to which supply is constrained (Glaeser 2005)



# Thanks for listening



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