The Capitalization of Stricter Building Codes in Miami, Florida House Prices

by
Randy E. Dumm
G. Stacy Sirmans
Greg Smersh

Introduction

- Hurricane Andrew in 1992 destroyed 25,000 homes and damaged 100,000
- Insurance claims totaled over $16 billion
- In 2004 Florida was impacted by Charley, Francis, Ivan, and Jeanne
- In 2005 Florida was impacted by Katrina, Rita, Wilma, and Dennis
- Total insured losses for 2004 and 2005 were $36 billion

Introduction

- Following Hurricane Andrew, Broward and Dade Counties passed new, tougher building codes effective in September 1994 (the South Florida Building Code)
- Total damage for 2004 and 2005 disasters was reduced by stricter building codes
- Newer homes suffered less damage than older homes

Introduction

- **While newer homes could be presumed to be “safer” , no previous research has measured the extent to which stricter building codes are valued by homeowners**
- **This study uses a hedonic pricing model to measure the capitalization of the stricter building code in house prices**

Building Codes and Disaster Mitigation

- The first model code was published by the National Board of Fire Underwriters in 1905
- Building codes are justified for at least two reasons: (1) to correct information asymmetries and (2) to prevent externalities that may endanger adjacent properties

Building Codes and Disaster Mitigation

- Consumers value saferooms in tornado-prone areas
- Consumers value storm shutters and structural integrity
- Properties built under code changes of National Flood Insurance Program were more likely to sustain damage (wind and/or flood)

Building Codes and Disaster Mitigation

- **Lack of consumer willingness to buy insurance or adopt cost-effective measures against disaster related to “natural disaster syndrome”**
- **Individuals underestimate the probability of disaster and future benefits have a small present value relative to costs**
- **Other factors: government aid will be forthcoming and lengthy periods of coverage without losses**

Building Codes and Disaster Mitigation

- Three factors contribute to consumers' reluctance to invest in mitigation
- Misperceptions of personal risk exposure
- Misperceptions of severity of disasters
- Procrastination in implementation (with uncertain benefits consumers often default to doing nothing)

Building Codes and Disaster Mitigation

- Fronstin and Holtmann (1994) found that, with Hurricane Andrew, homes built before the 1970s withstood the hurricane better than homes built afterwards. Reasons:
- A decline in building codes beginning in the 1970s
- Consumers found it more cost effective to substitute homeowners insurance for quality construction and structural integrity

Building Codes and Disaster Mitigation

- Less expensive and more efficient evacuation. Issue becomes property damage and not loss of life
- Cheaper inputs mean lower costs. Buyers favored characteristics over solid construction
- Social insurance in the form of low interest loans and National Guard protection of property

Data

- Owner-occupied single-family homes in Miami-Dade County
- Data available on physical characteristics, age, etc.
- GIS is used to determine locational risk for each parcel
- Final data set contains 60,163 homes that were built between 1970 and 2007

Data

- Data are divided into three zones
- Zone 1 includes homes within 1,500 feet of the coastline in the Storm Surge Coastal Control Line. These homes would be exposed to extreme hurricane risk including winds greater than 150 MPH
- Zone 2 includes houses more than 1,500 feet from the coast but within ten miles of the coastline

Data

- **Zone 2 falls within the 140 MPH wind contour and would have less risk exposure but still subject to extreme conditions**
- **Zone 3 includes properties located more than ten miles from the coastline and outside the wind contour and would be expected to have somewhat lower risk exposure**

Empirical Model

- **To examine the effect of the change in building code, the hedonic model is:**

$$\ln(sp) = \alpha_0 + \beta i\, X_{ij} + \beta\, Bldgcode_j + Bldgcode2006_j + Bldgcode2007_j + \varepsilon_i$$

Results

- **For the aggregate data, *Bldgcode* is negative and significant indicating that houses built under the new code sold for less, on average**
- **The difference is small at 0.6 percent**
- **The post-catastrophe variables, *Bldgcode 2006* and *Bldgcode2007*, are not significant indicating no effect on building code value after "reality check"**

Results

- **For Zone 1, the *Bldgcode* variable is positive indicating an 8 percent premium for houses built under the stricter code**
- **The post-catastrophe variables are not significant indicating no greater premium after the 2004 and 2005 disasters**

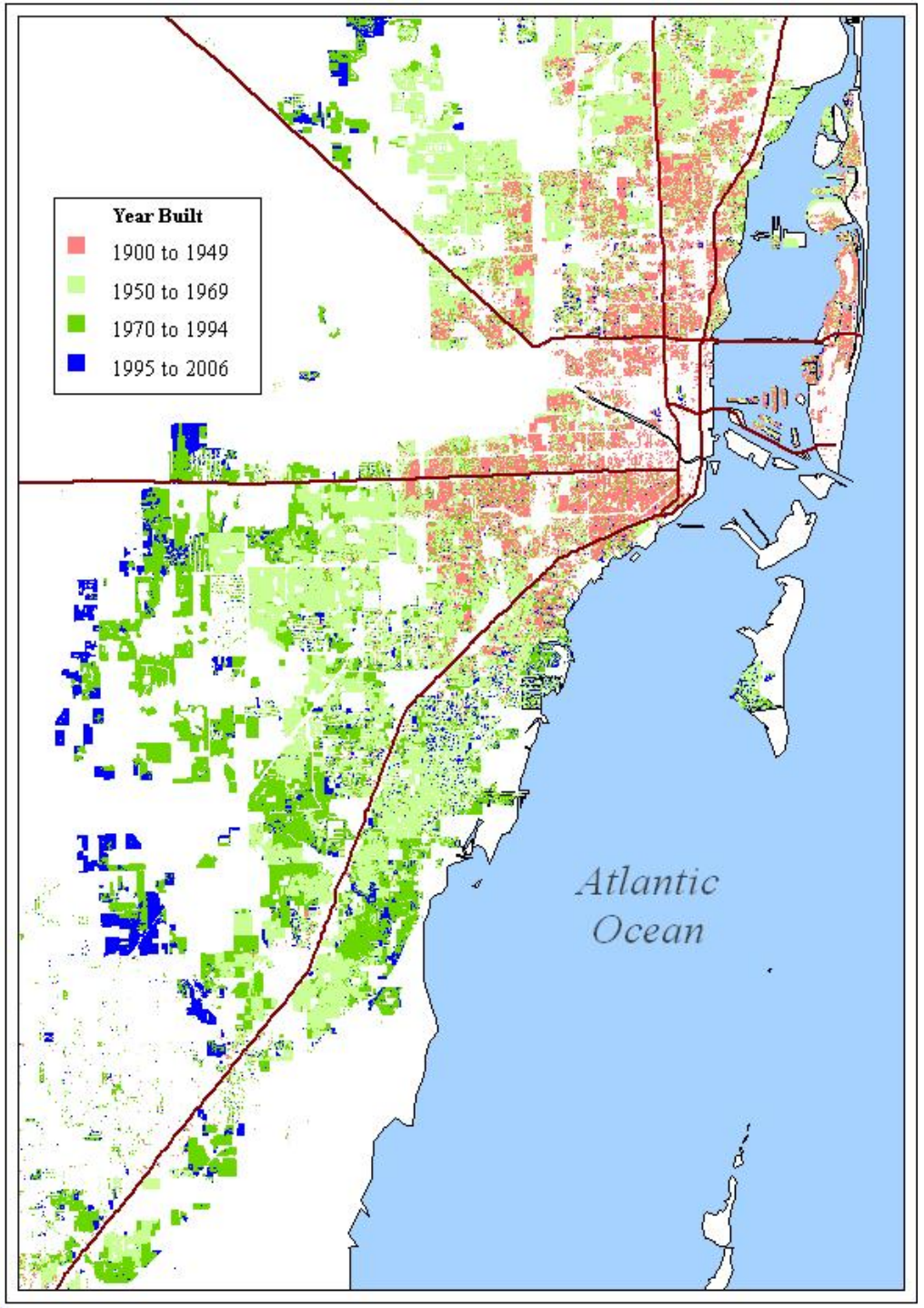
Results

- **For Zone 2, *Bldgcode* is negative and significant, indicating that homes under the newer, stricter code sold for about 2.70 percent less than homes built under the older, less strict code**
- **The post-catastrophe variables are not significant**

Results

- **For Zone 3, *Bldgcode* is positive and significant, indicating that homes under the newer, stricter code sold for about 4 percent more, than homes built under the older, less strict code**
- ***Bldgcode2006* is negative and significant, although the combined effect of *Bldgcode* and *Bldgcode2006* is positive**

Spatial Pattern of Houses by Year Built- Miami, Florida



Variable Definitions

Ln(sp)	Log of sale price ln(*sp)* = dependent variable
SqFt	The square footage of the house
Lotsize	Size of the lot
Age	The age of the house in years
Baths	The number of bathrooms
Swimming Pool	Binary variable with a value of one if the house has a swimming pool, zero otherwise
Bldgcode	Binary variable with a value of one if the house was built under the stricter 1994 South Florida Building Code, zero otherwise
Bldgcode_2006	Binary variable with a value of one if the house was built under the stricter 1994 South Florida Code and was sold in 2006, zero otherwise
Bldgcode_2007	Binary variable with a value of one if the house was built under the stricter 1994 South Florida Code and was sold in 2007, zero otherwise
Zone 1	Binary variable with a value of one if the house is within 1,500 feet from the coast, zero otherwise
Zone 2	Binary variable with a value of one if the house is between 1,500 feet and ten miles from the coast, zero otherwise
Zone 3	Binary variable with a value of one if the house is located more than ten miles from the coast, zero otherwise
Y2000 – Y2007	Time trend variables for the years 2000 through 2007

Descriptive Statistics

Panel A: Aggregate

	Price	Sqft	Lotsize	Age	Baths	Pool	Bldgcode
Mean	339442	2289.84	11116.40	15.34	2.28	0.33	0.35
Min	50000	826	1456	0	1	0	0
Max	5000000	9931	2182061	37	8	1	1
Std. Dev.	365839	1017.90	15813.10	11.15	0.80	0.47	0.48
N	60163	60163	60163	60163	60163	60163	60163

Panel B: Zone 1

	Price	Sqft	Lotsize	Age	Baths	Pool	Bldgcode
Mean	1385836	4130.94	13005.84	15.64	3.76	0.84	0.36
Min	55000	900	1747	0	1	0	0
Max	5000000	9931	89668	37	8	1	1
Std. Dev.	934475	1463.41	7925.87	11.61	1.40	0.36	0.48
N	1865	1865	1865	1865	1865	1865	1865

Panel C: Zone 2

	Price	Sqft	Lotsize	Age	Baths	Pool	Bldgcode
Mean	322794	2240.48	11247.16	17.06	2.23	0.35	0.32
Min	50000	826	1456	0	1	0	0
Max	5000000	9847	466446	37	8	1	1
Std. Dev.	311481	1013.25	10953.26	11.61	0.78	0.48	0.46
N	40237	40237	40237	40237	40237	40237	40237

Panel D: Zone 3

	Price	Sqft	Lotsize	Age	Baths	Pool	Bldgcode
Mean	268478	2209.71	10629.98	11.46	2.24	0.26	0.41
Min	50000	828	2627	0	1	0	0
Max	3162000	9583	2182061	37	8	1	1
Std. Dev.	144357	762.43	23634.07	8.84	0.58	0.44	0.49
N	18061	18061	18061	18061	18061	18061	18061

Regression Model Output Dependent Variable = ln(sp)				
	Aggregate	**Zone 1**	**Zone 2**	**Zone 3**
Constant	**11.5305** (.008416)*	**11.9210** (.039537)*	**10.8803** (.005388)*	**11.1803** (.006685)*
Sqft	**.000371** (.000002)*	**.000234** (.000011)*	**.000397** (.000002)*	**.000320** (.000003)*
Lotsize	**.000001** (.000001)*	**.000006** (.000002)*	**.000001** (.000001)*	**.000001** (.000001)*
Age_Resid	.000290 (.000165)	**-.004106** (.001483)*	**.001805** (.000207)*	**-.003141** (.000257)*
Baths	**.075663** (.002135)*	**.105524** (.009849)*	**.075846** (.002774)*	**.037954** (.003340)*
Swimming Pool	**.171784** (.002640)*	**.212529** (.027642)*	**.184394** (.003278)*	**.127999** (.003773)*
Bldgcode	**-.006587** (.002468)*	**.077661** (.024326)*	**-.027041** (.003202)*	**.040017** (.003221)*
Bldgcode _2006	-.011166 (.007394)	.030285 (.072365)	-.013348 (.009081)	**-.027226** (.010911)*
Bldgcode_2007	.013961 (.009939)	-.001701 (.084991)	.018278 (.012250)	-.005077 (.014675)
Y2001	**.085350** (.003919)*	**.105947** (.035335)*	**.090573** (.005225)*	**.074335** (.004824)*
Y2002	**.213375** (.003935)*	**.171007** (.035726)*	**.222974** (.005200)*	**.192280** (.004926)*
Y2003	**.349773** (.003982)*	**.277159** (.035455)*	**.360151** (.005157)*	**.325198** (.005239)*
Y2004	**.525924** (.003900)*	**.414577** (.033249)*	**.526625** (.005033)*	**.530806** (.005213)*
Y2005	**.754629** (.003996)*	**.679691** (.034485)*	**.754233** (.005141)*	**.761151** (.005370)*
Y2006	**.909366** (.004816)*	**.733023** (.044147)*	**.904529** (.005923)*	**.958486** (.007382)*
Y2007	**.922542** (.005950)*	**.769043** (.051698)*	**.915401** .007227)*	**.962845** (.009374)*
Zone 2	**-.591741** (.006492)*			
Zone 3	**-.540348** (.006674)*			
R^2	.8453	.6752	.8302	.8341
N	60163	1865	40237	18061
*Significant at the 1% level.				

Regression Model
Dependent Variable: ln(sp)

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Pool	**.171784**	**.212529**	**.184394**	**.127999**
Bldcd	**-.006587**	**.077661**	**-.027041**	**.040017**
Bldcd_2006	-.011166	.030285	-.013348	**-.027226**
Bldcd_2007	.013961	-.001701	.018278	-.005077
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