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The Value of Dune Width in Avalon, New Jersey: A Hedonic Pricing Analysis

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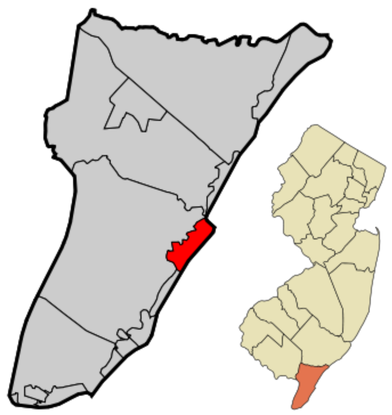
Introduction

- Previous research on the economics of coastal housing markets has proven that housing values along the east coast of the United States capitalize on the attributes of local beaches.
- Recent studies document two important findings: i) that beach width positively affects coastal property values; ii) and that there is a proximity effect, in which distance from the beach plays a significant role in the capitalization of local beach attributes.
- This paper builds upon previous research by exploring the influence that dune width has on coastal property values in Avalon, New Jersey.



Avalon within Cape May County (Left)
Cape May County within New Jersey (Right)

Motivation

- The motivation behind this topic stems from the negative effects associated with climate change and rising sea levels around the world.
- Specifically, Hurricane Sandy was extremely detrimental along the New Jersey coastline in 2012, but Avalon was relatively unscathed. Many attribute this to the protection provided by the high dunes that are extremely unique along the entire east coast.
- Avalon's high dunes stand up to 16.5 yards high and reach as far as 400 yards wide.

"The high dunes stretch from 40th to 59th Streets, offering not only hurricane protection to island residents but also a home to hundreds of species of birds and animals"
-Protect Avalon's Dunes, Inc.

"The Borough of Avalon has long realized that the dunes are important for public safety and the protection of property. The Borough is also proud to claim one of the few examples of a mature maritime forest to be found between Virginia and Massachusetts"
-Brian Reynolds, Phd., Chairman, Avalon Borough Environmental Commission

Aerial view of Avalon's high dunes (Left)
Photo from one of Avalon's dunes towards the beach and ocean (Above)

Approach and Methodology

- A dataset was constructed that combines real estate data with beach attribute data.
- The dataset includes sales records for 748 residential properties in Avalon, New Jersey from 2010 to 2015.
- A hedonic pricing model was then used to estimate the value of dune width that is capitalized in Avalon property values.
- The following two models were analyzed:

$$\ln(\text{SalePrice}) = \beta_1\text{Bedrooms} + \beta_2\text{Bedrooms}^2 + \beta_3\text{Bathrooms} + \beta_4\text{Bathrooms}^2 + \beta_5\text{Lavatories} + \beta_6\text{Lavatories}^2 + \beta_7\text{Street} + \beta_8\text{PropertyType} + \beta_9\text{BeachAccess} + \beta_{10}\text{DuneWidth} + \beta_{11}\text{Distance*DuneWidth} + \beta_{12}\text{YearlySaleDummies} + \varepsilon$$

$$\ln(\text{SalePrice}) = \beta_1\text{Bedrooms} + \beta_2\text{Bedrooms}^2 + \beta_3\text{Bathrooms} + \beta_4\text{Bathrooms}^2 + \beta_5\text{Lavatories} + \beta_6\text{Lavatories}^2 + \beta_7\text{Street} + \beta_8\text{PropertyType} + \beta_9\text{BeachAccess} + \beta_{10}\ln(\text{DuneWidth}) + \beta_{11}\text{Distance*}\ln(\text{DuneWidth}) + \beta_{12}\text{YearlySaleDummies} + \varepsilon$$

Summary Statistics:

Variable	Obs	Mean	Std. Dev.	Min	Max
Price	748	1,222,000	920,066	145,000	12,400,000
Bedrooms	748	4.153743	1.214217	0	9
Full Bathrooms	748	2.897059	1.318732	1	9
Lavatories	748	.4679144	.6254636	0	5
Street	748	35.27005	21.08037	9	80
Property Type Dummy	748	.6350267	.4817448	0	1
Beach Access Dummy	748	.9131016	.2818746	0	1
Dune Width	748	112.0327	87.56689	38.25	429
Distance to Beach	748	2.707219	1.260501	1	5
2010 Dummy	748	.1590909	.3660056	0	1
2011 Dummy	748	.1885027	.3913747	0	1
2012 Dummy	748	.2165775	.4121879	0	1
2013 Dummy	748	.1991979	.3996644	0	1
2014 Dummy	748	.1965241	.3976352	0	1
2015 Dummy	748	.040107	.1963413	0	1

Results

- The findings in this paper suggest that property values in Avalon, New Jersey increase as dune width increases, but the effect that dune width has on property values decreases as the distance from the beach increases.

Hedonic Pricing Model Results (within 2 blocks from beach):

Dependent Variable—ln(Sale Price)

	(1)	(2)
Number of Bedrooms	**0.548*** **	**0.600*** **
	(0.0567)	(0.0564)
Bedrooms²	**-0.0515*** **	**-0.0574*** **
	(0.00664)	(0.00658)
Number of Full Bathrooms	**0.134** **	**0.114** **
	(0.0542)	(0.0523)
Full Bathrooms²	**0.00280**	**0.00551**
	(0.00721)	(0.00696)
Number of Lavatories	**0.135*** **	**0.117*** **
	(0.0412)	(0.0398)
Lavatories²	**-0.00495**	**-0.000183**
	(0.0156)	(0.0150)
Street	**0.000219**	**0.000415**
	(0.000723)	(0.000718)
Type (=1 if single family home)	**0.568*** **	**0.559*** **
	(0.0490)	(0.0473)
Beach Access (=1 if yes)	**0.113**	**0.190*** **
	(0.0708)	(0.0616)
Dune Width (yards)	**0.00313*** **	
	(0.000601)	
Distance x Width (yards)	**-0.00177*** **	
	(0.000284)	
ln(Dune Width)		**0.160*** **
		(0.0404)
Distance x ln(Dune Width)		**-0.0621*** **
		(0.00751)
Constant	**11.85*** **	**11.45*** **
	(0.133)	(0.213)
Yearly Sale Dummies	**Included**	**Included**
Observations	367	367
Log lik.	-49.63	-36.98
R-Squared	0.8340	0.8451

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$