The Impact of Surf Breaks on Home Prices in Santa Cruz, CA

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JEL Classification Code G510—Valuation of Environmental Effects

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Abstract: The growing field of "surfonomics" attempts to document surfing's economic contribution to local and regional communities, as well the consumer surplus surf breaks provide to millions of surfers. To date, no research has examined the extent to which the value of surf breaks is capitalized into home prices. This study uses the hedonic price method with data from three distinct beach-adjacent neighborhoods in Santa Cruz, CA to estimate whether proximity to surf breaks leads to higher home values. We find that after controlling for proximity to the beach, ocean views, the specific characteristics of the homes, and neighborhood effects, that proximity to surf breaks is a statistically significant contributor to overall home value. A home that is right next to a surf break is valued at approximately $106,000 more than an equivalent home a mile away.

Keywords: Hedonic price method, non-market valuation, surfonomics, surfing

I. Introduction

Surf economics (or "surfonomics") is a growing sub-field within environmental economics that attempts to document the economic contributions of surfing to local and regional economies, as well as to consumer surplus. Surfonomics is still a very small field, with only a handful of published works, but interest is growing as evidenced by a recent front-page article in The Washington Post Business Section on August 24th, 2012.[1]

Most studies on surf economics (Buckley 2002, Weight 2003, Lazarow 2007, Murphy 2008, Coffman & Burnett 2009, Lazarow & Tomlinson 2009) focus on the contributions that surfing makes to local economies through tourism revenue, and the associated multiplier impacts. There have also been studies (e.g. Tilley 2001) that have employed the Travel Cost Method (TCM) to estimate the consumer surplus of surf breaks—the value that individuals receive through the provision of surfing as a free public resource. TCM is the only method that has been employed so far to estimate the non-market values associated with surfing.

TCM, while providing useful information, suffers from a significant structural flaw: people who live closest to the surf breaks, and typically value surfing the most, are not captured by the models because their travel costs are zero or close to zero. Put simply, travel cost methods are best used to estimate recreational areas that people visit on vacation, or perhaps on weekends, but not those for which people will spend lots of money to live close to, and hence whose values are capitalized into real estate values. For example, TCM studies are good at estimating consumer surplus for national parks or summer beach destinations, but not for neighborhood parks, where much of the value is capitalized in nearby home prices.

A question arises: is proximity to surf breaks also capitalized into home prices? That is, do equivalent beach homes—one near a surfing spot and the other not—differ in price? Given the immense popularity of surfing in California, which has well over one active million surfers (Leeworthy and Wiley 2001), and the tremendous amounts of money people are willing to pay to enjoy the sport, the answer is most likely yes. The question is how much? And how can this be estimated?

The statistical technique best suited to testing this hypothesis is the Hedonic Price Method (HPM). HPM is based on work by the late economist Kelvin Lancaster (Lancaster 1966, 1971, 1977) who theorized that consumer goods can best be viewed as bundles of attributes, all of which combine to determine the total value or price. In the case of home values, they are determined by a variety of attributes, including the number of bedrooms and bathrooms, the age, as well as a host of other potential environmental and neighborhood values, such as the quality of the local schools, the weather, and proximity to recreational opportunities or shopping.

Hedonic price studies have been used to estimate the value of lake views (Notie & Lonnie 1995), air quality (Neill, Hassenzahl & Assane 2007), proximity to greenways (Nicholls & Crompton 2007), proximity to open space (Sander & Polasky 2007, Lutzenhiser & Netusil 2001), as well as "disamenities" such as proximity to landfills (Hite et al. 2000, Thayer, Albers & Rahmatian 2009) by adding measures of these attributes to the list of independent variables that are already known to directly contribute to home prices and identifying statistically significant correlations. To date, however, no such study has been conducted to estimate the value of being close to a surf break, which is what this study sets out to do.

II. The Study Area

In order to estimate the monetary impact on home prices of being close to a surf break, it is necessary to compare homes near beaches with surf breaks with those next to beaches but without surf breaks. It is this variation that makes it possible to use linear regression analysis to

estimate whether proximity to surf breaks is significantly correlated with home price. The area for this study includes three beach-adjacent neighborhoods in Santa Cruz, CA, two of which do not border surf breaks and one which does. The three neighborhoods (pictured together in Figure 1) include Pleasure Point-Opal Cliffs, Rio Del Mar (7.1 miles to the south), and Seabright (3.4 miles to the north).

The Pleasure Point-Opal Cliff neighborhood (see figure 2) includes multiple surf peaks that begin at Pleasure Point near 30th avenue and extend for almost a mile down Opal Cliff to the edge of the small town of Capitola. When the swell is sizeable there are 7 breaking peaks (and sometimes more, depending on the size and direction of the swell) ridden by hundreds of surfers on a given day (even on weekdays). All of the homes in the Pleasure Point-Opal Cliff area are close enough for the occupants to walk to the surf breaks without having to cross a major road. There are 6 main entry points along the cliffs with wide stairways that lead directly down to the beach. The area is one of the most easily accessible surf zones in all of California. The beaches in this area are very narrow and often completely washed out at high tide, making this primarily a surf beach, and not one for general recreating and sun bathing. There is a path along the cliff used for biking and walking, which also has a few benches for viewing the ocean and surf.

Rio Del Mar (see Figure 3) is south of Pleasure Point along a stretch of State beach that goes on for many miles, all the way from New Brighton (near Capitola) to Moss Landing. The beach bordering Rio Del Mar is wide and popular with tourists, but there are no major surf breaks (people will sometimes body board in the waves that crash close to shore, and on rare days there are a few areas where surf will break nearby that is rideable, but generally these beaches are

considered dead zones for surfing). People who frequent these beaches do so mainly to lay on the beach, play in the sand, swim, walk their dogs, jog, or view the wildlife (as there are often dolphins, seals, otters, and sea birds in the area; there is also a small wharf with a half-sunken concrete ship nearby that is a tourist attraction). The weather in this neighborhood can at times be foggier than other areas in Santa Cruz County, but average temperatures are comparable.

Seabright (see Figure 4) is an area wedged between the Santa Cruz Yacht Harbor and the edge of the cliff that borders the Santa Cruz Beach Boardwalk area. It has a wide beach that is also popular with tourists, and is often sunny and warm. There is no surf break on Seabright beach, and the surf that breaks near the harbor mouth jetty nearby breaks very rarely, and it is illegal to surf there even when it does. Seabright has the advantage of being the closest of the three neighborhoods to downtown Santa Cruz and the University of California at Santa Cruz.

III. Data

Data for this study include the following variables obtained through a local real estate office in Santa Cruz: final home sale price (adjusted to $2011), age of home, lot size (sq. ft), home size (sq. ft), no. of bedrooms, and no. of bathrooms. Added to these variables were the following variables created specifically for this study using Google Maps: blocks from beach (the number of cross streets from the shoreline to each home), ocean view (a dummy variable equal to 1 if the home has a panoramic view of the ocean), and distance to surf break (measured in driving miles from each home to the nearest major surf entry point—i.e. stairway to the beach).

It is important to note that the "distance to surf break variable" was measured so as not to overestimate any effects. The nearest surf break to Rio Del Mar is the Capitola Pier, which is .8 miles south from the southernmost reef in the Pleasure Point-Opal Cliff reef system. It is mostly a beginner's break, with smaller waves, fewer rideable days, and it is also harder to access for parking (and the parking is metered instead of free near Pleasure Point-Opal cliffs). Seabright is closest to the Steamer Lane reef system on the north side of town, which is comparable in quality, variety, and number of surf days to Pleasure Point-Opal Cliffs. However, the southernmost entry point for the Steamer Lane system is Cowell's beach, which like Capitola Pier, is a small beginner break with many fewer days of rideable surf than the breaks just slightly north. We measured the "distance to surf break" from Rio Del Mar and Seabright to these lower quality surf breaks so as to err on the side of a lower travel distance between the homes and a surf entry point.

The total number of homes in the sample across all three neighborhoods was 357—122 in Pleasure Point-Opal Cliffs, 157 in Rio Del Mar, and 78 in Seabright. Summary statistics for the whole sample are in Table 1, and for each neighborhood individually in Tables 2-4. Overall, homes in Pleasure Point-Opal Cliffs near the surf breaks are slightly less expensive than in the other two neighborhoods but they are also smaller.

IV. Regression Results and Discussion

In order to determine whether proximity to the surf breaks impact home values, an OLS regression was run on the following equation.

Home price= House size + Lot Size + No. Bedrooms + No. Bathrooms + Age + Ocean view + Blocks to beach + Distance to surf break + Neighborhood dummy

The neighborhood dummy variables were included to account for any neighborhood differences that might influence home prices that aren't incorporated into the dataset, including differences in weather, nearby schools, parks, distance to other amenities, etc.

The results were tested for heteroscedasticty using the Cook-Weisberg test and the results strongly rejected the null hypothesis of homoscedasticity. Therefore, the model was run again with robust standard errors to account for the differences in variance between the error terms and the independent variables. The results are reported in Table 5.

All of the variables except for the number of bedrooms have the expected sign. Larger house and lot sizes, and a greater number of bathrooms, all are associated with higher home values; lot size and house size are significant at the 99% levels and bathrooms at the 90% level. Even though "no. bedrooms" has the incorrect sign, it is not close to being statistically significant. The reason for this anomaly is likely the fact that all four variables—lot size, house size, no. bedrooms, and no. bathrooms—are positively correlated at the 99% level, with pairwise correlation in the range of .30 to .66. This makes it difficult to estimate the incremental and unique contribution to home prices of each of these four variables individually. It appears that house and lot size are the variables that most accurately estimate home prices, and because on average the bigger the house

the more bathrooms and bedrooms, the lack of statistical significance and consistency across all four of these variables does not invalidate the model.

All of the other variables have the expected sign. Age is negatively correlated with home price but is not statistically significant. This is not surprising since age does not incorporate whether the home has been remodeled, and therefore, is not necessarily an accurate predictor of overall house quality. Blocks to beach is negative, large, and statistically significant at the 99% level, indicating that home prices decline on average approximately $146,000 per block away from the beach. Ocean view is positive, statistically significant at the 99%, and extremely large—indicating that on average homes with a full ocean view cost almost $1 million more than a comparable house with no view.

The variable of most interest for this paper is "distance to surf break" and it is statistically significant at the 95% level,[2] negative, and large. It indicates that on average a similar beach-adjacent home that is near a surf break versus one that is 1 mile away, is worth over $106,000 more (to be precise, the model describes the converse—equivalent homes 1 mile way are worth $106,000 less). This is the first evidence in the economics literature to demonstrate that proximity to surf breaks is capitalized into home values, just as other environmental amenities.

V. Conclusion

The hedonic price method (HPM) has been used for decades to estimate the value of environmental assets that are capitalized into home prices. But never before has research

attempted to estimate the value of proximity to surf breaks as a potential contributor to home value. This study conducted in Santa Cruz, CA uses a unique dataset, with significant variation in distance to surf breaks across three distinct beach-adjacent neighborhoods, to estimate the real estate values associated with proximity to a major surf break in town. The results indicate that on average, similar homes—in size, proximity to beach, and ocean view—differ significantly in price based on distance to a major surf break. For every mile away from a surf break, equivalent homes are worth approximately $106,000 less. Put another way, those homes closest to surf breaks are worth potentially hundreds of thousands of dollars more than equal homes on beaches without surf.

A few key issues should be kept in mind regarding these results:

1. It is likely that there is a broad-based price premium for all homes in Santa Cruz County because of the town's amazing surf breaks and surf culture. Even many of those who live miles away from the beaches and surf breaks use them frequently, and are willing to pay a premium to live in town so that they can enjoy surfing on a regular basis. What this research has indicated is that there is *an added* premium of being in walking distance to a surf break. It is important to stress that these results in no way capture the full extent of the value of surfing to home values in Santa Cruz County. Put another way, if the waves off of Santa Cruz mysteriously disappeared, the home prices would almost assuredly be negatively impacted not just near the surf breaks but throughout the county.

2. While there are many upsides to living near a surf break (especially if you're a surfer), there are also downsides—namely crowds and the noise and parking woes they bring with them. This research seems to indicate that despite the negative aspects of being close to surf breaks, the upside is significant enough that home values are higher than they otherwise would be in the absence of the surf breaks.

3. Property taxes are a major source of tax revenue in California.[3] To the extent that surf breaks increase property values they also increase government revenue, providing a direct and sustainable stream that can be traced from this natural resource to government coffers. Though beyond the scope of this paper, it is theoretically possible to estimate how much surf (and other environmental resources) provide to local and state government through this increased property tax revenue. (In addition, in cities and towns around the world that are considering expanding their surf tourism industry, using property taxes as the means to extract royalties from this natural resource could provide a significant and sustainable stream of revenue).

In summary, surfing provides many values to local and regional communities. Some of this can be captured in the revenue spent by surfers and the associated multiplier impacts. What this research has demonstrated is that the economic value of surfing is also capitalized into home price values, and indirectly provides a stream of revenue to local governments.

Figure 1: Coastal Santa Cruz County (All 3 neighborhoods)

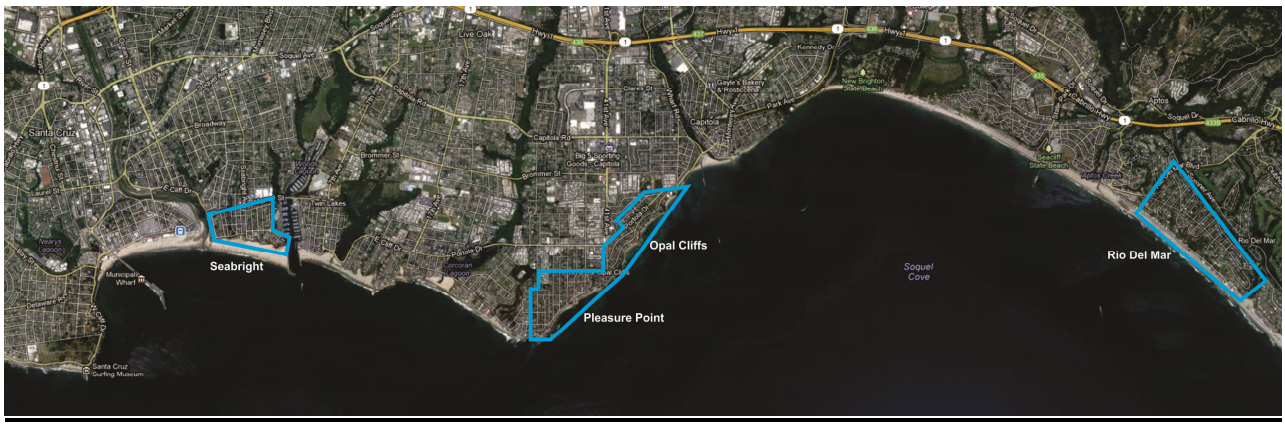

Figure 2: Pleasure Point-Opal Cliffs

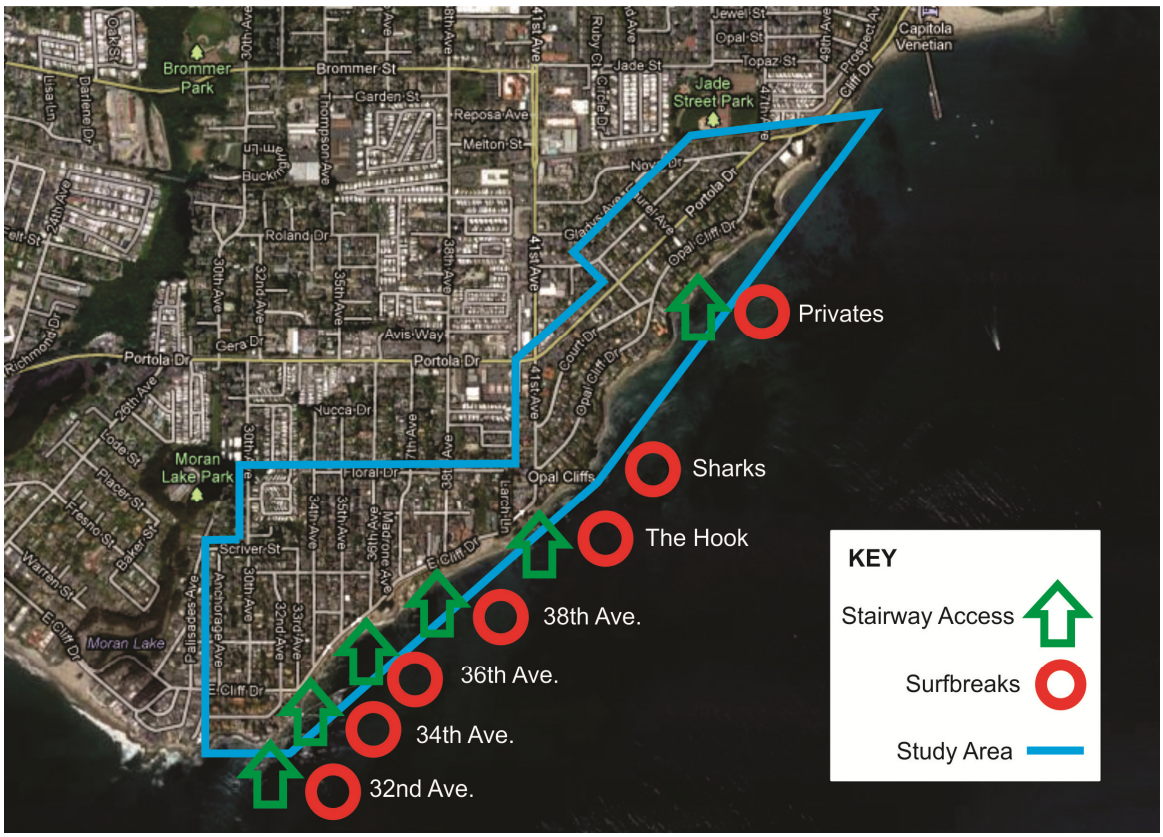

Figure 3: Rio Del Mar

Figure 4: Seabright

Table 1: Summary statistics (whole sample)

Variable	N	Mean	Std. Dev	Min	Max
Home Price	357	$1,302,549	$845,470	$372,500	$5,319,293
Age	357	47	25.4	1	124
Lot Size	357	5742	3719	304	27442
House Size	357	1810	874	472	8785
No. Bathrooms	357	2.4	.94	1	6
No. Bedrooms	357	2.9	.89	1	6
Blocks to beach	357	1.3	.96	0	4
Ocean View	357	.18	.38	0	1
Distance to surf break	357	2.7	2.2	0	6.6

Table 2: Summary statistics (Pleasure Point-Opal Cliffs)

Variable	N	Mean	Std. Dev	Min	Max
Home Price	122	$1,114,012	$790,346	$425,000	$4,891,304
Age	122	47	23.5	4	89
Lot Size	122	5614	3644	1200	27442
House Size	122	1561	658	472	3800
No. Bathrooms	122	2.1	.87	1	5
No. Bedrooms	122	2.7	.91	1	5
Blocks to beach	122	1.6	1	0	4
Ocean View	122	.11	.32	0	1
Distance to surf break	122	.18	.10	0	.4

Table 3: Summary statistics (Rio Del Mar)

Variable	N	Mean	Std. Dev	Min	Max
Home Price	157	$1,483,335	$953,555	$372,500	$5,319,293
Age	157	44.7	18	2	92
Lot Size	157	6932	3818	435	21500
House Size	157	2114	938	588	8785
No. Bathrooms	157	2.7	.81	1	5.5
No. Bedrooms	157	3.2	.81	1	6
Blocks to beach	157	.89	.81	0	4
Ocean View	157	.28	.45	0	1
Distance to surf break	157	5.0	.62	4.1	6.6

Table 4: Summary statistics (Seabright)

Variable	N	Mean	Std. Dev	Min	Max
Home Price	78	$1,233,552	$594,435	$400,000	$3,287,355
Age	78	53.1	37.5	1	124
Lot Size	78	3547.6	2399	304	13503
House Size	78	1587	856	505	4500
No. Bathrooms	78	2.1	1.0	1	6
No. Bedrooms	78	2.7	.86	1	5
Blocks to beach	78	1.7	.81	0	4
Ocean View	78	.06	.25	0	1
Distance to surf break	78	1.9	.15	1.7	2.3

Table 5: OLS Regression Results (Dependent variable: Home price, n=357)

R-squared =.74

F- Stat (10, 346) = 53.7; Prob >F = 0.0000

Independent Variable	Coefficient	Standard Error	t-stat
House size	264	91	2.90***
Lot Size	60	14	4.39***
No. Bedrooms	-25,845	44,830	-.58
No. Bathrooms	102,577	54,517	1.88*
Age	-1,551	1,062	-1.46
Ocean view	956,678	11,3824	8.40***
Blocks to beach	-145,908	32,393	-4.50***
Distance to surf break	-106,381	55,068	-1.93**

*, **, *** = statistically significant at the 90%, 95%, and 99% levels respectively

Notes

[1] Thomas, Gregory. "Surfonomics quantifies the worth of waves." The Washington Post 24 Aug. 2012, G 1.

[2] The t-stat of -1.93 makes the variable statistically significant right on the edge of the 95% level.

[3] According to the U.S. Census Bureau property tax revenue in CA in 2009-2010 accounted for almost 18% of all state revenue. This information can be viewed at: http://www.indexmundi.com/facts/united-states/state-finances/california/total-revenue/amount#graph.

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