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The Private Provision of Public Goods: An Analysis of Homes on Golf Courses

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Abstract
This paper examines the joint production of golf and real estate development. The empirical results of this analysis show that, over time, golf courses are being constructed less for recreational golf and more for contractual assurance of green open space for homes. We believe that this fundamentally provides some evidence that the demand for environmental quality is growing and that markets are increasingly able to find creative contracting mechanisms to satisfy demands for public goods.

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I. Introduction

As people and economies grow richer, they demand enhanced environmental quality. At least that seems to be one of the non-controversial conclusions that can be reached from economic analysis of environmental Kuznets curves (Yandle et al., 2004). Green space initiatives are increasingly common on the political landscape, and the issue is full of economics, politics, emotion, and opinion. Therefore, we start from the position that there is some fledgling demand for people to sequester or otherwise prevent the development of certain areas, particularly those near housing. These areas are being

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preserved as open, pasture, wooded, prairie, or raw land and not converted into commercial or residential development. We propose that homes on golf courses may be an entrepreneurial attempt at supplying the joint provision of golf courses along with housing on desirable green spaces.

It is fair to say that economic analysts, pundits, and lay people have long argued that the private, free market may regularly fail to provide public goods such as green space, open space, parks, and similar environmental amenities owing to the public goods and free rider problem. While that may very well be true, we think a second look may reveal that the growing demand for these environmental assets may be met in unusual ways by private, profit-oriented entrepreneurs.

We believe that there is a significant, private, demand for environmental amenities that grows as people become wealthier. Hence we study how markets and contract solutions might come to meet this demand. We do this in two seemingly separate but actually similar contexts: the demand for open, green space and the demand for golf. One important caveat is in order. We do not intend to argue or present evidence that the socially optimal level of collective goods is created or produced by private demanders, but rather, that markets are not barren when it comes to the provision of these public goods. This is not a normative analysis.

This paper explores whether golf courses may be substitutes for natural open green space in the eyes of some consumers and to some extent satisfy their demands for environmental quality. Simply, are golf courses today being constructed, in part, not only for people to play golf, but also to provide open green space to adjacent home owners? We remain agnostic on, and it is not the point of our paper, whether golf courses are superior to alternative forms of green spacing such as conservation easements, deed covenants, taxation and regulation, or similar devices.

We start from the following factual basis. Golf course construction proceeds at an unusually high rate given the growth in the number of people playing golf or the amount of golf being played. In 2000, an estimated 56,000 new homes on golf courses were constructed at a total cost of $8.4 billion, and they make up approximately 4 percent of the total 1.5 million homes constructed in the United States (Golf 20/20, 2003). In fact, the golf industry laments with some ever-increasing agony the continuing construction

of courses with no concomitant apparent increase in the demand for golf:

> Hit with a shot of bad weather and a surge in the construction of new courses, many golf course owners across Wisconsin are struggling to stay below par. "We are definitely saturated in terms of courses," said Terianne Petzold, executive director of the Golf Course Owners of Wisconsin, a Milwaukee-based industry group. "We're at the point where we're getting pretty close to full immersion. It would be nice to figure out a way to get people to stop building." (Brooks, 2004)

> Rounds are down, player development is flat, new course openings are half of what they were a few years ago and more courses than ever have "For Sale" signs out front because of overbuilding, overfinancing and over-the-top wishful thinking by dot-com millionaire developers. (Jones, 2003)

The golf course industry seems to implicitly recognize the main point of our inquiry:

> The percentage of real-estate oriented courses, where profitability issues can be offset by the increase in land values, will continue to increase, and courses driven by real estate will be more than half of the new courses added within a year or two. (Golf 20/20, 2003, p.18)

This paper is designed to align three branches of economic inquiry into sports economics and environmental issues. One, can and do golf course designers and builders internalize the impact that their construction techniques have on neighboring real estate? Two, is it appropriate to challenge the assertion that private and free markets always underproduce public goods? Three, is the demand for open and green space real, and can it be quantified?

II. The Recapitalization Hypothesis

One way that real estate developers can capture the joint demand of golf and green space is by constructing homes on golf courses and charging price premiums for contractual assurance that the green

space will persist. A *New York Times* article (Harden, 2001) indicates that golf course construction continues to rise while growth in the number of golfers has slowed. It states that many golf developers enter projects knowing they will lose money in the golf operation but make up the difference by charging price premiums at the real estate office. Moreover, many golf developers sell their courses to management companies once home sites are sold. Casual empiricism suggests that many people living in golf course communities do not play golf but simply demand the open space, and that the fraction of people buying homes on courses who actually play golf is declining. In this paper, we investigate, cross-sectionally, the factors that play a role in golf courses as surrogate green spaces. We also examine data on golf course sales that capture the recent phenomena of golf club reevaluations.

We develop what we will call the recapitalization hypothesis. This idea says:

1. There is an increasing demand for green space adjacent to homes, and golf courses are surrogate green space.
2. Golf courses provide long-run assurance that green space will persist.
3. Golf courses then add value to adjacent real estate by virtue of their persistent green, open space provision.
4. Golf course entrepreneurs will tap this demand for green open space and construct golf courses.
5. These new golf courses will appear to be constructed out of hubris. That is, they will cost more than the resulting cash flows will reveal.
6. Land values will capitalize the value of the adjacent green open space because the new home buyers demand the open green space and will pay resulting price premiums.
7. The golf course builder, the land developer, will capture the overcharges on the cost of golf course construction in the added value to the adjacent real estate.
8. Because the golf course builder is actually a real estate developer, he will subsequently liquidate the golf course at some fraction of its cost to an expert at managing and running golf courses who can make a normal return on the operation of the golf course because the initial capital outlay for him is now lower than the original construction costs.

9. The new buyer will be contractually obligated to maintain the open green space into the foreseeable future.

We subject this recapitalization, environmental quality hypothesis to testing using a comprehensive golf course database. In short, the goal of this analysis is to examine the contractual assurance (in the spirit of Klein and Leffler, 1981) that golf developers provide to homeowners that demand green space and to provide evidence of a Coasian (1960) solution in the joint production of golf courses and real estate developments. Supposing that we find these assurances, we will summarize these results in the framework of a market-based solution to the demand for green space, not a demand that goes unquenched in need of collective action. Assuming we find these assurances, we will offer alternative explanations of the political phenomenon we observe around us, the publicly funded green space initiative. Lacking these assurances, we will ponder why the market has failed to deliver that which homeowners desire and why collective action is deemed appropriate. We expect that we may find a mixed bag, locationally based, which may be enlightening as to why some market locales are better than others at providing the desired green space, the growing places, as opposed to the stable places where few new homes are under construction.

III. Related Literature

The Coase Theorem (1960) is typically applied to what has traditionally been defined as negative externalities where one firm's costs are a positive function of another's output. The implications of this model are that, in the case of what is usually called a positive externality, Firm 1 will take into account its positive impact on Firm 2's profits and thus its output will be higher than that under isolated behavior.

There exists a copious amount of empirical literature that examines how assets without prices are sometimes captured, internalized, and accounted for in prices and contracts. Cheung's (1973) classic paper on "The Fable of the Bees" responds to earlier assertions set forth by Meade (1952) and Bator (1958) about where apple farming and beekeeping occur next to each other. The apples provide food for the bees, and the bees fertilize the apple crops, creating increased value for neighbors without compensation on both accounts. In Cheung's analysis of bee services and nectar in

Washington, he provides some suggestion of a Coasian solution and shows that farmers and beekeepers do indeed contract with each other, and the market rental prices of hives reflect what look to be unpriced values of pollination. More recently, Muth et al. (2003) provide further evidence that the market for beekeeper services is well developed and that the unpriced, so-called external benefits of pollination to many agricultural crops are not so external or unpriced. They show, using times-series data on pollination fees, that exogenous shocks to beekeeper costs (specifically, *Varroa* mite infestations) positively influence pollination fees.

There are several papers that study how unpriced assets or outputs affect store rent at shopping malls. Brueckner (1993) develops a theoretical model in which a particular store's revenue is a function of its total floor space and the space of nearby stores. The developer allocates space to stores so that net marginal revenue (which accounts for what are usually called the external effects of increasing each store's space on rents paid by other stores) is equal to the marginal cost of space. Brueckner's theory states that if two stores have the same rent elasticity of demand, the store that generates the greater positive overall impact will pay a lower land rent. Thus, large anchor stores that attract consumers to nearby specialty shops are offered land rent subsidies to produce at a larger quantity than they otherwise would in an isolated location with no spillover effects. Pashigian and Gould (1998) use 1992 operating data for mall stores to examine contractual arrangements between mall developers and anchor stores. They show that the per-square-foot rent paid by anchor stores in super-regional malls is 90 percent less than the median per-square-foot rent paid by clothing stores and up to 95 percent less than rents paid by food, shoe, and jewelry stores.

There is research on the impacts of unpriced assets on home prices. Li and Brown (1980), for example, examine micro-neighborhood effects on housing prices. They examine aesthetic attributes of neighborhoods, pollution levels, and proximity of homes to local amenities such as schools, industry, parks, and bodies of water. They use data from a sample of 781 single-family home sales in the Boston, Massachusetts, area. They specify a linear hedonic model of home prices regressed on home structure characteristics (such as number of bedrooms, age of structure, lot size), demographic attributes (such as density, per capita income), property tax paid, and the micro-neighborhood location or unpriced asset

variables. One of the micro-neighborhood variables is an on-site visual index that measures homeowners' ranking of visual quality and views from the house. The authors estimate the model with and without the neighborhood variables. Most of the coefficients for these unpriced attributes have the expected signs. For example, an increase in noise level reduces home prices, and the visual quality index has a positive impact. The results of the models also indicate that structural attribute coefficients in the hedonic equation are affected very little by the introduction of the location variables in the model, an unsurprising result considering that construction costs are typically independent of these attributes. Some differences, however, do exist between the two models, especially for demographic characteristics. When the unpriced assets are introduced, the coefficient for median income is reduced to a non-significant value. Also, the coefficients for residential density and high school dropouts have either the wrong sign or are insignificant until the micro-neighborhood variables are included.

Do and Grudnitski (1995) were the first to empirically estimate the impact that unpriced golf course assets have on the prices of adjacent single-family homes. Using data on 717 residential sales in the San Diego area, they use a hedonic pricing model with a dummy variable for properties that abut golf courses and other controls such as age, square footage, number of bedrooms, etc. In their sample, they employ a matched-pair design to ensure that price premiums for golf properties are not driven by other location-specific variables or by systematic differences in the physical characteristics of the houses. The matched-pair technique in their study is implemented by including in the sample at least one property in the same vicinity (but not on the golf course) for every golf course property. Do and Grudnitski estimate that the price premium paid for homes on golf courses is approximately 7.6 percent.

Our hypothesis that homes on golf courses are contractual assurance of open green space is akin to Foldvary's (1994) view of territorial collective goods. Foldvary would argue that in our case, the value of the environmental amenities of these homes on golf courses—green open space or scenic water and woody views—is capitalized into the land values of the home sites. Foldvary goes on to promote the use of site rents or user fees as a stream of revenue to fund these environmental amenities. We, however, argue that the

prices of these home sites already incorporate the increased value from the environmental amenities.

Another underlying theme at the root of this analysis is the concept of the Environmental Kuznets Curve. Kuznets (1955) originally suggested that as real income per capita increases, income inequality increases as well, but then decreases after some turning point. Thus, as economies grow, income equality follows a U-shape relationship. There have been other related analyses since Kuznets that have shown long-term relations between capitalism and economic equality (Berggren, 1999).

The environmental applications of Kuznets's proposition started with Grossman and Krueger's (1995) study of environmental quality across different countries over several years. Using panel data from the Global Environmental Monitoring System tracking of urban air quality in both developed and undeveloped countries, they examined the relationship between GDP per capita and several measures of environmental quality. For example, sulfur dioxide, smoke, and heavy particles are each used as proxies for urban air pollution. Their results provide strong evidence that increases in GDP are associated with environmental decay for very poor countries. They find that the critical turning point occurred at incomes per capita of less than $8,000 (in 1985 dollars).

IV. Data and Empirical Framework

We have obtained a large golf course database from *Sportometrics*[1] that has already been used in other economics and environmental work (Limehouse et al., 2010). This database consists of more than 125 golf course characteristics for approximately 15,000 golf courses in the United States and Canada. To this we have added local and demographic information, plus some environmental information (such as Sierra Club membership), which gives us a large and powerful starting point for economic analysis of the basic and underlying questions posed in this analysis.

In addition, we have obtained data from *Golf, Inc. Magazine*[2] on golf course sales from January 2000 to December 2002. This database

[1] *Sportometrics* is a golf course consulting company that licensed its data to us for this project.

[2] *Golf, Inc. Magazine* is a publication for golf course owners, developers, and managers.

lists all courses in the United States that were sold during that time period, and for most of these courses, the following information is also provided: (i) the sale price, (ii) whether or not the seller was in default, (iii) whether the sale was part of the sellers' liquidation of non-strategic assets, and (iv) if the buyer plans to develop (or continue to develop) surrounding land adjacent to the course.

Table 1 reports summary statistics for selected numeric variables in our databases for golf courses meeting the following characteristics:

1. All golf course sales from January 2000 to December 2002.
2. Golf course sales for which there is mention in the sales report that the seller was bankrupt or in default with the lending agent providing financial capital for the golf course construction or operation.
3. Sales for which there is mention that the seller sold the course as part of its liquidation of non-strategic assets. (It should be noted that the courses in this category are mutually exclusive from the courses in #2 above.) Sales for which the buyer plans to develop surrounding land into home sites.
4. All courses in the Limehouse et al. (2010) database.

Courses that were sold between December 2000 and January 2002 are, on average, newer courses. The average age of courses listed in the sales report is 19 years old, compared to an overall average of 37 years for all courses. In addition, transactions in which the seller was in default involve even newer courses (14 years) and have a smaller standard deviation than all course sales. Total golf fees (greens plus cart fees per 18 holes) are generally more expensive on the sold golf courses. However, for sales involving liquidation of non-strategic assets, the golf fees are, on average, less than those for all sales and for all golf courses.

Table 2 gives other course characteristics for course sales and for all courses in our sample. The proportion of sales involving courses with homes is significantly larger than all courses (73.1 percent versus 41.5 percent). In addition, a larger proportion of course sales is located in golf communities. There appears to be no pattern in the data concerning course classifications (public, private, etc.) of course sales. However, a larger proportion of semi-private courses was sold during the time period.

To better analyze the sale prices of courses sold during the relevant time period, consider the following calculation to estimate the capitalized (present value) value of each course:

$$PV_j = \frac{\left(Fees_j \times Rounds_j\right) - Expenses_j}{i} = \frac{Cashflows_j}{i}$$

Table 1: Summary Statistics of *Golf, Inc.* Sales Data

Variable	Obs	Min	Max	Mean	SD
All sales from Jan. 00 to Dec. 01, n = 127 courses					
Sale Price ($)	101	467,500	77,500,000	8,134,079	13,864,200
Course Age	122	1	82	19	14
Total Golf Fee[1]	117	18	175	64	34
Rounds Per Day	86	44	191	108	31
Sales in which seller was in default, n = 15 courses					
Sale Price	14	600,000	20,000,000	3,810,714	5,561,120
Course Age	15	3	31	14	11
Total Golf Fee	12	25	117	52	22
Rounds Per Day	10	60	110	85	17
Sales involving liquidation of non-strategic assets, n = 14 courses					
Sale Price	11	1,500,000	6,000,000	2,615,000	1,331,413
Course Age	14	11	39	28	8
Total Golf Fee	14	18	64	40	14
Rounds Per Day	9	44	164	100	43
Sales in which buyer will develop surrounding land, n = 18 courses					
Sale Price	14	467,500	20,000,000	5,119,821	5,508,983
Course Age	18	1	40	14	12
Total Golf Fee	17	43	130	63	24
Rounds Per Day	12	55	137	99	23
All golf courses in the Sportometrics database, n = 15,051 courses					
Sale Price	n/a	n/a	n/a	n/a	n/a
Course Age	15,051	0	124	37	27
Total Golf Fee	15,051	3	375	51	30
Rounds Per Day	9,787	7	464	105	48

[1] Calculated as greens fee plus cart fee per 18 holes.

where *PV* is the present or capitalized value of course *j*, *Fees* is the greens fees for each course, *Rounds* is the number of annual rounds played on the course, *Expenses* is the operating maintenance expenses for the course, and *i* is the discount rate, assumed to be 8 percent. Adjustments to the discount rate have little or no impact on the empirical results.

Table 2: Characteristics of Golf Course Sales

Course Characteristic	Course Sales (Jan 00–Dec 02)[1]	All Courses[2]
Homes on Course	87 (73.1%)	6,250 (41.5%)
Located in Golf Community	48 (40.3%)	2,728 (18.1%)
Public Course	41 (34.5%)	6,919 (46.0%)
Private Course	28 (23.5%)	3,826 (25.4%)
Semi-Private Course	40 (33.6%)	3,236 (21.5%)
Resort Course	10 (8.4%)	910 (6.05%)

[1] 127 golf course sales from the *Golf, Inc.* sales report.
[2] 15,051 golf courses from the *Sportometrics* database.
Note: Percentages of total courses within each category are reported in parentheses.

The majority of courses in our database do not provide operating expenses. For these courses, we estimate cash flows by assuming that operating expenses are 35 percent of total revenue—the median ratio of operating expenses to revenues for courses that provide expense data. Although this may not correctly estimate cash flows for some or many of the courses, it does allow for an adequate measure for analyzing the relationship between the variation in golf course revenues and the sale price of courses. It should be noted that membership fees make up a substantial proportion of revenues for private and semi-private courses. Unfortunately, we do not have adequate data on membership fees to include them in this analysis. It is, however, ambiguous as to whether the above calculation over- or underestimates revenues for courses with memberships. Although we are not including membership fees in the calculation, greens fees are typically paid only by guests on courses and are not market driven as in public courses. To accurately calculate course revenue, the data would have to report the number of rounds played by members and the number played by guests. This issue is addressed and corrected

for, in part, by including dummy variables for private and semi-private courses in any models in which revenues and greens fees are analyzed.

Golf courses can be appraised very differently for property tax purposes, and the tax millage that is assessed can differ substantially from year to year, causing the property tax liability for golf courses to be quite different across states and even across time for the same golf course. We are unable to control for these differences in property taxes. We acknowledge that differences in property taxes are more important in the tax treatment between private (for-profit) versus public (tax-exempt or municipal-owned) courses, and we include dummy variables to control for these differences.

Although it has been suggested to us that the cost of water may be important to our analysis, we are of the opinion that because many U.S. golf courses do not pay to use water, but instead use surface water or well water, that this factor is not critical. We acknowledge that surface or well water has value in terms of opportunity cost, but because the correlation between these and municipal water varies so dramatically across the land, we take the position that water cost differences do not materially impact our results. According to Throssell et al. (2009, Table 10), only 14 percent of U.S. golf courses use municipal water as a source for irrigation. Furthermore, we believe that any differences in property tax rates, water prices, and other operating costs would be reflected in the capitalized value we calculated. Generally, golf courses that face higher property tax rates, water prices, or other operating costs would presumably pass along these costs to their customers and charge higher prices for their services. These higher prices would result in a higher present value of cash flows.

V. Results

1. Golf Course Recapitalization

Table 3 presents model results of course sale prices regressed on capitalized course value, course yardage, course age, and dummy variables for the following characteristics: 1) homes on the course, 2) golf community, 3) seller in default, 4) non-strategic asset sale, 5) buyer to develop surrounding land, and 6) course type for private, public, and semi-private courses (resort courses serve as the excluded group). As expected, the capitalized value coefficient is positive and highly significant but is not statistically equal to one, indicating that

factors other than expected cash flows explain some of the variation in sale prices. The coefficients for public, private, and semi-private courses show that resort courses are sold at higher prices, indicating that other revenue-generating amenities may be included in these transactions. Insignificant coefficients in the regression are golf community, seller in default (both of these are marginally significant), buyer to develop surrounding land, and course age. The coefficient for homes on the course is positive and significant at the 5 percent level, indicating a $7.6 million premium for golf courses with residential development on site. While the buyer to develop surrounding land variable attempts to capture some of this effect, the homes on course variable indicates that these courses are sold at a premium. On the other hand, courses sold as part of the seller's liquidation of non-strategic assets are sold at an average discount of $9.4 million. In the sales data, all courses that were sold in this

Table 3: Golf Course Sales: OLS
Dependent Variable: Sale Price

Variable	Parameter Estimate	Standard Error	
Intercept	60,854,316	(22,797,753)	***
Capitalized Value	0.47	(0.10)	***
Homes on the Course	7,577,273	(3,374,439)	**
Golf Community	-4,525,501	(2,711,579)	
Seller in Default	-5,218,685	(3,306,425)	
Non-strategic Asset Sale	-9,441,105	(4,248,701)	**
Buyer to Develop	-1,848,272	(3,037,713)	
Course Yardage	-18,757	(10,120)	*
Course Yardage Squared	1.94	(1.03)	*
Course Age	-569,261	(552,400)	
Course Age Squared	19,579	(11,967)	
Public Course	-23,490,234	(4,142,390)	***
Private Course	-23,650,519	(4,654,482)	***
Semi-private Course	-28,402,542	(3,984,079)	***
R-squared	0.81		
Observations	68		

*** p-value < 0.01, ** p-value < 0.05, and * p-value < 0.10.

category had homes. This may provide evidence for the notion that once course developers sell housing lots, the golf operation is sold to management companies at a discount. The summation of the homes on course and non-strategic asset coefficients ($1.8 million) is an estimate of the net discount for courses sold with homes. Due to the large standard errors of both coefficients, the hypothesis that the sum of these coefficients is equal to zero cannot be rejected.

2. Other Data Considerations

Our database provides course characteristics that may be factors in golf courses as surrogate green spaces. As environmental demand increases and as population and crowding grow, a new market potential has emerged to use golf courses as wildlife refuges and green space to complement land development. As a proxy to identify courses that operate, in part, to meet an environmental demand for open space, we consider golf clubs that have homes adjacent to the course. These homes are not necessarily part of golf communities developed specifically for home sites. At some point, however, it would seem that some creative contracting and environmental entrepreneurship captured part of the demand for open space by building homes on courses. The data indicate that the average age of courses with homes is statistically less than the average age of courses without homes.

The binary logit model reported in Table 4 estimates the determinants of whether courses have homes. The explanatory variables are 1) course age, 2) course classification (private, public, etc.), 3) the proportion of the county population that are members of the Sierra Club, 4) county population per square mile, 5) county housing units per square mile, 6) year 2000 per capita personal income in the county where the course is located, 7) the level of real GDP per capita (in year 2000 dollars) at the time the course was constructed, and 8) whether the course is environmentally certified by Audubon International.

The coefficient on course age is negative and highly significant, indicating that newer courses are more likely to have homes on the course, providing some indirect evidence that we are on the downward sloping portion on an Environmental Kuznets Curve and that the demand for environmental quality rises once the income threshold is reached.

Table 4: Homes on Golf Courses: Binary Logit Dependent Variable: [1 = Homes on Course; 0 = No Homes on Course]

Variable	Parameter Estimate	Standard Error	
Intercept	1.127	(0.247)	***
Course Age	-0.018	(0.003)	***
Proportion Sierra Club	53.969	(9.627)	***
Public Course	-1.55	(0.079)	***
Private Course	0.115	(0.084)	
Military Course	-3.014	(0.337)	***
Semi-private Course	-0.437	(0.082)	***
Population Per Square Mile	-0.0006	(0.00015)	***
Housing Units Per Square Mile	0.001	(0.00037)	***
Aububon Certified Golf Course	0.063	(0.072)	
Per Capita Personal Income	-0.00002	(0.000003)	***
Initial Real GDP Per Capita	0.00001	(0.000006)	**
Observations	15,045		

*** p-value < 0.01, ** p-value < 0.05, and * p-value < 0.10.

The proportion of county population that are members of the Sierra Club is included to proxy for environmental sensitivity in the area. This coefficient is positive and significant at the 1 percent level. This result is consistent with the intuition in that environmentally sensitive areas are more likely to find creative ways to meet demand for open space. On the other hand, it is unlikely that members of activist organizations that promote regulation such as the Sierra Club would desire to live on golf courses. This proxy, however, attempts to capture environmental attributes in the area, not the political climate.[3]

Public, military, and semi-private courses are all negatively related to the probability of homes on courses (resort courses serve as the

[3] In an alternate model, we also include the proportion of county voters in favor of the Green Party (Ralph Nader) in the 2000 election. This measure has a correlation coefficient of 0.45 with the Sierra Club variable. The coefficient on the Green Party variable in the logit model is negative and significant, and the Sierra Club coefficient remains positive and significant at the 1 percent level.

excluded group for course classification). The coefficients for private courses and Audubon member courses are both insignificant. County population per square mile and per capita personal income both have negative and significant coefficients, whereas the coefficient on housing units per square mile is positive. The negative coefficient on county income is seemingly counterintuitive (i.e., it appears to contradict the Kuznets notion of the positive relationship between income and the demand for environmental quality). We offer the explanation that many homeowners in low-income counties have a desire to sort themselves in exclusive neighborhoods such as golf communities. Thus, this result provides additional evidence that courses are being constructed not for recreational golf, but to meet other ancillary demands for environmental quality and green open space. We do note, however, that the level of real GDP at the time the course was constructed (as indicated by our variable *Initial Real GDP per Capita*) is positive and significant—indicating that as real income increases over time, newly built courses are more likely to have homes.

VI. Conclusion

The first empirical analysis in this paper focuses on data that report the sales of golf courses from January 2000 through December 2002. These data provide some evidence for the notion that many courses have recently been forced to recapitalize once home sites have been sold and that some golf developers enter projects knowing they will not cover operating expenses, but instead charge price premiums for home sites located on the golf course. The data indicate that, relative to other courses in the United States, the vast majority of courses sold in the relevant two years had homes on the course and that these courses were, on average, significantly newer than other courses.

The second empirical analysis examines data on every golf course in the United States and, in effect, reaches the same fundamental conclusion as the first empirical exercise. That is, over time, golf courses are becoming vehicles for contractual assurance of green open space for homes. We believe that this fundamentally provides some evidence that markets are increasingly finding creative contracting mechanisms for satisfying demands for public goods.

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