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Does Tourism Eco-Certification Pay?

Costa Rica's Blue Flag Program

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Abstract

Tourism associated with beaches, protected areas, and other natural resources often has serious environmental impacts. The problem is especially acute in developing countries, where nature-based tourism is increasingly important and environmental regulation is typically weak. Eco-certification programs—voluntary initiatives certifying that tourism operators meet defined environmental standards—promise to help address this problem by creating a private-sector system of inducements, monitoring, and enforcement. But to do that, they must provide incentives for tourism operators to participate, such as price premiums and more customers. Rigorous evidence on such benefits is virtually nonexistent. To help fill this gap, we use detailed panel data to analyze the effects of the Blue Flag Program, a leading international eco-certification program, in Costa Rica, where nature-based tourism has caused significant environmental damage. We use new hotel investment to proxy for private benefits, and fixed effects and propensity score matching to control for self-selection bias. We find that past Blue Flag certification has a statistically and economically significant effect on new hotel investment, particularly in luxury hotels. Our results suggest that certification has spurred the construction of 12 to 19 additional hotels per year in our regression samples. These findings provide some of the first evidence that eco-certification can generate private benefits for tourism operators in developing countries and therefore has the potential to improve their environmental performance.

Key Words: Costa Rica, eco-certification, propensity score matching, tourism

JEL Classification Numbers: Q13, Q20, Q26; 013, Q54

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1. Introduction

Tourism associated with beaches, protected areas, and other natural resources often has serious environmental impacts (Buckley 2004; Holden 2000; Mieczkowski 1995). Hotels, cruise ships, and transportation operations, along with roads and other supporting infrastructure, generate pollution, destroy and degrade biodiversity habitat, and introduce invasive species. Moreover, they spur economic and population growth that multiplies these effects. The problem is especially acute in developing countries, where nature-based tourism is increasingly important, representing the backbone of some economics (Balmford et al. 2009; Christ et al. 2003), and where land-use planning, coastal zone management, and other types of environmental regulation are typically weak (Russell and Vaughan 2003; Blackman 2010).

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According to advocates, private-sector voluntary schemes certifying that tourism operations adhere to defined environmental process or performance standards can help address this problem (Honey and Rome 2001; UNEP 1998). First introduced in Europe in the 1980s, they have proliferated over the past 25 years (Dodds and Joppe 2005; Font 2002). Today, dozens are active in developing countries. Among the best known are the Blue Flag and Green Globe programs, which are international in scope, and the Certification for Sustainable Tourism (CST) program, which is based in Latin America (Dodds and Joppe 2005). In theory, initiatives like these create incentives for tourist operations to improve their environmental performance by widening the availability of reliable information about this performance, thereby enabling consumers, capital markets, and civil society to more easily reward green operators and sanction dirty ones. For example, armed with better information, vacationers can patronize or boycott certain hotels, and lenders can extend or withhold credit. Hence, in principle, eco-certification can create a private-sector system of incentives, monitoring, and enforcement, effectively sidestepping the problem of weak regulation.

But for tourism eco-certification programs to spur such environmental improvements, they also must provide eco-certified operators with significant private economic benefits, such as price premiums and more customers (Blanco et al. 2009). The reason is twofold. Participation in eco-certification programs is costly: operators incur substantial pecuniary and nonpecuniary costs to meet certification environmental performance standards and to pay application fees and other transactions costs (Sasidharan et al. 2002; Salzhauer 1991). In addition, by definition, participation is voluntary. Therefore, unless certification generates economic returns sufficient to at least offset these costs, few operators will participate.

Yet we know little about the private economic effects of tourism eco-certification in developing countries. One reason is that requisite producer-level data are scarce. In particular, data on profits and market share of tourism operators in developing countries are proprietary and tightly held. A second reason is that evaluating economic effects of eco-certification is challenging. To be credible, evaluations must control for the nonrandom selection of certain types of tourism operators into certification—that is, for self-selection bias. Already green operators generally have strong incentives to participate because few additional investments are required to meet certification standards. Profitable operators also typically have strong incentives to participate because they can best afford to cover the associated costs. Evaluations that fail to control for the disproportionate participation of such operators conflate the economic effects of certification with the effects of certified operators' preexisting characteristics.

It is perhaps not surprising, then, that credible evidence on the link between developing country tourism eco-certification and private economic benefits is quite thin. What's more, the evidence that we do have is very mixed. To our knowledge, the only published quantitative evaluation of this link is Rivera (2002), which examines CST hotel certification in Costa Rica. The author uses original survey data on 169 hotels along with a Heckman model to control for self-selection bias. He finds that CST certification does not boost prices or market share for the average hotel but does have price benefits for hotels with particularly strong environmental performance.

Three other strands of literature bear on the link between developing country tourism eco-certification and private economic benefits. However, their findings must be applied cautiously since they focus on economic sectors other than tourism and/or on industrialized countries—sectors and countries where the drivers of and links between environmental and economic performance are likely to be different. The first relevant strand of the literature is on the private economic benefits of eco-certification in nontourism sectors. This strand also is limited, however. Blackman and Rivera (2011) review the published literature on producer-level effects of eco-certification in five sectors where it is particularly prevalent: bananas, coffee, fish products, forest products, and tourism. Among the nontourism sectors, they find 20 empirical retrospective studies of eco-certification's private economic effects, only 8 of which control for self-selection bias. All 8 focus on Fair Trade and organic certification of bananas or coffee in developing countries. Three find some evidence of economic benefits (Arnould et al. 2009; Bolwig et al. 2009; Fort and Ruben 2008a), and 5 find none (Fort and Ruben 2008b; Lyngbaek et al. 2001; Ruben and van Schendel 2008; Sáenz Segura and Zúñiga-Arias 2008; Zúñiga-Arias and Sáenz Segura 2008).

The literature on voluntary actions other than eco-certification that tourism operators take to improve environmental performance also is relevant. However, it too is quite thin. In their review of this nascent literature, Blanco et al. (2009) find just six published studies, only one of which—Kassinis and Soteriou (2005)—attempts to control for selection bias. Using a structural econometric model to examine a sample of high-end European hotels, the authors find that environmental management does not have a direct effect on economic performance, although it does affect it indirectly through customer demand.

Finally, the voluminous literature on the link between corporate social responsibility (CSR)—actions not required by law that firms take to improve environmental quality, workers' health and safety, and/or community welfare—and private economic benefits in industrialized countries has some bearing. Several recent meta-analyses conclude that on average the relationship, if it exists at all, is at best mildly positive: although CSR does not usually entail significant losses, neither does it generate significant profits. In other words, most CSR essentially just pays for itself (Reinhardt et al. 2008; Margolis et al. 2007; Portney 2008).

Hence, overall, we have little rigorous evidence on the link between eco-certification and private economic benefits in the tourism sector of developing countries—or for that matter, any type of eco-certification in any sector in developing and industrialized countries. To help fill this gap, we examine the Blue Flag Program (BFP), an international program that certifies beaches and other tourist destinations, in Costa Rica. We focus on BFP because, as noted above, it is one of the most prominent eco-certification programs in the developing world (Dodds and Joppe 2005). We study Costa Rica because it is a global leader in nature tourism and is struggling to mitigate the serious environmental damage this sector causes, particularly in coastal areas (Fonseca 2010; Lunmsdon and Swift 1998).

Our analysis aims to determine whether BFP certification of tourist beach communities generates significant private economic benefits for local hotels. We use panel data on 141 tourist beach communities in Costa Rica, compiled from a variety of sources, including the country's national tourism and census agencies and a geographic information system (GIS) on beach communities' geophysical characteristics. We use fixed effects and propensity score matching to control for self-selection bias. Data directly measuring economic benefits—for example, hotel occupancy rates and room prices—are proprietary and/or quite noisy. Therefore, as a proxy, we use new hotel investment, which is closely associated with expected private economic benefits. A finding that, all other things equal, past BFP certification spurs new hotel investment would indicate that local hotels expect significant private economic gains from certification; the opposite finding suggests they do not. We find that past BFP certification has a statistically and economically significant effect on new hotel investment, particularly investment in luxury hotels. Our results suggest that certification has spurred the construction of 12 to 19 additional hotels per year in our regression samples. These findings provide some of the first evidence that eco-certification can generate private benefits for tourism operators in developing countries and therefore has the potential to improve their environmental performance.

The remainder of the paper is organized as follows. The next section discusses possible causal links among BFP certification, private economic benefits, and hotels' location decisions. The third section presents background on tourism in Costa Rica and BFP. The fourth section discusses our empirical approach and data. The fifth section presents results, and the last section sums up and concludes.

2. Eco-certification and Hotel Location

What are the causal links among BFP certification, private economic benefits, and hotels' decisions about where to locate new facilities or expand existing ones? Two countervailing sets of links are possible, each implying a different relationship between BFP certification and hotel location. On one hand, hotels may locate in BFP-certified areas because certification generates private economic benefits. In theory, the causal mechanism works as follows. Tourists value the overall environmental quality of beach communities, including clean sea water, safe drinking water, and lack of litter (Frampton 2010). But they are not able to assess this quality a priori, since self-claims of environmental quality by local hotels are unreliable and independent assessments are not available. Hence, to the extent that BFP provides a credible independent signal of environmental quality, hotels in certified areas should attract more customers and/or higher price premiums. Given that, new hotels should be more likely to locate there and existing hotels should be more likely to expand there. Notwithstanding these arguments, BFP certification could also deter hotels from building new facilities or expanding existing ones. The reason is that obtaining and maintaining certification may effectively require hotels to make costly investments in water treatment and other types of environmental protection (Brunnermeier and Levinson 2004). Empirical research on the deterrent effect of more stringent environmental standards has mostly focused on the effect of regulations on new investments in highly polluting industrial plants (Levinson 2010; Ambec and Lanoie 2008; Margolis and Walsh 2003). Although most studies find that environmental regulations do not have statistically significant effects on new plant location, these industries are quite different from the tourism hotel sector. Hence, given that BFP certification could either spur or deter new hotel investment, empirical analysis is needed to determine which effect dominates.

3. Background

In 2008, two million tourists visited Costa Rica—an eightfold increase since 1987—making tourism one of the most important sectors of the national economy (ICT 2009). Surveys of tourists consistently show that beach and nature activities are the most important reasons for visiting the country (ICT 2009; Rivera 2002). Unfortunately, however, the environmental damage from tourism is increasingly evident, particularly around heavily visited beaches and national parks (Fonseca 2010). BFP may be seen as a response to that threat.

Launched in France in 1987 and now administered by an international umbrella organization called the Foundation for Environmental Education, BFP certifies tourist destinations represented by local public agencies, nongovernmental organizations, and businesses. It has been implemented in 46 countries in Europe, Africa, Latin America, and the Caribbean and has certified more than 3,600 tourist destinations (Blue Flag 2012). In Costa Rica, BFP was established in 1996 by the national Water and Sewer Agency (AyA) with the support of the Tourism Business Chamber and the Ministries of the Environment, Education, Health, and Tourism. The main purpose was to maintain beach communities' appeal to tourists of (Mora Alvarado 2001).

To obtain Blue Flag certification in Costa Rica, which is valid for one year, a beach community must first apply to BFP and then undergo an independent evaluation by the National Water Laboratory, a government organization. It must obtain a score of at least 90 of 100 points based on five performance criteria: beachfront sea water quality, beach quality, drinking water quality, litter control, environmental education, and beach safety (Table 1).

Table 1. Blue Flag Program Evaluation Criteria and Scoring System

Evaluation parameters	Maximum score
1. Beachfront sea water quality	35
2. Beach quality (solid waste and wastewater management)	30
3. Drinking water quality	15
4. Environmental education efforts	10
5. Beach safety and administration	10
Total maximum score	100

Source: AyA 2006.

Each year between 2001 and 2008, 60 to 87 of the 281 tourist beach communities in Costa Rica applied or reapplied for BFP certification, and each year 60 to 80 percent of those applicants were certified (Table 2). In 2008, the most recent year for which we have data, 87 beach communities applied to BFP and 60 were certified or recertified. Figure 1 maps the locations of the 281 communities and the 60 that were certified in 2008.

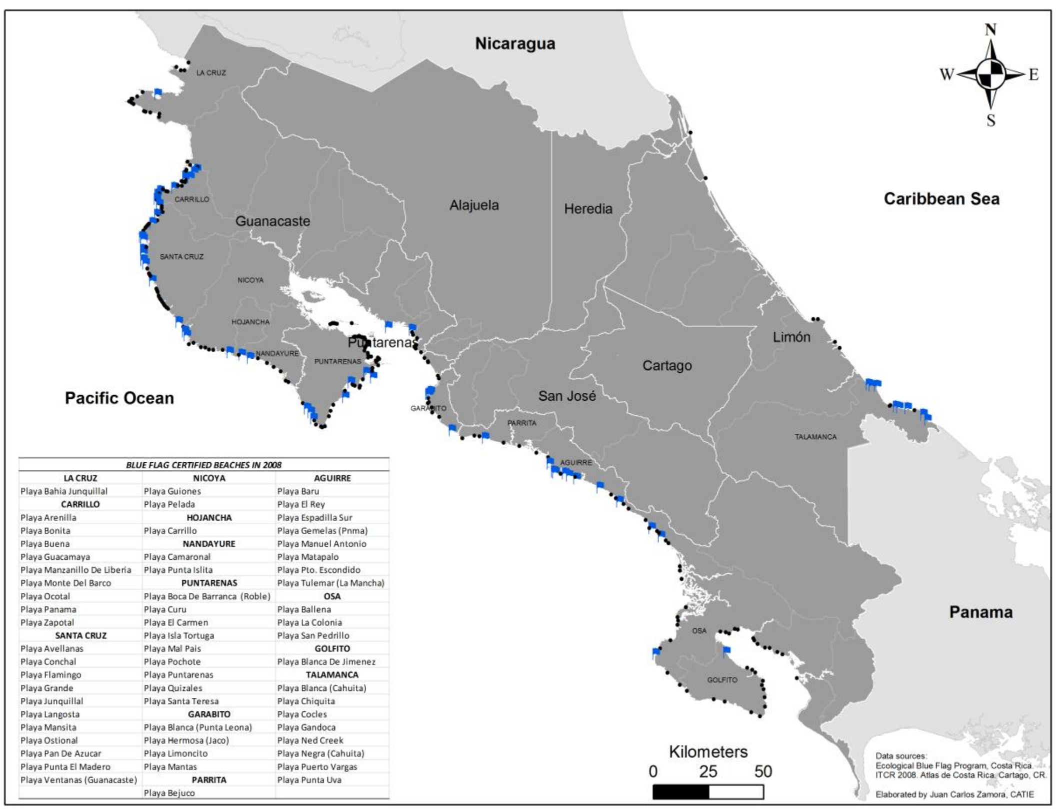
In 2008, roughly 2,600 hotels were operating in Costa Rica. Remarkably, more than three-quarters of these hotels were built in the past 25 years (ICT 2009). Most hotels are small, offer basic services, compete based on price, and are located close to national parks and beaches. In Costa Rica's 281 tourist beach communities, the number of hotels grew from 977 to 1,355 between 2001 and 2008, and the number of hotel rooms increased from 38,856 to 69,083 (Table 2).

Table 2. Number of Hotels and Hotel Rooms and Blue Flag Program (BFP) Participation in Tourist Beach Communities, by Year and Sample

Year	Hotels				BFP certification					
	Costa Rica (n=281)		Reg. sample (n=141)		Costa Rica (n=281)			Reg. sample (n=141)		
	hotels	rooms	hotels	rooms	applied	certified	not applied	applied	certified	not applied
2001	977	38,856	504	19,200	60	36	221	43	24	98
2002	997	42,168	513	20,876	64	44	217	47	29	94
2003	1,044	50,762	534	24,437	70	56	211	48	38	93
2004	1,078	50,184	556	24,245	74	50	207	51	33	90
2005	1,202	59,791	612	28,313	80	57	201	55	38	86
2006	1,213	59,573	620	28,215	82	57	199	57	36	84
2007	1,248	58,124	637	28,200	86	57	195	58	34	83
2008	1,355	69,083	690	32,654	87	60	194	59	38	82

Sources: ICT 2008; PBAE 2008.

Figure 1. Blue Flag-Certified Beaches, 2008



4. Methods

4.1. Empirical Approach

A naive approach to modeling the effect on new hotel investment of BFP certification would posit that the number of new hotels in a given beach community in a given year—hereafter, a "community-year"—depends on the community's BFP certification in previous years, a vector of the time-invariant social and economic control characteristics, and year dummy variables. That is,

$$Y_{it} = \alpha + \boldsymbol{\beta} \mathbf{X}_i + \chi C_{it-z} + \boldsymbol{\delta} \mathbf{W}_t + \varepsilon_{it}, \quad (1)$$

where i is a community index; t is a year index; Y is the number of hotels or hotel rooms in community i in year t; $\mathbf{X}$ is a vector of time-invariant social and economic control variables; C is a dummy indicating BFP certification; $\mathbf{W}$ is a vector of year dummies; α, $\boldsymbol{\beta}$, χ, and δ are parameters or vectors of parameters to be estimated; and ε is an error term. The parameter χ would measure BFP's effect. However, this measure likely would be biased upward because C_{it-z}, the BFP certification dummy, would be endogenous (i.e., correlated with ε_{it}). The reason is that, as noted above, BFP certification is not randomly assigned across beach communities. Rather, communities already meeting BFP certification standards, and those best able to finance BFP certification, are almost certain to disproportionately self-select into certification. A failure to control for this self-selection effect would conflate (i) the effect on new hotel investment of the preexisting characteristics BFP beach communities with (ii) the causal effect of BFP certification, thereby biasing χ upward.

We use two strategies to control for self-selection bias. The first is fixed effects (Wooldridge 2006). That is, we use ordinary least squares (OLS) to estimate

$$Y_{it} = \alpha + \chi C_{it-z} + \boldsymbol{\delta} \mathbf{W}_t + \boldsymbol{\gamma} \mathbf{G}_i + \varepsilon_{it}, \quad (2)$$

where $\mathbf{G}_i$ is a vector of community dummy variables, and $\boldsymbol{\gamma}$ is a vector of parameters. The fixed effects control for unobserved heterogeneity of communities, including that generated by self-selection. We omit the time-invariant social and economic control variables in $\mathbf{X}_i$ because they are perfectly correlated with the community dummies in $\mathbf{G}_i$.

In addition, we control for self-selection by using matching to "preprocess" our data (Rosenbaum and Rubin 1983; Caliendo and Kopeinig 2008; Ho et al. 2007). Intuitively, this strategy amounts to identifying a "matched" control group of uncertified beach communities that are similar to the treatment group of certified communities in terms of characteristics that drive certification, dropping unmatched control communities from the regression sample, and then running a regression to estimate χ, the parameter that measures the effect of BFP. Given this preprocessing, any residual effect of BFP certification on new hotel investment can reliably be attributed to the program.

We use propensity scores for each community—the predicted probability of treatment (here, BFP certification) from a probit regression—to match certified and uncertified communities (Rosenbaum and Rubin 1983). Propensity scores can be interpreted as weighted indices of the characteristics that drive treatment (here, certification) and therefore are an appropriate metric for matching treatment and control observations. We implement propensity score matching as follows. First we use a probit model to estimate propensity scores for each community. The model is specified as

$$C_i = \alpha X_i + \varepsilon_i \quad (3)$$

where C_i is a dummy equal to one if the community was BFP certified in any year of our panel, α is a vector of regression coefficients for community-level variables, and ε_i is an error term. We estimate propensity scores at the community level, not the community-year level, because our community characteristic variables are time invariant.

Second, we create a control group of uncertified beach communities by matching BFP-certified communities with uncertified communities on the basis of propensity scores. After dropping observations not on the common support (i.e., that do not have propensity scores common to both certified and uncertified communities), we use a nearest-neighbor 1-to-4 matching method with replacement and a caliper of 0.01 to identify up to four uncertified matches for each certified community (Cochrane and Rubin 1973). The caliper requires that the propensity scores for certified and matched uncertified communities do not differ by more than 0.01.

Third, we assess the similarity of the BFP-certified communities and matched uncertified communities by using t-tests to compare the mean of each covariate (X_i) for each group, verifying that no statistically significant differences exist.

Finally, using the matched sample, we estimate Equation 2 above, employing weighted OLS regressions with community and year fixed effects. We calculate robust standard errors by weighting uncertified observations that constitute the control group based on the number of times they were included as matches (Abadie and Imbens 2006).

4.2. Data

4.2.1. Sources and Scale

The spatially explicit data used in our analysis come from four sources. The first source is lists of tourist beach communities that applied for BFP certification each year from 2001 to 2008 and communities that were actually awarded certification (PBAE 2008). The second is national registries of hotels, by year, for the same eight-year period, maintained by the National Tourism Institute (ICT 2008). The third is the Digital Atlas of Costa Rica, a rich compendium of GIS data (ITCR 2008). The final source is the 2000 National Census, at the census tract level (INEC 2000). The finest spatial resolution at which all but the first of these data sets are available is the census tract level. Therefore, using Arc-GIS, we merge the data from these four sources by census tract.

4.2.1. Regression Samples

Our data include all 281 tourist beach communities in Costa Rica. However, 196 of these communities share the same census tract with other communities. Having 196 observations with virtually identical covariates (all covariates other than BFP certification) would hinder our efforts to identify the effects of BFP certification, in effect exacerbating (spatial) measurement error. We therefore eliminate all but one beach community in census tracts that include multiple communities. The result is a sample of 141 beach communities, each in a unique census tract.

Our panel covers eight years, from 2001 to 2008. However, we include one- and two-year lags for our BFP certification indicator variable (C_{itz} in Equations 1 and 2), which rules out using the first two years of the panel. Therefore, our panel effectively spans six years, 2003 to 2008, and our full sample comprises 6 × 141 = 846 community-years.

Our fixed-effects model (Equation 2) without matched controls uses this full sample of 846 community-years, of which 217 were BFP certified and 629 were not.

Our matching model (Equation 2) uses a subset of the full sample. We eliminate 20 beach communities certified in at least one year that are not on the common support. In addition, we drop uncertified communities that are not matched to BFP-certified communities. Drawn from a total of 75 communities, the resulting sample of 450 community-years comprises 124 that were BFP certified and 326 that were not.

4.2.3. Variables

The merged data described above were used to create the following variables (Table 3). We use two sets of dependent variables. The first set comprises *hotels total*, the total number of hotels located within 5 kilometers of the census tract centroid in each year of our panel, and *hotels 0&1 star*, *hotels 2&3 star*, and *hotels 4&5 star*, the number of hotels of different quality in the same distance band in each year. We use a 5-kilometer distance band because beach communities often extend beyond census tract boundaries. We measure quality as the number of stars (zero to five) assigned to each hotel by Costa Rica's National Tourism Institute. The second set of dependent variables comprises *hotel rooms total*, the total number of hotel rooms within 5 kilometers of the census tract centroid in each year of the panel, and *hotel rooms 0&1 star*, *hotel rooms 2&3 star*, and *hotel rooms 4&5 star*, the number of hotel rooms of different quality in the same distance band in each year.

The independent variables of interest are *BFP certification*, a dummy variable equal to one if the beach community was awarded BFP certification in a given year and zero otherwise, and two lagged versions, *BFP certification (t-1)* and *BFP certification (t-2).*

We control for a variety of geophysical and socioeconomic characteristics of beach communities. As for geophysical characteristics, *distance national park* and *distance river* are distances measured in kilometers from the census tract centroid to the nearest national park and river. *Primary roads* and *secondary roads* are the kilometers of each type of road within the census tract. Finally, *rainfall* is the average precipitation, measured in millimeters per year, in the census tract, and *rainfall squared* is its square.

Table 3. Variables and Sample Means for Unmatched Sample of Beach Community-Years

Variable	Source	Spatial scale	Mean			
			All (n= 846)	BFP certified (n=217)	BFP uncertified (n=629)	Difference (t-test)
Dependent						
Hotels total (no.)	ICT (2008)	<5km census tract centroid	4.31	5.07	4.05	**
Hotels 0&1 star (no.)	ICT (2008)	<5km census tract centroid	0.73	0.78	0.71	
Hotels 2&3 star (no.)	ICT (2008)	<5km census tract centroid	2.44	2.86	2.29	**
Hotels 4&5 star (no.)	ICT (2008)	<5km census tract centroid	1.14	1.42	1.04	**
Hotel rooms total (no.)	ICT (2008)	<5km census tract centroid	196.29	240.48	181.05	***
Hotel rooms 0&1 star (no.)	ICT (2008)	<5km census tract centroid	14.89	16.94	14.19	
Hotel rooms 2&3 star (no.)	ICT (2008)	<5km census tract centroid	61.12	63.31	60.36	
Hotel rooms 4&5 star (no.)	ICT (2008)	<5km census tract centroid	120.28	160.24	106.50	***
Certification						
BFP certified (0/1)	PBAE (2008)	Beach-community	0.26	1.00	0.00	***
BFP certified (t-1) (0/1)	PBAE (2008)	Beach-community	0.25	0.87	0.03	***
BFP certified (t-2) (0/1)	PBAE (2008)	Beach-community	0.23	0.80	0.04	***
Geophysical						
Distance ntl. park (km)	ITCR (2008)	From census tract centroid	17.99	15.45	18.86	***
Distance river (km)	ITCR (2008)	From census tract centroid	2.44	2.26	2.50	*
Secondary roads (km)[1]	ITCR (2008)	Census tract	7.92	6.92	8.27	**
Primary roads (km)[1]	ITCR (2008)	Census tract	0.59	0.93	0.47	***
Rainfall (mm)	ITCR (2008)	Census tract	3006.27	2839.86	3063.67	***
Rainfall squared (mm)	ITCR (2008)	Census tract	1.00e+07	0.86e+07	1.05e+07	***
Socioeconomic						
Foreign population (%)	INEC (2000)	Census tract	17.40	25.09	14.75	***
Income inequality (0-1)	INEC (2000)	Census tract	0.48	0.48	0.49	**
Population density (p/km)	INEC (2000)	Census tract	94.89	173.39	67.81	***
Poverty[2] (%)	INEC (2000)	Census tract	20.72	16.327	22.23	***
Safety[3]	ITCR (2008)	Canton	0.62	0.69	0.61	***
Eduation[5]	INEC (2000)	Census tract	7.09	8.00	6.78	***
Polit. participation[5]	ITCR (2008)	Canton	0.59	0.60	0.58	

1. Kilometers of road.
2. Percentage of households with per capita income equal to or below the poverty line in 2000.
3. 2006 county-level safety index ranging from 0–1, with higher values indicating more safety.
4. Average number of years of education, by household.
5. Percentage of eligible voters who took part in 2006 presidential election.
*** p<0.01, ** p<0.05, * p<0.10.

As for socioeconomic characteristics, *foreign population* is the proportion of residents in the census tract who were not Costa Rican citizens in 2000. *Income inequality* is the 2000 Gini coefficient for the canton (county) where each beach community is located. This variable ranges from zero to one, with higher values indicating more inequality. *Population density* is the number of residents per square kilometer in the census tract in 2000. *Poverty* is the percentage of households in the census tract with a per capita income equal to or below the poverty line in 2000. *Safety* is the 2006 canton safety index, which ranges from 0 to 1, with higher values indicating more safety. This index is based on the rate per 100,000 inhabitants of three crimes: intentional homicide, domestic violence, and robbery (Madrigal 2006).[1] *Education* is the average number of years of education in households in the census tract. Finally, *political participation* is the percentage of eligible voters from a given beach community who voted in the 2006 presidential election.

Table 2 (columns 3 and 5) and Table 3 provide descriptive statistics for these variables. The difference-in-means t-tests reported in the last column of Table 3 indicate simple positive correlations between BFP certification on one hand and several hotel and hotel room variables on the other. These summary statistics provide a preliminary indication that BFP certification may affect new hotel investment decisions. It remains to be seen whether this correlation persists after controlling for beach community characteristics, self-selection of certain types of communities into BFP, and the timing of certification and investment—all aims of our econometric model.

5. Results

5.1. Probit Model of Blue Flag Certification

Table 4 presents the results of the community-level probit model of BFP certification, which is used to estimate propensity scores for each community. Among the geophysical variables, BFP certification is strongly positively correlated ($p<0.05$) with proximity to a national park and abundance of primary roads. Among the socioeconomic covariates, BFP certification is strongly correlated with higher foreign population and higher population density and is weakly correlated with lower poverty and higher safety.

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[1] The safety index is based on National Citizen Security Survey 2006 developed by the Ministry of Public Security and Ministry of Justice, with support from United Nations Program for Development.

Table 4. Probit Model of Blue Flag Program Certification (unmatched sample communities)

Variable	Coefficient [s.e.]	Marginal effect [s.e.]
Geophysical		
Distance national parks (km)	-0.00**	-0.00**
	[0.00]	[0.00]
Distance river (km)	-0.00	-0.00*
	[0.00]	[0.00]
Secondary roads (km)	-0.00	-0.00
	[0.00]	[0.00]
Primary roads (km)	0.00**	0.00**
	[0.00]	[0.00]
Rainfall (mm)	0.00	0.00
	[0.00]	[0.00]
Rainfall squared (mm)	-0.00	-0.00
	[0.00]	[0.00]
Socioeconomic		
Foreign population	0.02**	0.01**
	[0.01]	[0.00]
Income inequality	-5.89	-2.02
	[6.19]	[2.10]
Population. density	0.00**	0.00**
	[0.00]	[0.00]
Poverty	-0.02*	-0.01*
	[0.01]	[0.04]
Safety	1.50*	0.51**
	[0.77]	[0.26]
Education	0.06	0.02
	[0.08]	[0.03]
Political participation	2.35	0.806
	[1.65]	[0.56]
Constant	-0.55	
	[3.26]	
N	141	
Log-likelihood	-67.46	
Likelihood ratio χ^2	44.59	
Pseudo R-squared	0.25	

*** p<0.01, ** p<0.05, * p<0.10.

The main purpose of the probit model is not to identify the drivers of certification. Rather, it is to estimate propensity scores used to correct for self-selection bias. Therefore, we confine our discussion of the model to assessing whether that the results make intuitive sense—that is, whether they have plausible explanations. In general, they do. The correlations between

BFP certification and at least four variables likely reflect each variable's underlying correlation with community's preferences for environmental amenities. In other words, these variables likely pick up the community's "green" preferences. They include proximity to national parks (a proxy for green preferences because one would expect relatively green tourists to stay in communities near parks), lower poverty (because wealth is generally correlated with green preferences), higher foreign resident population (because in Costa Rica, most foreign residents of beach communities are from industrialized countries where green preferences tend to be relatively strong), and higher primary road density (because these communities are more accessible to, and accessed by, foreign tourists). The correlations between BFP certification and at least two other variables may reflect each variable's underlying correlation with community cohesion, internal communication, and cooperation. They include higher population density and higher levels of safety.

5.2. Propensity Score Matching

We use propensity scores derived from the probit certification model to identify a matched sample of uncertified communities. Difference-in-means tests indicate that this procedure is effective in constituting a control group of communities with average characteristics that are similar to the group of BFP-certified communities. Before matching, eight covariate means for BFP-certified communities were significantly different from those for uncertified communities (Table 5). (Note that these means and t-test results differ from those reported in Table 3 because they are at the community level, not the community-year level.) These differences reflect self-selection of certain types of communities (those with more roads, more foreign residents, etc.) into the BFP program. After matching, however, differences in covariate means for certified and uncertified communities are no longer significant.

Table 5. Matching Balance: Community Variable Means

Variable	Unmatched sample (n=141)			Matched sample (n=75)		
	certified (n=47)	uncertified (n=94)	difference (t-test)	certified (n=27)	uncertified (n=48)	difference (t-test)
Geophysical						
Distance ntl. park (km)	16.36	18.81		17.23	18.17	
Distance river (km)	2.27	2.52		2.66	2.48	
Secondary roads (km)	6.59	8.59		7.43	6.77	
Primary roads (km)	0.90	0.43	*	0.58	1.10	
Rainfall (mm)	2813.83	3102.48		2796.30	2990.70	
Rainfall squared (mm)	8.6e+06	1.1e+07	*	8.7e+06	9.7e+06	
Socioeconomic						
Foreign population	24.15	14.03	***	21.44	15.19	
Income inequality	0.48	0.49		0.48	0.47	
Population. density	178.48	53.10	**	58.64	74.22	
Poverty	16.62	22.77	***	18.85	19.23	
Safety	0.66	0.61	*	0.65	0.64	
Education	7.96	6.66	***	7.30	7.01	
Political participation	0.60	0.58		0.59	0.60	

*** p<0.01, ** p<0.05, * p<0.10.

5.3. Ordinary Least Squares Models

Table 6 presents results from fixed-effects regressions explaining the total number of hotels and the number of hotel rooms for the full sample (Models 1 and 3) and matched sample (Models 2 and 4). As noted above, in the matched sample regressions, we calculate robust regression standard errors by weighting the uncertified communities based on the number of times they are used as matches (Abadie and Imbens 2006). BFP certification lagged two years is positive and both statistically and economically significant in each of the four models. In the total hotels models (Models 1 and 2), this variable is significant at the 10 percent level using the full sample and at the 5 percent level using the matched sample. In the total hotel rooms models (Models 3 and 4), it is significant at the 1 percent level using the full sample and at the 5 percent level using the matched sample. BFP certification lagged one year is not significant in any of the four models, which likely reflects the fact that building hotels or hotel rooms typically takes more than one year.

Table 6. Ordinary Least Squares Fixed-Effects Panel Regression Models (dependent variable = hotels or hotel rooms <5km census tract centroid)

Variable	Model 1 Full sample (hotels)	Model 2 Matched sample (hotels)	Model 3 Full sample (hotel rooms)	Model 4 Matched sample (hotel rooms)
BFP cert. (t-1)	0.12	0.05	10.55	4.27
	[0.14]	[0.33]	[9.02]	[28.08]
BFP cert. (t-2)	0.26*	0.70**	24.63***	60.31**
	[0.13]	[0.33]	[8.84]	[28.56]
d2003	-1.08***	-1.19***	-55.81***	-66.11***
	[0.09]	[0.21]	[5.89]	[13.54]
d2004	-0.94***	-1.09***	-58.71***	-70.46***
	[0.09]	[0.19]	[5.87]	[13.45]
d2005	-0.56***	-0.70***	-31.06***	-35.84***
	[0.09]	[0.16]	[5.84]	[11.86]
d2006	-0.49***	-0.64***	-31.26***	-36.88***
	[0.09]	[0.16]	[5.85]	[11.88]
d2007	-0.38***	-0.60***	-32.09***	-41.86***
	[0.09]	[0.18]	[5.84]	[12.39]
Constant	4.80***	4.78***	222.76***	224.51***
	[0.08]	[0.18]	[4.96]	[13.32]
Fixed effects	yes	yes	yes	yes
Observations	846	450	846	450
R^2	0.23	0.27	0.18	0.22
Prob > F	0.00	0.00	0.00	0.00
No. communities	141	75	141	75

*** p<0.01, ** p<0.05, * p<0.10; standard errors in brackets.

In addition to being statistically significant, BFP certification lagged two years is economically significant. Using coefficient estimates from the matched and full sample models as upper and lower bounds, we find that BFP certification has resulted in 0.3 to 0.7 additional new hotel per year at the average BFP-certified beach community, or 12 to 19 additional new hotels per year among all BFP beach communities in our regression samples (47 in the full sample and 27 in the matched sample). Turning to the number of hotel rooms (Models 3 and 4), the estimated coefficients on the two-year lag certification dummy indicate that BFP certification results in 25 to 60 new rooms per year at the average BFP-certified beach community, or 1,158 to 1,628 rooms per year among all BFP beach communities in our regression samples.

Presumably, these predicted total effects are even larger in the full sample of Costa Rica's 71 BFP-certified beaches. Hence, in general, these results support the hypothesis that new hotels are more likely to locate and/or expand in BFP-certified communities, all other things equal.

5.4. Alternative Dependent Variables

To further explore and test of the robustness of our results, we experiment with alternative dependent variables. To determine whether the effect of BFP certification on new hotel investment was driven by the decisions of certain types of hotel, we replicate Models 1–4 using as dependent variables the number of hotels and hotel rooms of different quality (zero to five stars) as determined by Costa Rica's National Tourism Institute (Tables 7 and 8). As in the models that aggregate all classes of hotels, BFP certification lagged one year never is significant. However, BFP certification lagged two years is significant in several models. For the hotels regressions (Models 5–10), it is significant at the 10 percent level in the two- to three- star model using the matched sample (Model 8), and at the 5 percent level in the four- to five-star model using the full sample. For the hotel rooms regressions (Models 11–16), it is significant at the 1 percent level in the four- to five-star model using the full sample (Model 15), and at the 10 percent level in the four- to five-star model using the matched sample (Model 15). Together, these results suggest that the effect of BFP certification on new hotel investment operates mainly through four- to five-star luxury hotels, not through less expensive hotels.

Table 7. Ordinary Least Squares Fixed-Effects Panel Regression Models (dependent variable = hotels of specified quality <5km census tract centroid)

Variable	Model 5 Full sample (0-1 star)	Model 6 Matched sample (0-1 star)	Model 7 Full sample (2-3 stars)	Model 8 Matched sample (2-3 stars)	Model 9 Full sample (4-5 stars)	Model 10 Matched sample (4-5 stars)
BFP cert. (t-1)	-0.02	0.01	0.06	-0.08	0.09	0.12
	[0.06]	[0.13]	[0.08]	[0.13]	[0.06]	[0.20]
BFP cert. (t-2)	0.02	0.13	0.10	0.25*	0.14**	0.33
	[0.06]	[0.09]	[0.07]	[0.13]	[0.06]	[0.20]
d2003	-0.23***	-0.24***	-0.56***	-0.57***	-0.30***	-0.38***
	[0.04]	[0.08]	[0.05]	[0.10]	[0.04]	[0.10]
d2004	-0.27***	-0.30***	-0.43***	-0.49***	-0.24***	-0.30***
	[0.04]	[0.07]	[0.05]	[0.10]	[0.04]	[0.08]
d2005	-0.26***	-0.34***	-0.20***	-0.23***	-0.09**	-0.13*
	[0.04]	[0.07]	[0.05]	[0.07]	[0.04]	[0.08]
d2006	-0.25***	-0.33***	-0.20***	-0.24***	-0.05	-0.08
	[0.04]	[0.07]	[0.05]	[0.07]	[0.04]	[0.07]
d2007	-0.18***	-0.29***	-0.09*	-0.15	-0.11***	-0.16**
	[0.04]	[0.07]	[0.05]	[0.10]	[0.04]	[0.07]
Constant	0.93***	0.80***	2.65***	2.77***	1.22***	1.21***
	[0.03]	[0.07]	[0.04]	[0.08]	[0.03]	[0.09]
Fixed effects	yes	yes	yes	yes	yes	yes
Observations	846	450	846	450	846	450
R^2	0.09	0.17	0.21	0.23	0.12	0.17
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
No. communities	141	75	141	75	141	75

*** p<0.01, ** p<0.05, * p<0.10; standard errors in brackets.

Table 8. Ordinary Least Squares Fixed-Effects Panel Regression Models (dependent variable = hotel rooms of specified quality <5km census tract centroid)

Variable	Model 11 Full sample (0-1 star)	Model 12 Matched sample (0-1 star)	Model 13 Full sample (2-3 stars)	Model 14 Matched sample (2-3 stars)	Model 15 Full sample (4-5 stars)	Model 16 Matched sample (4-5 stars)
BFP cert. (t-1)	-1.12	-1.68	2.50	0.25	9.16	5.70
	[1.23]	[3.29]	[2.84]	[5.38]	[7.61]	[25.29]
BFP cert. (t-2)	1.14	3.21	0.06	7.77	23.43***	49.34*
	[1.21]	[2.55]	[2.78]	[4.94]	[7.46]	[25.62]
d2003	-6.29***	-7.04***	-21.12***	-23.77***	-28.40***	-35.30***
	[0.80]	[1.78]	[1.85]	[3.63]	[4.97]	[10.76]
d2004	-6.86***	-7.76***	-22.05***	-25.04***	-29.81***	-37.65***
	[0.80]	[1.64]	[1.85]	[3.81]	[4.95]	[10.63]
d2005	-6.46***	-7.77***	-11.65***	-15.50***	-12.96***	-12.57
	[0.80]	[1.68]	[1.84]	[3.39]	[4.93]	[9.60]
d2006	-6.56***	-7.92***	-12.25***	-16.28***	-12.45**	-12.67
	[0.80]	[1.65]	[1.84]	[3.35]	[4.94]	[9.49]
d2007	-5.44***	-7.15***	-6.26***	-9.62**	-20.38***	-25.09**
	[0.80]	[1.68]	[1.84]	[3.86]	[4.93]	[9.71]
Constant	20.17***	17.48***	72.71***	72.78***	129.88***	134.25***
	[0.68]	[1.89]	[1.56]	[3.27]	[4.19]	[10.86]
Fixed effects	yes	yes	yes	yes	yes	yes
Observations	846	450	846	450	846	450
R^2	0.14	0.19	0.24	0.27	0.09	0.14
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
No. communities	141	75	141	75	141	75

*** p<0.01, ** p<0.05, * p<0.10; standard errors in brackets.

Finally, as a robustness check, we replicate Models 1–4 using a more conservative spatial definition of our dependent variables. Instead of the total number of hotels and hotel rooms within 5 kilometers of the centroid of the census tract associated with each beach community, we use the total number of hotels and hotel rooms that are actually in the census tract (Table 9). The qualitative results are the same: BFP certification lagged two years is statistically significant in both the total hotels models (Models 16 and 17) and total hotel rooms models (Models 18 and 19). This more restrictive spatial definition of a beach community not surprisingly generates a much smaller average number of hotels and hotel rooms per community: 0.48 hotels and 19.96 rooms versus 4.12 hotels and 182.75 hotel rooms. Therefore, as expected, the estimated coefficients on the lagged certification dummies are much smaller than in models that use a less restrictive spatial definition of beach community (Models 1–4).

Table 9. Ordinary Least Squares Fixed-Effects Panel Regression Models (dependent variable = hotels or hotel rooms in census tract)

Variable	Model 17 Full sample (hotels)	Model 18 Matched sample (hotels)	Model 19 Full sample (hotel rooms)	Model 20 Matched sample (hotel rooms)
BFP cert. (t-1)	-0.00	0.00	-2.10	-4.92
	[0.04]	[0.08]	[2.69]	[7.11]
BFP cert. (t-2)	0.08**	0.18**	6.22**	13.21*
	[0.04]	[0.08]	[2.63]	[7.61]
d2003	-0.07***	-0.11**	-5.30***	-7.68***
	[0.02]	[0.06]	[1.75]	[2.72]
d2004	-0.07***	-0.12**	-4.43**	-7.97***
	[0.02]	[0.06]	[1.75]	[2.54]
d2005	-0.04	-0.08	-3.03*	-4.97**
	[0.02]	[0.05]	[1.74]	[2.38]
d2006	-0.03	-0.08*	-3.64**	-5.83**
	[0.02]	[0.05]	[1.74]	[2.45]
d2007	-0.02	-0.07	-4.75***	-5.01*
	[0.02]	[0.05]	[1.74]	[2.58]
Constant	0.51***	0.64***	24.12***	34.81***
	[0.02]	[0.05]	[1.48]	[2.73]
Fixed effects	yes	yes	yes	yes
Observations	846	450	846	450
R^2	0.03	0.08	0.03	0.10
Prob > F	0.00	0.13	0.00	0.02
No. communities	141	75	141	75

*** p<0.01, ** p<0.05, * p<0.10; standard errors in brackets.

6. Conclusion

We have used 2001–2008 panel data on 141 beach communities in Costa Rica to measure the effect of Blue Flag Program certification on new hotel investment. We used fixed effects and propensity score matching to control for self-selection of certain types of communities into BFP. We found that past BFP certification is positively and significantly correlated with new hotel investment, particularly investment in luxury hotels. Estimated coefficients suggest this is an economically significant effect. In our regression sample of fewer than 50 BFP communities, our results suggest that certification has spurred the construction of 12 to 19 new hotels and 1,158 to 1,628 new hotel rooms per year. Presumably, these effects are even more substantial in the full sample of Costa Rica's 71 BFP-certified beaches.

The findings suggest that BFP certification has significant private benefits for local hotels. Although we have not tested it directly, we assume that the causal mechanism for the correlation has to do with signaling. Presumably, BFP certification gives tourists a credible signal of overall environmental quality of beach communities and therefore increases demand for hotel rooms in certified beach communities. BFP's effects on new investment may stem from program characteristics that other studies have shown reliably reflect participants' environmental performance, namely, reliance on environmental performance (versus process) standards, periodic third-party audits, and public rewards and sanctions (Darnall and Carmin 2005; Prakash and Potoski 2007; Rivera 2002).

What are the policy implications of our findings? They provide some of the first evidence that tourism eco-certification programs can generate private benefits for local operators in developing countries. They suggest that these programs are apt to attract operators and at least have the potential to improve environmental quality. Moreover, they may boost local economies. These capabilities are particularly important in the developing country context, where conventional command-and-control environmental management tools are often if not typically ineffective and where concerns about economic growth often trump worries about environmental protection. One cautionary note, however, is that if eco-certification attracts new businesses, it also will put additional pressure on the environment and presumably on local communities' ability to meet certification standards.

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