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Analysis

Divestment of the English Forestry Estate: An economically sound choice?

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ABSTRACT

This paper evaluates if the proposed divestment of the English Forestry Commission Estate in 2010 was economically rational. The analysis is composed of two parts. First, an amenity value threshold for continued public access to the Estate was estimated. Based on a stated value of the Estate (i.e. £700 million) and assuming a discount rate of 3.5% the Estate should never have been considered for sale. However, assuming a discount rate of 5% then the associated critical amenity value was estimated to be approximately £5 million. Second, travel cost methods were employed to value public access to the Forest of Dean as a proxy for the Estate. An on-site survey was conducted that yielded estimates of consumer surplus that exceed the critical amenity value of the Estate by two orders of magnitude even when we employ a discount rate above that typically used in public policy decision making. Therefore, we conclude that the policy to divest the Estate for £700 million was not 'a good deal' and as such the resulting policy reversal was an economically sensible decision.

1. Introduction

In February 2011 the government abandoned a proposed policy to sell all of the 258,000 ha of publically owned Forestry Commission Estate (hereafter the Estate) in England (Bennett, 2011). The proposed divestment policy met with substantial opposition (Lawrence and Jollands, 2011), with a reported half million members of the public signing a petition against it. Whilst the policy to sell the Estate was clearly an emotive subject, little formal analysis of the costs and benefits of the divestment strategy is available, let alone the final decision to not pursue the sale. The objective of this paper is to evaluate if the proposed divestment of the Estate at an estimated market price of £700 million (Bennett, 2011) was economically rational.

To undertake this analysis we employ two specific methods. First, we estimate the critical amenity value of the Estate following Conrad (1997). Under this approach the Estate is assumed to generate a dividend characterised as an amenity flow of recreational access benefits. Consequently, there exists some critical value of amenity flow above which it is not economically rational to close the forest. This critical amenity value is estimated assuming that private ownership of the Estate will result in an irreversible loss of public access opportunities. This implies that once the government has sold an asset to the private sector it will not be taken back into public ownership. Although a strong assumption it is considered reasonable given the likely motivations of private commercial owners. Given future amenity values are uncertain they are assumed to evolve stochastically, hence the critical amenity value reflects an option value approach.

All other non-market benefits (e.g. biodiversity, watershed protection etc.) are assumed to be statutorily protected. As is clear from Lawrence and Jollands (2011), loss of public access for the purpose of recreation was a major issue driving the decision to abandon the policy.

Second, we employ travel cost survey data to quantify the non-market value of continued public recreational access to the Estate. That is we estimate public Willingness-to-Pay (WTP) and the associated consumer surplus (CS) for on-going access to the Estate. We employ data from a travel cost survey collected for the Forest of Dean. We use these data as a proxy to assess the benefits from recreational activity in the Estate.

Finally, we undertake policy analysis by comparing the critical amenity value calculated for the estate against the estimated benefits of recreational activity in the Estate from the travel cost survey data. Overall our results indicate that the proposed price for the sale of the Estate was far too low and the resulting policy reversal was an economically sensible outcome.

Our analysis adds to the literature in a number of ways. First, our application of Conrad (1997) adds to a small literature that examines the importance of option values in forestry management (e.g., Abildtrup and Strange, 1999; Bulte et al., 2002; Forsyth, 2000; Walsh et al., 1984). In our case we focus on the critical amenity value for continued access to the Estate for recreation. Second, by combining our critical amenity value and travel cost estimates we are able to focus on the key issues that lead to the abandonment of the sale: recreational access and public ownership.

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The structure of the paper is as follows. In Section 2 we present our critical amenity value analysis. We briefly explain the method devised by Conrad (1997) and then report our critical amenity value estimates. In Section 3 we introduce and report our travel cost analysis. Finally in Section 4 we discuss the policy implication of our results and conclude.

2. Critical Amenity Value for Forest Recreation

In this section we begin by briefly reviewing Conrad (1997). We then present our analysis for the Estate. The purpose of the analysis is to derive the critical amenity value for continued public access to the Estate which can be compared to WTP for on-going recreation opportunities.

2.1. Critical Amenity Values

Conrad (1997) provides a method to estimate a critical amenity value for an existing forest resource using visitation data on the actual or closely related resources. The forest is assumed to generate a dividend characterised as amenity flow (A), where A = A(t). Amenity flow captures the sum of non-timber benefits, such as recreational visitation, provided by the forest over time (t). Building on the results presented by Reed (1993) he shows that under the assumption that amenity flow values (A) evolve stochastically via a process of Brownian motion, A is characterised as follows:

$$dA = \mu A.dt + \sigma A.dz \tag{1}$$

where dA is the change in A, μ is the mean drift rate in amenity value (average increase in visitor numbers per year), dt is a time increment, σ is the standard deviation rate in amenity value (standard deviation in visitor numbers) and dz is the increment of standard Wiener process (representing Brownian motion over time). Conrad (1997) then assumes that once the forest is felled (or in our case closed to the public) it is not possible to reverse this management decision. Conrad (1997) shows that the option value function V = V(A), its first and second derivatives V′(A) and second V″(A), must satisfy the following condition if maintaining access to the forest is to be optimal:

$$\delta V(A) = A + \mu A V'(A) + \left(\sigma^2/2\right)A^2 V''(A) \tag{2}$$

where δ corresponds to a discount rate. It will never be optimal to close the forest if μ ≥ δ (Reed, 1993). However, if μ ≤ δ, then there exists a lower bound critical threshold value for the amenity value (A^*). This A^* corresponds to the value of amenity flow at the point where the optimal management decision is indifferent between closing the forest or keeping it open, when $V(A^*) = N$ or $V'(A^*) = 0$, where N is the value of the forest. If the stochastically evolving A falls below A^* it therefore becomes optimal to close the forest. Conrad (1997) shows that value function is equal to:

$$V(A) = kA^{-\alpha} + A/(\delta - \alpha) \tag{3}$$

where

$$\alpha = \left(1/2 - \mu/\sigma^2\right) - \sqrt{\left((1/2 - \mu/\sigma^2)^2 + 2\delta/\sigma^2\right)} \tag{4}$$

and k is an unknown constant. Eq. (3) can be solved for the two unknowns' k and A^* using:

$$A^* = \alpha(\delta - \mu)N/(\alpha + 1). \tag{5}$$

Consequently, provided the values of N, μ and σ are known and an acceptable value for δ exists (such as a commercial interest rate or social discount rate), A^* for any forest that will be closed can be calculated.

As demonstrated by Conrad (1997) μ and σ can be estimated using time-series data on visitation rates. For his application the data yielded μ = 0.05 and σ = 0.10. In another example, Forsyth (2000) estimated the critical amenity value for the Killarney Provincial Park in Canada deriving values of μ (0.173) and σ (0.203).

2.2. Estimation of the Critical Amenity Value of the Estate

We began by collecting visitation data for the Estate. We contacted all eleven English Forestry Commission District Offices requesting time series data on forest visitor numbers, or a suitable proxy, for each district. Data on overall visitor numbers to each district was unavailable, but, site-specific and estimated visitor data was provided by the following three districts from across the country: South East England Forest District, the Kielder Forest District, and the West Midlands District. In total the three districts provided data on eight forests.

For the South East we employed visitor numbers to Alice Holt Forest (estimated by the Forestry Commission as car counts × 2.5) for the period 2001–2011. In addition, we had data on the number of pay and display car park tickets sold at Wendover Forest for 2001–2011. For the Kielder district we had data for Hamsterley Forest, Chopwell Woodland Park and Kielder Castle Car Park for 1998–2011. In the West Midlands we had estimated figures for number of visitors to their Birches Valley, Haughmond Hill and Wyre Forest sites for 2000–2011. In fact, in all cases in which we have car park data we use the Forestry Commission estimate of 2.5 visitors per car to convert all data into total number of visits (all primary data used in the analysis are provided in Appendix A).

To undertake our analysis we began by pooling the data sets for the period 2001–2011 (n = 11), the longest period of overlapping data. We took this approach as we are interested in the Estate as a whole. In keeping with Conrad (1997) we employed the pooled data to estimate two regressions that allowed us to calculate the Dickey–Fuller test statistic to see if our data can be used to calculate μ and σ. Our test result, like those in Conrad (1997) meant that we could not reject the null hypothesis of the log of the visitor number data corresponding to Brownian motion (results are presented in Appendix B).

Given this result we were able to estimate the mean drift rate (μ) and the standard deviation rate (σ) using the pooled time-series. These estimates are obtained from the time series of the natural logarithm of the ratio of visitor numbers between successive years (i.e., $Ln(R_{t+1}/R_t)$, where R_t = visitor numbers in a given year t). Our estimates are as follows: μ = 0.0425 and σ = 0.052. These values are lower than existing values reported in the literature (e.g., Conrad, 1997; Forsyth, 2000). However, they are plausible and are subsequently assumed representative of overall visitor trends for the Estate as a whole.

Based on these estimates and assuming a δ of 3.5% (H.M. Treasury, 2003) and 5% (e.g. Conrad, 1997; Evans, 2006; Forsyth, 2000) plus the value of the Estate (N) to be £700 million (Bennett, 2011) we arrived with the following results. First, μ < δ if we employ the 5% discount rate and so there is no economic reason to assume a priori that the Estate should be retained in public ownership in perpetuity with guaranteed access. However, this conclusion is reversed if we employ the lower discount rate. In this case there is an economic argument to keep the Estate available for public access.

We can examine this result in more detail if we look at each individual forest we have data for. In this case we find that 3 forests could be considered for sale even when employing the lower discount rate as they yield estimates of μ < δ. In turn this means that 5 forests have μ > δ. In fact 3 forests have μ > δ even when we employ the higher discount rate. This raises an interesting question about the sale of the Estate at least as far as opportunity for continued access is concerned. Should we consider all parts of the Estate as a single entity or should we examine each forest as a separate entity? If the latter option has been pursued there is good reason to assume