The Effect of Administrative Costs on Timber Harvest Strategy

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Abstract: With the increase in social concern about ecological conservation and natural environment, the administrative cost that a forest firm bears is increased. For example, the firm may bear the expenditure of money on preserving a couple of birds of endangered species that inadvertently migrates from an old growth forest to firm's productive new growth forest, and, in some cases, the expenditure of money on moving its offspring to a pertinent place. The magnitude of such expenditure would increase with the increase in the biomass of a forest stand on a given parcel of land. In addition, it is widely accepted among fire experts that some form of the pruning of tree branches contributes to protecting stands from damage in the event of fire, since it reduces the fuel loading present in the stands. The firm may bear the expenditure of money on such pruning operations, whose amount might also increase with the increase in the stand biomass. This type of expenditure shall be called the variable administrative cost. This paper proposes a continuous-time type dynamic timber harvesting model that includes an administrative cost function depending on the time-varying biomass of an even-aged stand of trees planted by a forest firm. Pontryagin's maximum principle and a realistic numerical example are used to discuss the effect of the magnitude of variable administrative costs on the optimal timber harvest strategy. It is shown that the value of the upper limit of optimal rotation age sharply decreases with the increase in variable administrative costs.

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