CLIMATE CHANGE AND OPTIMAL ROTATION
IN A FLAMMABLE FOREST

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ABSTRACT. This paper builds a Faustmann-based model to study the effects of increased climate-induced fire risk on the optimal forest rotation period. Simulations using species prevalent in North American forests indicate that both the commercial and socially optimal rotation ages decline as the risk increases. The reduced carbon absorbed by the standing timber can then create a positive feedback effect.

This has potentially important policy implications. The Kyoto ratification agreement reached in the autumn of 2001 was dependent on allowing the 'Umbrella Group' of countries to use their forests' carbon-absorbing ability to offset their need for fossil fuel emission reductions. This carbon-absorbing ability will decline if rotation ages decrease with increased fire risk, weakening the force of the argument for allowing these countries to use their carbon 'sinks' to avoid reducing anthropomorphic emissions.

KEY WORDS: Atmospheric carbon, boreal forests, carbon storage, climate change, Faustmann, forest fires, forests, global warming.

1. Introduction. From December 1 to 10, 1997, ministers and other high level officials from 160 countries met in Kyoto, Japan, for the Third Conference of Parties to the United Nations. Under the Kyoto Protocol that resulted from this conference, industrialized countries must reduce their collective emissions of greenhouse gases by 5.2 percent below 1990 levels by 2012. Despite a U.S. boycott of further talks, a compromise agreement on the implementation of the accord was finally reached in late 2001. A key part of the compromise was allowing the use of carbon sinks as offsets for national caps on fossil fuel emissions. Because forests and other growing plant matter absorb carbon dioxide, Article 3 of the Kyoto Protocol explicitly recognized that increasing the biomass of global forests could be an alternative to reducing anthropogenic emissions. In the ratification agreement, the arguments of the so-