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Variation of federal cost-share programs in the United States and the inducement effects on tree planting

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Abstract

A long existing question associated with federal cost-share programs in the United States has been whether these public subsidies have induced or substituted for landowners' private investment in tree planting. This study reexamined the relationship between public funding and private investment behavior in the past 50 years by employing a state space model with time-varying parameters. Three regions, i.e., the South, North, and West were formed and compared. The analysis revealed that the relationship has changed over time and across regions and both inducement and substitution effects have occurred. The inducement effect occurred in the South from 1960 to 1972 and in the West from 1961 to 2002 while the substitution effect was present for all other years in the South and West. In the North, there has been a strong substitution effect from 1951 to 2002.

JEL Classification: C220; Q230

Keywords: Cost-share programs; Kalman filter; State space; Time-varying parameter

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Introduction

Tree planting has become increasingly active on US forest land in the past century. As of 1997, plantation forests accounted for 7% of forest land area in the US (Smith et al., 2001). Governments have encouraged private tree planting activities through various cost-share programs, taxation policies, and technical assistance. Particularly, governments have spent billions of dollars in a range of incentive cost-share programs during the past 50 years. These programs have been evolving over time, and exhibited great variations in program designs and funding sizes.

The instability of these federal cost-share programs reflects that forest policies in the United States generally evolve in a dynamic process where both official and unofficial participants interact. Policy is normally built upon the current situation and formulated as a small variation of the past (Cubbage et al., 1993). Among forestry community, there is a contention that public financial assistance may help maintain the supply of wood fiber at a healthy level, given the rising demand and diminishing supply from public lands. These cost-share programs also may help reduce the negative externalities of timber production and maintain a socially desirable environmental setting (de Steiguer, 1984). Therefore, there has been persistent demand for government cost-share programs from private landowners. On the side of legislation, changes in administration and public budgets often result in different policy formulation and adoption, program authorization, and expenditure appropriation. As a result, governments have implemented various cost-share programs with a range of funding sizes, such as the early 1936 Agricultural Conservation Program (ACP) and the recent 1986 Conservation Reserve Program (CRP).

A long existing question concerning these cost-share programs is whether these public subsidies have induced or substituted for landowners' private tree planting efforts. As reviewed in the next section, most previous studies have focused on the South because, compared to the rest of the nation, this region has received most of the federal cost-share assistance. Many studies also exclusively searched for substitution effects while ignoring inducement effects (Lee et al., 1992). The results from these studies were mixed and both inducement and substitution effects have been found.

One issue that emerged from these studies is that the validity of these empirical findings relies on the assumption of constant parameter values over time. This assumption, however, may be restrictive and sometimes unnecessary. Given the changing demand for government cost-share programs and unstable legislative environments, the impact of cost-share programs on private investment behavior in tree planting may vary greatly over time.

Motivated by the uncertain results from the literature, the objective of this study was to reexamine the relationship between federal cost-share programs and private investment behavior in the United States over the past 50 years from 1951 to 2002. An innovative state space model with time-varying parameters (TVPs) was employed to analyze the relationship. The advantage of the method was that it captured the influence of external shocks that were gradual and diffuse in nature, such as the