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Landowner knowledge and willingness to supply woody biomass for wood-based bioenergy: Sample selection approach

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ABSTRACT

Nonindustrial private forest (NIPF) landowners' willingness to harvest woody biomass for wood-based bioenergy is important if sustainable feedstock supplies are to be realized in the U.S. However, a significant number of them do not know that unused logging residues could be used to produce wood-based bioenergy. Therefore, this study analyzed landowner willingness to harvest woody biomass in Mississippi contingent upon their knowledge of wood-based bioenergy. The requisite data were analyzed in accordance with the Heckman approach. Results indicated that elderly, male, and resident landowners, having larger tracts of pine plantations were more likely to be aware of wood-based bioenergy. The results further revealed the need for bioenergy related extension education focusing on female landowners and those having small tracts of forest land.

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Introduction

Wood-based bioenergy has received considerable attention in the United States due to an increase in awareness from negative environmental consequences of fossil fuels, a need for energy security, and the potential for economic revenue and job creation for rural communities among others (Woli

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et al., 2012; Mayfield et al., 2007). When considering the two potential feedstock sources used in wood-based bioenergy, forest resources are often viewed as superior to agricultural crops, as use of the latter often conflicts with national food security interests (Skipper et al., 2009). Guo et al. (2007) classified the major benefits of wood-based bioenergy into three groups namely: energy security, environmental protection, and economic development. Gan and Smith (2007), on other hand, indicated that wood-based bioenergy is not currently cost competitive with fossil fuels, unless environmental and energy security benefits are considered. Similarly, past research has also cautioned that excessive use of woody biomass for wood-based bioenergy production could adversely impact soil and wildlife habitat (Perlack et al., 2005; Faaji et al., 1998). Such varied opinions, in part, indicate that there is uncertainty among stakeholders about the benefits and costs of wood-based bioenergy.

Forest lands in the United States provide ample opportunity for production of wood-based bioenergy. Moreover, given their dominance in southern forest lands, feedstock availability from nonindustrial private forest (NIPF) is important for sustainable production of wood-based bioenergy. Earlier studies on NIPF landowners have indicated that forest landowners are a diverse group having multiple forest management objectives that range from timber production to wildlife management or recreation (Majumdar et al., 2008; Measells et al., 2005; Kluender and Walkingstick, 2000). While NIPF landowner harvesting decisions are critical for sustainable wood-fuel supply (GC and Mehmood, 2010), past research has indicated that their timber harvesting behavior is case specific and unpredictable (GC et al., 2009; Majumdar et al., 2008; Kluender and Walkingstick, 2000; Kuuluvainen et al., 1996). Given the socio-economic, environmental and energy security benefits and the unique nature of feedstocks used in wood-based bioenergy (Guo et al., 2007), existing literature on timber harvesting does not properly address the nature of biomass harvesting behavior of NIPF landowners. These facts, therefore, warrant the need for understanding NIPF landowner willingness to supply woody biomass for wood-based bioenergy.

In the past few years, owing to an increased interest over wood-based bioenergy, research related to woody biomass harvesting behavior of landowner has received considerable attention. Recent literature on NIPF landowners has indicated forest management objectives, biophysical forest characteristics, and socio-demographic characteristics as important determinants of NIPF landowner biomass harvesting behavior (Gruchy et al., 2012; Joshi and Mehmood, 2011; GC, 2009; Paula, 2009). In particular, landowners having wildlife management or recreational interests were also in favor of supplying woody biomass for wood-based bioenergy (Joshi and Mehmood, 2011).

Previous studies generally agreed that NIPF landowners have a positive motivation for supplying woody biomass for wood-based bioenergy generation. For example, Conrad et al. (2011) revealed that 90% of southern NIPF landowners were willing to supply woody biomass, provided that they would receive viable economic incentives. Perhaps due to the incipient market conditions for wood-based bioenergy, only 12% of respondents, however, had previously sold woody biomass to a wood-based bioenergy facility (Conrad et al., 2011). Joshi and Mehmood (2011) analyzed the determinants of NIPF landowner willingness to supply woody biomass in three southern states namely: Arkansas, Virginia, and Florida. They found that biophysical forest characteristics such as percentage of planted pine and mixed pine-hardwood forests, size of landowner acres, and woody biomass prices had a significant impact on landowner willingness to supply woody biomass. Similarly, forest management objectives and socio-demographic variables such as timber production and wildlife management, and respondent age and education were also significant determinants of landowner decisions to supply woody biomass for wood-based bioenergy. In spite of their positive motivations, however, the authors cautioned that a significant percentage of NIPF landowners in each state were not aware of generating energy from wood-based biomass. GC (2009) also revealed a significant association of forest characteristics, forest management objectives, and socio-demographic variables with NIPF landowner bid acceptance behavior. The author reported that a significant percentage of resident and elderly landowners were skeptical about their willingness to supply woody biomass, even if they were approached with the high price offers. Landowner level of awareness related to wood-based bioenergy, among others, was an important determinant of their skepticism (GC, 2009).

Paula (2009) highlighted the willingness of NIPF landowners to supply biomass feedstocks for a wood-based bioenergy industry in Lee County, Alabama. Results suggested that the price of woody biomass, forest tract size, and conservation and financial motivations, among others, were significant

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