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# Meta-analysis of consumer's willingness-to-pay premiums for certified wood products

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## ABSTRACT

Consumers' willingness to pay (WTP) price premiums for environmentally certified wood products has been frequently estimated using stated preference methods. Estimates of WTP premiums for certified wood products over non-certified options reported in the literature range from 1.0% to 39.3%. This paper describes a meta-analysis used to determine the key factors associated with WTP price premium estimates by examining data from 19 different studies conducted around the world. Results of Bayesian hierarchical models show that frequently purchased wood products and wood products with lower base prices tend to capture higher percentage premiums. Survey administration method was also a statistically significant factor influencing variations in WTP estimates. Results show that conjoint analysis elicited inflated WTP estimates toward certified wood products compared with contingent valuation methods. Reported WTP estimates have increased in recent years. Recommendations to reduce the error of WTP estimates toward certified wood products and improve the validity of experimental studies are provided.

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## Introduction

The adoption of Forest Principles and Agenda 21 in the Earth Summit of 1992 formalized for the first time the adoption of sustainable development principles as part of forest management worldwide

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(Sitarz, 1993). Consumers, corporate shareholders, local communities, and other stakeholders increasingly require assurances that the production of goods conforms to minimum standards of social and environmental responsibility (Fischer et al., 2005). In response to such demands forest certification emerged as a market-based tool that guarantees compliance of forest management with sustainability principles.

Forest certification programs have been established since the 1990s and adopted worldwide. Most widely used programs include the Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI) and Programme for the Endorsement of Forest Certification (PEFC). These programs provide principles for the certification of forestland but also include protocols for the establishment of chains-of-custody (C-O-C) for wood products to be traced back to certified forests of origin. By 2011, FSC had certified 147.8 million hectares of forests in 80 countries, 40.4% of which were in North America, 43.1% in Europe and 3.2% in Asia (FSC, 2011) and has issued 21,879 C-O-C certificates in 106 countries (FSC, 2011). PEFC has certified 153.8 million hectares in North America, 72.3 million hectares in Europe and 4.6 million hectares in Asia and issued 7669 C-O-C certificates worldwide (PEFC, 2011). The SFI program, which geographic area is limited to North America, has certified about 74 million hectares of forest area across the U.S. and Canada, and issued 1000 C-O-C certificates (SFI, 2011).

Marketing studies have suggested the existence of environmental friendly wood product niche markets (e.g. Anderson and Hansen, 2004; Hansen et al., 2006; Aguilar and Vlosky, 2007). Forest certification has been identified as an important product attribute when consumers buy wood products by Ozanne and Vlosky (1997), Spinazze and Kant (1999) and many others. Ozanne and Vlosky (1997) and Ozanne and Smith (1998) identified one consumer segment characterized as positively seeking eco-friendly wood products in the U.S. Bigsby and Ozanne (2002) distinguished two segments of consumers existing in the wood outdoor furniture market in New Zealand, who attached great value to environmental attributes when purchasing wooden outdoor furniture. Lee et al. (2007) surveyed consumers in South Korea and found that more than 60% of the respondents were willing to buy certified wood products.

Previous studies have reported a wide range of consumers' WTP price premiums for environmentally certified wood products using survey-based stated preference techniques. These range from the lowest WTP price premium at 1.0% (Veisten, 2002) to a highest of 39.3% (Aguilar and Cai, 2010). Among studies with low price premium levels (<5%), Veisten (2002) found stated price premiums of 1.6% and 1.0% among British and Norwegian consumers, respectively, for a wooden furniture. Ozanne and Vlosky (1997) reported that U.S. consumers would be likely to pay a 4.4% premium for a new home built using certified materials with a base price of \$100,000. Another group of studies have reported price premiums ranging between 5% and 15%. For example, Liu et al. (2006) reported that consumers would be likely to pay a 10.0% price premium for a certified night table in Beijing, P.R. China. Cha et al. (2009) surveyed 136 residents in South Korea and found that respondents would be likely to pay premiums over the product base price equivalent to 6.8% for a wood table, 7.6% for wood flooring, 9.8% for copier paper and 11.6% for a wood frame. Studies on consumers' WTP premiums have also elicited large values exceeding well over 30% of the product base price. Ladenburg and Martinsen (2004) report that cutting boards priced at 100 Danish Krone (around \$39.81) could capture a 35.0% price premium from Danish consumers if they carry an environmental certification label. Kruger (2010) pointed out that survey respondents in Canada were willing to pay a 36.5% price premium for certified printer paper. Results of a conjoint analysis by Aguilar and Cai (2010) indicate U.K. consumers may be willing to pay a 39.3% premium for a bedside night table.

The large variability in reported WTP estimates motivated this study to investigate and parameterize the determinants of such large variability. Data from a large number of reports were pooled and analyzed in what is commonly referred to as a meta-analysis. Based on a review of the literature, salient factors behind consumer WTP premiums were identified and an econometric model developed to test their effect and statistical significance. Four specific objectives were set for this research which included to: (a) examine how WTP price premiums estimates are influenced by product characteristics (e.g. wood product base price, wood product purchasing frequency); (b) determine the variance in WTP premiums associated to particular elicitation methods; (c) test if regional differences exist; and (d) determine if consumers' WTP premiums toward certified wood products has changed in recent years. Our study contributes to the study of WTP price premiums for environmentally certified wood products by pooling a large body of data from the existing literature using a meta-analysis. This study

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