# Consumer Price Premiums for FSC-Labeled Wood Flooring: A Comparison of Five Chinese Cities

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## Abstract

*Widespread use of Forest Stewardship Council (FSC) certification helps to promote forest sustainability in China. However, consumer purchasing behavior varies among cities because of differences in economies, education, and environments. This study assesses the price premium consumers are willing to pay for FSC-labeled wood flooring in five Chinese cities. It examines differences in consumer preferences, identifies target markets for FSC-labeled products, and suggests strategies to increase acceptable price premiums in different cities. Results from 1,004 online questionnaires in five cities show that mean price premiums for FSC-certified wood flooring are 42 CNY/m$^2$ in Beijing, 39 CNY/m$^2$ in Shanghai, 37 CNY/m$^2$ in Guangzhou, 48 CNY/m$^2$ in Tianjin, and 45 CNY/m$^2$ in Chongqing. Guangzhou shows the largest potential market shares for spreading FSC-labeled wood flooring when the price premium range is 0–20 CNY/m$^2$, whereas Chongqing shows the largest potential market shares when they span 80–90 CNY/m$^2$. The results also suggest city-specific strategies to raise consumer-accepted price premiums for FSC-certified wood flooring: increase consumer knowledge of the FSC label in Beijing and Shanghai, target buyers of high-priced wood flooring in Guangzhou and Chongqing, and improve consumers' satisfaction with the urban environment in Guangzhou and Tianjin.*

*Keywords:* consumer, price premium, FSC, wood flooring, Chinese major cities

## 1. Introduction

In 1993, Forest Stewardship Council (FSC) certification was established as part of an initiative to reduce deforestation and promote the management of tropical forests (FSC 2012). As a global forest certification system, FSC certification is recognized as an effective tool for promoting sustainable forest management. By April 2019, the FSC had certified 198 million hectares of forest and issued 36,956 chain-of-custody (CoC) certifications globally. To date, the FSC has certified 987,000 hectares of forest and issued 7,605 CoC certifications in China (FSC 2019). As the world's largest market for wood products, including wood flooring, China consumed 415 million square meters (m$^2$) of wood flooring in 2017, representing over half of all global consumption (China Timber Organization 2018). China, therefore, might have a large potential market for FSC-certified wood flooring. Understanding Chinese consumer preferences in terms of forest-certified products could make a significant contribution to the accomplishment of sustainable development goals in China.

Many studies have shown that there are various consumer segments that intend to pay a price premium (PP) for forest-certified products (Table 1). Moreover, through a meta-analysis, Cai & Aguilar (2013) verified the fact that consumers considered wood products as worthy of a high PP. They suggested that frequently purchased wood products with lower base prices were more likely to have higher PPs if they included forest certifications.

The studies listed above showed that the following factors influenced PP. First, consumers with a higher degree of knowledge regarding forest certification intended to pay more for those products (e.g., Kempen et al. 2009, Shoji et al. 2014, Tan et al. 2019). Second, consumers' budgets also positively affected their PP (e.g., Gronroos & Bowyer 1999, Tan et al. 2019, Veisten

**Table 1. Previous studies regarding consumers' price points (PP) for forest-certified products**

| Authors | Survey sites | Research observations | PP estimates | Influencing factors of PP |
|---|---|---|---|---|
| Ozanne & Vlosky (1997) | USA | A range of certified wood products including studs, chairs, dining room sets, kitchen remodeling jobs, and homes | 4%–19% | Females and members of both the Democratic Party and an environment conservation group |
| Gronroos & Bowyer (1999) | USA | Home built with forest certified lumber and wood products | $2500 per home built | Budget and consumer's environmental awareness |
| Kempen et al. (2009) | USA | Legal firewood | 25% | Knowledge and income |
| Aguilar & Cai (2010) | US, UK | Certified wood product | 5% higher price can capture 34%–50% of the market | Knowledge (disclosure of forest of origin), gender (female), age, and income |
| Veisten (2002) | UK and Norway | Eco-labeled wooden furniture | 5% or less (32%–39% of sample) | ECA and gender (female) |
| Veisten (2007) | UK and Norway | Eco-labeled wooden furniture | 2%–16% (median) | Knowledge of the label, budget, and gender (female) |
| Aguilar & Vlosky (2007) | UK | Certified wood products | 10% or more | Environmental consumption awareness and income |
| Lee et al. (2007) | South Korea | Certified timbers and wood products | 11% | Gender (male) and age |
| Cha et al. (2009) | South Korea | Copier paper, wooden frame, wood dining table, wood flooring | 7%–12% | Gender (female), age, married, education, and income |
| Shoji et al. (2014) | Japan | FSC-labeled interior materials | 41% | Knowledge of the label |
| Liu et al. (2007) | China | Forest-certified bedside night table | 10% | Trust for the label, education, and income |
| Wang et al. (2011) | China | Forest-certified wood product | 5%–15% (61% of samples) | ECA, gender (female), and education |
| Wang (2013) | China | FSC-labeled wood furniture | 1%–5% | Budget and income |
| Liu et al. (2016) | China | Forest-certified wood product | 5% (48% of samples) | Budget, education, and income |
| Luo et al. (2017) | China | Forest-certified wood product | 10%–30% (29% of samples) | Knowledge of the label, purchase experience, and budget. |
| Tan et al. (2019) | China | Eco-labeled wood flooring | 17% (41 CNY, mean) | Knowledge of the label, budget, purchase amount |

Note: ECA means consumers' environmental consumption awareness.

2007). These findings aligned with those of Cai & Aguilar (2013) and Ladenburg & Martinsen (2004) suggesting that economic status gives consumers the ability to pay a PP for certified products. Third, consumers' consumption values and environmental concerns influenced their PP (e.g., Gronroos & Bowyer 1999, Veisten 2002). Suki & Suki (2015) also affirmed that consumers' social norms influenced their purchasing decisions regarding environmentally friendly products, as they aimed to help preserve the environment. Finally, consumers' socioeconomic status affected their PP. For instance, it was demonstrated that women paid a higher PP for certified wood products than did men (Cha et al. 2009; Ozanne & Vlosky 1997; Veisten 2002, 2007). However, Lee et al. (2007) demonstrated that in South Korea, men were more willing to pay a higher PP than women were

for such products. Also, Kempen et al. (2009) and Cha et al. (2009) identified income as a factor that positively influenced consumers' PP.

On the other hand, some studies compared the differences between consumer preferences for forest-certified products across the country (Aguilar & Cai 2010; Veisten 2002, 2007). Few studies compared regional differences between consumer preferences regarding forest-certified products in China, although studies regarding non-forest products showed that consumer behavior differed significantly amongst Chinese cities, and suggested that marketing segmentation strategies could compensate for the imbalance caused by urban economic development and cultural diversity. For instance, Paproski's (2011) assessment of 12 product categories (e.g., household cleaners, bottled waters, etc.) found that purchasing intentions

of consumers in Beijing, Shanghai, Guangzhou, and Chongqing differed significantly, including consumer inclinations to try new products, brand loyalty, the use of discount cards, and the willingness to buy substitute brands. Cui & Liu (2001) examine differences in consumer attitudes toward foreign brands in 41 Chinese cities based on demographics, lifestyles, and media use. They recommended using a marketing segmentation strategy to adapt to local markets.

The study aims to assess the regional differences between consumer preferences for FSC-certified wood flooring amongst major Chinese cities. Specifically, the study aims to (1) estimate consumers' PPs for FSC-certified wood flooring in the following five Chinese cities: Beijing, Shanghai, Guangzhou, Tianjin, and Chongqing; (2) identify the factors that influence consumers' PPs in each city, in terms of consumer knowledge, budget, environmental consumption awareness (ECA), and socioeconomic status; and (3) estimate the market share for premium-priced FSC-certified wood flooring in each of those cities. This study's findings will be important to forest policy makers and forest certification institutions in terms of expanding forest certification in China. Also, these findings will help wood product manufactures to launch marketing segmentation strategies that might increase consumer intention to purchase forest-certified products in China.

## 2. Methods

### *2.1 Survey Sites*

We surveyed Beijing, Shanghai, Guangzhou, Tianjin, and Chongqing, located in northern, eastern, western, and southern China, respectively (Figure 1). Gross domestic product (GDP), income, education, and air quality differ amongst these cities (Table 2).

Beijing is China's capital and its second-largest regional economy. Its employed workers earn China's highest



*Figure 1. Map of study site locations throughout mainland China.*

average income—nearly double the nationwide average of 74,318 CNY/year (NBSC 2017). According to the China Sustainable Cities Report published in 2016, residents of Beijing aged 25 and older averaged 11.5 years of formal education in 2017 (UNDP 2016) versus 9.02 years for China overall (Zheng 2017). Industrial development in northern China has precipitated serious environmental problems, most notably air pollution. The air quality index data of Beijing is worse than those of Shanghai, Guangzhou, and Chongqing (China PM 2.5 2019).

Shanghai is China's most developed city by GDP (Table 2). Workers there earn China's second-highest average income after Beijing (NBSC 2017). A resident's average education (10.58 years) exceeds the national average (UNDP 2016, Zheng 2017), and its air quality surpasses that of Beijing and Tianjin (China PM 2.5 2019).

Guangzhou is the provincial capital of Guangdong and a high-tech center. Workers' average income is below that of Beijing and Shanghai, but above the national average (NBSC 2017). Its residents average 10.55 years of education, again, above the national average (UNDP 2016), and its air quality surpasses that of Beijing, Tianjin, and Shanghai (China PM 2.5 2019).

**Table 2. Descriptive information of the five surveyed cities.**

| City | Population (10,000) | GDP (per 100 million CNY) | Air quality index | Per capita education (years) | Average wage of employed persons (CNY/year) |
|------|--------------------|-----------------------------|-------------------|------------------------------|---------------------------------------------|
| Beijing | 1,359 | 28,015 | 106 | 11.50 | 131,700 |
| Shanghai | 1,450 | 30,632 | 77 | 10.58 | 129,795 |
| Guangzhou | 898 | 21,503 | 54 | 10.55 | 98,612 |
| Tianjin | 1,050 | 18,549 | 117 | 10.20 | 94,534 |
| Chongqing | 3,390 | 19,425 | 55 | 7.89 | 70,889 |

Source: Data are from the UNDP (2016), NBSC (2017), and China PM 2.5 (2019).

Tianjin is a major industrial city, but is the least developed amongst the five surveyed cities in terms of its GDP. On average, its residents earn 94,534 CNY and have 10.2 years of education, both above the national average (NBSC 2017). Near Beijing, Tianjin suffers serious air pollution, and its air quality is the worst amongst the five study sites (China PM 2.5 2019).

Inland Chongqing has China's largest urban population, but its economy is less developed than that of Beijing, Shanghai, and Guangzhou. Income (70,889 CNY) is below the national average (NBSC 2017). Residents have less formal education (7.9 years) than those of the other cities surveyed as well as the national average (UNDP 2016). Air quality was rated better than that of Beijing, Shanghai, and Tianjin (China PM 2.5 2019).

## 2.2 Data Collection

The survey data were collected through an online questionnaire via a professional Chinese survey website, Wenjuanxing (www.wjx.cn). Our respondents were registered users of the Wenjuanxing website, each of whom received an e-mail with our questionnaire survey and a brief introduction to the survey enclosed. Participants who were interested in the survey could complete it via a website interface. Two hundred and ten samples were collected in each city during the time period between July 29, 2018 and August 6, 2018. Of the total 1,040 responses, 46 were removed from the data due to lack of reliability. For example, a male respondent under 21 years of age reported that he was married, but he had not yet reached the legal age, based on the Chinese Marriage Law. Also, there were 45 respondents under 21 years of age who indicated that their educational level was bachelor's degree level or above—which is most likely not possible. We ascertained the reliability of responses to survey questions only manually, considering a descriptive statistic check would create bias for data analysis. Ultimately, a total of 1,004 valid responses were collected for the sample as follows: 208 from Beijing, 205 from Shanghai, 209 from Guangzhou, and 191 each from Tianjin and Chongqing.

Table 3 summarizes the sample's demographics. Amongst the respondents, there were more male than female respondents in Beijing, Shanghai, and Guangzhou; males and females replied in the same ratio in Tianjin; and there were fewer males than females in Chongqing. An analysis of the distribution of respondents by age showed that over 70% of the respondents were under 41 years of age in each of the cities. It also revealed that younger respondents were more interested in taking the online survey. Kaplowitz et al. (2004) and Stanton & Rogelberg (2011) previously showed that population samples collected via the web, on average, skewed younger than those collected with paper-based samples. In terms of education, over half of the respondents held a three-year college certification or above. This means that the respondents demonstrated a higher education level than the average citizen in a city, where the average per capita education was between 8 and 12 years (Table 2). Moreover, the percentage of respondents that held bachelor's degrees or above was higher in Beijing, Shanghai, and Guangzhou than in Tianjin and Chongqing. That percentage accords with the data regarding educational attainment in China's cities (Table 3). Finally, more than half of the respondents in each city reported incomes within the range of average household income in China. As reported by China's National Bureau of Statistics (Table 2), the annual household income based on marital status was 100,000 to 300,000 CNY in Beijing and Shanghai, 100,000 to 200,000 CNY in Guangzhou and Tianjin, and 50,000 to 200,000 CNY in Chongqing (NBSC 2017).

## 2.3 Questionnaire Design

To limit the sample to respondents that planned to buy wood flooring, we first asked prospective participants whether their household currently planned to buy wood flooring. If so, we ascertained that they, not their family or friends, would make that decision. Only respondents who answered "yes" to both questions received questionnaires.

The survey was divided into three sections. The first section established respondents' pre-purchase information and environmental concerns, specifically regarding the following factors: (1) type of wood flooring, (2) budgets, (3) purchase amount, (4) ECA, and (5) satisfaction with urban environmental quality (SUEQ). The second section displayed the FSC label and asked respondents to rate their familiarity with it as "known," "seen before," and "unknown." It then asked of their intention to buy FSC-labeled wood flooring. Respondents that intended to buy were asked to further indicate the PP that they were willing to pay, in increments from 0 to 100 per 10 $CNY/m^2$. The final section gathered basic demographic information, such as gender, age, education, and household income (Tables 3–5).

There were several limitations to our study. First, the PP in this study was measured by a questionnaire; real

**Table 3. Summary of demographic variables.**

| Variables | | Frequency (%) | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | | Beijing (n = 208) | Shanghai (n = 205) | Guangzhou (n = 209) | Tianjin (n = 191) | Chongqing (n = 191) |
| Gender | Male | 64 | 57 | 53 | 50 | 42 |
| | Female | 36 | 43 | 47 | 50 | 58 |
| Age | Under 21 years old | 1 | 2 | 0 | 11 | 13 |
| | 21–30 years old | 47 | 37 | 63 | 28 | 41 |
| | 31–40 years old | 36 | 44 | 32 | 31 | 18 |
| | 41–50 years old | 8 | 13 | 4 | 17 | 20 |
| | Over 50 years old | 8 | 4 | 1 | 12 | 7 |
| Education | High school certification or below | 6 | 10 | 3 | 18 | 35 |
| | Three-year college certification | 15 | 18 | 15 | 23 | 22 |
| | Bachelor's degree | 67 | 58 | 75 | 50 | 37 |
| | Master's degree or above | 12 | 15 | 7 | 9 | 6 |
| Household income (CNY/year) | Below 50,000 | 7 | 6 | 4 | 14 | 24 |
| | 50,000–100,000 | 16 | 15 | 12 | 31 | 28 |
| | 100,001–200,000 | 45 | 36 | 45 | 34 | 30 |
| | 200,001–400,000 | 26 | 35 | 27 | 16 | 13 |
| | Over 400,000 | 7 | 8 | 11 | 5 | 5 |

**Table 4. Definitions and descriptions of items in the questionnaire.**

| Variable | Description |
| --- | --- |
| Purchase amount | Ranging from 30 to 120 at 10-m$^2$ intervals. |
| Budget | Ranging from 100 to 500 in 100 CNY/m$^2$ intervals. |
| Solid wood flooring | 1 = Intend to buy; 0 = Intend not to buy. |
| Engineered wood flooring | 1 = Intend to buy; 0 = Intend not to buy. |
| Laminate flooring | 1= Intend to buy; 0 = Intend not to buy. |
| Environmental consumption awareness (ECA) | Consumer's perceived importance on the purchase of an eco-labeled product: 1 = Not at all important; 2 = Slightly important; 3 = Somewhat important; 4 = Very important; 5 = Extremely important. |
| Satisfaction with urban environmental quality (SUEQ) | 1 = Dissatisfied; 2 = Somewhat dissatisfied; 3 = Neutral; 4 = Somewhat satisfied; 5 = Satisfied. |
| Known | Respondent partly knew or was familiar with FSC label: 1 = Yes, 0 = No. |
| Seen before | Respondent had seen only, but did not know that label stood for FSC label: 1 = Yes, 0 = No. |
| Unknown | Respondent had neither seen nor knew FSC label: 1 = Yes, 0 = No. |
| Purchase intentions | Respondent had an intention to buy FSC labeled flooring: 1 = Yes, 0 = No. |
| Price premium (PP) | A price premium for FSC ranging from 0–100 at 10 CNY/m$^2$ intervals. |

PP values given by consumers in actual purchases might differ (Johansson 1987). However, Nestor & Podolsky (1998) and Botelho & Pinto (2002) showed that there were no significant differences between hypothetical and real PPs when questionnaires and field observation study responses were collected from the same sample of respondents. Second, this study used self-reporting measures to assess knowledge of the FSC label; thus, there may exist some degree of social desirability bias (Groves et al. 2004). Third, we did not measure consumers' purchase experiences of forest-certified products—they may be associated with a PP (Young et al. 2010).

**Table 5. Summary of variables and significant differences between surveyed cities.**

| Variable | Mean | | | | | ANOVA | |
|---|---|---|---|---|---|---|---|
| | Beijing | Shanghai | Guangzhou | Tianjin | Chongqing | F | Sig. |
| Purchase amount | 66.11 | 64.88 | 65.69 | 63.35 | 67.02 | 0.70 | 0.589 |
| Budget | 271.15 | 291.71 | 280.86 | 258.12 | 257.07 | 3.94 | 0.004 |
| Solid | 0.49 | 0.57 | 0.47 | 0.38 | 0.63 | 7.32 | <0.001 |
| Engineered | 0.45 | 0.40 | 0.49 | 0.55 | 0.27 | 9.17 | <0.001 |
| Laminate | 0.06 | 0.02 | 0.04 | 0.07 | 0.10 | 3.10 | 0.015 |
| ECA | 4.05 | 4.07 | 3.98 | 4.32 | 4.09 | 3.48 | 0.008 |
| SUEQ | 3.09 | 3.53 | 3.54 | 3.18 | 3.67 | 18.72 | <0.001 |
| Known | 0.31 | 0.29 | 0.37 | 0.24 | 0.32 | 2.21 | 0.066 |
| Seen before | 0.20 | 0.22 | 0.34 | 0.23 | 0.16 | 5.15 | <0.001 |
| Unknown | 0.49 | 0.49 | 0.29 | 0.53 | 0.52 | 8.22 | <0.001 |
| Purchase intentions | 0.74 | 0.77 | 0.85 | 0.67 | 0.72 | 4.94 | <0.001 |
| Price premium | 41.95 | 39.30 | 36.63 | 48.36 | 44.93 | 3.53 | 0.007 |

Note: ECA measures respondents' environmental consumption awareness. SUEQ indicates their satisfaction with urban environmental quality.

## 2.4 Data Analysis

Using analysis of variance (ANOVA), following Malhotra & Birks (2007) and Paproski (2011), we cataloged respondents' descriptive statistics and assessed differences in their purchase amounts, budgets, types of flooring, ECA, SUEQ, knowledge of the FSC label, purchase intentions, and PP in each surveyed city. Following Newey (1987), we used Tobit regression analysis with continuous endogenous regressors (IV-Tobit model) to identify factors influencing the PP for each city. The Tobit model is a censored regression model in which the range of the dependent variable (PP value) is constrained in one way, either above or below. In this particular case, censoring was affected from below, with the threshold set to zero, meaning that values below zero were constrained (Tobin 1958). In cases of a continuous variable with a relatively large number of zero values, Tobit regression models using maximum likelihood estimations were preferred to ordinary least squares (OLS), as they predict only positive rational PP values (Maddala 1983, Tobin 1958, Greene 1981). Explanatory variables included knowledge of the FSC label, budget, purchase amount, type of wood flooring, ECA, SUEQ, gender, and income rate. Income rate measured the proportion of respondents' indicated income to the average urban income, which provided a balanced representation of the city's income level. Assuming income correlated positively to both education and age, we adopted the income rate as an endogenous variable, leaving education and age as instruments in the IV-Tobit model.

To identify potential markets for the development of premium-priced FSC-labeled wood flooring products, we estimated the relationship between market share and PP in each city. Equation (1) defines market share:

$$Market\ share_{c,p} \tag{1}$$

$$= \frac{n_{c,p} + n_{c,(p+10)} + n_{c,(p+20)} \ldots \ldots + n_{c,100}}{n_c}.$$

where $n_c$ is the number of respondents in city $c$, and $p$ is the value of PPs; $n_{c,p}$ is the number of respondents that indicated their value $p$ for PP in city c.

We then used the Tobit model to relate market share and PP as expressed in Equation (2):

$$MS_c = \begin{cases} 1, \text{if } \beta_c \times PP + \mu_c > 1 \\ \beta_c \times PP + \mu_c \\ 0, \text{if } \beta_c \times PP + \mu_c < 0 \end{cases} \tag{2}$$

where MS stands for an estimated market share, c represents a city, β is the coefficient for PP, and μ is a constant. Student's t-test determined any significant differences between the highest and lowest market shares for each level of PP.

# 3. Results

## 3.1 Estimated PP in Each City

The mean PPs for FSC-labeled wood flooring were 42, 39, 37, 48, and 45 CNY/m$^2$ for respondents in Beijing, Shanghai, Guangzhou, Tianjin, and Chongqing, respectively. Those premiums accounted for 15%, 14%, 13%, 18%, and 17% of respondents' reported budgets in each city, respectively (Figure 2). ANOVA testing showed significant differences in PPs among the five cities (Table 5).

## 3.2 Factors Influencing PP by City

Table 6 shows the results for the IV-Tobit model. The Wald test for exogeneity accepted the null hypothesis for Beijing, Shanghai, Guangzhou, and Tianjin and rejected it for Chongqing. This suggests that the in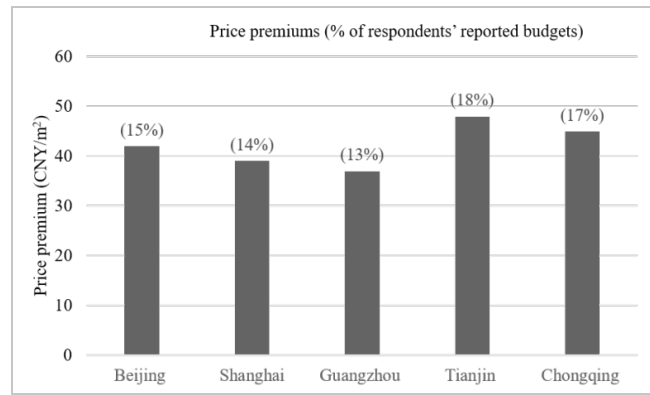come rate is an exogenous variable for Beijing, Shanghai, Guangzhou, and Tianjin, while it is an endogenous variable for Chongqing.

According to the results, there was a statistically significant relationship between PP and respondents'



Figure 2. Consumer PP for FSC-labeled wood flooring in five cities.

**Table 6. Results of Tobit regression with continuous endogenous regressors (IV-Tobit Model).**

| Variable | Coefficient (S.E.) | | | | | |
|---|---|---|---|---|---|---|
| | Total of five cities (n = 756) | Beijing (n = 154) | Shanghai (n = 158) | Guangzhou (n = 178) | Tianjin (n = 128) | Chongqing (n = 138) |
| Known | 8.932*** (2.985) | 19.652*** (6.211) | 19.162*** (5.609) | 5.791 (5.733) | 6.205 (8.192) | −3.944 (8.748) |
| Seen | 5.806* (3.214) | 7.646 (7.417) | 13.818** (6.234) | 9.731 (5.975) | 0.214 (8.660) | −3.991 (9.629) |
| Budget | 0.043*** (0.013) | −0.008 (0.025) | 0.018 (0.025) | 0.106*** (0.023) | 0.024 (0.032) | 0.126*** (0.038) |
| Amount | 0.212*** (0.058) | 0.178 (0.121) | 0.160 (0.111) | 0.155 (0.120) | −0.051 (0.166) | 0.309** (0.151) |
| Solid wood flooring | 12.184** (6.119) | 9.748 (13.203) | 28.422 (17.530) | 4.761 (12.520) | 3.447 (16.950) | 14.299 (13.325) |
| Engineered wood flooring | 11.496* (6.126) | 14.627 (13.247) | 23.489 (17.704) | 8.358 (12.923) | 5.454 (16.069) | 12.946 (14.251) |
| ECA | 3.498* (1.380) | 7.306** (2.885) | 5.641** (2.836) | −4.191 (2.550) | −2.385 (4.244) | 3.980 (3.620) |
| SUEQ | 2.042 (1.490) | 2.696 (2.887) | 1.898 (3.008) | 7.335** (3.196) | 6.748* (3.913) | 0.208 (4.800) |
| Gender | −2.543 (2.481) | −5.677 (5.644) | 0.810 (4.969) | −5.844 (4.134) | 0.602 (7.337) | 3.056 (7.321) |
| Income rate | −51.401* (30.348) | −2.539 (110.305) | −34.923 (56.737) | 20.411 (97.086) | 49.566 (71.609) | −110.533** (51.061) |
| Constant | −9.861 | −24.668 | −37.298 | −27.361 | −0.932 | 27.047 |
| Wald Test of Exogeneity | | | | | | |
| $\chi^2$ | 2.12 | 1.75 | 0.52 | 0.64 | 0.38 | 4.89 |
| Sig. | 0.145 | 0.186 | 0.471 | 0.424 | 0.536 | 0.027 |
| Log likelihood | −2579.274 | −446.920 | −468.525 | −592.268 | −408.776 | −476.434 |

Notes: *, **, and *** indicate significance at 10%, 5%, and 1%, respectively. ECA measures respondents' environmental consumption awareness. SUEQ indicates respondents' satisfaction with urban environmental quality.

knowledge levels of the FSC label and ECA in Beijing and Shanghai. The positive coefficients of knowledge levels indicated that consumers in Beijing who knew the FSC label were willing to pay more for FSC-labeled wood flooring than who did not know the label, while consumers in Shanghai who either knew or had seen the FSC label before were more willing to pay a higher PP, compared to who did not comprehend the label. Also, the positive coefficients of ECA indicated that consumers who perceived a higher importance to the purchase of environmentally friendly products were more willing to pay a higher PP in those two cities. In Guangzhou, a statistically significant relationship existed between PP and budget and SUEQ. The positive coefficients of both the budget and SUEQ variables indicated that consumers with higher budgets and higher SUEQ were more willing to pay a higher PP than consumers with a lower budget for wood flooring and lower SUEQ. In Tianjin,

there was statistically significant relationship between PP and SUEQ. The positive coefficients of SUEQ also indicated that consumers' PP in Tianjin positively correlated with their SUEQ. In Chongqing, a statistically significant relationship existed between PP and budget, purchase amount of wood flooring, and income level. The positive coefficients of both the budget and purchase amount variables indicated that consumers in Chongqing with higher budgets and larger purchase quantities were more willing to a pay higher PP than consumers with lower budgets and smaller purchase quantities. The negative coefficients of income level suggested that consumers in Chongqing with higher incomes were less willing to pay a higher PP for FSC-labeled wood flooring.

### 3.3 Estimated Market Share in Each City

Table 7 displays study results for the Tobit model. As market share percentage of FSC-labeled wood flooring

**Table 7. Results of Tobit model.**

| Variable | Coefficient (S.E.) | | | | |
|---|---|---|---|---|---|
| | Beijing | Shanghai | Guangzhou | Tianjin | Chongqing |
| Price premiums | −0.007*** | −0.008*** | −0.008*** | −0.006*** | −0.006*** |
| | (0.000) | (0.001) | (0.001) | (0.000) | (0.000) |
| Constant | 0.703*** | 0.729*** | 0.784*** | 0.670*** | 0.685*** |
| | (0.027) | (0.032) | (0.043) | (0.020) | (0.022) |

Note: *** indicates significance as 1%.

**Table 8. Estimated market share of FSC-labeled wood flooring in five surveyed cities.**

| Price premium (CNY/m²) | Market share (%) | | | | | Student's t-test result |
|---|---|---|---|---|---|---|
| | Beijing | Shanghai | Guangzhou | Tianjin | Chongqing | Significance between two cities with the highest and the lowest market share |
| 0 | 70 | 73 | 78 | 67 | 69 | 2.330** |
| 10 | 63 | 65 | 70 | 61 | 62 | 2.225** |
| 20 | 56 | 58 | 61 | 54 | 56 | 2.076* |
| 30 | 49 | 50 | 53 | 48 | 49 | 1.684 |
| 40 | 42 | 42 | 44 | 42 | 43 | 0.742 |
| 50 | 35 | 35 | 36 | 36 | 36 | 0.460 |
| 60 | 28 | 27 | 28 | 29 | 30 | 1.380 |
| 70 | 21 | 19 | 19 | 23 | 23 | 1.289 |
| 80 | 14 | 12 | 10 | 16 | 17 | 1.780** |
| 90 | 7 | 4 | 2 | 10 | 10 | 1.978* |
| 100 | 0 | 0[a] | 0[a] | 4 | 3 | 0.848 |

Notes: * and ** indicate significance at 10% and 5%, respectively. 0%[a] indicates that the estimated market share was −4% in Shanghai and −6% in Guangzhou.

declined, PP increased (Table 8). Student's *t*-test showed significant differences between the highest shares in Guangzhou and the lowest shares in Tianjin when PP spanned 0 to 20 CNY/m$^2$. The same was true between Guangzhou and Chongqing when PP spanned 80 to 90 CNY/m$^2$. No significant difference appeared when PP spanned 30 to 70 CNY/m$^2$ or at 100 CNY/m$^2$.

## 4. Discussion and Conclusions

This study estimated consumers' PP for FSC-labeled wood flooring in five major Chinese cities and examined influencing factors. Based on the results, PPs for each city ranged between 13% and 18%, which were higher than the previous findings of Liu et al. (2007), Wang et al. (2011), and Wang (2013) (Table 1). However, our results are consistent with those of recent studies conducted by Luo et al. (2017) and Tan at al. (2019). One explanation for this study's high PP estimates is that there has been growth in disposable personal income in China (NBSC 2018), which enables consumers the ability to indicate a higher PP for environmentally friendly products. Another explanation is that enhanced consumer knowledge of the FSC label motivates consumers to pay a higher PP for such products (McEachern & Warnaby 2008, Rashid 2009, Shoji et al. 2014, Tan et al. 2019). Approximately 30% of survey respondents knew about the FSC label, a higher percentage than previously estimated. For instance, Wang (2013) found that only 2% of respondents in Zhejiang Province and Jiangsu Province knew about the FSC label. Luo et al. (2017) and Tan et al. (2019) reported that 19% of respondents throughout China and 21% in Chongqing knew the FSC label, respectively.

Based on the results of the IV-Tobit model, the factors that influenced consumers' PP for FSC-labeled wood flooring differed amongst the five cities. Two factors were identified as influencing consumers' PPs in Beijing and Shanghai: knowledge of the FSC label and consumers' ECA. This finding confirmed Shoji et al. (2014)'s that awareness of FSC certification enhanced consumers' willingness to pay more for FSC-labeled wood products. McEachern & Waranby (2008) and Daugbjerg et al. (2014) also linked knowledge of eco-labels and purchase of eco-labeled products to higher PPs. Daugbjerg et al. (2014), Liu et al. (2007), and Tan et al. (2019) suggested that consumers' trust of the label was as important as the knowledge in consumers' PP for eco-labeled products. It should be noted that consumers in Shanghai who had seen the FSC label before were willing to pay a higher PP

for the labeled products. This suggests that manufacturers and retailers could make the FSC logo clearly visible to consumers in order to promote the forest-certified products there. PPs were associated with consumers' environmental consumption awareness; this follows Wee et al. (2014) and Diddi & Niehm (2016), whose studies showed that consumer perceptions of environmentally friendly goods influenced purchasing behavior.

Consumer budgets were examined in terms of their influence on PP in Guangzhou and Chongqing. These findings indicated that manufacturers should target consumers who had a greater intention to buy high-PP FSC-labeled wood products there. It was noteworthy that lower-income respondents in Chongqing were also willing to pay a higher PP. Usually income correlates positively with PP for environmentally friendly products (Lin & Kim 2017, Wan et al. 2015, Wang et al. 2017). Our research showed the potential to increase the consumption of FSC-labeled products amongst low-income consumers in Chongqing. A possible explanation is that despite a lack of recognition of forest certification, consumers considered such products as branded and hoped to gain social status by purchasing them. Ram (1994) and Li & Su (2007) attributed such a result to Confucius face culture. Xia et al. (2014) showed that Chinese consumers had a strong preference for luxury brands because displaying prestigious products that signaled one's wealth and social status was a convenient way of enhancing face. Jap (2010) showed that Confucius face culture has a greater influence on less-educated consumers. This might explain why income rate correlated negatively with PP in Chongqing, where respondents' average education was the lowest amongst the five surveyed cities (Tables 1 and 2). Also, the purchased amount of wood flooring was examined to influence consumer's PP in Chongqing, following Tan et al. (2019). The results indicated that the consumers who demanded more flooring intended to spend more money on the forest-certified product. Hence, targeting cities that have apartments with larger floor areas seems to be an effective way for manufacturers to expand FSC-labeled wood products in China.

The SUEQ was identified as influencing consumer's PP in Guangzhou and Tianjin. This suggests that consumers with high SUEQ were motivated to pay a higher PP for forest certification. This finding follows Boztepe (2012) and Larashati et al. (2012), who suggested that consumers' environmental concerns influenced purchasing behavior

for environmental goods. Therefore, targeting consumers motivated by environmental concerns seems to be an effective strategy for FSC-labeled wood products there.

Previous studies have shown that women pay a higher PP for environmental goods than do men (Cha et al. 2009; Lee at al. 2007; Veisten 2002, 2007). However, no statistically significant gender effect on PP was found in our study. A possible explanation is that our surveyed item was wood flooring, which is used to improve the living environment for the entire family. Gender, therefore, was not considered a key factor on consumer PP for certified products.

Based on the results of market share estimates, Guangzhou exhibited the highest percentage of respondents who intended to buy certified wood flooring, with PPs below 40 CNY/m$^2$, amongst the five cities. We concluded that knowledge of the FSC label influenced the purchase of FSC-labeled products with a low PP. This finding implies that manufacturers of FSC-labeled wood products with lower PPs should prioritize markets where there is greater knowledge of the FSC label. When PP exceeds 70 CNY/m$^2$, more than 25% of stipulated budgets, market share in the five surveyed cities was below 25%. To our surprise, Chongqing had high market shares for high-premium wood flooring, despite having the lowest average education and GDP among the five cities. Confucius face culture apparently affects purchasing behavior in less educated cities (Jap 2010). Perhaps consumers in less educated environs accept a higher PP for FSC-labeled products because they regard them as luxury brands. By appealing to social culture, related manufacturers may gain higher premiums by promoting forest certification in less educated cities. However, PP may decline along with an enhanced knowledge of forest certification amongst consumers.

In conclusion, this study assessed consumers' PPs for FSC-labeled wood flooring in five major cities of China. It also examined the regional differences in consumers' price premiums and related influencing factors and provided marketing segmentation strategies to expand familiarity with such products. Further, the study explored the effect of PP on product market share.

The findings of this study have significant implications for wood products manufacturers to develop their business strategies regarding the promotion of premium-priced forest-certified products in China. First, a high degree of knowledge regarding the FSC label and high PP estimates indicated that Chinese consumers in major cities have an increased awareness of forest certification and a high intention to purchase such products. To meet consumer demand, wood product producers should adopt forest certification and consider the widespread promotion of certified products as a business strategy. Second, consumer motivation regarding PP for forest-certified products differed by city. This suggests that market campaigns for forest-certified products should be verified in each city. For instance, in Beijing and Shanghai, consumers who have a higher degree of recognition of forest certification are willing to pay a higher PP for those products; therefore, wood products manufacturers there should increase public awareness of the FSC label (Joshi & Rahman 2015, Luo et al. 2017, Wan et al. 2018). Third, consumer PP estimates were negatively associated with income in Chongqing, where consumers had low education levels. This might be affected by Confucius face culture (Jap 2010). Consumers might misunderstand FSC-labeled products as a premium or branded product due to a lack of true understanding of forest certification. However, this negative income effect may not be manifested, since public awareness of forest certification is increasing in China.

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