

## U.S. Secondary Wood Manufacturers are Becoming Larger – are there Implications for Hardwood Sawmills?

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### ABSTRACT

*Previous research has shown that large secondary wood manufacturers request numerous product-related services from their hardwood lumber suppliers. In addition, large secondary manufacturers also source more of their lumber directly from hardwood sawmills than do smaller secondary manufacturers, which tend to purchase more lumber from distributors. Current trends in the U.S. hardwood industry suggest that secondary manufacturers are becoming larger in size and more concentrated (excluding the wood household furniture sector), a reversal of a trend toward smaller size during the Great Recession that started in 2007. Furthermore, many secondary manufacturers have been focusing on reducing input costs in conjunction with more streamlined or lean manufacturing processes. Thus, it might be expected that these manufacturers would be seeking more services from hardwood sawmills regarding their lumber purchases. This notion is consistent with the results from a recent small survey, which indicated that hardwood sawmills are experiencing an increase in the services being requested by their customers. Concurrently, hardwood sawmills in the United States are showing a trend of increasing size and concentration as well, also reversing patterns evident during the Great Recession. Thus, many hardwood sawmills seem well-positioned to provide these extra services. The resource-based view of the firm states that larger firms possess more internal capabilities and resources, which in this case can help sawmills meet the market demand of providing more product-related services to secondary manufacturers.*

### 1. INTRODUCTION

There are several compelling reasons why firms within a given industry tend to grow larger over time. In fact, the growth of the firm over time is the prevalent trajectory within a given economy (Penrose 1995). Some of the reasons for this include the advantages associated with economies of scale and scope, as well as experience effects (Ghemawat 1986). Additionally, the resource-based view (RBV) of the firm is consistent with the notion of firm growth over time and states that larger firms possess more internal capabilities and resources than smaller firms, giving them a competitive advantage (Hoopes et al. 2003). For example, several studies have shown that larger hardwood sawmills are more likely than smaller mills to be exporters (Bumgardner et al. 2016). Other RBV studies have suggested that investment capital and the skills needed to start up and exploit modern technology are resources associated with larger sawmills (Lähtinen et al. 2008).

While large firms generally are most competitive in expanding economies, previous research in the wood products industry has shown that smaller firms might actually have a competitive advantage when markets are declining (Bumgardner et al. 2011). The primary reason for this finding was that small firms (defined in the study as those with fewer than 20 employees) were closer to their customers and thus able to fully customize products when market conditions were difficult. During economic downturns, the inherent advantages associated with being a larger manufacturer are less compelling; for example, large firms have relatively high fixed costs and economies of scale are less favorable when demand contracts.

Given the discussion above, it might be expected that housing-related sectors in the United States (cabinets and millwork) would show a pattern of increasing firm size up to the Great Recession that started in 2007, followed by a period of declining firm size during the recession and associated housing downturn, to a return to growth coming out of the recession. The exception might be the wood household furniture industry, which has not been globally competitive in the United States for a number of years (Lihra et al. 2008; Luppold and Bumgardner 2009). For this sector, employment has been in long-term structural decline.

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As secondary manufacturers grow larger, it might be expected that their manufacturing and supplier needs would change. It has been shown that larger firms in the secondary woodworking industry (20 employees or more) generally request more services from their lumber suppliers than do smaller manufacturers (Buehlmann et al. 2013). Out of the ten services investigated in that study, only S2S (surfacing lumber on two sides) was requested significantly more by smaller firms. Conversely, four of the ten services investigated were requested significantly more by larger firms. This is likely due to the fact that large secondary firms are seeking to reduce input costs in conjunction with more streamlined or lean manufacturing processes (Buehlmann et al. 2013). In addition to requesting more services from their suppliers, large secondary woodworking firms sourced more of their lumber directly from sawmills than did smaller firms, which relied more on distribution yards for their lumber purchasing. Nearly 45% of large firms' lumber purchasing came directly from sawmills, on average, while just 29% of small firms' purchases came directly from sawmills (Buehlmann et al. 2013).

### **1.1 STUDY OBJECTIVES**

The preceding discussion indicates that secondary hardwood manufacturers (except furniture manufacturers) generally would be expected to be growing larger in size (by number of employees) coming out of the Great Recession. For this paper, the recessionary period was expressed in annual terms as lasting from 2007 to 2009; the starting point for the analysis was chosen to be 2003 because another recession ended in 2002 (Luppold and Bumgardner 2016a).

Furthermore, large secondary manufacturers have been shown to require numerous services from their hardwood lumber suppliers and to source much of their hardwood lumber directly from sawmills. Taken together, it would be expected that if U.S. secondary manufacturers are in fact becoming larger, then U.S. hardwood sawmills would be realizing increasing demand for a number of product-related services. These notions were investigated using secondary data and the results from a survey.

## **2. METHODS**

### **2.1 SECONDARY DATA COMPONENT – FIRM SIZE TRENDS**

Data available from the U.S. Bureau of Labor Statistics (2017) was used to determine average firm size from 2001 to 2015 for the following U.S. sectors: wood kitchen cabinet and countertops (North American Industry Classification System [NAICS] 337110), millwork (which includes flooring) (NAICS 32191), nonupholstered wood household furniture (NAICS 337122), and sawmills (NAICS 321113). Firm size was derived by dividing total employment by the total number of firms for each sector for each year. Although other measures of firm size are sometimes used (e.g., annual turnover, annual sales), employment and firm data were readily available from secondary sources and simple to track through time. The resulting value is termed “average” firm size for this paper, even though it was calculated as a ratio rather than a true average (an average would require a list firms and their corresponding number of employees).

For hardwood sawmills, average firm size was calculated using only states with at least 60% of their lumber production in hardwood as discussed in Bumgardner et al. (2016). This was necessary because sawmill employment is not separated by hardwood and softwood mills in the Bureau of Labor Statistics data, so the only way to develop data specific to hardwood lumber is to limit the analysis to primarily hardwood lumber-producing states. Sixteen states were included. Data for wood kitchen cabinets, nonupholstered wood household furniture, and millwork were national in scope since the breakdown of hardwood use by region was not known for these sectors. The latest year for which data was available at the time of the study was 2015.

### **2.2 PRIMARY DATA COMPONENT – CHANGES IN SAWMILL SERVICES**

An internet-based survey was conducted in the winter and early spring of 2016 with members of the National Hardwood Lumber Association (NHLA). Sawmill representatives were invited to visit a website containing a 26-question survey instrument via NHLA and Virginia Tech newsletters (companies were not sent the questionnaire directly). A total of 12 usable questionnaires were returned; the responding mills collectively produced about 210 million board feet (MMBF) of lumber (495,000 cubic meters or  $m^3$ ) in 2015. This figure represented about 2.2% of U.S. hardwood lumber consumption (including exports) in 2014 (Luppold and Bumgardner 2016b). Although the sample size was quite small, the data could be used in conjunction with the secondary data analysis to help understand if the services being requested of hardwood sawmills were increasing.

Most of the mills ( $n=7$ ) reported total hardwood lumber production in the range of 6 to 20 MMBF (14,160 to 47,200  $m^3$ ) in 2015; two mills reported production of less than 6 MMBF and three mills reported production of 21 MMBF (49,560  $m^3$ ) or more. Only 1 responding mill indicated that their production volume was lower in 2015 than in 2011. The respondents were dispersed geographically, with five located in the Midwest, four in the South, and three in the Northeast. Nearly all of the

responding mills ( $n=10$ ) exported hardwood lumber. Only one respondent reported that their average customer was smaller in 2016 compared to five years prior. Conversely, in previous research conducted during the housing downturn, 41% of hardwood sawmills had indicated that their average customer was smaller in size in 2008 than five years prior (Espinoza et al. 2011), which is consistent with the notion that firm size decreases during periods of economic decline.

The main research questions for the present study were: “What services were being requested by your hardwood lumber customers in 2011 and 2015?” and “What services did you offer in 2015?” The response format was to check all that applied from a list of 18 potential product-related services.

### 3. RESULTS

#### 3.1 FIRM SIZE TRENDS

As shown in Figure 1, the expectations based on the the literature review were consistent with firm size trends in the wood kitchen cabinet sector (U.S. Bureau of Labor Statistics 2017). This sector, which remains competitive in the United States, showed a period of growth in average firm size through 2006, followed by a period of declining firm size during the Great Recession, and a return to growth coming out of the recession. The U.S. millwork sector showed a similar overall pattern and is illustrated separately from the other secondary sectors given its larger average firm size (Figure 2). In contrast, the U.S. nonupholstered wood household furniture sector realized a long-term decline in average firm size (Figure 1). Thus, in periods of market decline, whether due to cyclical economic conditions (i.e., the case with the cabinet and millwork sectors), or long-term structural decline (i.e., the case with the wood houeshold furniture sector), it can be seen that firms tend to become smaller. Conversely, they grow larger when markets are expanding (such as the case with cabinets and millwork, pre- and post-recession). It is interesting to note that the year 2015 marked the first time in the data series where the average U.S. cabinet firm was larger than the average U.S. wood household furniture firm (Figure 1).

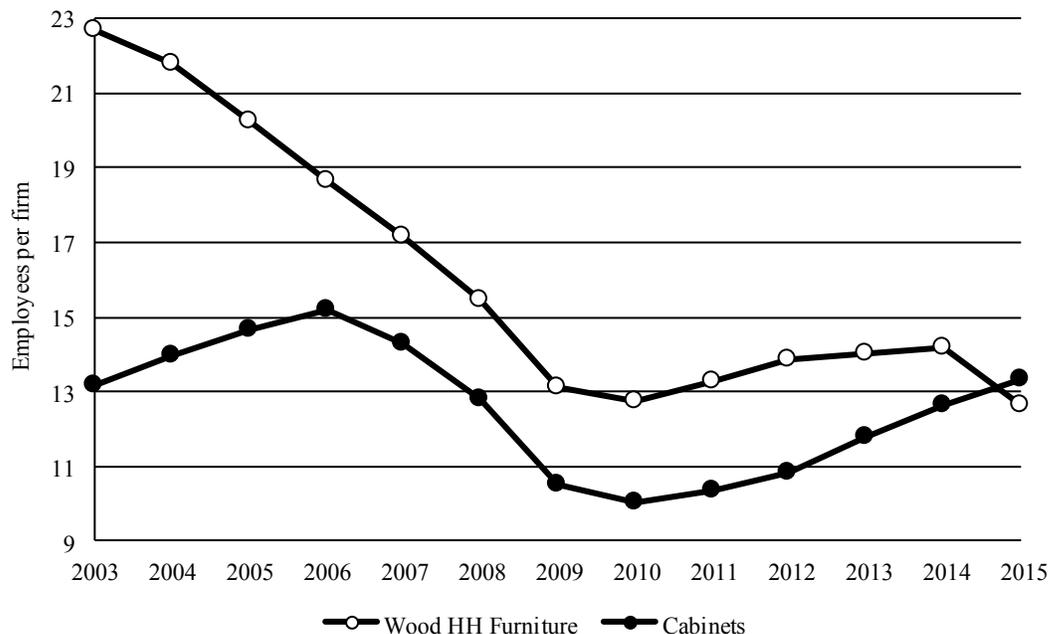


Figure 1: Number of employees per firm for the U.S. nonupholstered wood household (HH) furniture and wood kitchen cabinet sectors (developed from U.S. Bureau of Labor Statistics 2017).

Similar to the U.S. cabinet and millwork sectors, U.S. hardwood sawmills also showed a general trend toward increasing firm size with the exception being during the Great Recession (Figure 3). For hardwood sawmills, firm size growth actually seems to have accelerated since the recession.

### 3.2 CHANGES IN SAWMILL SERVICES

The results of the primary research questions are shown in Table 1. Seven of the listed services were requested of at least half of the responding mills in 2015, including double-end trimming, kiln drying, S2S, special grading, width sorting, quick delivery, and color sorting.

The overall result was that for every responding mill, each service was requested the same or more in 2015 than 2011. Eight of the 18 services (or eight out of 12 services if considering only those services that were requested at least once) showed an increase in the number of mills indicating that they were requested more in 2015 than 2011. Two of these services, special grading and quick delivery, realized double-digit gains in requests over the period. The general trend is consistent with the notion that more services are being requested of hardwood sawmills. Table 1 also shows the percentage of responding mills providing each service in 2015. The levels of services provided generally are close to the percentages being requested in 2015, although several are slightly lower. However, there were two services whose offered percentage was somewhat lower than what was being requested (by double-digits), including S2S and width sorting.

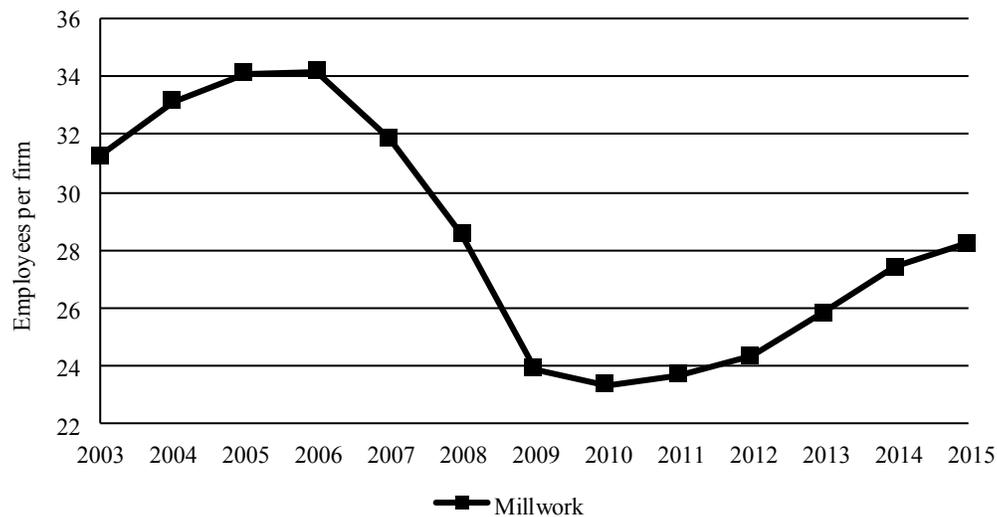


Figure 2: Number of employees per firm for the U.S. millwork sector (developed from U.S. Bureau of Labor Statistics 2017).

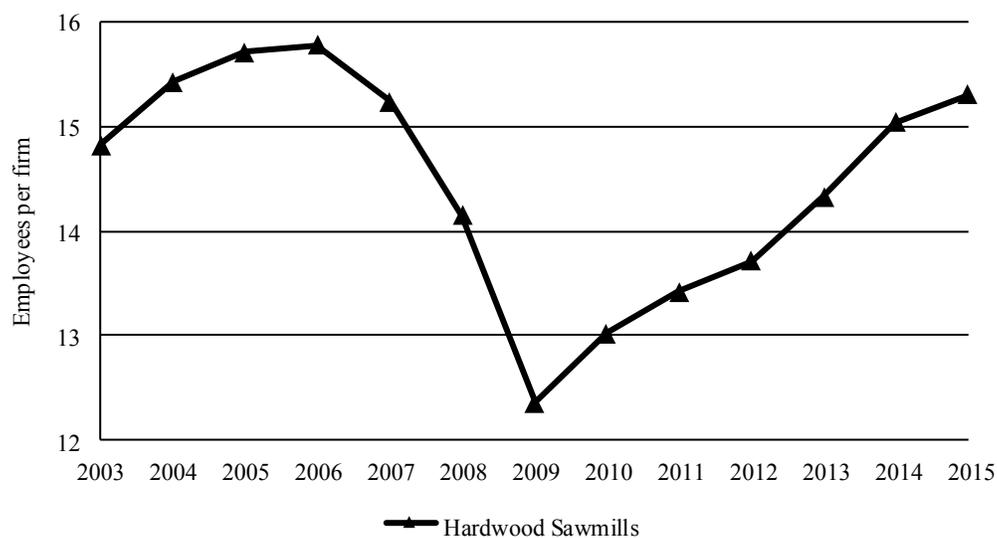


Figure 3: Number of employees per firm for U.S. hardwood sawmills (developed from U.S. Bureau of Labor Statistics 2017).

Respondents also were given space on the questionnaire to respond to an open-ended question asking how their hardwood lumber customers were changing. Several of the comments anecdotally supported the notion that services were becoming increasingly important. For example, one respondent wrote that they were seeing “more specific specifications for widths, lengths, color and grain.” Another indicated their customers were “more inventory conscious” and another respondent that customers were “more demanding.” One respondent wrote, “Our customers continually want high quality, consistent lumber. Price does not drive orders as much as in the past.” Five respondents said they perceived no changes with customers and the remainder ( $n=3$ ) mentioned other changes.

Table 1: Percentage of sawmills ( $n=12$ ) receiving requests from customers for 18 product-related services in 2011 and 2015, and the percentage of those sawmills offering the services in 2015.

Service Requested	Requested 2011 (%)	Requested 2015 (%)	Increased, Equal, or Decreased	Offered 2015 (%)
Double-end trim	83	92	+	92
Kiln drying	75	75	=	83
S2S	58	67	+	50
Special grading	50	67	+	58
Width sorting	58	67	+	50
Quick delivery	42	58	+	50
Color sorting	50	50	=	42
Just-in-time orders	33	42	+	42
Break bundles	17	25	+	33
S4S	17	17	=	17
Custom molding	0	8	+	8
Custom flooring	0	0	=	0
Imported species	0	0	=	0
Profile sanding	0	0	=	0
Priming	0	0	=	0
Embossing	0	0	=	0
Finishing	0	0	=	0
Other (i.e., “phytosanitary heat treat”)	8	8	=	8

#### 4. DISCUSSION

The results of the present study are interesting in that trends in average firm size are consistent with what would be predicted based on theories of the growth of firms. Namely, firms tend to grow larger over time with the exception of periods of market decline. Of the hardwood sectors investigated, only nonupholstered wood household furniture has shown a long-term decline in average firm size. Structural change has reduced the competitiveness of this sector in the United States. Therefore, smaller wood furniture firms are finding niches protected from larger scale production overseas, and “smallness” might actually have become a competitive advantage (Buehlmann et al. 2011). Other major parts of the secondary hardwood industry have realized increasing average firm size since 2010. Similarly, hardwood sawmills have been increasing in size since 2009.

As secondary wood firms grow larger in size, previous research suggests that they can be expected to request more services from their hardwood lumber suppliers. This notion was supported by the present small survey, which showed that several of the services investigated were being requested more frequently in 2015 than in 2011. None were being requested less frequently.

Going forward, sawmills likely will need to be prepared to offer more services to their customers. The RBV, which states that internal capabilities and resources are the main source of competitive advantage for firms, suggests that sawmills will be well-positioned to meet this market demand given that they too show a trend of increasing size over time (outside of the recessionary period). However, S2S and width sorting are services that currently might be under-provided by hardwood sawmills.

## 5. LITERATURE CITED

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## PROCEEDINGS

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