Are There Regional Differences in US Hardwood Product Exports?

Matthew Bumgardner
Scott Bowe
William Luppold

Abstract

Exporting is a critical component of the product mix for many domestic hardwood firms. Previous research has identified factors associated with hardwood lumber exporting behavior, but less is known about the advantages and disadvantages to exporting associated with the region within which a firm is located, or about exporting of secondary hardwood products. A procedure comparing a measure of production (employment) to the level of exporting in three US hardwood regions (based on aggregations of state-level data) was used to contrast regional relative exporting of primary and secondary products. Several factors were then considered as possible explanations for the observed regional differences. Overall, the results suggested that proximity to seaports (i.e., the East Coast) benefited exporting of both hardwood lumber and secondary products, but the impact was greater for lumber. Thus, for secondary products, regional exporting barriers appeared to be lower. Firm size and sawtimber quality and species were additional factors that were associated with regional exporting. Data for individual states provide clues to interstate movement of hardwood products as they make their way to US ports. This influence also is discussed, but such movement makes state-level analysis of exporting difficult.

Exports have been important to the US hardwood industry since the early 1970s with the inception of floating exchange rates (Luppold and Bumgardner 2010). As declines in furniture manufacturing, and more recently housing construction, have taken their toll on demand for hardwood lumber in the United States, exports have taken on even greater importance. Since 2009, exports have been the largest single market for appearance-grade hardwood lumber (Luppold and Bumgardner 2013). Thus, the potential to export becomes an important topic for manufacturers and researchers alike when developing marketing plans and outreach efforts for the hardwood industry. Increased profits and provision of a hedge against domestic economic downturns are among the most important stimuli for firms to export hardwood products (Ifju and Bush 1993).

Studies have shown that many factors can influence exports of US hardwood products, with much of the literature to date focusing on primary products such as logs and lumber. Although there have been findings to the contrary (Ringe et al. 1987), several studies have found firm size to be an important factor associated with hardwood lumber exporting (Hammett et al. 1991, 1992; Ifju and Bush 1993; Dickerson and Stevens 1998; Naka et al. 2009). Other research found a similar result across a sample of primary and secondary hardwood product manufacturers (Gazal and Wang 2012). In these studies, larger firms have been shown to possess several advantages in terms of manufacturing, marketing, financing, and management that help initiate and enable exporting efforts.

The above findings appear to be consistent with a resource-based view of firm competitiveness, where capabilities and resources internal to the firm are the primary sources of competitive advantage (Hoopes et al. 2003). Firm capabilities related to size can include economies of scale and scope, as well as experience effects (Ghemawat 1986). However, another potentially important factor to exporting is regional location, which can offset some of the apparent advantages of firm size and associated internal capabilities. Hoopes et al. (2003) posit that firms operating in a low-cost region can outperform firms outside that region, separate from the firms' relative capabilities. Within the forest sector, endowment of forest resources has been shown to be

The authors are, respectively, Research Forest Products Technologist, USDA Forest Serv., Northern Research Sta., Delaware, Ohio (mbumgardner@fs.fed.us [corresponding author]); Professor and Wood Products Specialist, Dept. of Forest and Wildlife Ecology, Univ. of Wisconsin–Madison (sbowe@wisc.edu); and Economist, USDA Forest Serv., Northern Research Sta., Princeton, West Virginia (wluppold@fs.fed.us). This paper was received for publication in June 2015. Article no. 15-00034.

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positively associated with net exports of wood products at the US state level (Prestemon and Buongiorno 1997).

Transportation costs to markets (i.e., those directly related to length of haul, see Bressler and King 1978) also appear to play an important role in regional hardwood exporting. Wang et al. (2010) discuss the importance of transportation costs to inland-located hardwood exporters in the United States. Luppold et al. (2000) showed that even though Appalachian hardwood sawmills tended to be larger than mills in most other regions of the eastern United States, lumber exports from that region were lower than most other regions. In contrast, exports from the New England region were the highest despite relatively small mill size, which was attributed to proximity to Canada. Overall, these results suggest that transportation costs for exports are a function of distance (costs are higher when ports or markets are farther away) and/or terrain (costs per mile can be expected to be greater, e.g., in mountainous regions) and that these costs might offset other potential advantages such as mill size.

The most common initial transportation mode for hardwood exports from the sawmill or manufacturing facility is truck, whether being shipped directly to the destination market (if in North America), or to an intermodal or other container loading facility in order to be sent by train to a coastal port for exporting overseas. Containers also are often delivered directly to the mill for subsequent loading and transport. Intermodal transportation is defined as involving multiple modes including truck, railroad, or ocean carrier (Intermodal Association of North America [IANA] 2015) and associated with a single rate and handling of a single load unit such as a container (Rodrigue and Slack 2015). Many major US cities are home to some type of intermodal facilities (e.g., rail terminals, container yards) and connected by intermodal rail routes to ocean ports (IANA 2015). While trucks provide flexibility for moving goods early and late in the intermodal process, for longer haul-line transportation (longer than a day's trip of 500 km or about 300 mi), railroads become the preferred mode (Rodrigue and Slack 2015).

Other studies have noted that exporting potential might vary between primary and secondary products. Reasons for this include the inefficiencies associated with movement of non-usable or low-value portions of primary products (water, kerf losses, trimmings, etc.), in contrast to the value added to secondary products through production, design, assembly, packaging, and other functions. In particular, this has been noted for the Great Lakes region, where it has been suggested that the export of secondary products is more economically feasible than that of primary products (Bowe et al. 2008). Luppold et al. (2000) also found that hardwood lumber export volume (i.e., primary products) was relatively low in the Great Lakes region. Given that primary producers tend to be located closer to the forest resource and secondary manufacturers closer to population centers (Aguilar and Vlosky 2006), it seems reasonable that transportation costs play a larger role in the movement of primary products. Bressler and King (1978) described how bulky agricultural products often are produced closer to raw material markets than are more concentrated products.

While previous research suggests that internal firm resources are a key overall contributor to export behavior for US hardwood producers, regional barriers related to transportation costs and raw material quality also likely play a role in the ability of firms to export. In addition, much of the exporting literature to date has focused on primary products. The objective of the present study was to assess regional relative exporting for both primary (lumber) and secondary (furniture and cabinets) hardwood products in the United States and to discern what regional characteristics might be associated with relative exporting levels.

Methods

The purpose of this study was to discern exporting behavior by comparing relative production to relative exports at a regional level (discussed below as a collection of state-level data) for lumber (defined as North American Industry Classification System [NAICS] 321113—Sawmills) and secondary products (defined as NAICS 3371—Household and Institutional Furniture and Kitchen Cabinet Manufacturing). As a baseline for analysis (i.e., assuming no locational differences in exporting), a region's export level would be proportional to its production. For example, if a given region represented 25 percent of the production in NAICS 321113 for the overall study region, it would also represent 25 percent of the exports of hardwood lumber. However, it is difficult to obtain production data at the state level, especially for hardwood lumber. Value of shipments data for NAICS 321113 were available for only five primarily hardwood states (as defined below) in the 2012 Economic Census of the United States (US Department of Commerce [USDC] Census Bureau 2015). Therefore, as a proxy for production, employment in NAICS 321113 was used. For the five states for which value of shipments data were available, the number of employees was highly correlated with shipments ($r = 0.989$) based on the 2012 Economic Census, suggesting employment is a suitable proxy for production.

Once it was determined to use employment data as a proxy for production, it was necessary to obtain employment data from each state. At the specific NAICS level for sawmills (321113), it is not possible to separate hardwood from softwood lumber industry employment. To separate hardwood lumber employment, it becomes necessary to focus on NAICS 321113 data arising from primarily hardwood-producing states. To do this, data from the US Census Bureau's Current Industrial Reports were used, which breaks down lumber production in each state by hardwood and softwood (USDC Census Bureau 2007, 2009). All states along and east of the Mississippi River were analyzed, and only states with at least 60 percent of their lumber production consisting of hardwood at least once between 2006 and 2008 (the data series was discontinued after 2008) were included.[1] By this criterion, states not included in the analysis were Alabama, Arkansas, Florida, Georgia, Louisiana, New Hampshire, Maine, Michigan, Mississippi, North Carolina, South Carolina, Virginia, and Rhode Island. Although this process removed some states from the analysis, it was important to ensure that softwood lumber production was not being counted against hardwood lumber exports. The population of interest for the study thus had an operational definition of states with at least 60 percent of their lumber production in hardwood,

[1] For the four states with missing data for all years from 2006 to 2008, the last year for which data were reported was used as follows: 2002 for Delaware and New Jersey, 2003 for Iowa, and 2005 for Connecticut.

and all such states were included in the analysis. It is a study limitation that some significant hardwood states by volume (e.g., Virginia, North Carolina, Michigan) were by necessity excluded from the analysis because they also had high softwood production.

Employment data for the study states were obtained from the US Department of Labor, Bureau of Labor Statistics (USDL BLS 2015) for NAICS 321113 (hereafter referred to as hardwood lumber) and NAICS 3371 (hereafter referred to as furniture and cabinets), with the exceptions of Delaware and Vermont, which did not have data available (these states therefore also were removed from the analysis). In total, 16 states were included in the analysis (Fig. 1), ranging from 67.6 percent hardwood lumber production for Massachusetts to 100.0 percent hardwood lumber production for Illinois, with an overall average of 89.5 percent for the 16 states.

The states were then grouped into regions to facilitate data analysis and to represent potential differences in regional exporting based on basic geography. Namely, states on or near the Atlantic coast, and at points increasingly inland, were defined to help isolate any potential location effect (Fig. 1). It is clear that some locations are farther from coastal ports than others, and based on the literature review and available secondary data, this was expected to impact relative exports. In 2013, 63 percent (by value) of US hardwood lumber exports left the US from East Coast ports (including all port types, i.e., water, land, and air), while another 20 percent left from West Coast ports, 12 percent left from ports in the Great Lakes, and 5 percent left from ports in the Gulf of Mexico (US Department of Agriculture, Foreign Agricultural Service [USDA FAS] 2015). It is also interesting to note that over 70 percent of the US hardwood lumber leaving from East Coast ports was destined for East Asia and Southeast Asia, suggesting there are ocean transportation advantages compared with overland travel to West Coast ports, and therefore inherent locational advantages (i.e., being closer to ocean ports is an advantage). Rodrigue and Slack (2015) point out that maritime transportation costs have reduced significantly as intermodal transportation systems have developed (e.g., through economies of scale associated with larger ships), but land transportation costs remain significant because of diseconomies (e.g., congestion due to increased numbers of containers).

For exporting, data for NAICS 321113 (value basis) were obtained from USDA FAS (2015). Although these data are specific to hardwoods, an important limitation is that state-level data do not necessarily represent production origin; they also can sometimes represent the state from which the product was concentrated for export, or the location where the export transaction was arranged (USDA FAS 2015). The data were analyzed, and the results are discussed, with this limitation in mind. For NACIS 3371, data were obtained from the US Department of Commerce, International Trade Administration (USDC ITA 2015). For this data series, a limitation is that a percentage of the overall US export value was classified as ''unallocated'' to any state in the source data, accounting for approximately 15 percent of the total NAICS 3371 export value in 2013. Assuming this amount is distributed proportionally among the states, it would have little bearing on the results. Finally, a 5-year average (2009 to 2013) was used for each state for both values (employment and exports) to account for any potential idiosyncratic single-year extremes in the data. At the time of the study, 2013 was the latest year for which state-level employment data were available.

For each region, the percentage of total employment and the percentage of total hardwood lumber export value within the study area were determined. The difference in these two percentages was the relative export measure for the region. The same process was then followed for secondary product employment and exporting. For each product type, if a region's relative exports were higher than its relative employment, the score was positive; if relative employment was higher than relative exports, the score was negative.

The regions were then further analyzed for characteristics such as relative firm size, export markets served, and sawtimber quality to assess possible reasons for relative export differences, beyond distance from coastal ports. Regional hardwood resource quality was evaluated in two

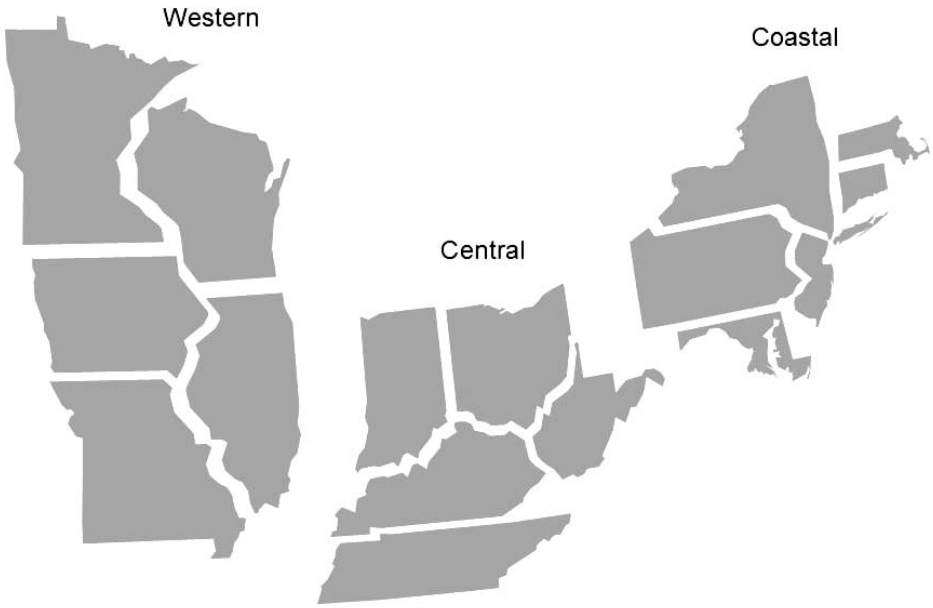

Figure 1.—Categorization of states by region for hardwood export analysis.

ways. First, the proportion of hardwood sawtimber volume in tree grade 2 or higher in each region was assessed; tree grade 2 was used as a measure of quality because it was assumed that No. 1 Common hardwood lumber could be produced in reasonable quantities from this resource base. Wang et al. (2010) found that most exported hardwood lumber is Grade 1 Common or higher. According to data from Hanks (1976), the yield of No. 1 Common and higher lumber emulating from tree grade 2 ranges from 32.5 percent for white oak (*Quercus alba* L.) to 58.5 percent for northern red oak (*Quercus rubra* L.). These yields drop to 16.6 and 28.4 percent, respectively, for tree grade 3. Second, the proportion of oak (*Quercus* spp.) sawtimber volume in tree grades 1 and 2 was assessed; 41 percent of US hardwood lumber exports by value were oak in 2013, with the second-place species yellow-poplar (*Liriodendron tulipifera* L.) dropping to 14 percent of the total (USDA FAS 2015).

Results and Discussion

Regional exports

For the hardwood lumber analysis, Table 1 shows the number of employees, export value, and relative exports for each study region. The Coastal Region scored highest on relative exports (+19.2), followed by the Central Region (–6.7) and the Western Region (–12.5). For the secondary product analysis, Table 2 shows similarly that the Coastal Region scored highest on relative exports (+6.9), again followed by the Central Region (–1.1) and the Western Region (–5.9). Thus, the notion that exporting is enhanced when located closer to ports was supported for both product types, although the effect seems greater for hardwood lumber given the larger range in scores. The notion that exports of primary products especially are more difficult for inland-located states (owing to higher transportation costs relative to value) was supported.

Tables 1 and 2 also show relative exports for the states composing each region, which provides additional insights and also reveals some of the potential data limitations previously discussed. For example, Maryland scored somewhat lower than the other states in the Coastal Region for hardwood lumber exports, and conversely, New York scored much higher than any other study state, even in the Coastal Region. This could in part reflect some interstate movement of hardwood lumber, with New York being the second-largest US port for hardwood lumber exports, Buffalo the eighth, and Ogdensburg the 12th (Table 3). It is difficult to know for certain, but perhaps some of the lumber exported from Maryland leaves through, or is arranged in, New York (and is counted toward New York), even though Baltimore also is an important port for hardwood lumber exports (Table 3). Another example was evident in the Central Region, where two states, Ohio and Tennessee, scored positively and much higher than the other states in the region. This could reflect the presence of large intermodal facilities or other points of collection in these states for mills in these and nearby states. A final example, from the Western Region, is Illinois and Minnesota, which also scored somewhat higher than other states in the region and might reflect concentration points for products going either to the East or West Coast from nearby states. For instance, with a single intermodal rail facility in the state (IANA 2015), some portion of the lumber exports originating in Wisconsin might be counted toward exports departing from cities such as Chicago (and then shipping to either East or West Coast ports) or Minneapolis (likely going to

Table 1.—Number of employees, export value, and relative exports for hardwood lumber (North American Industry Classification System 321113) by region and state based on 5-year averages for 2009 to 2013.

	No. of employees[a]	% of total employees	Export value ($000)[b]	% of total export value	Relative exports[c]
Coastal	5,982	29.6	372,556	48.8	+19.2
Connecticut	152	0.8	8,200	1.1	+0.3
Maryland	524	2.6	6,898	0.9	−1.7
Massachusetts	159	0.8	7,691	1.0	+0.2
New Jersey	42	0.2	5,978	0.8	+0.6
New York	1,527	7.5	192,044	25.2	+17.7
Pennsylvania	3,578	17.7	151,745	19.9	+2.2
Central	9,333	46.1	300,867	39.4	−6.7
Indiana	1,284	6.3	36,157	4.7	−1.6
Kentucky	2,280	11.3	38,407	5.0	−6.3
Ohio	1,319	6.5	77,138	10.1	+3.6
Tennessee	2,561	12.7	101,993	13.4	+0.7
West Virginia	1,889	9.3	47,172	6.2	−3.1
Western	4,927	24.3	89,996	11.8	−12.5
Illinois	324	1.6	12,548	1.6	0.0
Iowa	397	2.0	6,990	0.9	−1.1
Minnesota	340	1.7	10,376	1.4	−0.3
Missouri	2,128	10.5	28,234	3.7	−6.8
Wisconsin	1,738	8.6	31,848	4.2	−4.4
Total	20,242	100.0	763,419	100.0	0.0

[a] Data source: US Department of Labor, Bureau of Labor Statistics (2015).
[b] Data source: US Department of Agriculture, Foreign Agricultural Service (2015).
[c] Range of regional relative exports = 31.7.

Table 2.—Number of employees, export value, and relative exports for furniture and cabinets (North American Industry Classification System 3371) by region and state based on 5-year averages for 2009 to 2013.

	No. of employees[a]	% of total employees	Export value ($000)[b]	% of total export value	Relative exports[c]
Coastal	23,122	26.9	379,370	33.8	+6.9
Connecticut	1,445	1.7	10,380	0.9	−0.8
Maryland	1,316	1.5	38,335	3.4	+1.9
Massachusetts	1,756	2.0	30,500	2.7	+0.7
New Jersey	2,698	3.1	68,661	6.1	+3.0
New York	6,435	7.5	135,118	12.1	+4.6
Pennsylvania	9,472	11.0	96,376	8.6	−2.4
Central	33,253	38.7	421,695	37.6	−1.1
Indiana	13,112	15.3	158,709	14.2	−1.1
Kentucky	1,987	2.3	17,322	1.5	−0.8
Ohio	10,364	12.1	173,312	15.5	+3.4
Tennessee	6,655	7.7	71,612	6.4	−1.3
West Virginia	1,135	1.3	740	0.1	−1.2
Western	29,604	34.4	320,049	28.5	−5.9
Illinois	6,324	7.4	99,916	8.9	+1.5
Iowa	3,293	3.8	28,737	2.6	−1.2
Minnesota	5,666	6.6	40,488	3.6	−3.0
Missouri	4,194	4.9	27,715	2.5	−2.4
Wisconsin	10,127	11.8	123,193	11.0	−0.8
Total	85,979	100.0	1,121,114	99.9[d]	−0.1

[a] Data source: US Department of Labor, Bureau of Labor Statistics (2015).
[b] Data source: US Department of Commerce, International Trade Administration (2015).
[c] Range of regional relative exports = 12.8.
[d] Columns may not sum to 100 percent (or zero) because of rounding.

West Coast ports). It has been noted (Rodrigue et al. 2015) that Chicago has become the largest intermodal center in North America because of its position at the junction of eastern and western US and Canadian rail systems.

Table 3.—Top 10 US Customs Districts for exports of all temperate hardwood species, oak, and maple, 2013 (US Department of Agriculture, Foreign Agricultural Service 2015).

	Total hardwood lumber exports		Lumber exports (rank)	
Customs District[a]	Value ($000)	Rank	Oak	Maple
Norfolk, VA	325,574	1	1	8
New York, NY	282,086	2	2	1
Savannah, GA	184,469	3	3	—[b]
Charleston, SC	151,874	4	4	—
Los Angeles, CA	139,178	5	6	—
Seattle, WA	137,522	6	—	2
Baltimore, MD	103,298	7	5	—
Buffalo, NY	70,138	8	8	5
Charlotte, NC	62,305	9	—	—
San Diego, CA	61,241	10	10	3
Mobile, AL	45,254	—	7	—
Ogdensburg, NY	45,100	—	—	6
Duluth, MN	43,187	—	9	9
Detroit, MI	40,480	—	—	10
Pembina, ND	30,797	—	—	4
Laredo, TX	27,069	—	—	—
El Paso, TX	15,279	—	—	—
Portland, ME	14,573	—	—	7

[a] A total of 33 Customs Districts reported temperate hardwood lumber exports in 2013; the top 10 overall Districts shown above accounted for 82.0 percent of the total.
[b] — = not ranked in top 10.

Table 3 shows the top 10 US Customs Districts for hardwood lumber exports for all temperate species, as well as oak and maple (*Acer* spp.) specifically (USDA FAS 2015). A Customs District is named for the city in which it is headquartered and includes all of the ports (including road, rail, ocean, and air) associated with the District. These results confirm the importance of East Coast ports to US hardwood lumber exports and the inherent transportation advantages for mills located nearer the coast. Only one port in the overall top 10 was located in the Great Lakes region (Buffalo), although Duluth also was in the top 10 for both oak and maple.

The results in Table 3 also reveal patterns suggestive of regional exporting characteristics. For example, maple exports seem to be overrepresented in West Coast ports (the second- and third-largest ports for maple were Seattle and San Diego even though the overall rankings for these ports was sixth and tenth, respectively). Pembina, North Dakota, also was a major port for maple but somewhat lower in the overall rankings. This likely suggests that exports from the Western Region, where maple is more prevalent than in other regions (and thus an indicator of export flows from this region), often is shipped west across the inland United States (or Canada) to be exported to Asian or Canadian destinations. Overall, maple exports were more dispersed across ports than were oak exports; the top three oak ports accounted for 50.3 percent of total oak exports, while the top three maple ports accounted for 36.4 percent of total maple exports. While oak exports closely followed overall exports across the major ports, it was interesting that the port at Mobile was the seventh largest for oak exports, even though it was not in the top 10 overall. This suggests that Mobile is an important terminal for oak exports from the south-central United States, and

likely the Central Region of the current study to some extent.

Industry structure, export markets, and forest resources by region

As discussed in the Introduction, firm size (and associated internal capabilities) and forest resources generally are thought to be positively related to lumber exporting behavior. Thus, a possible reason for regional differences in exporting could involve the firm size and resource characteristics of a given region. As shown in Table 4, for NAICS 321113, the Western Region had the smallest firm size ratio (employees per establishment), which could be a further disadvantage (beyond location) for hardwood lumber exporting there. For NAICS 3371, the smallest firms, on average, were in the Coastal Region, which also had the highest relative exports. Average firm size was larger in the Western Region, and especially in the Central Region. Thus no clear pattern emerged in terms of secondary product exporting and firm size. Another consideration for regional differences in relative exporting, particularly for primary products, involves the quality of the available sawtimber resource. As shown in Table 4, the Western Region also had the smallest percentage of hardwood sawtimber volume in tree grades 1 and 2, as well as the smallest percentage of oak sawtimber in tree grades 1 and 2, which could serve as further disadvantages to exporting hardwood lumber.

A final consideration for regional exporting involves markets served, which also provides clues of product flows. For hardwood lumber exports, nearly half of the total went to Asian markets, and this was consistent across all study regions (Table 5). The most discernable regional difference in hardwood lumber exports was with the Central Region, which sent proportionally more to Europe and less to Canada than the other regions. In particular, Kentucky and Tennessee sent very low proportions of their lumber exports to Canada (6.8% and 1.8%, respectively, corresponding to rankings of 14th and 16th out of the 16 states). Conversely, these states were the first- and fourth-largest proportional exporters to Europe (31.1% and 25.6%, respectively).

For secondary products, most exports went to Canada, especially from the Central and Western regions (Table 5). The Coastal Region sent somewhat more proportionally to Europe than the other regions, driven in part by New York and Massachusetts, which were the top- and third-ranked proportional exporters to Europe (40.1% and 34.8% of all exports from New York and Massachusetts went to Europe, respectively). Conversely, just 24.7 percent of New York's exports went to Canada, ranking it last among the study states. Similarly, Connecticut and Massachusetts were ranked 14th and 15th in secondary product exports to Canada.

Table 4.—Resource and firm characteristics by region, based on 5-year averages for 2009 to 2013.

Region	Firm size ratio[a]		% sawtimber in grades 1 & 2	
	NAICS 321113	NAICS 3371	Hardwood[b]	Oak[c]
Coastal	13.8	10.9	47.0	17.7
Central	15.2	23.7	43.5	17.7
Western	10.4	15.7	32.2	13.8

[a] Defined as the number of employees divided by the number of establishments (US Department of Labor, Bureau of Labor Statistics 2015). NAICS = North American Industry Classification System.

[b] On timberlands (US Department of Agriculture, Forest Service [USDA FS] 2015).

[c] On timberlands, includes all select and other red and white oak (USDA FS 2015).

Table 5.—Regional breakdown of export value by product and world destination, based on the 5-year average for 2009 to 2013.

Product and region	Canada (%)	Europe (%)	Asia (%)	Rest of world (%)
Hardwood lumber[a]				
Coastal	24.4	17.9	48.7	9.0
Central	17.0	24.4	50.2	8.3
Western	24.5	20.2	47.2	8.1
Overall study area	21.5	20.7	49.1	8.6
Furniture and cabinets[b]				
Coastal	42.9	23.9	8.7	24.5
Central	59.8	10.5	7.3	22.5
Western	56.5	13.1	7.3	23.1
Overall study area	53.1	15.8	7.8	23.3

[a] Data source: US Department of Agriculture, Foreign Agricultural Service (2015).

[b] Data source: US Department of Commerce, International Trade Administration (2015).

Summary and Conclusions

The growing importance of exports to the US hardwood industry makes it useful to better understand exporting potential from different regions of the United States. Consistent with expectations developed from past literature, this analysis confirmed that relative exporting for primary and secondary hardwood products differs by regions in the United States and that there generally is more regional parity in exporting secondary products. More inland regions of the United States seemingly face greater disadvantages to exporting primary products in particular, likely due to longer haul distances to ocean ports and the associated higher transportation costs relative to product value. Canada was the most important destination for secondary product exports from the overall study area, suggesting that proximity to market is a factor generally beneficial to exporting. This was especially true for the Coastal and Western regions. However, for hardwood lumber, Asia has replaced Canada to become the most important US export destination, which can be disadvantageous to regions that face longer overland travel distances to reach ocean ports.

An analysis of the top exporting US ports for hardwood lumber, and the species exported from these ports, shows possible trade patterns for individual regions of the United States. For example, it appears that a major route for maple from the Western Region involves shipping to ports on the West Coast. However, a limitation of the data used in this study is that exports are not always attributed to the states from which they originate. Conducting the analyses at regional levels helps alleviate this issue. But even within the regions, patterns among individual states suggest the states from which exports are often ultimately leaving the regions—either directly from ocean ports (in the Coastal Region) or from concentration points such as intermodal facilities where exports are then shipped to ocean ports.

Even for states somewhat close to coastal ports, such as West Virginia, limited in-state access to intermodal facilities might play a role in relative exporting directly and/or indirectly impact the data for exports originating from the state. Conversely, states such as Ohio and Tennessee, with relatively high sawtimber quality and large mill size (Table 4) and major intermodal centers, can show strong relative exporting and likely also serve as concentration points for exports from nearby states. It is unknown from this work how large of a factor interstate movement is in influencing state-level export data. While data patterns uncovered in this study suggest such influences, it also is true that all of the study states showed export volume going to each of the major markets shown in Table 5. Perhaps future work could assess these movements in more detail.

Many other factors beyond location also could influence regional exports. The Western Region was found to have a lower percentage of higher-grade sawtimber overall, a lower percentage of higher-grade oak sawtimber specifically, and smaller sawmills on average than the other regions. These all might serve as further limitations to exporting. Some states likely are home to large local markets for hardwoods that might limit exports, such as the barrel and stave industries in Kentucky and Missouri. Additionally, these were the first- and third-largest proportional exporters to Europe, which perhaps corresponds to increasing cooperage exports from the United States to Europe (Luppold and Bumgardner 2014). While several factors affecting regional hardwood exports were considered here, this work is best viewed as exploratory given the somewhat coarse nature of the available secondary data. However, the results generally conformed to expectations as developed from the existing literature. Further research could expand on the findings from this study, perhaps including such factors as exporting assistance.

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