

# CHANGES IN U.S. HARDWOOD LUMBER EXPORTS, 1990 TO 2008

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**Abstract.**—The volume of hardwood lumber exported from the United States grew by 63 percent between 1990 and 2006 before decreasing by 29 percent between 2006 and 2008. Canada is both the largest export market for U.S. hardwood lumber and the largest source country for hardwood lumber imported into the United States. In the last 19 years China/Hong Kong has displaced Japan as the second most important export market for U.S. lumber. Nearly 60 percent of the hardwood lumber exported in 1990 was red or white oak, but exports of these species had decreased by 32 and 22 percent, respectively, by 2008. By contrast, exports of yellow-poplar, black walnut, and maple have increased by 252, 242, and 141 percent, respectively. In 1990, exports accounted for 6.8 percent of domestic production compared to 9.8 percent in 2008. However, the export of individual species as a percentage of domestic production varies widely. The change in export trading partners and the species exported between 1990 and 2008 is the result of a shift of secondary hardwood manufacturing capacity from the United States to China/Hong Kong, Mexico, and Vietnam, and changes in furniture fashion trends from open-grained to closed-grained species.

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## INTRODUCTION

The volume of hardwood lumber exported from the United States grew by 63 percent between 1990 and 2006 but decreased by 29 percent between 2006 and 2008 (Fig. 1). During this period Canada has consistently been the largest export market for U.S. hardwood lumber, but volumes shipped to other trading partners have changed considerably. In 1990 exports to Japan and Taiwan were the second and third most important markets for U.S. hardwood lumber, respectively, and European demand accounted for 35 percent of the export market (Fig. 1). By 2008, China, Japan, and other Asian nations accounted for 35 percent of U.S. exports while Europe accounted for 20 percent (Fig. 1). China/Hong Kong<sup>2</sup> was the second most important market after Canada (Table 1).

As hardwood lumber exports have grown, the species exported have changed. Nearly 60 percent of the lumber exported in 1990 was red oak (*Quercus rubra* L.) or white oak (*Q. alba* L.); red oak was the most commonly exported product (Table 2). The volume of lumber exported as a percentage of domestic hardwood lumber production increased by nearly 70 percent between 1990 and 2006 but decreased by 2008 (Table 3). In 2008 exports were second only to the kitchen cabinet industry in the volume of graded hardwood lumber consumed (Hardwood Market Report 2009). The fact that most of the lumber that is exported is kiln-dried means that the value of export sales rivals the value of lumber sold to the kitchen cabinet industry.

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<sup>2</sup>We treat China and Hong Kong as one market in this study because most of the lumber entering Hong Kong is shipped to mainland China.

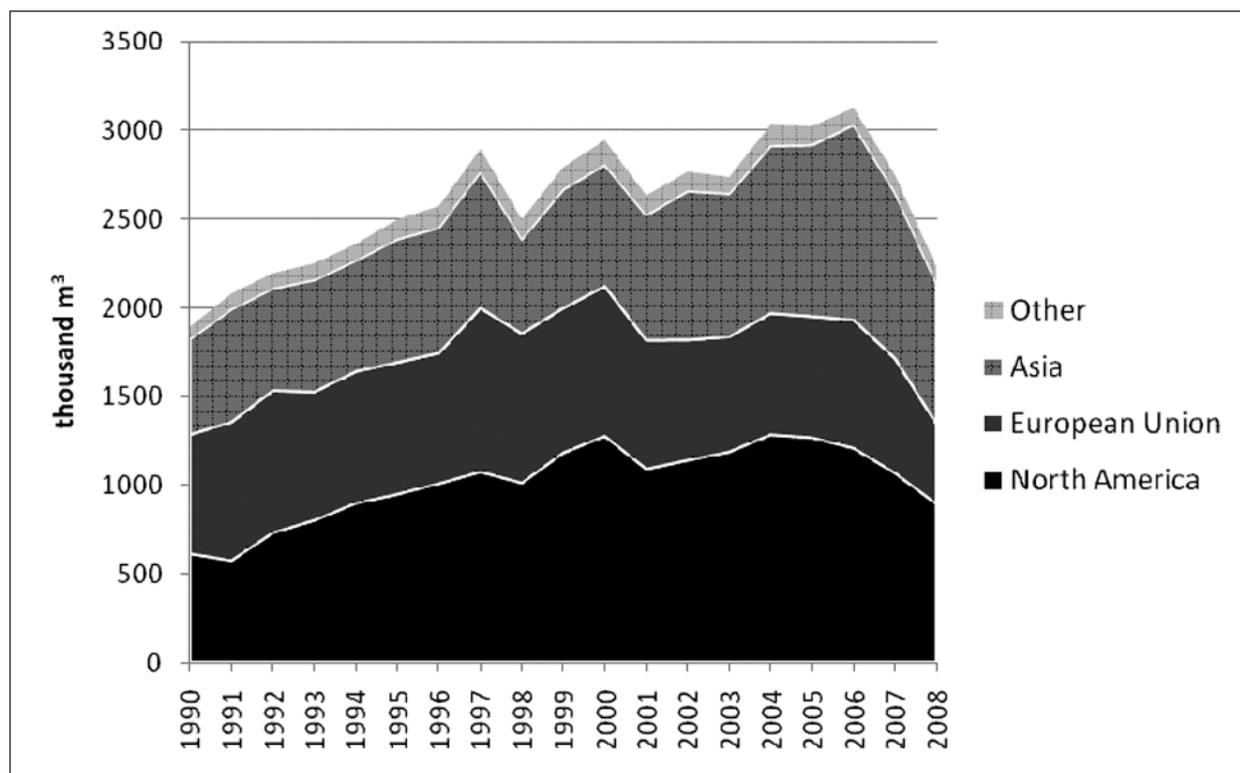


Figure 1.—U.S. hardwood lumber exports to major world regions (USDA FAS 2009).

Because exports have become a major market for hardwood lumber, it is important that we understand changes that have occurred in this market in terms of individual species, trading partners, and the reasons for these changes. It also is useful to understand the importance of exports as a percentage of domestic production for specific species or species groups. The objective of this paper is to review changes in hardwood lumber export by species and country, and to examine changes in exports as a percentage of domestic hardwood lumber production.

## METHODS

We analyzed changes in Canadian and U.S. trade, given the mutual importance of this trade relationship. We then examined changes in the species exported and destination of hardwood lumber exports from the United States. These analyses were made for four time intervals (1990 to 1997, 1997 to 2001, 2001 to 2006, and 2006 to 2008) and utilized data developed from the U.S. Department of Agriculture, Foreign Agricultural Service (USDA FAS) (2009) and U.S. Department of Commerce (USDC), Census Bureau (2000 to 2009). These intervals represent periods of increasing and decreasing levels of export activity (Fig. 1). By examining changes between these intervals, we could determine the direction and speed of shifts and changes in lumber exports for the various hardwood species.

## RESULTS

### U.S.-CANADIAN HARDWOOD TRADE

While Canada has been the largest market for U.S. hardwood lumber exports, it also has been the largest source country for U.S. hardwood lumber imports (Table 4). Between 1990 and 2008, 80 to 90 percent of the lumber imported by the United States from Canada consisted of unspecified species, maple (*Acer* spp.),

**Table 1.—Top three export markets for major hardwood species in 1990, 1997, 2001, 2006, and 2008.\***

Species	Year	Rank 1		Rank 2		Rank 3	
		Country	%	Country	%	Country	%
Red oak	1990	Canada	41.8	Taiwan	17.5	Japan	10.2
	1997	Canada	54.0	Mexico	9.7	Taiwan	8.2
	2001	Canada	54.9	China/HK	12.1	Mexico	9.0
	2006	Canada	55.4	China/HK	22.1	Mexico	10.1
	2008	Canada	55.1	China/HK	21.1	Mexico	9.3
White oak	1990	Canada	12.9	U.K.	11.0	Spain	10.2
	1997	Spain	18.8	Canada	12.5	Japan	9.5
	2001	Spain	27.5	Canada	14.5	U.K.	8.1
	2006	Spain	16.5	Canada	15.9	China/HK	10.9
	2008	Canada	19.5	China/HK	13.9	Spain	10.9
Yellow-poplar	1990	Japan	40.3	Italy	33.9	U.K.	6.0
	1997	Italy	33.4	Japan	16.6	Mexico	16.3
	2001	China/HK	30.6	Italy	25.8	Mexico	17.6
	2006	China/HK	36.7	Italy	18.9	Mexico	8.6
	2008	China/HK	25.8	Vietnam	23.2	Italy	17.6
Maple	1990	Canada	41.2	Japan	15.1	Taiwan	11.5
	1997	Canada	40.0	Korea	7.4	China/HK	6.8
	2001	Canada	56.8	China/HK	10.9	Mexico	6.4
	2006	Canada	55.4	Mexico	22.1	China/HK	10.1
	2008	Canada	55.3	China/HK	13.3	Mexico	12.4
Red alder	1990	Japan	42.4	Italy	17.5	Taiwan	15.4
	1997	Germany	33.7	Italy	16.1	Taiwan	12.7
	2001	China/HK	34.7	Italy	13.1	Mexico	10.1
	2006	China/HK	42.7	Mexico	16.2	Canada	13.8
	2008	China/HK	41.3	Italy	15.2	Mexico	12.4
Ash	1990	Japan	35.8	Canada	22.0	U.K.	15.5
	1997	Canada	30.3	Japan	18.4	U.K.	10.7
	2001	Canada	27.3	China/HK	15.6	U.K.	14.8
	2006	Canada	23.2	China/HK	19.0	Italy	8.4
	2008	Canada	21.4	China/HK	21.2	U.K.	7.9
Walnut	1990	Japan	21.2	Canada	19.8	Italy	17.8
	1997	Canada	30.3	Italy	19.5	Taiwan	9.9
	2001	Canada	31.4	China/HK	22.4	Italy	11.0
	2006	Canada	36.8	China/HK	13.8	Japan	5.3
	2008	Canada	48.6	China/HK	9.2	Japan	5.8
Cherry	1990	Canada	28.9	Japan	15.6	Taiwan	8.6
	1997	Canada	31.3	Japan	8.5	Italy	7.2
	2001	Canada	34.5	China/HK	14.3	Mexico	7.1
	2006	Canada	29.5	China/HK	20.6	Mexico	9.3
	2008	Canada	31.2	China/HK	20.6	Mexico	9.0
Total	1990	Canada	28.9	Japan	15.6	Taiwan	8.6
	1997	Canada	31.3	Japan	8.5	Italy	7.2
	2001	Canada	34.5	China/HK	14.3	Mexico	7.1
	2006	Canada	29.5	China/HK	20.6	Mexico	9.3
	2008	Canada	31.2	China/HK	20.6	Mexico	9.0

\*Source: USDA FAS (2009).

**Table 2.—Volume of U.S. hardwood lumber exported by species in 1990, 1997, 2001, 2006, and 2008.\***

Species	1990	1997	2001	2006	2008
	thousands of cubic meters				
Red oak	600.1	649.0	548.6	486.5	407.3
White oak	526.0	665.3	537.8	602.7	412.6
Yellow-poplar	107.0	203.8	224.5	388.1	376.8
Maple	97.9	390.8	364.8	404.4	235.7
Red alder	103.0	302.7	187.1	259.2	157.3
Ash	140.3	151.7	130.6	180.1	135.7
Walnut	22.4	19.7	60.4	95.9	76.4
Cherry	47.3	112.3	159.6	164.5	73.9
Other†	244.2	397.9	419.0	541.8	353.7
<b>Total</b>	<b>1,895.8</b>	<b>2,893.3</b>	<b>2,632.4</b>	<b>3,123.1</b>	<b>2,229.4</b>

\*Source: USDA FAS (2009).

†Includes birch, hickory, beech, tropical, and unspecified species.

**Table 3.—Volume of U.S. hardwood lumber exported as a percentage of domestic lumber production by species in 1990, 1997, 2001, 2006, and 2008.\***

Species	1990	1997	2001	2006	2008
	percent				
Red oak	6.7	6.8	6.0	5.6	5.6
White oak	13.1	14.9	12.7	14.1	10.6
Yellow-poplar	3.2	4.5	5.5	9.4	10.0
Maple	3.6	11.7	10.6	11.8	8.5
Red alder	7.7	18.1	11.0	16.3	11.8
Ash	13.4	16.4	16.2	21.3	18.9
Walnut	12.8	16.4	30.7	31.4	30.1
Cherry	5.7	12.0	17.1	15.8	9.7
<b>All species</b>	<b>6.8</b>	<b>9.9</b>	<b>9.5</b>	<b>11.5</b>	<b>9.8</b>

\*Developed from USDA FAS (2009), USDC Bureau of the Census (1991 to 1999), USDC Census Bureau (2000 to 2009), and Luppold and Bumgardner (2008). Volume of lumber reported by Census as not specified by kind and as mixed hardwood were allocated to the various reported species by the proportion they were produced relative to one another. Alder was assumed to be two-thirds of western production.

**Table 4.—Canadian imports, exports, and re-exports of hardwood lumber to the United States, Western Europe, and other countries.\***

Item	1990	1997	2001	2006	2008
	thousands of 1982 U.S. dollars				
<b>Imports from:</b>					
U.S.	149.2	185.5	206.5	199.9	155.5
Europe	0.2	0.4	0.5	1.3	1.6
Other	5.7	5.5	9.2	13.8	15.7
<b>Total</b>	<b>155.1</b>	<b>191.4</b>	<b>216.2</b>	<b>215.0</b>	<b>172.8</b>
<b>Exports to:</b>					
U.S.	36.9	101.2	142.9	137.2	60.4
Europe	82.9	104.8	85.1	57.6	35.0
Other	15.6	38.4	23.7	51.0	42.5
<b>Total</b>	<b>134.4</b>	<b>244.4</b>	<b>251.7</b>	<b>245.8</b>	<b>137.9</b>
<b>Re-exports to:</b>					
U.S.	0.3	0.2	1.7	2.2	1.6
Europe	51.4	13.4	5.7	1.0	0.1
Other	4.2	1.4	0.6	1.0	0.2
<b>Total</b>	<b>55.9</b>	<b>15.0</b>	<b>8.0</b>	<b>4.2</b>	<b>1.9</b>

\*Source: Industry Canada (2009).

and birch (*Betula* spp.). Red oak has consistently been the most important species exported from the United States to Canada, but the second most important species has varied over time from white oak in 1990 to maple species, starting in 1994 and continuing through 2008.

Re-exports represent products shipped to one country then reshipped to a third country without having any value added. Nearly one-third of the lumber exported to Canada in 1990 was re-exported to Europe (Table 4) with half of the re-exports being oak species. The reason for these re-exports included long-term relationships between Canadian and European traders and possibly lower shipping costs from the port of Quebec in the early 1990s. By 1997, re-exports to Europe had declined by nearly 75 percent and had all but disappeared by 2008.

If green lumber is shipped to Canada and then dried before being reshipped to another country, it is considered an export and not a re-export. Because of this definition, the volume of U.S. lumber exported to Canada that is dried or remanufactured then reshipped to the United States or other countries is not known. However, it appears that such reshippments do occur because the United States imports lumber of species not commonly found in Canada, including yellow-poplar (*Liriodendron tulipifera* L.), white oak, hickory (*Carya* spp.), and black walnut (*Juglans nigra* L.).

## THE OAKS

In 1990, red oak accounted for nearly 32 percent of hardwood exports and 70 percent of this material was shipped to Canada, Taiwan, or Japan (Table 1). The volume of red oak exported in 1990 amounted to 6.7 percent of domestic production of red oak on a volume basis (Table 3). Canadian demand was associated with furniture and cabinet production (Armstrong and others 1993). Taiwan imported red oak to produce furniture and other secondary products for export primarily to the United States, while Japan's demand for U.S. red oak appeared to be for the production of products consumed within that country (USDC, International Trade Administration 2009).

Between 1990 and 1997 red oak exports increased in absolute terms but decreased in relative terms because of increased exports of most other hardwood species (Table 2). While exports to Canada increased, exports to Taiwan and Japan declined by 50 and 70 percent, respectively. The decline in exports to Taiwan was apparently the result of reduced furniture production in this country as exhibited by the decline in furniture imports from Taiwan to the United States (USDC, International Trade Administration 2009). The decline in Japanese demand was in part the result of the prolonged recession in that country, which started during the 1990s and continues in the Japanese housing market today. Mexico was the second largest purchaser of red oak in 1997, and like Taiwan, most of the products manufactured from this material were exported back to the United States. What was largely unnoticed between 1990 and 1997 was the tenfold increase in exports to Hong Kong and China as Taiwan's furniture industry slowly shifted manufacturing to mainland China (USDA FAS 2009).

Between 1997 and 2001 red oak exports declined by 15 percent, which was greater than the 9 percent decrease in total exports during the period. During this time, exports to Taiwan decreased by nearly 70 percent. By contrast, exports to China/Hong Kong increased by 37 percent as the Asian furniture industry continued to migrate from Taiwan to mainland China. However, total exports of red oak to Asia decreased during this period as maple and other closed-grain species displaced red oak in the U.S. furniture market.

By 2006 red oak accounted for only 16 percent of hardwood lumber exports. In 2008 red oak exports were distributed among three major markets, Canada, China/Hong Kong, and Mexico (Table 1).

White oak was the second most important species exported from the United States in 1990 and accounted for 28 percent of the market in that year. As demonstrated in Table 1, the market for white oak is considerably more diffuse than the market for red oak; the top three trading partners account for 34 percent of the total market. While Canada imported a slightly greater volume of white oak than the United Kingdom and Spain, Europe collectively accounted for 36 percent of export markets for this species in 1990 (USDA FAS 2009). Most of the white oak shipped to Europe is used for appearance applications, including furniture and millwork, but the white oak shipped to Spain is used in wine barrel production.

Between 1990 and 1997 white oak exports increased 27 percent but decreased in relative terms because of increased exports of most other hardwood species (Table 2). While exports of white oak to Spain increased by more than 135 percent, exports to other major European markets decreased. Canada was the second most important market for white oak during this period, but overall shipments to this country decreased by 15 percent. Exports to Japan increased by 50 percent between 1990 and 1997 as U.S. white oak was substituted for indigenous white oak, which was becoming more expensive.

Between 1997 and 2001 white oak exports declined by 19 percent because of reduced shipments to nearly every major market other than Spain. Even though exports of white oak to the United Kingdom decreased during this period, this country became the third largest market for this species because Japan's demand declined by 66 percent. The decline in demand from Japan for U.S. white oak coincided with a decline in all lumber imports into this country from all sources other than Canada and China (e-STAT 2009).

Exports of white oak to Spain decreased between 2001 and 2006 while exports to other major European markets and Canada increased. However, the greatest change in the export market for white oak during this period was the 700-percent increase to China/Hong Kong. Exports of white oak to Spain declined by more than 50 percent between 2006 and 2008 while exports to Canada and China/Hong Kong declined by much smaller amounts. As a result of these changes, China became the second most important export market for white oak (Table 1).

While the volume of red oak exported has been considerable, exports of this species as a percentage of domestic production have been relatively low (Table 3). Red oak is the most commonly produced hardwood lumber species in the United States and accounted for approximately 28 percent of domestic production in 2007. By contrast, exports of white oak as a percentage of production have consistently been about twice the level of red oak (Table 3). White oak is the second most produced U.S. hardwood species.

## **YELLOW-POPLAR**

Yellow-poplar exports increased 250 percent between 1990 and 2008 and this species has become the third most important export species on a volume basis (Table 2). In 1990, yellow-poplar exports accounted for only 3.2 percent of domestic production. Since that period the volume of yellow-poplar exported as a percentage of domestic production has tripled and by 2008 exports accounted for more than over 10 percent of domestic production (Table 3).

In 1990, 80 percent of the yellow-poplar exported went to three countries—Japan, Italy, and the United Kingdom (Table 1). Between 1990 and 1997 exports of yellow-poplar to Japan decreased while exports to Italy and Mexico increased. By 2001, China/Hong Kong became the largest market for yellow-poplar, but Italy and Mexico also were major markets for this species. In 2006, nearly 37 percent of the yellow-poplar exported went to China even as exports to Italy and Mexico increased by 50 and 15 percent, respectively. Vietnam became the second most important market for yellow-poplar in 2008, rivaling the volume exported to China/Hong Kong. As in the case of China, the yellow-poplar exported to Vietnam was exported back to the United States and other countries in the form of secondary products such as furniture.

## MAPLE

Between 1990 and 2006 maple exports increased by 313 percent but decreased by more than 40 percent between 2006 and 2008 (Table 2).<sup>3</sup> The volume of maple exported as a percentage of domestic production also increased between 1990 and 1997 and remained around 11 percent before declining between 2006 and 2008. Canada has traditionally been the largest market for U.S. maple (Table 1) but actually exports more maple to the United States than it imports. In 1990 the second and third most important markets for maple were Japan and Taiwan, respectively. By 1997 Korea became the second most important market for maple, which was used primarily in the production of pianos and other musical instruments that were exported. China and Mexico became important markets for maple in the 21st century as maple became a major furniture species.

## RED ALDER

Red alder (*Alnus rubra* Bong.) is a West Coast species which can be finished to resemble more expensive black cherry (*Prunus serotina* Ehrh.) and currently is one of the most exported hardwood species as a percentage of production (Table 3). In 1990, 75 percent of the alder exports went to Japan, Italy, and Taiwan (Table 1). Between 1990 and 1997 alder exports to Japan declined while exports to Germany increased by 1,600 percent. Much of the alder exported to Japan in 1990 was in the form of rough dimension.<sup>4</sup> Similarly, initial exports to Germany also were rough dimension. In recent years, however, most of the alder has been sold in board form under proprietary grading rules.

China/Hong Kong became the most important market for red alder in the 21st century. As in the case of maple exports, there was a large reduction in alder exports between 2006 and 2008 that primarily occurred because shipments to China/Hong Kong and Mexico declined by 54 and 42 percent, respectively. Again this decline corresponded with a decline in furniture exports to the United States. during this period.

## ASH, WALNUT, AND BLACK CHERRY

In 1990 ash (*Fraxinus* spp.) lumber exports represented nearly 14 percent of domestic production (Table 3) and were shipped primarily to Japan, Canada, and the United Kingdom (Table 1). While some of the secondary products produced from ash in Canada may have been shipped to the United States, the products manufactured from this species in the United Kingdom and Japan were primarily for internal use. Between 1990 and 1997 ash exports to Canada increased by nearly 50 percent while exports to Japan and the United

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<sup>3</sup>Export statistics have not consistently and unambiguously separated maple into the hard and soft species groups.

<sup>4</sup>This observation is based on knowledge gained by one of the authors, who toured West Coast sawmills in the 1990s.

Kingdom decreased by 44 and 26 percent, respectively. Although Canada and the United Kingdom remained important markets for ash, China/Hong Kong became the second most important market for this species by 2001.

Ash exports increased by 38 percent between 2001 and 2006 as higher volumes of this species were shipped to several countries, including a 70-percent increase to China/Hong Kong (USDA FAS 2009). In 2006 ash exports represented 21 percent of domestic production of this species. While ash exports to all major markets declined between 2006 and 2008, the proportion of ash shipped compared to domestic production has remained high.

Walnut was the only hardwood species examined in Table 2 that had a decline in lumber exports between 1990 and 1997. This decline was primarily the result of a 50-percent reduction in shipments to Japan (USDA FAS 2009). During this period, apparent domestic demand and price of this species fell, resulting in a 34-percent drop in production. This large decrease in production caused the exported proportion of domestic production to increase (Table 3) even though the total volume of walnut exported decreased (Table 2).

Walnut's fortunes began to change in the 21st century as China/Hong Kong started to import this species. Unlike most other hardwood species, walnut was used to produce products for domestic consumption. By 2001 more than 30 percent of the walnut produced in the United States was exported; Canada and China/Hong Kong accounted for more than half the market. While walnut exports have declined since 2006 primarily because of a 47-percent decrease in shipments to China/Hong Kong, it still remains the most heavily exported U.S. species as a proportion of total production (Table 3).

The export of black cherry lumber nearly quadrupled between 1990 and 2006 but has declined by more than 50 percent between 2006 and 2008. In 1991 nearly 95 percent of the cherry exports went to Canada and Europe. More than 80 percent of the cherry continued to be exported to Canada and Europe in 1997 and 2001 even though China/Hong Kong was the second largest market for this species by 2001. Cherry exports peaked in 2004 and 2005 but have declined 60 percent since then. The greatest decline was the 80-percent decrease in exports to Europe.

## **DISCUSSION**

In the past two decades exports have become a major market for hardwood lumber, but the species mix and countries of destination have changed. In 1990 oak accounted for nearly 60 percent of the lumber exported by U.S. companies. Exports to Europe accounted for 35 percent of the total volume and Canada, Japan, and Taiwan were the three most important individual markets. While exports were an important market for hardwood lumber on a value basis in 1990, they accounted for only 6.8 percent of domestic production. In the case of white oak, ash, and walnut, however, exports represented approximately 13 percent of domestic production.

The volume of hardwood exported peaked in 2006 at 3.1 million cubic meters (1.3 billion board feet). While the oaks remained the most important species exported, they accounted for only 35 percent of the market while the combined exports of maple, yellow-poplar, and red alder accounted for 34 percent of the market. In 2006 exports accounted for 11.5 percent of total domestic production, but exports of walnut and ash amounted to 31 and 21 percent, respectively, of the production of these species.

Exports declined by nearly 30 percent between 2006 and 2008, but cherry, maple, and red alder exports declined by 55, 42, and 39 percent, respectively. By contrast yellow-poplar exports declined by only 3 percent. In 2008 yellow-poplar was the third most exported species and 50 percent of yellow-poplar export went to China and Vietnam.

While Canada has continually been the most important market for U.S. hardwood lumber exports, China/Hong Kong and Mexico have displaced Japan and Taiwan as the second and third most important markets in 2008. Only 20 percent of the lumber exported in 2008 went to Europe as a result of large declines in cherry, maple, and white oak shipments. While exports accounted for nearly 10 percent of domestic hardwood lumber production in 2008, they represented 30 and 19 percent of walnut and ash production, respectively. By contrast, red oak is currently the least exported major hardwood species as a percentage of the volume produced.

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