

# Factors Influencing Changes in U.S. Hardwood Log and Lumber Exports from 1990 to 2011

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Domestic consumption of hardwood products in the United States since 2000 has trended downward, making exports the single most important market for higher grade hardwood lumber and a major market for higher value hardwood logs. Between 1990 and 2011, hardwood lumber exports increased by 46%. During most of this period, Canada was the largest export market for U.S. lumber, but in 2009 China/Hong Kong became the most important market. Nearly 60% of the lumber exported in 1990 was red or white oak, but the proportion of exports of these species had decreased to 38% by 2011. By contrast, exports of yellow-poplar lumber increased by 381% over this period. The volume of hardwood logs exported grew by 62% between 1990 and 2011, and Canada remained the largest customer. Several factors can affect the export of hardwood lumber and logs. In the 1990s, changes in exchange rates and economic activity in importing countries could be linked with changes in lumber and log exports. Since 2000, China, Vietnam, and other East Asian furniture-producing countries have become important export markets as overseas manufacturers seek lumber of species familiar to U.S. consumers. Conversely, the large decrease in hardwood lumber and log exports to Canada between 2006 and 2009 coincides with a similar decrease in wood furniture imports from Canada.

*Keywords:* Hardwood lumber; Hardwood logs; Exports; Exchange rates; International trade

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## INTRODUCTION

The volume of hardwood lumber exported from the United States grew by 63% between 1990 and 2006 before decreasing by 39% between 2006 and 2009 (Fig. 1). Lumber exports increased by 48% between 2009 and 2011, but they still remain below 2006 levels. Even at the lower volumes that have been exported since 2006, exports have become the largest market for non-industrial or appearance lumber, surpassing consumption by U.S. kitchen cabinet, millwork, flooring, and furniture manufacturers since 2009 (Johnson 2011). Export markets are therefore increasingly important to hardwood producers in the United States. Hardwood log exports also have increased since 1990. The volume of hardwood logs exported from the U.S. grew by 142% between 1990 and 2005 before decreasing by 35% between 2005 and 2009 (Fig. 2).

U.S. exports of hardwood lumber and logs depend on several factors, such as currency exchange rates, proximity to markets, expansion or contraction of industries that consume lumber or logs, species marketability, and overall economic activity in the importing countries (Sinclair 1992; Luppold and Bumgardner 2009). Because exports

have become a major market for hardwood products, it is important to understand how these factors affect exports of individual species and the countries receiving them. The objectives of this paper are to review changes in U.S. hardwood lumber and log exports by species and destination country and then to examine the major factors influencing these changes.

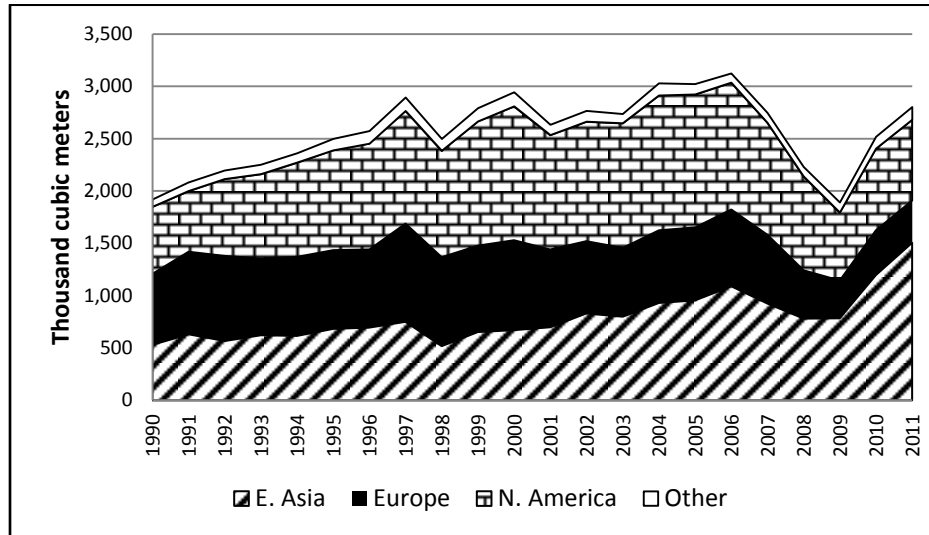


Fig. 1. U.S. hardwood lumber exports by major world regions, 1990 to 2011 (USDA FAS 2012)

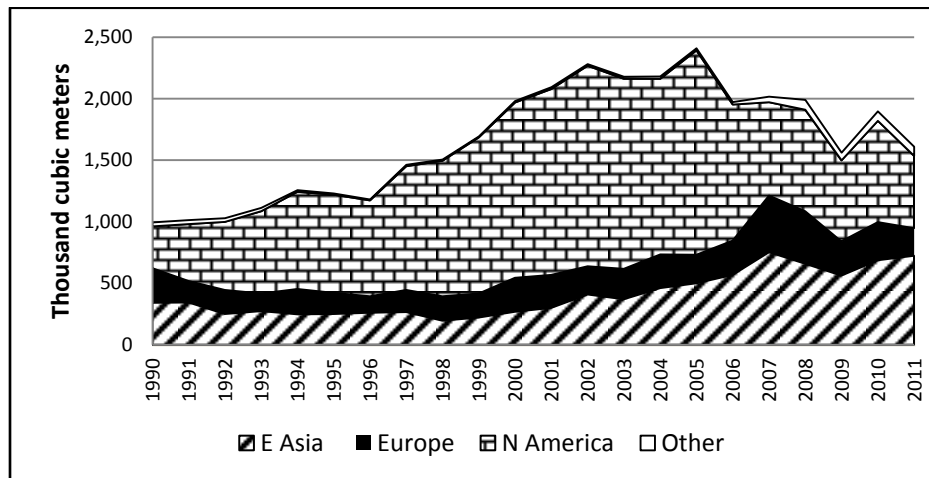


Fig. 2. U.S. hardwood log exports by major world regions, 1990 to 2011 (USDA FAS 2012)

## MATERIALS AND METHODS

Changes in hardwood lumber and log exports are examined over four periods: 1990 to 2000 (2000 was a high point for lumber exports), 2000 to 2006 (another high point for lumber exports), 2006 to 2009 (a period of contraction for both logs and lumber), and 2009 to 2011 (a partial recovery for lumber exports). The impact of

exchange rates, proximity to market, expansion or contraction of industries that consume lumber or logs, and overall economic activity in the importing country are examined next. Hardwood lumber and log export data were obtained using the Global Agricultural Trade Systems of the U.S. Department of Agriculture (USDA), Foreign Agricultural Service (FAS), (USDA FAS 2012). These data were analyzed in terms of species exported and receiving country.

Exchange rate data were based on the long-term series published in the USDA Forest Service's Bulletin of Hardwood Market Statistics (Emanuel and Rhodes 2002; Akers 2006; Jones 2011). Data on economic activity in major importers of hardwood lumber and logs were based on total value added and value added by manufacturing industries (UN Statistics Division [SD] 2012). Total value added is similar to Net National Product. Manufacturing value added trends with the Index of Industrial Production. Information on imports of wood furniture was developed from reports by the U.S. Department of Commerce (USDC), International Trade Administration (ITA), (USDC ITA 2012) and available literature.

## RESULTS AND DISCUSSION

### Changes in Hardwood Lumber Exports

In 1990, the U.S. exported 1,918 thousand cubic meters (TCM) of hardwood lumber with oak species accounting for nearly 60% of this volume (Table 1). Every other export species accounted for less than 10% of total volume. Nearly 36% of exports went to Europe, 33% to North American trading partners (Canada and Mexico), and 28% to East Asia (Fig. 1). The most important individual export markets were Canada, Japan, and Taiwan (Table 2).

**Table 1.** Volume of U.S. Hardwood Lumber Exported by Species in 1990, 2000, 2006, 2009, and 2011 (USDA FAS 2012)

Species	1990	2000	2006	2009	2011
--- Thousand Cubic Meters ---					
Red oak	600.1	650.4	486.5	334.9	534.5
White oak	526.0	575.3	602.7	370.4	531.6
Yellow-poplar	107.0	253.0	388.1	325.8	515.8
Maple	97.9	451.5	404.4	161.8	212.6
Red alder	103.0	216.4	259.2	133.1	210.0
Ash	140.3	145.9	180.1	123.5	224.2
Walnut	22.4	40.9	95.9	64.9	115.4
Cherry	47.3	178.0	164.5	41.7	49.6
Other *	274.1	432.0	541.8	333.9	408.5
Total	1918.1	2943.3	3123.2	1890.1	2802.1

\* Includes birch, hickory, beech, tropical species, and unspecified species.

Hardwood lumber exports increased by 53% between 1990 and 2000 and exceeded 2,900 TCM. Oak species continued to be the most important export species, but the proportion of oak exports dropped to 42% over this period (Table1). North America became the most important export region by 2000 (Fig. 1) and Canada continued to be the largest individual market. As exports to Japan and Taiwan decreased by 60 and 42%,

respectively (USDA FAS 2012) and exports to China/Hong Kong and Mexico increased, important export markets were realigned (Table 2).

Between 2000 and 2006, hardwood lumber exports increased by only 12%, but there were large shifts in the species exported (Table 1). Total exports of oak continued to decline in absolute and relative terms during this period. By contrast, walnut exports increased more than 130% and yellow-poplar increased by 53%. Exports of red alder, ash, and white oak also increased during this period while exports of maple and cherry declined. North America continued to be the most important export region, but East Asia displaced Europe as the second most important region (Fig. 1).

**Table 2.** Top Three U.S. Hardwood Lumber and Log Export Markets Shares by Volume in 1990, 2000, 2006, 2009, and 2011 (USDA FAS 2012)

Product	Year	Rank 1		Rank 2		Rank 3	
Lumber	1990	Canada	28.9	Japan	15.4	Taiwan	8.6
	2000	Canada	34.9	China/HK	10.0	Mexico	8.5
	2006	Canada	29.5	China/HK	22.7	Mexico	9.3
	2009	China/HK	26.1	Canada	24.9	Vietnam	9.4
	2011	China/HK	37.8	Canada	20.1	Vietnam	9.3
Logs	1990	Canada	32.9	Japan	17.8	Germany	13.5
	2000	Canada	71.5	Japan	4.9	Italy	4.6
	2006	Canada	55.3	China/HK	17.2	Italy	4.9
	2009	Canada	41.4	China/HK	24.0	Vietnam	6.1
	2011	Canada	36.2	China/HK	32.2	Vietnam	6.2

Hardwood lumber exports declined by 39% between 2006 and 2009 (Table 1). This decline was not uniform across regions as exports to East Asia, Europe, and North America declined by 28, 51, and 46%, respectively (Fig. 1). Exports of oak continued to decrease during this period, but maple, cherry, and red alder had the greatest decline on a relative basis (Table 1). By contrast, exports of yellow-poplar decreased by less than 5%. Exports to most major markets declined between 2006 and 2009, but Vietnam was the exception. A 50% increase in exports to Vietnam with yellow-poplar being the most important species imported by this country (USDA FAS 2012), made this country the third most important market for U.S. hardwood lumber exports in 2009 (Table 2).

### Changes in Hardwood Log Exports

In 1990, the U.S. exported 994 TCM of hardwood logs. Although the oaks were the most prevalent species of log exported, they represented just 36% market share in 1990 (Table 3). Maple and birch also were exported in significant volumes in 1990. Exports to North America and Asia were virtually identical at 340 TCM in 1990 while Europe imported 281 TCM of hardwood logs (Fig. 2). Canada, Japan, and Germany were the most important individual markets (Table 2).

Between 1990 and 2000 hardwood log exports increased by 99%, mostly as a result of increased exports to Canada (USDA FAS 2012). By contrast, exports to East Asia decreased by 21% as the reduction in exports to Japan and Korea exceeded the increase in exports to China/Hong Kong (Fig. 2). Exports to Europe declined by 21% as the decline in German exports offset increased exports to Italy. Canadian market share of the U.S. log export market consequently increased to 72% (Table 2).

**Table 3.** Volume of U.S. Hardwood Logs Exported by Species in 1990, 2000, 2006, 2009, and 2011 (USDA FAS 2012)

Species	1990	2000	2006	2009	2011
	- - - Thousand Cubic Meters - - -				
Red oak	179.0	309.6	261.0	166.2	222.5
White oak	179.7	139.2	171.2	195.0	228.5
Yellow-poplar	11.7	56.9	137.1	183.2	129.1
Maple	113.0	641.3	489.9	182.1	301.9
Red alder	29.1	12.4	14.9	32.4	8.3
Ash	13.0	32.5	45.2	65.9	69.6
Walnut	61.4	50.8	129.0	75.4	136.6
Birch	116.8	109.5	114.8	104.9	184.2
Cherry	18.3	151.5	132.7	34.5	41.5
Other *	272.4	477.2	476.4	521.6	287.4
Total	994.3	1980.8	1972.1	1561.1	1609.5

\* Includes hickory, beech, tropical species, and unspecified species.

Hardwood log exports fluctuated between 2000 and 2006 as exports to China/Hong Kong increased and exports to Canada decreased (USDA FAS 2012). During this period log exports of most species increased, but maple and red oak exports declined primarily as a result of decreased shipments of these species to Canada (Table 3). As exports to Japan continued to decrease, China/Hong Kong became the second most important export market for U.S. hardwood logs in 2006 (Table 2).

Hardwood log exports remained nearly constant between 2006 and 2008, but exports to Canada declined by 17%. Shipments to all regions declined between 2008 and 2009 with the greatest decline in shipments to Europe (Fig. 2). Exports rebounded in 2010 in all three market regions but declined between 2010 and 2011 as the reduction in exports to Europe and Canada exceeded the increase in exports to East Asia. Even as exports to Canada declined, this country remained the largest market for hardwood logs in 2011, but China and Vietnam had large increases in their market shares (Table 2).

### Factors that have Influenced U.S. Hardwood Lumber and Log Exports

Shifts in exports of hardwood lumber and logs between 1990 and 2011 have been caused by combinations of such factors as currency exchange rates, proximity to markets, changes in lumber- or log-consuming industries, species marketability, and overall economic activity in the importing countries. Normally, however, there are one or two dominant factors for a specific country and time period. In the 1970s and 1980s, upward or downward movement of markets determined floating exchange rates and had a strong influence on U.S. hardwood exports to Europe, Canada, and Japan (Luppold and Bumgardner 2009). In 1990, countries with floating exchange rates were still receiving at least 80% of U.S. lumber and log exports (USDA FAS 2012). In the following subsections, factors that have influenced major export markets and species are discussed for the study periods.

#### *1990-2000 Period*

In 1990, Canada was the major market for U.S. hardwood products with a 29% market share of lumber exports and a 33% market share of log exports (Table 2). Canada sawtimber inventories of northern hardwood species such as birch and sugar maple are small compared to those of the U.S., as is the level of hardwood lumber production in

Canada. Lumber exports in 1990 got a boost from the growth in the Canadian furniture, flooring, and cabinet industries that started during the late 1980s and continued into the early 1990s (Armstrong *et al.* 1993). Most of Canada's hardwood sawmills are located in southern Quebec and Ontario, close to the U.S. border (Miller Wood Trade Publications 2011). Proximity to the Canadian market and the associated reduced transportation costs have long influenced exports of hardwood lumber and logs to Canada.

The second most important export market in 1990 was Japan, with a 15 and 18% market share of the lumber and log export markets, respectively. During this year Japan was the world's largest importer of hardwood lumber and a major importer of hardwood logs (UN FAO 2012). Taiwan was the third most important market for hardwood lumber in 1990, but exchange rates had very little to do with this market share because Taiwan pegs the value of its currency to the U.S. dollar (a managed exchange). In 1978, Taiwan became the most important source of furniture imported into the U.S. and remained the most important furniture exporter in 1990 (Luppold and Bumgardner 2011). Much of the lumber used to produce this furniture was imported from the U.S., with the oaks, the leading species in the U.S. furniture market in the early 1990s (Frye 1996), accounting for the bulk of these shipments.

Germany was the third most important export market for logs on a volume basis (Table 2). Exports of logs and lumber to Germany in 1990 were facilitated by a declining value of the dollar against the German mark (Emanuel and Rhodes 2002) and a growing economy (UN SD 2011). White oak accounted for over 30% of log exports to Germany in 1990.

Between 1990 and 2000 the Canadian dollar declined by 25% (Emanuel and Rhodes 2002), but exports of hardwood lumber and logs increased by 86 and 330%, respectively (USDA FAS 2012). A major factor contributing to this apparent contradiction is that the Canadian furniture industry started to change in the late 1980s, producing furniture in small batches in smaller plants that utilized just-in-time procurement and distribution procedures (Luppold 2009). These changes allowed Canada to become price competitive with U.S. and Taiwanese producers. By 2000, Canada had surpassed Taiwan as the most important source of furniture imports into the U.S. (Luppold and Bumgardner 2011). To meet U.S. consumers' import demands, Canadian furniture producers sourced lumber directly from the U.S. or purchased lumber from Canadian sawmills that imported increasing volumes of U.S. logs. Although red oak remained the most important lumber and log species exported to Canada in the 1990s, the greatest increases in exports were for maple and cherry, which were gaining greater acceptance as furniture species (Frye 1996, 2000).

Japan remained the second most important market for hardwood logs in 2000 but became a minor market for hardwood lumber (Table 2) (USDA FAS 2012). The decline in exports to Japan between 1990 and 2000 was the result of stagnated economic growth (UN SD 2011). Mexico was the third most important market for hardwood lumber in 2000 and was the fourth major source of wood furniture imports that year (USDC ITA 2012). Like Canada, Mexico imported increasing volumes of U.S. hardwood lumber as it exported increasing volumes of furniture back to the U.S. (USDC ITA 2012).

Similar to Japan, Taiwan became a minor importer of U.S. hardwood lumber in 2000 (Table 2). By 2000, much of the Taiwan furniture manufacturing capacity had moved to mainland China in an effort to become more price competitive (Luppold and Bumgardner 2011). Similar to Taiwanese currency, the Chinese Yuan is managed. Even though China did not appear to be as dependent on U.S. hardwood lumber as was Taiwan

in 2000 because of the global nature of its lumber sourcing (Bowe *et al.* 2008), China was the second most important market for U.S. hardwood lumber exporters by 2000. The most important species exported to China in 2000 was western red alder, which was both inexpensive and most likely less expensive to ship.

Italy ranked as the third most important market for log exports in 2000 because of the large reduction in exports to Germany that was associated with low growth in the German manufacturing sector (UN SD 2012) and an 11% increase in the value of the Mark (Emanuel and Rhodes 2002). Italy imported greater volumes of yellow-poplar and walnut logs (ideal for walnut plywood production) between 1990 and 2000. Despite the continual decline of the Italian lira against the U.S. dollar, the Italian economy grew moderately and exports of furniture to the U.S. increased (Emanuel and Rhodes 2002; UN SD 2011; USDC ITA 2012). An additional factor influencing Italian wood product imports in the early 2000s was relative strength in construction and related industries, with growing interest in hardwoods for architectural uses (Besozzi 2003).

#### *Periods 2000-2006, 2006-2009, and 2009-2011*

Between 2000 and 2006, exports of furniture from Canada to the U.S. declined slightly, but the Canadian dollar increased in value by 24% against the U.S. dollar (Emanuel and Rhodes 2002; Jones 2011; USDC ITA 2012). As a result, lumber and logs exported to Canada declined by 11 and 23%, respectively. Still, Canada remained in the top position in the export market for these products; red oak and maple were the most important species exported (USDA FAS 2012).

Although the Chinese allowed the Yuan to increase slightly against the dollar between 2000 and 2006, furniture imports from China to the U.S. increased by 210% (Emanuel and Rhodes 2002; Jones 2011; USDC ITA 2012). Concurrently, exports of hardwood lumber and logs to China/Hong Kong increased by 390 and 950%, respectively. The large increase in hardwood product exports to China relative to furniture imports indicates an increase in requirements for U.S. species including yellow-poplar and western red alder. As a result, China was the most important export market for U.S. hardwood lumber in 2009 and the second most important market for hardwood logs (Table 2).

The value of the Canadian dollar against the U.S. dollar remained stable between 2006 and 2009, but imports of Canadian furniture declined by 53% (Jones 2011; USDC ITA 2012). Hardwood lumber and log exports to Canada also declined by 49 and 41%, respectively. The decline in furniture imports was influenced by the economic recession, which caused U.S. economic growth to decline and the continued impact of low-priced furniture imports from China/Hong Kong and other East Asian countries. The decline in hardwood lumber and log exports to Canada appears to be a direct result of the decline in furniture imports from this country.

Between 2006 and 2011, Vietnam became a major producer and exporter of wood furniture as anti-dumping duties leveled by the U.S. on Chinese furniture manufacturers of bedroom furniture caused some relocation of manufacturing (Luppold and Bumgardner 2011). The combination of an economic downturn in the U.S. and the implementation of the anti-dumping rules caused imports of furniture from China to decrease by 22% and imports from Vietnam to increase by 154% (USDA ITA 2012). Still, China was the most important export market for hardwood lumber and the second most important export market for hardwood logs in 2011; Vietnam became the third most important export market for both lumber and logs. Chinese and Vietnam furniture

producers' desire to reduce costs also resulted in a surge of yellow-poplar lumber and log exports, but since 2009, there has been an increase in oak shipments to China.

## CONCLUSIONS

- 1. Volume of Exports** - The volume of hardwood lumber exported from the United States grew by 63% between 1990 and 2006 before decreasing by 39% between 2006 and 2009 and then increasing in 2010 and 2011. Similarly, the volume of hardwood logs exported grew by 142% between 1990 and 2005 before a 35% decrease between 2005 and 2009 and an increase in 2010. While exports of all major individual species of hardwood lumber declined during the 2006-2009 period, there were notable differences in species performance over the broader study frame of 1990 to 2011. The best performers over this period were walnut (increase of 415%) and yellow-poplar (increase of 382%), which interestingly represent the higher- and lower-end of the price spectrum. Conversely, red and white oak represented nearly 60% of hardwood lumber export volume in 1990, but the oaks had decreased to 38% by 2011.
- 2. Early Export Markets** - In the early 1990s, Canada and Japan were the most important markets for hardwood lumber and logs, and Germany was the third most important market for hardwood logs. These major markets were all similar in that each had a floating exchange rate, which has been the traditional factor affecting exports of U.S. hardwood lumber (Luppold and Bumgardner 2009). The one exception to the exchange rate argument was lumber exports to Taiwan (the third most important market for lumber in 1990), which was affected by the growth of the export-oriented furniture industry in that country.
- 3. Exports to Canada** - In 2000, Canada was the largest importer of U.S. hardwood logs and lumber, and Canada also was the most important source of furniture imported into the U.S. During this year, the Canadian dollar hit an all-time high for the 1990-2011 time period (Emanuel and Rhodes 2002; Jones 2011). Normally, when the value of a currency declines against the U.S. dollar (as was the case with Canada at the time), exports to that market decrease. But, in the case of Canada, demand arose from a furniture industry needing lumber so it could sell relatively low-price furniture in the U.S. In this sense, Canada was similar to China in that lumber imports moved not in accordance with exchange rates but rather with export-oriented furniture companies that were able to take advantage of the favorable exchange rates with the U.S.
- 4. Exports to China and Vietnam** - While Canada remained the most important market for U.S. hardwood log exports because of proximity to the U.S. market, exports to China and Vietnam increased as a result of the growth of the furniture industry in these countries. China became the most important market for U.S. hardwood lumber in 2009 as economic growth slowed in Canada. Vietnam became the third most important market for hardwood lumber in 2009 largely as a result of an expansion in its furniture industry in response to increased furniture exports to the U.S.



5. **Export Drivers** - While exchange rates appear to be the major factor influencing hardwood lumber and log exports in 1990 and prior years, material requirements by countries that exported furniture to the U.S. appeared to be the dominant factor influencing lumber and log exports in 2011. This factor was apparent for East Asia exports other than Japan as early as 1990 and is demonstrated by the coinciding decrease in exports to Taiwan and increase in exports to China as furniture manufacturing capacity moved from Taiwan to China. In more recent years, exports of logs and lumber to Canada also appear to be related to exports of furniture to the U.S. This apparent relationship is suggested by the parallel declines in furniture imports from Canada to the U.S. and in lumber and log exports to Canada between 2007 and 2009. Although the relationship between furniture imports (Luppold and Bumgardner 2011) and hardwood product exports appears strong today, other factors such as economic growth in China and other developing countries could become more important in the future.

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