Employment Changes in U.S. Hardwood Lumber Consuming Industries during Economic Expansions and Contractions Since 1991

William G. Luppold,[a,*] and Matthew S. Bumgardner [b]

Understanding employment trends is important for discerning the economic vitality of U.S. hardwood lumber users. After a period of growth in the 1990s, employment in industries consuming hardwood lumber has declined in the 21st century. The wood household furniture industry has experienced the greatest decline, with North Carolina, Virginia, and California being the states most affected. Nearly all of the decline in employment in the furniture industry can be attributed to increased importation of this product. Millwork and kitchen cabinets are industries associated with home construction. Both of these industries experienced declines in employment in the 21st century. Employment in millwork started to decline after 2000, while employment in the kitchen cabinet industry started to decline after 2006. While there was little change in the relative regional employment rankings in the millwork industry, Indiana displaced California and Texas to become the largest employer in the kitchen cabinet industry. Employment in the pallet industry has declined in the 21st century, but mostly during the two recessionary periods. The pallet industry was the only industry that had an employment increase after 2009. Ohio was once the major pallet producing state, but it was displaced by California and Texas after 2002.

Keywords: Employment; Hardwood lumber processors; Kitchen cabinets; Millwork; Pallets; Secondary hardwood industry; Wood household furniture

*Contact information: a: U.S. Forest Service, Northern Research Station, 241 Mercer Springs Road, Princeton, WV 24740; b: U.S. Forest Service, Northern Research Station, 359 Main Road, Delaware, OH 43015; *Corresponding author: wluppold@fs.fed.us*

INTRODUCTION

In the last 15 years, many industries that consume hardwood lumber have endured a prolonged period of difficult market conditions. Significant factors influencing these markets have been the globalization of the furniture industry (Grushecky *et al.* 2006; Quesada and Gazo 2006), the decline in the housing market in the late 2000s (Alderman 2015), two economic recessions during the 21st century, and a slow rate of growth in the domestic economy since the 2008 to 2009 recession. The difficult market conditions follow a period of continuous growth during the 1990s in the domestic hardwood lumber consuming industries (Luppold and Bumgardner 2008).

The economic vitality of the industries that consume hardwood lumber is reflected by changes in employment, which is generally considered an important economic indicator (Gregory 1972; Carnes and Slifer 1991). On a regional level, employment also is an important metric because a change in employment has a multiplier effect (either positive or negative) as a result of downstream and upstream industries associated with the manufacturing process and consumer spending by waged employees (Tilley and Munn

2007). Furthermore, employment data pertaining to hardwood industries has become more consistently available than industrial production data.

Hardwood Industry Background and Study Objectives

The largest users of hardwood lumber graded for appearance applications (hereafter called grade lumber) in the United States in the latter part of the 20th century and in the beginning of the 21st century were the millwork, wood kitchen cabinet, and wood household furniture (WHF) industries (Luppold and Bumgardner 2008). In 2002, manufacturers in these industries consumed approximately 85% of the total grade hardwood lumber available. Employment during 2002 was 153,000 and 149,000 employees for the millwork and wood kitchen cabinet industries (USDL 2015a). The WHF industry employed 107,000 people in 2002, which was an 18% decline from 1999, the peak employment year for this industry as defined under the North American Industrial Classification System.

The largest user of industrial lumber, which is sound material with visible defects, is the pallet and container industry. This industry consumed approximately 63% of this lower value material domestically in 2002 and employed 60,000 workers that year. Together, the millwork, wood kitchen cabinet, WHF, and pallet and container industries accounted for approximately 74% of all hardwood lumber domestically consumed in the United States in 2002 and employed nearly 470,000 workers that year. These industries are the focus of this paper.

In 2002, employment in the industries examined was heavily concentrated in the North Central and Southeast regions of the United States, followed by the South Central, Pacific West, and Northeast regions (Table 1). These regions correspond to former U.S. Forest Service, Forest Inventory and Analysis and are regions prior to the recent mergers of eastern Research Stations. For this paper, the North Central region includes Ohio, which corresponds to the original classification of this state by the U.S. Forest Service. Traditionally, the U.S. Department of Commerce has included this state in the North Central region, as did the U.S. Forest Service prior to the 1980s. The North Central region had the highest concentration of millwork, kitchen cabinet, and pallet producers, while the Southeast region has traditionally had the highest concentration of WHF producers. The Intermountain region contained a little more than 5% of the total national employment with a large proportion of this employment (47%) in the kitchen cabinet industry.

In this paper, changes in national employment for major users of hardwood lumber were examined during three periods of economic expansion (in which employment was expected to have increased) and two periods of economic contraction (in which employment was expected to have decreased) since 1991. These expectations arise from the tenet that periods of expansion and recession are reflected in labor markets (Boyes and Melvin 1991). The second objective was to examine if regional and state changes in employment have occurred in the last two economic expansions. Due to limited available data, this regional/state analysis began with 2002. In order to accomplish these objectives, the relevant measures of economic growth are discussed, and the three periods of economic expansion and the two periods of economic contraction since the early 1990s are described.

Measures of Economic Growth and Related Economic Expansions and Declines

Three measures of economic growth were of interest in the analysis, including gross domestic product (GDP), the industrial production index (IPI), and total housing

completions. These and related measures are commonly used economic indicators (Carnes and Slifer 1991). Because employment is also an economic indicator, the extent of association between these variables and employment for the four hardwood industries during recent periods of economic expansion and contraction also was of interest. GDP is perhaps the most commonly quoted measure of economic growth. This estimate is developed by the Bureau of Economic Analysis, and it is a measure of all finished goods and services produced or provided in a specific time period. Another measure of economic growth that is highly correlated with GDP is the IPI, which is developed by the Federal Reserve and is a measure of the real production output of manufacturing, mining, and utilities (BGFRS 2015a). Because pallets are an industrial product, it is expected that the IPI would be especially relevant to pallet employment.

Table 1. Employment Regions

Region	States
Northeast[1]	Connecticut, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island[2], Vermont, West Virginia[3]
North Central	Illinois, Indiana, Iowa, Kansas[4], Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin
Southeast	Florida, Georgia, North Carolina, South Carolina, Virginia
South Central	Alabama, Arkansas, Kentucky, Louisiana, Mississippi, Oklahoma, Tennessee, Texas
Intermountain	Arizona, Colorado, Idaho, Montana[5], Nevada, New Mexico, Utah, Wyoming[6]
Pacific West[1]	California, Hawaii[5], Oregon, Washington

[1] Delaware and Alaska data was suppressed for all years for all four industry groupings
[2] Data suppressed for the cabinet Industry
[3] Data suppressed for the wood household furniture industry
[4] Data suppressed for the wood household furniture industry
[5] Data suppressed for the pallet industry
[6] Data suppressed for the millwork and pallet industries

Home construction is a sector-specific measure of economic growth, which should correlate with production and employment in the millwork and kitchen cabinet industries (Carnes and Slifer 1991). Because millwork and cabinets are both installed at the end of home construction, they should be more closely associated with home completions than with the more commonly quoted housing starts estimate. However, home completion could be an incomplete predictor of demand for kitchen cabinets because of the volume of this product consumed in the remodeling market. For example, nearly 31% of the value of residential private construction (single family, multi-family, and improvements) in the United States in 2014 was accounted for by improvements, totaling nearly $103 billion (USCB 2015a). As recently as 2011, this percentage was nearly 50%, as single family home construction lagged behind improvements. Housing completions may be less inclusive of activity in the millwork industry because these products are used in hotels and commercial building construction as well. The broadest measure of home completion is total (single family plus multi-family) housing completions, and analysis of that data indicated that total housing completions were more correlated with millwork and cabinet employment than with completion of single family housing units.

As measured by growth in GDP, there have been three economic expansions since the early 1990s that were preceded by periods of economic contraction. Expansion 1 occurred from April 1991 until February 2001 and was preceded by an 8-month economic recession (NBER 2015). For this study, expansion 1 was represented in annual terms by

the years 1991 to 2000. As described in the Methods section, data limitations did not allow for the examination of employment during the recession that preceded this expansion. Expansion 2 began in December 2001 and extended to November 2007; it was also preceded by an 8-month economic recession. This expansion was represented by the years 2002 to 2007, and the preceding recession (*i.e.*, contraction) was represented by the period 2000 to 2002. Expansion 3 occurred from July 2009 to 2013 and was preceded by an 18-month economic recession. This expansion was represented by the period 2009 to 2014, and the preceding recession was represented from 2007 to 2009.

METHODS

The analysis was based on employment data for the millwork (North American Industrial Classification System {NAICS} 32191), wood containers and pallets (NAICS 321920), wood kitchen cabinets (NAICS 337110), and nonupholstered wood household furniture (NAICS 337122) industries at both a national and regional/state level (USCB 2015b). This information was obtained from the U.S. Department of Labor (USDL), Bureau of Labor Statistics, where both national (USDL 2015a) and regional and state (USDL 2015b) data was analyzed. Indices (with the base year equal to 100) were developed for the three expansion periods and two recessionary periods to show relative changes in employment associated with economic conditions for the four industries.

Annual data for the GDP, IPI, and total housing completions were obtained from the U.S. Bureau of Economic Analysis (USBEA 2015), Federal Reserve Bank of St. Louis (BGFRS 2015b), and U.S. Census Bureau (USCB 2015c), respectively. Correlation analysis (Pearson product-moment correlation coefficient) was employed to relate annual employment data to the economic indicator data for each expansion period (n = 10, 6, and 6 years, respectively) using Microsoft Excel 2010 (Redmond, WA, USA).

One major change in 1997 that affected the analysis of the hardwood processing industry was the transition in the classification of business establishments from the Standard Industry Code (SIC) to the North American Industry Classification System (NAICS). This change resulted in the reclassification of the hardwood flooring industry as part of the millwork industry (NAICS 32191). As a result, much of the U.S. Department of Commerce census data collected prior to 1997 was not comparable to data from 1997 and subsequent years. However, the U.S. Department of Labor has estimated the employment data for NAICS codes back to 1990 at the national level. Thus, the economic expansion period that began in 1991 was the beginning point for the national analysis. Because of these limitations, shifts in regional and state employment were confined to the second (2002 to 2007) and third (2009 to 2014) expansion periods.

RESULTS AND DISCUSSION

National Analysis

Figure 1 shows employment indices for the millwork, pallet, kitchen cabinet, and WHF industries during the economic expansions of 1991 to 2000, 2002 to 2007, and 2009 to 2014. Figure 2 presents employment indices for these same four industries during the economic recessions that preceded the last two economic expansions. The gaps in Fig. 1 correspond to the recession years covered in Fig. 2, and the gaps in Fig. 2 correspond to

the expansion years in Fig. 1. The base years for the two recessionary periods in Fig. 2 are the last years of the proceeding expansion periods. These boundaries were set to fully demonstrate the impacts on employment during the recessions. By indexing these measures, relative employment growth and decline for each hardwood lumber consuming industry were easily compared. For instance, employment in the kitchen cabinet industry increased by nearly 50% during the first expansion period and peaked at a 20% increase in the second expansion (Fig. 1).

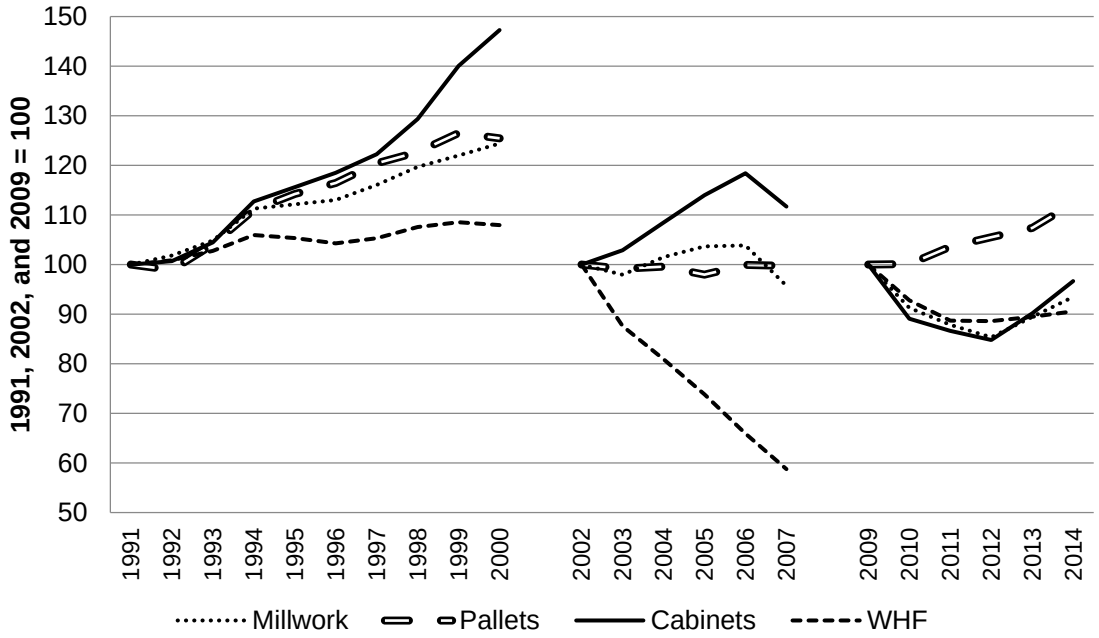

Fig. 1. Index of employment adjusted for productivity in the millwork, wood containers and pallets (pallets), kitchen cabinets (cabinets), and non-upholstered wood household furniture (WHF) industries for expansion 1 (1991 to 2000), expansion 2 (2002 to 2007), and expansion 3 (2009 to 2014). Developed from USDL (2015a).

The economic expansion that began in 1991 was a period of growth for all major consumers of hardwood lumber, as reflected in Fig. 1. The increase in employment in the first expansion period ranged from 8% for the WHF industry to 47% for the kitchen cabinet industry. Total employment in the four major hardwood-consuming industries increased by over 100,000 workers (25%), with 77% of this increase occurring in the kitchen cabinet and millwork industries. During this period, employment in the kitchen cabinet, millwork, and pallet industries was highly correlated with GDP, IPI, and housing completions, with correlations ranging from $r = 0.96$ to 0.99. WHF was slightly more closely associated with housing completions ($r = 0.95$) than with IPI or GDP (both with $r = 0.90$).

The economic recession of the early 2000s did not officially start until late 2001, and housing completions did not decline during this particular recession. However, employment in the WHF and pallet industries started to decline in the summer of 2000 (USDL 2015a). The decline in employment in the WHF industry during this period is opposite to what would be expected during and economic expansion, but this decline was more of a function of increased furniture imports from East Asia (primarily China and Vietnam) than any change in U.S. economic activity (Han *et al.* 2009; Luppold and Bumgardner 2011). There was a noticeable decline in employment in the pallet industry

that began in the summer of 2000, which possibly served as an indicator of the coming recession. The decline in millwork employment started in late 2000 and continued into early 2003. The steady employment in the kitchen cabinet industry during this recession was more consistent with the slower but not negative activity in the housing market.

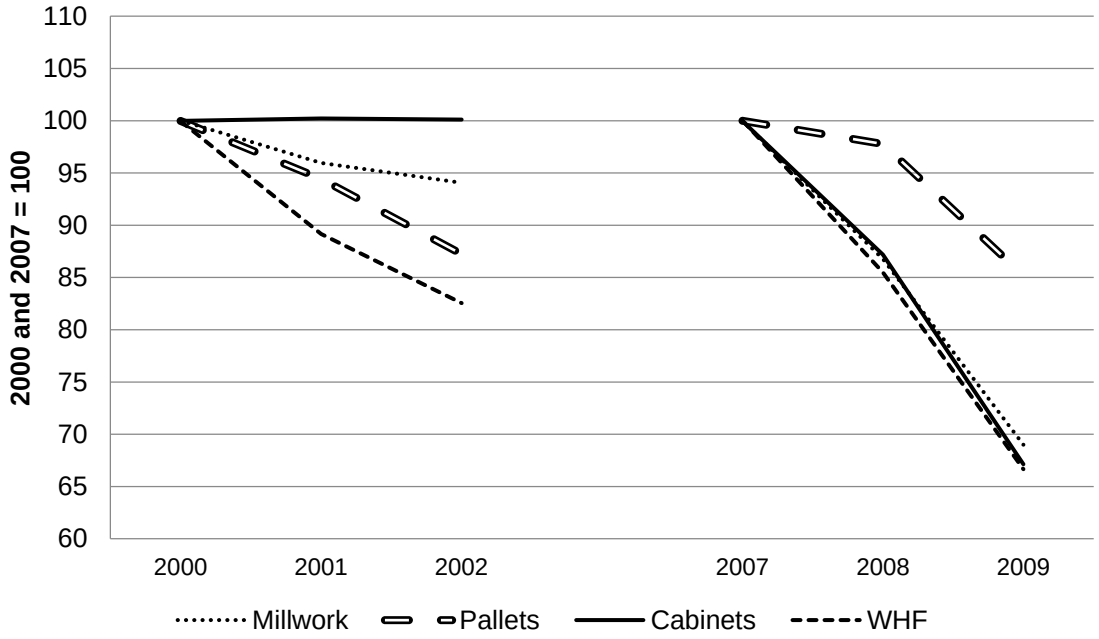

Fig. 2. Index of employment adjusted for productivity in the millwork, wood containers and pallets (pallets), kitchen cabinets (cabinets), and non-upholstered wood household furniture (WHF) industries for recession 1 (2000 to 2002) and recession 2 (2007 to 2008). Developed from USDL (2015a).

Employment in the kitchen cabinet industry increased by nearly 20% before it decreased during the economic expansion of 2002 to 2007 (Fig. 1). Similarly, employment in the millwork industry initially increased but then decreased. While millwork employment was highly correlated with housing completions (r = 0.95), kitchen cabinet employment was most correlated with GDP (r = 0.87) and poorly correlated with housing completions (r = 0.58). Employment in the pallet industry remained nearly constant for this period and was not correlated with any of the three indicators of economic activity (r = -0.02 to -0.36). The most significant change during this period was the decline in WHF employment, which was negatively correlated with GDP and IPI (r = -0.99 and -0.98, respectively), and again was the result of rising U.S. furniture imports. When combined with the decline that started in 2000 (Fig. 2), the 40% decline that occurred during expansion period 2 (Fig. 1) resulted in a loss of over 62,000 workers in the WHF industry (52%) between 1999 and 2007.

The economic recession of 2008 to 2009 saw similar relative declines in employment in the WHF, kitchen cabinet, and millwork industries (Fig. 2). The declines in the kitchen cabinet and millwork industries were consistent with the decline in home completions during this period; however the continual decline in WHF employment appears to be a combination of globalization and recession. The separation of the trajectory of employment in the pallet industry versus the industries consuming grade lumber during this period not only influenced the price of grade versus industrial lumber but appears to

have had a measurable impact on the prices of low grade versus higher grade logs (Luppold *et al.* 2014).

Employment in the pallet industry increased by over 10% during the third economic expansion (Fig. 1), and this increase was highly correlated with the increases in GDP and IPI (r = 0.98 and 0.96, respectively). In contrast, employment in the WHF, kitchen cabinet, and millwork industries continued to decline through 2012 before increasing in 2013 and 2014. Despite this increase, employment remained below 2009 levels. During this period, employment in the millwork industry was weakly correlated with housing completions (r = 0.63), and employment in the kitchen cabinet industry was moderately correlated with housing completions (r = 0.80). Employment in the WHF industry followed a similar pattern to the millwork and kitchen cabinet industries, and it was not correlated with any economic indicator as employment in these three industries decreased rather than increased during a period of economic expansion.

As indicated in Fig. 1, there were declines in employment in the grade lumber-using industries until 2012, which coincided with the first consistent increase in the prices of grade hardwood lumber for most species (J. Johnson, *Hardwood Market Report*, personal communication). While these price increases were also influenced by exports, exports began to increase after 2009; prices started to increase in the fall of 2012. Examination of employment in the industries that consume hardwood lumber from their peak points to their 2012 low points (Table 2) showed losses of 93,000, 82,000, and 76,000 workers in the WHF, kitchen cabinet, and millwork industries, respectively. Employment in the pallet industry also declined when compared to its peak in the late 1990s, but this decline was considerably less in both relative and absolute terms.

Table 2. Employment Statistics in Peak Years *vs*. 2012 for the Millwork, Wood Containers and Pallets (Pallets), Kitchen Cabinets (Cabinets), and Non-Upholstered Wood Household Furniture (WHF) Industries [1]

Industry	Peak Year for Employment	Employment in Peak Year (Thousands)	Employment in 2012 (Thousands)	Absolute Change (Thousands)	Percent Change (%)
Millwork	2000	163.1	86.6	-76.5	-46.9
Pallets	1999	69.0	53.5	-15.5	-22.5
Cabinets	2006	176.6	94.6	-82.0	-46.4
WHF	1999	130.4	37.2	-93.2	-71.5

[1] Developed from USDL (2015a)

Regional and State Analysis 2002 to 2014

Between 2002 and 2014, national employment in the millwork, pallet, kitchen cabinet, and WHF industries decreased by 35%, 5%, 27%, and 65%, respectively (USDL 2015a). Of the four industries and six regions examined in Table 3, only the pallet industry in the Intermountain and Pacific West regions had an increase in employment. Thus, an examination of changes in employment at the regional and state level is more of an examination of which areas lost the least amount of employees than which areas gained employment.

Millwork

In 2002, the North Central region had the greatest number of employees in the millwork industry (Table 3) with nearly 60% of this employment being in Wisconsin,

Minnesota, and Iowa (USDL 2015b). The South Central and Pacific West regions were also large employers, led by Texas, California, and Oregon. As indicated in Table 4, California, Wisconsin, Minnesota, Iowa, and Oregon had the largest numbers of millwork employees nationally. The Southeast and Northeast regions also had significant employment in this industry, while the less-populated Intermountain region had less than 5% of the national employment. There was no unique explanation for the distribution of this industry across states, but factors may include proximity to urban and suburban populations, access to a skilled workforce, and access to wood materials.

Table 3. Total Employment by Region for Examined Hardwood Industries in 2002, 2007, 2009, and 2014 [1,2]

Millwork				
	2002	2007	2009	2014
Region	Percent	Percent	Percent	Percent
Northeast	12.5	12.1	12.2	13.1
North Central	33.1	32.9	35.8	35.3
Southeast	14.3	15.5	14.0	14.4
South Central	18.5	17.7	17.1	16.6
Intermountain	4.7	6.0	5.1	5.2
Pacific West	17.0	15.7	15.8	15.4
Wood Containers and Pallets				
	2002	2007	2009	2014
Region	Percent	Percent	Percent	Percent
Northeast	12.9	14.3	14.3	14.2
North Central	35.8	33.0	32.6	32.7
Southeast	16.1	14.7	15.3	15.8
South Central	21.4	23.3	22.1	21.8
Intermountain	2.5	3.4	3.1	3.6
Pacific West	11.2	11.3	12.6	11.9
Kitchen Cabinets				
	2002	2007	2009	2014
Region	Percent	Percent	Percent	Percent
Northeast	14.8	13.5	14.4	13.5
North Central	30.6	29.5	31.8	32.3
Southeast	14.1	15.3	14.0	14.6
South Central	17.9	18.5	18.7	18.1
Intermountain	8.1	8.9	7.7	7.7
Pacific West	14.5	14.2	13.3	13.8
Nonupholstered Wood Household Furniture				
	2002	2007	2009	2014
Region	Percent	Percent	Percent	Percent
Northeast	14.8	16.9	17.9	17.3
North Central	20.6	27.5	29.5	36.6
Southeast	36.1	28.9	25.1	19.5
South Central	9.7	10.8	10.4	9.1
Intermountain	5.1	6.8	5.9	6.0
Pacific West	13.7	12.0	11.2	11.5

[1] Percentages may not add up to 100 due to rounding errors
[2] Developed from USDL (2015b)

During the 2002 to 2007 economic expansion (in which total millwork employment declined), there were small regional shifts, but the most notable change was the loss in employment in the Pacific West region, especially in California. This resulted in Wisconsin becoming the largest employer in this industry even though Wisconsin also lost employment (Tables 3 and 4). During this same period, Iowa displaced Minnesota as the third largest employing state for the millwork industry. The only region to gain employment in this industry during the second economic expansion was the Intermountain region.

Between 2007 and 2009, national employment in the millwork industry declined by 31%, with the greatest declines occurring in the Intermountain and Southern regions. Employment in the millwork industry continued to decline through 2012 before increasing in 2013 and 2014. The South Central, Southeast, and Pacific West regions suffered the greatest declines in employment during this period, while the Northeast region experienced a small increase. The top five states for millwork employment remained consistent from 2007 to 2014 with the exception of Minnesota and Iowa exchanging positions. From 2002 to 2014, the South Central and Pacific West regions lost over 40% of their millwork employees, while the Intermountain, North Central, and Northeast regions all lost less than 35% of these employees. The Southeast region lost 37% of its millwork employees.

Pallets

In 2002, over 57% of the workers employed by the pallet industry were in the North Central and South Central regions, with Ohio and Texas being the largest employers in these regions, respectively (Tables 3 and 4). Other states that had a sizable pallet workforce were California, Pennsylvania, and North Carolina. Because pallets are a low value, bulky product that is relatively expensive to transport, in addition to being able to be manufactured from virtually any wood species and not requiring clear lumber, pallets tend to be produced proximate to the final customer.

During the second economic expansion, employment in the pallet industry increased in the Northeast, South Central, and Intermountain regions, decreased in the North Central and Southeast regions, and remained nearly constant in the Pacific West region (USDL 2015b). During this period, the largest change in the pallet employment state rankings was California displacing Ohio as the top employer. During the 2008 to 2009 recession, pallet employment decreased in all regions with the largest declines occurring in the North Central and South Central regions. This change is reflected in the relative growth in employment in California and relative decline in employment in Ohio and Texas between 2007 and 2009 (Table 4).

Wood containers and pallets was the only industry that had a growth in employment every year during the third economic expansion, and this growth occurred in every region (USDL 2015b). While there was little change in proportional regional employment during this period, the top four states all had proportional decreases in employment, with the largest decrease occurring in Ohio (Table 4). Between 2002 and 2014, Ohio lost nearly 4,200 employees in the pallet industry (54%), which was considerably greater than the 2,700 person decline in employment nationwide as many other states gained employment in the pallet industry during this period.

Wood kitchen cabinets

Over 30% of the employment in the kitchen cabinet industry in 2002 was located in the North Central region, and an additional 18% was in the South Central region (Table

3). California had the greatest single state employment (Table 4). As in the case of the millwork industry, there was no single factor affecting regional employment in the kitchen cabinet industry. During the 2002 to 2007 economic expansion, employment in the kitchen cabinet industry increased in all regions, with the largest increases occurring in the South Central and Southeast regions. The individual state rankings remained similar during this period, with the exception of Indiana displacing Ohio for the number 4 position. However, as Fig. 1 indicates, employment in this industry started to decline after 2006.

Table 4. Total Employment Rankings by State for the Examined Hardwood Industries in 2002, 2007, 2009, and 2014 [1]

Millwork								
	2002		2007		2009		2014	
Rank	State	Percent	State	Percent	State	Percent	State	Percent
1	CA	8.3	WI	8.0	WI	8.4	WI	7.5
2	WI	8.0	CA	7.2	CA	7.9	CA	7.5
3	MN	6.2	IA	5.9	IA	6.7	MN	6.4
4	IA	5.6	MN	5.7	MN	6.7	IA	6.3
5	OR	5.5	OR	5.6	OR	5.3	OR	5.4
Wood Containers and Pallets								
	2002		2007		2009		2014	
Rank	State	Percent	State	Percent	State	Percent	State	Percent
1	OH	12.9	CA	8.3	CA	9.6	CA	8.9
2	CA	8.8	OH	8.2	OH	7.5	TX	7.1
3	TX	6.2	TX	7.8	TX	7.4	OH	6.3
4	PA	5.1	PA	5.8	PA	5.8	PA	5.7
5	NC	4.9	NC	5.1	NC	5.2	NC	5.3
Kitchen Cabinets								
	2002		2007		2009		2014	
Rank	State	Percent	State	Percent	State	Percent	State	Percent
1	CA	9.8	CA	8.6	TX	8.8	IN	8.9
2	TX	8.6	TX	8.4	CA	8.2	TX	8.3
3	PA	6.8	PA	6.3	IN	6.6	CA	8.2
4	OH	6.0	IN	5.8	PA	6.3	PA	5.4
5	IN	5.4	OH	4.9	OH	5.5	OH	4.7
Nonupholstered Wood Household Furniture								
	2002		2007		2009		2014	
Rank	State	Percent	State	Percent	State	Percent	State	Percent
1	NC	20.6	NC	13.2	NC	11.4	WI	11.8
2	CA	12.5	CA	10.3	CA	9.7	OH	9.7
3	VA	10.4	VA	10.1	VA	8.9	NC	9.6
4	NY	5.8	NY	7.0	WI	8.8	CA	9.4
5	WI	4.5	WI	6.7	NY	7.2	NY	7.1

[1] Developed from USDL (2015b)

Between 2007 and 2009, employment in the kitchen cabinet industry decreased by 65,000 people, and all regions experienced declines exceeding 30% (USDL 2015b). During this period, employment decreased the least in the Northeast and North Central regions and the most in the Southeast and Pacific West regions (Table 3). By 2009, Texas had displaced

California as the largest cabinet employment state, and Indiana had displaced Pennsylvania as the third largest state (Table 4).

Employment in the kitchen cabinet industry continued to decline from 2010 to 2012 before an upward shift in 2013 and 2014 occurred. Between the years of 2006 (the peak for housing) and 2012, the cabinet industry lost nearly 82,000 workers. The North Central region remained the most significant, but the Southeast region experienced the greatest proportional growth (smallest proportional decline). In 2014, the North Central state of Indiana had the greatest employment in the cabinet industry, displacing the South Central state of Texas for the number one spot (Table 4).

Wood household furniture

In 2002, over 36% of the employment in the WHF industry was within the Southeast region, and an additional 21% was within the North Central region (Table 3). Other important WHF producing regions in 2002 were the Northeast and the Pacific West, which accounted for 15% and 14% of the employment in this industry, respectively. By 2002, the WHF industry had already experienced a two-year period in which national employment had declined by over 22,000 workers.

During the second expansion period, employment in the WHF industry continued to decline in all regions, but the largest declines were in the Southeast and Pacific West regions (55% and 48%, respectively), compared with a 25% decline in the North Central region and a 32% decrease in the Northeast region (USDL 2015b). These shifts resulted in large proportional decreases in employment in the Southeast and Pacific West regions relative to the northern regions. However, the ranking of the top five WHF employment states remained the same between 2002 and 2007, with North Carolina being the top state followed by California and Virginia.

During the economic recession of 2008 and 2009, employment in the WHF industry continued to decline in all regions with the smallest decline occurring in the North Central and Northeast regions, and the greatest numeric decline (6,600 workers or 35%) occurring in the Southeast region. As a result, the North Central region was the largest employer in the WHF industry in 2009 (Table 3). Although Wisconsin only had a relatively small decrease in WHF employment during the Great Recession, its ranking only increased from fifth to fourth (Table 4).

In the third expansion period of 2009 to 2014, employment in the WHF industry in the North Central region increased, while employment in all other regions continued to decrease, with the largest decline occurring in the Southeast (primarily North Carolina and Virginia) and Pacific West regions (primarily California) (USDL 2015b). By 2014, proportional employment was 85% higher in the North Central region *versus* the Southeast region, and employment in both Wisconsin and Ohio exceeded employment in North Carolina. Virginia experienced the largest decrease (44%) between 2009 and 2014, which resulted in a decline in ranking from the third most important state in 2009 to the sixth most important state in 2014 (USDL 2015b).

CONCLUSIONS

1. After a period of continuous growth in employment in the 1990s, the industries consuming hardwood lumber have experienced large declines in employment this century. The major industries consuming more expensive, higher grade lumber have

had the largest declines in employment, while the pallet industry has been affected by a lesser degree.

2. The wood household furniture (WHF) industry has experienced the greatest decline in employment as the result of increased furniture imports. A large portion of this decline was confined to North Carolina, Virginia, and California, but even Wisconsin and Ohio (the most important WHF states in 2014) experienced declines in employment. However, after experiencing a low point in 2012, employment in this industry has remained nearly constant since.
3. Employment in the millwork industry started to decline after 2000, remained somewhat constant during the 2002 expansion, declined after the decline in home construction, and has only started to recover since 2012.
4. In contrast to the millwork industry, the kitchen cabinet industry exhibited employment that continuously increased during the first economic expansion, stayed constant during the recession of the early 2000s, and increased again in the second economic expansion until the decline in housing construction. However, between 2006 and 2012, the kitchen cabinet industry experienced the same percentage decline in employment as the millwork industry did between 2000 and 2012. Since 2012, the cabinet industry has experienced an increase in employment, but has not reached the 2009 level. There has been a shift at the state level, from the two most populous states (California and Texas) to Indiana.
5. Although employment in the pallet industry has declined in the 21st century, nearly this entire decline has occurred during recessionary periods. Furthermore, the pallet industry was the only major industry examined that had an increase in employment during the third expansion period. There was a decline in the proportional employment of the pallet industry in the North Central region as a result of the large decline in employment in Ohio.
6. While changes in employment of secondary processors of hardwood lumber were related to the three general measures of economic activity at times, these correlations were inconsistent.
7. Other than an expansion in employment in the pallet industry since the 2008 to 2009 recession, employment in the major hardwood consuming industries had improved but not surpassed 2009 levels by 2014. This trend was observed over most states and regions.

REFERENCES CITED

Alderman, D. (2015). "Housing and construction," in: *Forest Products Annual Market Review 2013-2014*, Geneva, Switzerland, pp. 113-122.

Board of Governors of the Federal Reserve System (BGFRS). (2015a). *About the G.17*, (http://www.federalreserve.gov/releases/g17/About.htm), accessed August 17, 2015.

Board of Governors of the Federal Reserve System (BGFRS). (2015b). *Industrial Production Index (INDPRO)*, Federal Reserve Bank of St. Louis, (https://research.stlouisfed.org/fred2/series/INDPRO/), accessed May 15 2015.

Boyes, W., and Melvin, M. (1991). *Macroeconomics*, Houghton Mifflin Company, Boston, MA, pg. 597.

Carnes, W. S., and Slifer, S. D. (1991). *The Atlas of Economic Indicators*, HarperCollins Publishers, New York, NY, pg. 232.

Gregory, G. R. (1972). *Forest Resource Economics*, The Ronald Press Company, New York, NY, pg. 548.

Grushecky, S. T., Buehlmann, U., Schuler, A., Luppold, W., and Cesa, E. (2006). "Decline in the U.S. furniture industry: A case study of the impacts to the hardwood lumber supply chain," *Wood Fiber Sci.* 38(2), 365-376.

Han, X., Wen, Y., and Kant, S. (2009). "The global competitiveness of the Chinese wooden furniture industry," *For. Policy Econ.* 11(8), 561-569.

Luppold, W., and Bumgardner, M. (2008). "Forty years of hardwood lumber consumption: 1963 to 2002," *For. Prod. J.* 58(5), 7-12.

Luppold, W., and Bumgardner, M. (2011). "Thirty-nine years of U.S. wood furniture importing: Sources and products," *BioResources* 6(4), 4895-4908.

Luppold, W., Bumgardner, M., and McConnell, T. E. (2014). "Assessing the impacts of changing hardwood lumber consumption and price on stumpage and sawlog prices in Ohio," *For. Sci.* 60(5), 994-999.

National Bureau of Economic Research (NBER). (2015). *US Business Cycle Expansions and Contractions*, (http://www.nber.org/cycles.html), accessed July 13, 2015.

Quesada, H. J., and Gazo, R. (2006). "Mass layoffs and plant closures in the U.S. wood products and furniture manufacturing industries," *For. Prod. J.* 56(10), 101-106.

Tilley, B., and Munn, I. A. (2007). "2001 economic impacts of the forest products industry in the South," *South. J. Appl. For.* 31(4), 181-186.

United States Bureau of Economic Analysis (USBEA). (2015). *Gross Domestic Product, BEA Account Code: A191RC,* (http://research.stlouisfed.org/fred2/series/GDP/downloaddata), accessed July 10, 2015.

United States Census Bureau (USCB). (2015a). *Annual Value of Private Construction Put in Place 2008-2014,* (http://www.census.gov/construction/c30/historical_data.html), accessed July 10, 2015.

United States Census Bureau (USCB). (2015b). *North American Industrial Classification System*, (http://www.census.gov/eos/www/naics/), accessed December 1, 2015.

United States Census Bureau (USCB). (2015c). *New Privately Owned Housing Units Completed, Annual Data,* (https://www.census.gov/construction/nrc/historical_data/index.html), accessed May 15, 2015.

United States Department of Labor, Bureau of Labor Statistics (USDL). (2015a). *Current Employment Statistics - CES (National)*, (http://data.bls.gov/pdq/querytool.jsp?survey=en), accessed June 18, 2015.

United States Department of Labor, Bureau of Labor Statistics (USDL). (2015b). *Quarterly Census of Employment and Wages*, (http://data.bls.gov/pdq/querytool.jsp?survey=en), accessed June 18, 2015.

Article submitted: October 27, 2015; Peer review completed: January 14, 2016; Revised version received and accepted: February 2, 2016; Published: February 9, 2016
DOI: 10.15376/biores.11.2.3123-3135