



# An Overview of the Forest Products Sector Downturn in the United States

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## ABSTRACT

In recent years, the forest products industry of the U.S. experienced a downturn in output to levels not seen in decades and employment losses in the hundreds of thousands -- for instance, a number far greater than witnessed in the Nation's automotive industry. The extent of the forest industry downturn varies by sector, impacted by structural changes in the overall economy coupled with substantial impacts from the Great Recession. Globalization of manufacturing and expanded use of electronic communication media contributed to a decline in U.S. pulp, paper, and paperboard output since the late 1990s, while the collapse of housing construction since 2006 and off-shoring of furniture production contributed to declines in U.S. wood product output. The paper points to structural changes that may be difficult to reverse, but also points to some potential prospects for growth in the future such as increased secondary product manufacturing and wood energy. This paper serves as an introduction to the extent of the downturn with a particular focus on trends in forest sector economic production and employment across the U.S. Because the nation's forest industry varies by region due to differences in forest resources and forest industries, additional regional examinations of this downturn (same issue) will highlight variations in the regional industrial response to the "Great Recession."

## NATIONAL TRENDS IN EMPLOYMENT AND PRODUCTION

The collapse in the U.S. housing market in 2006 followed by a “Great Recession” in the U.S. (December of 2007 to June of 2009) and globally led to the U.S.’s worst housing and wood products market conditions since the 1930s Great Depression. U.S. housing starts were 554,000 in 2009. This is the lowest level in over 50 years, with only a slight increase in 2010 and 2011 (Fig. 1). Wood product prices and outputs of the wood and paper products industries fell dramatically during the recession and ensuing slow recovery. This “Great Recession” and aftermath have had immediate and large impacts on the forest products industry, employment, and regional, and local economies. To illustrate, U.S. softwood lumber consumption and production were at record high levels in 2005, but by 2009 had fallen by 50% and 43%, respectively. Softwood lumber consumption and production during 2009 and 2010 were at their lowest levels since the late 1940s. Other major sectors such as paper were not as severely impacted as softwood lumber, but experienced declines in output, production value, and employment. Such substantial decline across all wood industry sectors has likewise substantially affected employment and the future of the wood products industry -- a story that inherently varies by region of the U.S.

Between 2005 and 2009, over 1.1 million jobs have been lost in six forestry, forest products, and related sectors of the U.S. economy (BLS 2012). Three primary sectors in the forestry and forest products industries are forestry & logging (North American Industrial Classification System; NAICS 113), wood manufacturing (NAICS 332), and paper manufacturing (NAICS 321) which lost 14,631, 218,677, and 89,507 jobs, respectively, for a total of 322,805 primary sector jobs. Related sectors include furniture and related manufacturing (NAICS 337), residential construction (NAICS 3261), and furniture retail (NAICS 422) which lost 208,908, 388,725, and 138,065 jobs, respectively, for a total of 735,767 related sector jobs. These six sectors do not fully represent the scope of job losses associated with

Figure 1. U.S. single-family housing starts and home ownership rate (quarterly)

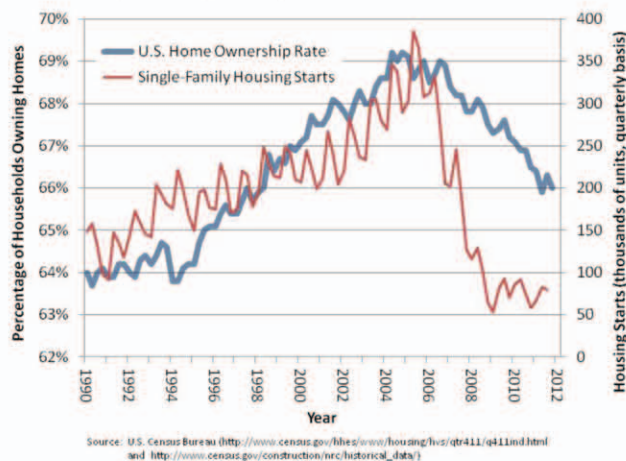
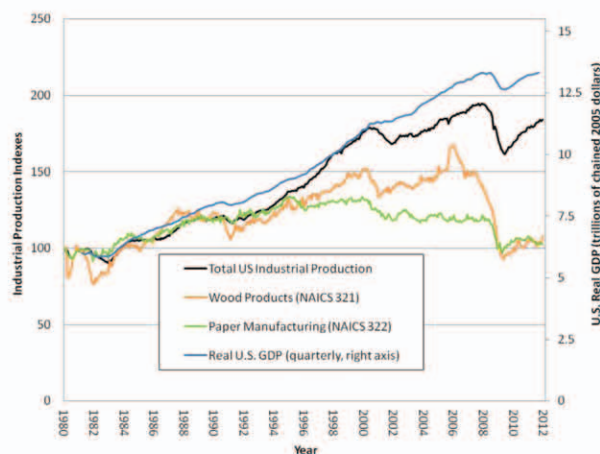


Figure 2. Trends since 1980 in U.S. Real Gross Domestic Product (GDP) and monthly industrial production indexes (Jan. 1980=100)



Note: GDP is the broadest measure of overall economic activity, and real GDP (in constant dollars) quantifies the absolute level of activity in the economy over time. Real GDP data for the United States are published on-line by U.S. Bureau of Economic Analysis (BEA): <http://www.bea.gov/national/index.htm#gdp>. Industrial production indexes quantify the level of output in industrial sectors of the economy. U.S. industrial production indexes by industry are published on-line by the U.S. Federal Reserve (G.17): [http://www.federalreserve.gov/releases/g17/table1\\_2.htm](http://www.federalreserve.gov/releases/g17/table1_2.htm)

the U.S. forest sector, but provide a sense of the magnitude of the impact on the nation’s forest industry and related work force. By comparison, employment in the transportation equipment manufacturing group (including automotive industry) declined by 25% over the same period (440,000 workers).

Two key forces have influenced the U.S. wood

Figure 3. U.S. employment trends in traditional wood-related industries

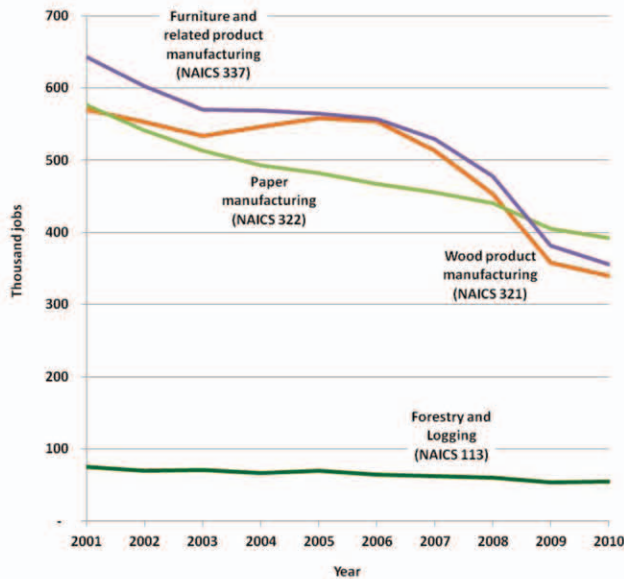
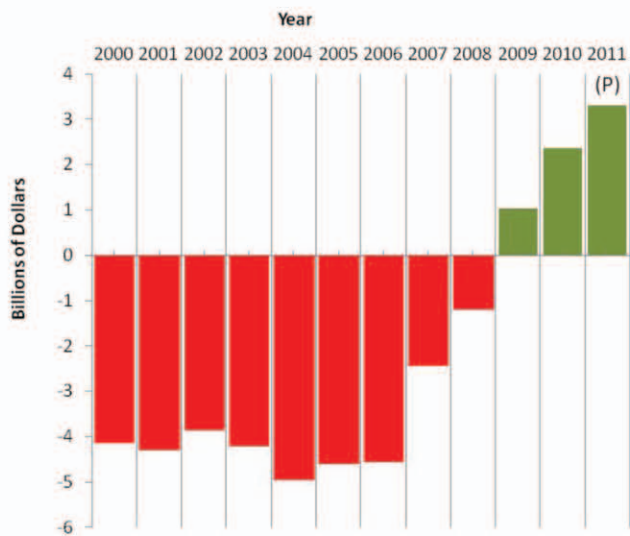


Figure 4. U.S. trade balance for pulp, paper & paperboard mill products (NAICS 3221)



industry. First, there are long term structural changes, such as the rise of electronic media and decline of paper (Ince et al. 2007). Second, there are effects from the 2007 to 2009 recession which are discussed subsequently. Structural changes are seen when decades-long product production trends depart from growth trends in the overall U.S. economy. These changes have occurred during a period of economic globalization and structural change (Ince et al. 2007). Comparison of several indexes of industrial production to historical trends in U.S. real Gross Domestic Product (GDP)

suggests a decline that was initiated prior to the recession of 2007 to 2009 (Fig. 2). Output of wood products and paper manufacturing has fallen well behind GDP growth and growth in overall U.S. industrial production. The growth in industrial production has also been slower growth than real GDP, possibly as a result of outsourcing and off-shoring of growth in manufacturing to foreign countries (Fig. 2). In recent years the outputs of wood products and paper manufacturing have both dropped to levels not seen since the mid-1980s. For paper manufacturing (including pulp, paper and paperboard mills plus paper converting plants), U.S. output peaked in the 1990s and has declined over the past decade (Ince et al. 2011) as electronic media made deep inroads into paper demands for print advertising and communication (Soirinsuo 2009) and off-shoring of manufacturing weakened demands for paper and paperboard in packaging. U.S. output of paper and paperboard peaked historically in 1999, having more than doubled since the 1960s. Output has not recovered to preceding peak levels, and by 2011 U.S. paper and paperboard output was running about 16% lower than the peak output of 1999 according to industry data (AF&PA 2012).

The recession of 2007-2009 has also had a major impact on forest products industries due to the continued weakness in housing and related industries. Wood product manufacturing continued to grow through the early 2000's until impacted by the decline and ultimate collapse in U.S. housing construction initiated in 2006 (Fig. 1). Since 2009, new single-family home construction starts have remained at less than one-quarter the levels of 2005, and lower than at any time since the 1950s. The collapse in housing construction, formerly the major driver of wood product demand, has led to substantial declines in wood product manufacturing, as is evidenced in specific regions of the U.S. (Woodall et al. 2011, Keegan et al. 2011, Hodges et al. 2011). In concert with widespread declines in wood manufacturing employment has dropped substantially (Fig. 3). The employment declines in traditional wood-related industries (Fig. 3) were particularly severe from 2005 to 2010, when 532,000 jobs were lost

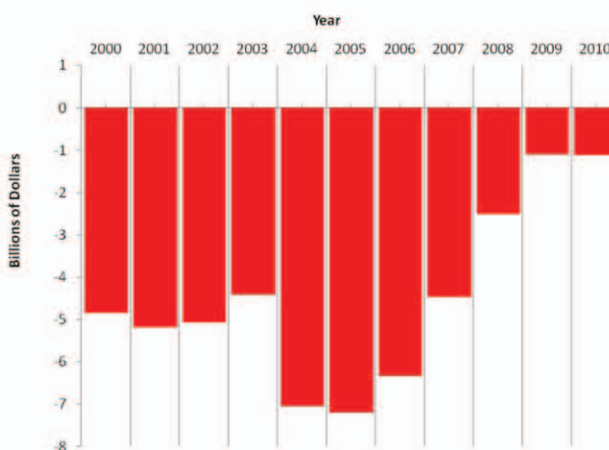
nationwide, a decline of 32%.

## TRENDS IN GLOBAL TRADE

The effects of the recession of 2007-2009 can be viewed from two perspectives. On one hand, long term structural changes in the industry coupled with the recent recession have promoted potential gains in efficiency and global competitiveness, as evidenced by increasing exports by the paper industry (Fig. 4). The declines in paper industry employment exceed the decline in industry output with respect to percentage change, and thus the downsizing of employment may reflect industry consolidation and closure of many older and less efficient mills and paper machines. The net result has been a substantial gain in labor productivity for U.S. paper manufacturers, with product output per employee at U.S. paper and paperboard mills increasing by over 40% on average since 2001. The now leaner and more competitive U.S. pulp and paper industry has achieved net exports in just the past couple of years for the first time in many decades. As an example, the recent history of the U.S. trade balance (exports minus imports) for pulp, paper and paperboard mill products (NAICS 3221) based on data from the International Trade Administration (ITA 2012) demonstrates a recent positive trade balance (Fig. 4) (data for 2011 are preliminary).

In contrast, the export of raw materials, although it reduces trade deficits, may represent the off shoring of jobs and the decline of the secondary wood product industry. The U.S. is the world's largest exporter of hardwood lumber, accounting for 14.7% of world exports, but a much smaller exporter of softwood lumber (4.2% of world exports); at the same time, the U.S. is the largest worldwide importer of softwood lumber (17.2%) (UN FAO 2012). U.S. sawmill and wood products industry net exports have improved substantially in recent years, partly as a result of declining wood product imports associated with the decline in domestic housing construction. In 2010, the largest U.S. trade surpluses for sawmill and wood products (NAICS 3211) and pulp, paper, and paperboard manufacturing (NAICS 3221) were with China, Japan and Mexico, while the largest

Figure 5. U.S. trade balance for sawmill & wood products (NAICS 3211)



U.S. trade deficits in both sectors were with Canada, although Canada is also a large importer of U.S. products (ITA 2012). In the first 11 months of 2011, hardwood log exports to China dramatically increased, reaching 40% of export market share (USDA FAS 2012). Thus, although the U.S. remains a net importer of sawmill and wood products, the trade balance (exports minus imports) has improved for the sawmill and wood preservation sectors (NAICS 3211) over the last decade (Fig. 5). However, this is primarily due to a decline in the import of softwood lumber (related to the housing crash), not a burgeoning export market. Although reductions in trade deficits can be viewed as positive, there is also the view that continued export of raw materials (e.g., hardwood sawlogs) represents off-shoring of skilled U.S. secondary jobs that are a critical component of domestic value-added manufacturing. Processing more raw materials in the U.S. could provide more domestic jobs.

## WOOD ENERGY PROSPECTS

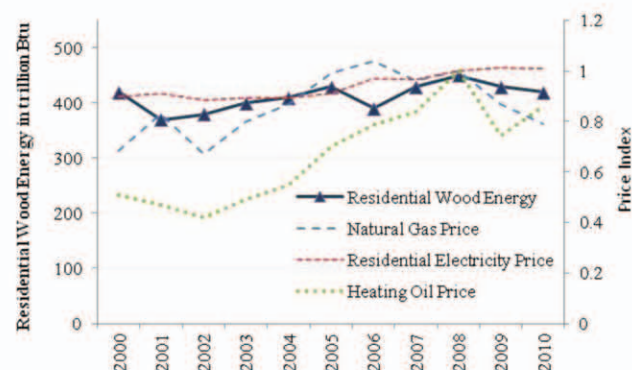
Given the decline in traditional wood product industries, social awareness of greenhouse gas emissions associated with burning fossil fuels, and the rising price of liquid fuels, the prospects of wood energy markets have come under increased scrutiny. According to data from the Energy Information Administration (US EIA 2011) U.S. wood energy consumption, including wood and wood-derived liquid and solid fuel reached 1,986

trillion Btu in 2010. This figure represents 46% of the 4,295 trillion Btu of energy generated from all types of biomass, 25% of the 8,049 trillion Btu of renewable energy, and 2% of the 98,003 trillion Btu of total U.S. energy consumption (US EIA 2010). The U.S. wood energy sector includes four main subsectors: industrial, residential, commercial, and electric power (US EIA 2010). In 2008, 1,344 trillion Btu of wood energy was used in the industrial sector, corresponding to 65% of total U.S. wood energy. The wood energy industrial sector comprises mainly (a) wood product manufacturing (NAICS 321), and (b) paper manufacturing (NAICS 322). Paper manufacturing consumed 787 trillion Btu of black liquor and 318 trillion Btu of wood/wood wastes in 2008 (EIA 2010). The total 1,105 trillion Btu of black liquor and wood/wood wastes used in the pulp and paper industry accounted for 82% of wood energy in the industrial sector and 54% of U.S. total wood energy consumption in 2008.

The amount of wood energy consumed by the U.S. forest products industry has experienced periods of growth, contraction and stability over the last four decades. The amount of wood energy consumption has been more closely associated to industry output than oil prices (Aguilar et al. 2011). For instance, with rising oil prices between 2003 and 2008, wood energy consumption by the industrial sector continued a downward trend following a decline in domestic U.S. pulp and paper production (Energetics Incorporated Columbia 2005, RISI 2010). By 2009, the consumption of wood energy by the industrial sector had dropped back to levels last seen in 1977, primarily because of the downturn in production of forest products.

In contrast to the U.S. industrial sector, the residential sector's consumption of wood energy has been largely affected by competing energy prices and government policies, not the recession. Since 1990 wood energy used in the residential sector has been closely aligned with changes in the price of energy substitutes, mainly electricity (Song et al. 2012, Howard and Westby 2009). With increasing prices of competitive fuels since 2002 and incentive programs such as the

Figure 6. Residential wood energy consumption and consumer price index (CPI) adjusted real prices indices of elected non-renewable energy sources (real price index 2008=1)



Residential Energy Efficiency Tax Credit (DSIRE 2010), the residential sector increased its wood energy consumption by 29% from 380 trillion Btu in 2002 to 450 trillion Btu in 2008 (Fig. 6). However, a drop in natural gas prices observed in recent years has been accompanied by a slight drop in residential wood energy consumption. A combination of income, urbanization and non-wood energy price effects suggest residential wood energy consumption may change little in the future. EIA national estimates suggest little to no changes through the year 2020 with consumption remaining at the same level observed in 2011 (US EIA 2012).

The future use of woody materials for the production of biofuels might be driven by federal Renewable Fuel Standards under the Energy Independence and Security Act of 2007 (P.L. 110-140) that set a target of 10.5 billion gallons of cellulosic biofuel to be used in transportation fuels in 2020. This target grows to 16 billion gallons of cellulosic biofuel by the year 2022. However, actual production has already fallen far short of the EISA target levels, and the standards have been adjusted accordingly by the EPA (2010). At present there is still no large-scale commercial facility producing liquid transportation fuels from wood in the U.S.

Use of wood energy in the electricity sector is projected to grow substantially nationwide from 190 trillion BTU in 2010 to 710 trillion BTU

by the year 2020 (US EIA 2012). According to Aguilar et al. (2011) implementation of programs such as the federal renewable energy production tax credit (PTC), Clean Renewable Energy Bonds (CREBs), federal business energy investment tax credits (ITC) among other public programs have had a significant effect on the greater use of biomass for energy generation. The adoption of Renewable Portfolio Standards by individual states has set targets for electricity generation from renewable sources may also stimulate greater use of woody biomass for energy.

The industrial wood pellet sector is expected to grow, given prospects for expanding local and international (mainly European) demand (Spelter and Toth 2009). Estimates from different sources suggest that by the year 2016 total industrial wood pellet demand from Europe might range from 30 to over 80 million dry metric tons. A joint effort between APX-ENDEX and the Port of Rotterdam in the Netherlands has created a global wood energy commodity contract exchange market (APX-ENDEX 2010). U.S. industrial wood pellet manufacturers will have to actively compete in a global market with producers in Asia, Canada, Europe, the Russian Federation and South America.

## **REGIONAL VARIATIONS IN DOWNTURN**

The decline of the U.S. forest industry is unique in its extent and its pervasiveness across all sectors and regions of the U.S. (Woodall et al. 2011, Hodges et al. 2011, Keegan et al. 2011). Within the northern region of the U.S. (from Maine to North Dakota in the north and Maryland to Kansas to the south) there has been a notable decline in terms of employment, mill numbers, wood consumption, and forest harvests since 2000, a downturn exacerbated by the recent recession (Woodall et al. 2011). As a large amount of this region's forest industry is print paper manufacturing and composite panel production, the ascent of electronic media and decline of home construction has precipitated a decade of decline which has only deepened since the recession of 2007-2009. In addition, industrial sectors associated with the hardwood resource (e.g., furniture) have also experienced substantial

declines related to the off-shoring of skilled secondary jobs and declines in the housing industry. Although this region's forest industry has declined, its predominantly private-owned forests continue to grow, with increasing volumes of some of the world's most valuable species such as walnut, cherry and high quality oaks. Coupled with this natural resource is an underutilized industry with spare capacity and a skilled work force. Recent positive trends in trade balances suggest that the decline of the North's forest industry may be slowing with increased export of unfinished products (e.g., pulp).

The South spans 13 southern states from Texas to Virginia and includes a diversity of ecosystems (Hodges et al. 2011). Southern forests are highly productive and, while they only account for 2% of the global forest cover, they produce 12% of world's industrial timber and 18% of its pulpwood. Historically, the number of primary wood-using facilities in the South has steadily decreased but the average output of the remaining mills has steadily increased. In the context of long-term forest products industry and land management trends, recent economic conditions accelerated and accentuated existing trends of mill closures, job losses, and land management in the South as harvest acres have declined substantially and many landowners have postponed harvests due to lack of markets. During the recent recession, the South experienced a striking increase in the rate of mill closures with over 500 closures since 2005. This has led to a decrease in overall production with sawmills being particularly hard-hit due to the precipitous decline in housing starts and the loss of demand for southern pine structural timber. Mill closures resulted in significant direct job losses, as well as the indirect impacts of jobs losses all along the supply chain which created further economic decline due to reduced household expenditures in local communities.

The western region of the U.S. can be broadly defined as including the 13 states west of the Great Plains, including Alaska and Hawaii (Keegan et al. 2011). The forest products industry is a major component of the economy in the West with pri-

mary and secondary wood and paper industry annual sales value of nearly \$50 billion. The Western forest industry directly employed almost 250,000 workers in 2005, a number sharply reduced by the recession. The West, prior to the recession, was a major softwood lumber producing region in the nation, which along with other wood products sectors was particularly hard hit by the Great Recession and housing collapse. Employment dropped by 30% or nearly 80,000 workers, and annual value of output fell by more than 25%, over \$15 billion (Keegan et al. 2011).

## **FUTURE PROSPECTS FOR GROWTH**

The nationwide and regional trends in the U.S. forest products sector point to some structural changes that may be difficult to reverse, but also point to some potential prospects for growth. Structural changes that will be difficult to reverse include the ongoing displacement of paper communication and print advertising with electronic communication technology. The extreme cyclical collapse of housing construction and realignment of home prices diminish prospects of a strong housing recovery in the near future. For several years now (2009-2011) U.S. single-family housing starts have been in the range of only 0.4 to 0.5 million per year (less than one-third the peak levels of 2005), and expert forecasts of U.S. housing starts have been revised downward in recent years. A full “recovery” of housing construction to previous peak levels (more than 1.5 million) is not expected to occur within the next decade, but a gradual and modest rebound in housing starts is widely anticipated (NAHB 2012). Meanwhile, the general improvement in U.S. net exports of pulp and paper products and wood products offers another prospect for future growth as long as it does not come at the cost of off shoring skilled domestic secondary jobs.

On a positive note, due to productivity gains and a generally weaker U.S. dollar, the U.S. pulp and paper industry has achieved for the first time in many decades net exports of pulp, paper and paperboard products (both in product value and tonnage), with the trade surplus reaching several billion dollars in 2011. Meanwhile, U.S. net imports of lumber and wood panel products were substantially reduced in recent years, with the trade deficit dropping from

around \$7 billion in 2005 to just over \$1 billion by 2010 in the U.S. sawmill and wood products industry, NAICS 3211 (ITA 2012). Global demands for paper and wood products continue to expand, particularly in Asia. Trends suggest that U.S. competitiveness and expansion of forest product exports afford one prospect for forest product sector growth in the future. Thus taking steps to sustain global competitiveness (holding down U.S. production costs).

Another approach is to develop new uses for wood. One prospect is to increase use of wood for energy. However, woody biomass is typically the lowest value wood commodity sold from the forest, typically lower in value than pulpwood and much lower in value than sawlogs or veneer logs. Thus, one concern about displacement of timber demands by future wood energy demands is the concern about adequate timber revenues to sustain forestry investments and forest management in the future. Ideally, the development of wood energy could include integrated forest biorefineries that could provide high value products from wood in the form of biomaterials and biochemicals. Limits to future supplies of petroleum and energy price increases may make such biorefining technology more lucrative in the future, but at present wood-based biorefining technologies are in their infancy or early stages of pre-commercial development. The wood products industries (such as pulp and paper mills) remain the largest consumers of wood energy in the U.S. economy. Thus, for the near term (at least the next decade or so) the prospects for growth in forest sector revenues and economic development hinge primarily on the anticipated gradual and modest rebound in housing construction and improvement in net exports. This paper and additional regional papers (Woodall et al. 2011, Keegan et al. 2011, and Hodges et al. 2011) serve as an introduction to this downturn. Trends suggest that U.S. competitiveness and expansion of forest product exports afford one prospect for sector growth in the future (i.e., sustaining global competitiveness...holding down U.S. production costs).

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