



The Monopolization of Forest Certification: Do Disparate Standards Increase Consumer Costs and Undermine Sustainability?

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Executive Summary

Certification has become an important trend in sound forestry management, as it balances resource sustainability with economic viability. Forest owners and manufacturers can voluntarily choose certification programs for their timber-based products by meeting the established requirements of one of several organizations, thereby earning the right to put that organization's eco-label on its products. Today, 40% of the world's certified forests are located in the North America.

However, a number of groups are pressuring corporations (sometimes even threatening boycotts) to purchase wood and paper products that meet an international certification standard established by the Forestry Stewardship Council (FSC). In essence, these groups are seeking to make FSC the only recognized standard in the US. Because most of the world's FSC-certified land is not in the US, an FSC-only approach would exclude the vast majority of certified US timber to the advantage of competing foreign timber.

This study addresses whether the US would be well served by exclusive reliance on this sole international standard. The following summarizes this study's major findings:

- The FSC certification seems to be significantly more costly than other standards, thereby raising producer costs and consumer prices in the range of 15% to 20%, as well as upsetting the balance between sustainability and economic viability;
- The FSC standard in the US appears to be stricter, and therefore more costly, than standards applied overseas, thereby disadvantaging US producers and raising retail prices for American consumers; and
- If a FSC standard becomes a regulatory requirement for US forests (through edict or non-market pressures from outside groups), consumer welfare losses would occur in a number of markets, including an estimated loss of \$10 billion per year for wood products and \$24 billion per year for paper products markets.

There are other potential consequences to consider. The FSC's disparity in standards across the globe ironically means that FSC may incentivize the harvesting of wood in more environmentally risky locations. A standards bias for foreign wood would also lead to an increased importation of foreign wood, thereby adding transportation costs and creating other environmental harms. In addition, the higher costs of wood in the US could push consumers to substitute to less environmentally-friendly materials, such as metals, concrete and plastics.

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The FSC standard may have merit and we make no attempt to disparage its environmental benefits, but by not having uniform standards worldwide, FSC's benchmarks do not represent a standard at all. Just as important, there are significant costs when governments institutionalize one standard through procurement requirements. Instead of adopting a *de facto* international standard, our analysis suggests that a better policy approach would be to maintain competition among certification programs, which would encourage US producers to more quickly adopt good forest management practices and produce more environmentally-friendly wood and paper products. This would also push certification organizations to achieve social and environmental benefits that are in balance with maintaining affordable consumer prices and job creation. By striking that balance, American consumers will more easily embrace eco-products making them both affordable and expanding their use by consumers.

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Introduction

In the last decade, the use of certification standards for good forest management has become a major catalyst to pushing the forest products industry toward more environmentally and ecologically responsible practices. In general, certification standards seek to achieve social benefits while balancing the economic viability of forest owners and manufacturers. There are more than 50 different certification standard groups worldwide,² including the American Tree Farm System (ATFS), Canadian Standards Association (CSA), Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC) and Sustainable Forestry Initiative (SFI). These latter groups are commonly open and transparent; have independent governance with a mixed board including representation from forestry, wildlife, conservation, industry, government and academia; and require independent certification and audits. The general approach, at least in North America, is for certification to be voluntary, non-regulatory in nature and market-based, but the specifics of each program vary and serve as competitive alternatives. This approach appears to have served the US well, where the North American market leads the world in forest certification, accounting for 40% of the world's certified lands.³

Does Certification Mean Increased Costs for US Producers?

While SFI is one of the more popular certification standards in the US, some groups believe that the FSC certification program should be the *de facto* (monopoly) standard. These groups have put pressure on large US corporations, and in some cases threatening boycotts of large US corporations, if these corporations do not buy FSC-certified products.⁴ With 90% of FSC certified lands being outside of the US, a sole FSC standard would exclude three-quarters of the nation's certified forests from being labeled as eco-friendly.⁵ Such a bias would disadvantage US firms relative to foreign firms, which are more likely to be FSC certified. In fact, a bias is already evident in the US Green Building Council's LEED 2012 rating system, which solely favors FSC, while treating wood from the other fifty certification programs as uncertified.

² British Columbia Forest Facts, March 2012 at <http://www.naturallywood.com/sites/default/files/Third-Party-Certification.pdf>.

³ "SFI and FSC Certification in North American – A Summary Comparison," January 2010, available at http://www.sfiprogram.org/files/pdf/SFI_FSC_comparison_2010.pdf.

⁴ For one example of a group boycotting a US corporation to pressure them into using more eco-friendly paper packaging, see Christa Hoyland, "Activists Target KFC over Packaging Sourcing," qrsweb.com, April 8, 2010, at <http://www.qrsweb.com/article/95644/Activists-target-KFC-over-packaging-sourcing>.

⁵ Letter from Congressman Glenn Thompson (et al) to Rick Fedrizzi, May 21, 2012, available at <http://1.usa.gov/JvM7oj>; and Kathy Abusow, "Open Letter – Top Ten Reasons Why USGBC Should Recognize All Credible Forest Certification Standards," Sustainable Forestry Initiative, May 11, 2012, available at http://www.sfiprogram.org/files/pdf/LEED%20Top%2010%20Messages_April_2012.pdf.

The pressure from these groups and their bias toward one certification program, whether justified or not, works to punish US firms and helps foreign competitors, while undermining the market-based incentives inherent in voluntary certification programs. In essence, a monopoly standard is tantamount to the imposition of industry regulations. The view of supporters of such a standard is simple: if you want to participate in the market for eco-products, then you must adhere to the one international certification program.

In general, a standard is used to define, specify, classify, measure or rank something or some attribute as a basis of comparison, like quality, quantity, value or excellence. A standard needs to be uniform to be meaningful and useful. If a standard is not uniform, then it creates a comparative bias. Differences in forestry certification will result in unfairly favoring one group over another and result in variations in cost, production and (ultimately) consumer price. In many locations, FSC operates without any standards, only using their principles as a guide. Indeed, an FSC auditor may perform an assessment and implement what he considers to be suitable standards to meet FSC objectives.

Available information shows that the FSC standards lack consistency. FSC negotiates standards from country to country, as a result the terms of certification may be more lenient in one country than in another, both because the underlying laws may be different and because the standards may be different between countries. Effectively, FSC forest management standards can differ depending on where the forest lands are located. These differences, in turn, can make FSC certification more costly in one country than in another, affecting the ability and cost to certify.

In fact, FSC management limitations can be more costly in the U.S than in Russia, Brazil, Sweden or New Zealand. Depending on the country, FSC sets different standards for limiting the size of clearcut openings and different “green-up” requirements for tree heights before harvesting adjacent tracts. For example, some US and Canadian forests have clearcut size limits, whereas FSC’s standards for Brazil, Russia and New Zealand have no limits.⁶ One FSC manager in Russia has admitted that there are gaps in FSC certification rules that put ancient forests at risk and stated that the standards are always based on “compromise.”⁷ However, by compromising from country-to-country, different standards are developed for the same certification process. As a result, differences in FSC standards affect the cost of timber and ultimately consumer prices.

⁶ See “Appendix II: Comparison of Most Costly Management Limitations in SFI and Selected FSC Regional and National Standards for an Enterprise > 10,000 Acres,” the Washington Forest Protection Association website, 2009, <http://www.wfpa.org/workspace/files/comparison-chart.pdf>. Also see, Kathryn Fernholz, Jim Bowyer, Sarah Stai, Steve Bratkovich and Jeff Howe, “Differences Between the Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) Certification Standards for Forest Management,” Dovetail Partners, Inc., March 28, 2011, <http://dovetailinc.org/files/DovetailFSCSFIComparison32811.pdf>; and “Assessing USGBC’s Policy Options for Forest Certification & the Use of Wood and Other Bio-Based Materials,” prepared by the Yale Program on Forest Policy and Governance, Yale University, February 25, 2008, Appendix A, worksheet at cell I46, available at <http://www.yale.edu/forestcertification/USGBCFinal.htm>.

⁷ Ida Karlsson, “Ikea Products Made from 600-Year-Old Trees,” *Guardian*, May 29, 2012, available online at <http://www.guardian.co.uk/environment/2012/may/29/ikea-ancient-tree-logging>.

FSC standards even differ within the US. For example, FSC requires 200 foot buffer along some fish bearing streams in Pacific Coast states, but only a 50 to 75 foot buffer elsewhere in the region, and no buffer limits in the Lake States or Northeast.⁸ These differences could mistakenly lead a Washington State resident who wants to protect streams to bypass uncertified wood from Washington State and purchase FSC-wood from Idaho, without realizing that FSC provides less protection for streams in Idaho.⁹ Heterogeneous standards compromise environmental benefits.

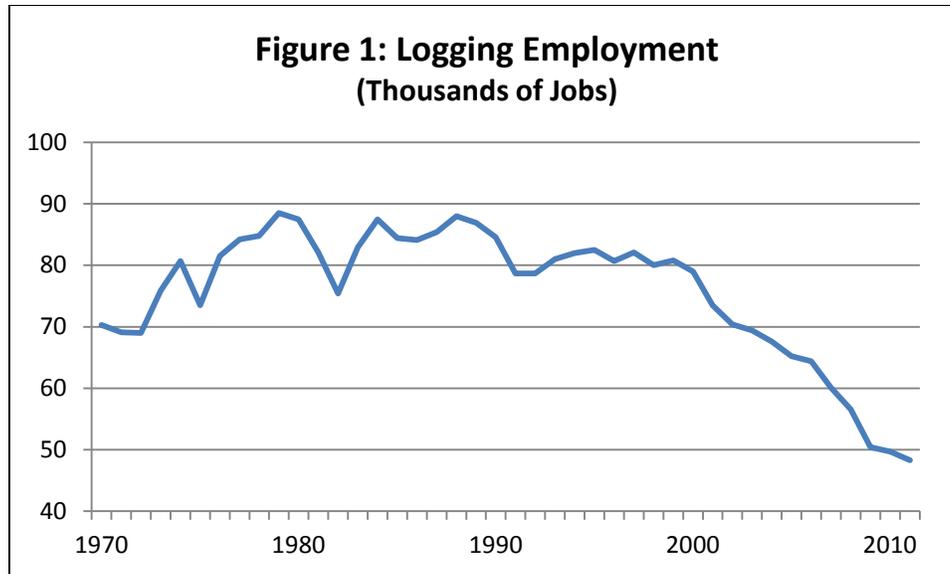
In contrast to the US, threats to tropical rainforests and other environmental risks are likely to be higher in some developing countries where timber is harvested. In these countries, government corruption, insufficient protections, restricted access and weak enforcement of environmental laws may be common. Therefore, if loss of or damage to forests is to be dealt with most effectively, standards that favor the production and consumption in better environmentally regulated countries would be more responsible than imposing standards that favor woods where environmental risks to deforestation, pollution and unsustainable practices are the greatest.

Property rights serve as an important incentive for good management. Since most of the wood in the US comes from privately-owned forests, owners have great long term incentives to care for their property and replant trees. On the other hand, publicly-owned forest managers may not have the same long term incentives. This distinction is demonstrated by the tragedy of the commons, where private interests on public lands lead to resource depletion. However, private ownership can mitigate this problem. That is why we observe home-owners often taking better care of their homes than renters do. It also explains why the American Bison was nearly exterminated a century ago from US public lands, whereas today their numbers reach nearly one million on private farms. The idea that US or Canadian forests should be held to a higher standard defies logic and it is counterproductive to environmental interests, because it encourages more risky environmental activities.

The imposition of a single standard such as FSC with different requirements across countries would hurt US production and that outcome could not come at a worse time for timber loggers in the US. Figure 1 depicts the annual levels in logging employment as tracked by the Bureau of Labor Statistics and shows the decline in industry jobs. Since 2000, logging employment has declined 39% or nearly 31,000 jobs, which is likely the result of many factors, including lower costs by international competitors. Therefore, the increase in domestic costs would have adverse consequences on the timber-based economy, as described in the Appendix of this study. As a result, increasing certification costs in the US would fuel this decline and push consumers to less environmentally friendly substitutes, like plastics, concrete and metals.

⁸ See fn. 6.

⁹ Todd Myers, *Eco-Fads*, Washington Policy Center, 2011.



In summary, the FSC standards vary by country and region, leaving the US subject to stricter standards. The imposition of stricter environmental certification standards in the US than in other countries is backward thinking, because it imposes more costs on US industries, thereby reducing domestic production while benefiting international production. When heterogeneous standards work to punish more compliant markets and reward less compliant ones, then they lead to worse outcomes for the environment and consumers. If FSC were to become the *de facto* standard in the US, the US would be greatly disadvantaged. Alternatively, a market featuring competing standards would be far better outcome for keeping the US internationally competitive and more environmentally friendly.

How Much Would a Monopoly FSC Standard Cost American Consumers?

FSC certification may be costly to implement. Some of the costs entail obtaining an initial review by a certifier, annual audits for FSC re-certification, training staff, and compliance with federal, state and local ordinances. To demonstrate the added cost of these audits, in a head-to-head comparison between FSC and SFI, an FSC audit took nearly one month compared to 6 days for SFI, and it consumed about 5 times more in labor resources.¹⁰ Because the depth of the FSC audits can differ between countries and because details are left to the discretion of the auditing teams, the lack of uniformity creates real cost differences between producers. Without uniformity in standards, there can be no clear environmental benefit for these added costs differences. As for “chain of custody” requirements, mills must take the time to track inventory, and potentially sequester, separate and track FSC-certified or “controlled” logs from non-certified logs and “mixed credit” logs.

¹⁰ See ForestryEthics report, Nov. 2010, p. 8 at <http://www.rocketday.com/downloads/SFI-greenwash.pdf>.

More importantly, FSC's costly processes reduce the amount of timber harvested per acre, which lowers the supply of timber and raises prices. This can cause manufacturers and consumers to substitute timber from overseas, which is cheaper and where there is less oversight. However, imports require higher transportation cost and have adverse environmental effects. In addition, builders could also substitute plastics, concrete or steel for wood, replacing renewable, energy-efficient sources of building material with non-renewable, energy-intensive sources.

Distortions caused by differences in FSC's standards cause confusion among consumers. Since the FSC standards are stricter in the US, this certification process imposes a disproportionately higher costs on US firms, which results in less production and higher consumer prices. Some believe that FSC wood adds significant and unnecessary costs that affect consumer choice.¹¹ This belief appears to be borne out by the evidence:

- One commercial printing company stated that "FSC certified paper could increase the cost up to 20% from a noncertified recycled stock. Depending on the project, client, budget, and message being relayed FSC stock may or may not be best choice."¹²
- A second commercial printing company stated that "The cost of an FSC initial review and re-certified annual audits is quite costly for FSC certified printers. Unfortunately these costs are passed along to the customer. For most FSC certified printers, the cost could increase by up to 20% from a non-certified recycled stock."¹³
- For the purpose of this study, ACI conducted an online search and found that FSC-certified increased the cost 32% for toilet paper, 10% for facial tissues and 30% for multi-purpose paper – or 24% on average – compared to FSI-certified products.
- One lumber firm acknowledged that "FSC is generally 15% more costly than conventionally harvested lumber."¹⁴
- In promoting LEED, another lumber firm noted FSC-certified lumber and plywood costs were approximately 15% more expensive than commodity wood and plywood.¹⁵
- A correction to a methodological error in a USGBC study found that LEED buildings use 29% more energy than non-LEED buildings, thereby undermining sustainability.¹⁶
- Listed on Slo Green Build website, an article written by Isman Design stated: "In general, FSC lumber costs tend to be around 15% higher than non-FSC lumber depending on

¹¹ For examples of where the green label is misleading, see Elisabeth Rosenthal, "Pondering that Green Label," *New York Times*, May 15, 2012; and Katherine Salant, "Why Green-Certified Products May Not Always Be the Best Choice," *The Washington Post*, April 30, 2012.

¹² Colorwise website, <http://www.bestbookprinting.com/blog/?p=83>, Feb. 13, 2009.

¹³ Bizink website, <http://www.bizinkprinting.com/FSCCertified.asp>, accessed May 31, 2012.

¹⁴ Crossroads Lumber website at <http://crossroadslumber.com/reclaimed-lumber-vs-fsc-certified/>, 9/14/09.

¹⁵ Greg Crabtree, "Beyond the Basics: FSC Certified Lumber, FD Sterritt Lumber's website at <http://www.buyleedlumber.com/lumber-products/fsc-lumber-prices/>, accessed May 31, 2012.

¹⁶ Jacob Gershman, "Fake Green Labels," *New York Post*, Sept. 21, 2009, available at http://www.nypost.com/p/news/opinion/opedcolumnists/item_aU9PWSSD4p71LigLp0z4eO.

availability of the specific product required, but this price could be higher or lower based on quantity of order and local resources.”¹⁷

- One firm stated “Typically, FSC decking costs about 20% more than non-FSC decking.”¹⁸
- One wood manufacturing owner reported paying 20% more for FSC certified mahogany wood, stating that “the mahogany that was certified was the same mahogany that had no certification.”¹⁹

Additionally, even after paying these price premiums, there is no clear indication that consumers who purchase FSC-certified products contribute to a more sustainable environment or the preservation of greater amounts of forestland. As discussed above, and FSC label can indicate timber harvested under a variety of standards applying across different places in the world. It is very realistic that a *de facto* FSC-monopoly could impose significant costs on consumers *and* the environment.

To summarize, evidence suggests that FSC prices are roughly 15% to 20% higher than SFI and non-FSC wood. For the purpose of this study, we will assume that, if FSC certification becomes the *de facto* standard in the US, wood product costs and prices will increase by 15%. Next, we estimate the impact that these higher costs would have on consumer welfare.

Higher Certification Costs Can Reduce Consumer Welfare

Consumer welfare (also referred to as *consumer surplus*) is a well-accepted concept in the economic literature with a precise definition that measures, in dollar terms, economic benefits bestowed on consumers. Since the 1960s, consumer welfare measurement has been among the rigorous tools available to economists to determine whether benefits of public policy have exceeded their costs.²⁰ In this section, we estimate the change in consumer welfare that would occur if FSC became the *de facto* standard. If businesses are pressured to buy FSC certified products then all producers would need to be FSC-certified, effectively changing the current voluntary process into a regulatory requirement. As Professor Weidenbaum explained, a price change from this sort of requirement is no different than product inflation.²¹

The change in consumer welfare resulting from the implementation of a more costly certification standard can be measured. Assuming an initial situation where a forest owner or a

¹⁷ Slo Green Build Website, accessed 5/31/12, <http://www.slogreenbuild.org/Library/documents/Articles/FSC-Certified-Lumber.pdf>.

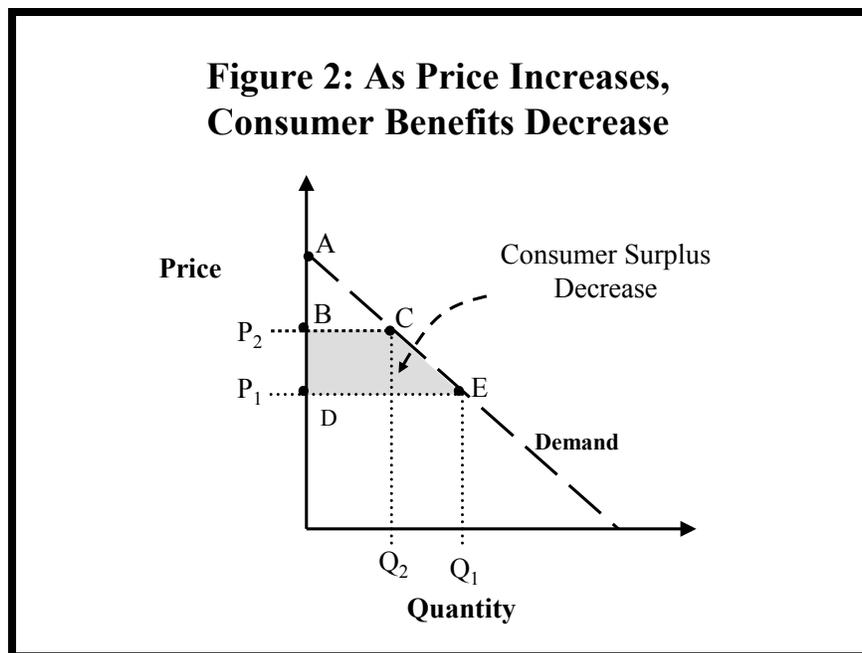
¹⁸ Chris Nolan, “FSC Decking Material Options,” <http://www.mataverdedecking.com/blog/bid/114076/FSC-Decking-Material-Options>, 1/16/12.

¹⁹ Brooks Gentleman, “FSC Wood Certification: Can’t See the Forest for the Trees,” *Woodworking Network*, July 18, 2012, at <http://www.woodworkingnetwork.com/wood-blogs/woodworking-industry-trends-guest-bloggers/FSC-Cant-See-the-Forest-for-the-Trees-162875896.html>.

²⁰ See Clifford Winston, “Government Failure versus Market Failure: Microeconomics Policy Research and Government Performance,” AEI-Brooking Joint Center for Regulatory Studies, Washington, DC, 2006, p. 7.

²¹ Murray L. Weidenbaum, *Government-Mandated Price Increases: A Neglected Aspect of Inflation*, American Enterprise Institute, 1975.

manufacturer produces goods using less costly certification standards, the end-user (consumers of these goods) will pay an initial price of P_1 and demand the initial quantity of Q_1 , resulting in an initial consumer welfare benefit represented by the area of the *triangle ADE*, as depicted in Figure 2. Now assume an increased price reflecting some pass-through of higher certification costs. In this case, end-users will see a 15% price rise, represented graphically as a shift from P_1 to P_2 . The increase in price will lead to a decrease in the quantity demanded from Q_1 to Q_2 . As a result of more costly certification standards, consumer surplus is now smaller, as depicted by the area of the *triangle ABC* in Figure 2. Therefore, the change in consumer welfare associated with more costly standards is the difference in the areas in *triangles ADE* and *ABC*, or the area depicted in Figure 2 as the *trapezoid BCED*. This area represents the consumer welfare lost due to implementation of more costly certification standards.



In order to estimate the consumer welfare effects from the implementation of more costly certification standards, it is necessary to understand the general sensitivity of product demand to changes in price or the *price elasticity of demand*. Based on a survey of economic studies for wood and paper products, Figure 3 provides various estimates of short run price elasticity for wood and paper production in the US. For this paper, we will assume the price elasticity of wood and paper products to be -0.5 and -0.8, respectively.²² This assumption is supported by Figure 3 which shows a wide range of elasticities.

²² Recent work suggests that wood is becoming somewhat more elastic and substitutable. See Nianfu Song and Sun J. Chang presentation "hardwood Lumber Becoming More Price Elastic and More Likely to Be Substituted" at <http://warnell.forestry.uga.edu/sofew/pdfs/Hardwood%20Lumber%20Becoming%20More%20Price%20Elastic%20-%20Song.pdf>.

Figure 3: Various Measures of Price Elasticity for Paper and Wood Products

Product	Price Elasticity	Source
• Hardwood	-0.24	Song and Chang-fn. 23
• Various lumber types	-1.05	Nagubadi, et al-fn. 24
• Various lumber types	-0.27 to -0.65	Luppold- fn. 25
• Softwood lumber	-0.17	Zhang- fn. 26
• Softwood lumber	-0.2 to -0.3	Uri and Boyd- fn. 27
• Softwood stumpage	-0.50 to -0.57	Prestemon and Abt-fn. 28
• Particleboard	-0.65	Tajdini, et al- fn. 29
• Furniture (various woods)	-0.14 to -1.08	Luppold
• Pulp	-0.30	Gallik, Abt, et al-fn. 30
• Pulp, paper, paperboard	-0.37	EPA-fn. 31
• Paper-weighted average	-0.86	Brown and Zhang-fn. 32

Using the value of manufacturing shipments (as shown in the Appendix of this study), we can estimate the revenue effects from imposing a more costly certification standard and

²³ Nianfu Song and Sun J. Chang, "Elasticities of US Hardwood Lumber Demand and Supply in the Long-Run and Short-Run," pp. 216-223, published in J. Siry, B. Izlar, et al (editors), *Proceedings of the 2008 Southern Forest Economics Workers Annual Meeting*, Savannah, GA, March 9, 2008.

²⁴ Rao V. Naubadi, Daowei Zhang, Jeffrey P. Prestemon and David N. Wear, "Softwood Lumber Products in the United States: Substitutes, Complements or Unrelated?" *Forest Science*, Vol. 50, No. 4, August 4, p. 423. This figure is an average of various lumber types, including several price elastic wood products, such as structural panels. The authors cite older estimates, including -0.67 for plywood, -0.59 to -0.86 for structural particle board and -0.59 for oriented stranded board.

²⁵ William G. Luppold, "The Effects of Changes in Lumber and Furniture Prices on Wood Furniture Manufacturers' Lumber Usage," USDA research paper NE-514, 1983.

²⁶ Daowei Zhang, "Welfare Impacts of the 1996 United States-Canada Softwood Lumber (Trade) Agreement," *Canadian Journal of Resources*, Vol. 31, 2001, p. 1962. This figure represents his average of several studies.

²⁷ Noel D. Uri and Roy Boyd, "Estimating the Regional Demand for Softwood Lumber in the United States," *North Central Journal of Agricultural Economics*, Vol. 12, No. 1, Jan 1990, p. 142.

²⁸ David N. Wear and John G. Greis, "The Southern Forest Resource Assessment: Summary Report," Southern Research Station, Asheville, NC, October 2002., in Chapter 13 by Jeffrey P. Prestemon and Robert C. Abt, "Timber Products Supply and Demand, Table 13.1, p. 301.

²⁹ Ajang Tajdini, Amir Tavakkoli, et al, "Application of Simultaneous Equations Model to Estimate Particleboard Demand and Supply, *Bioresources* 6(3), 2011, p. 3204.

³⁰ Christopher S. Gallik, Robert C. Abt and Yun Wu, "Forest Biomass Supply in the Southeastern United States: Implications for Industrial Roundwood and Bioenergy Production," *Journal of Forestry*, 107(2), pp. 69-77, March 2009. Also see "The 1993 Timber Assessment Market Model Structure, Projections, and Policy Simulations," #PNW-GTR-368, US Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR, p. 58; and S. Pattanayak, B. Murray and R. Abt, "How Joint is Joint Forest Production? An Econometric Analysis of Timber Supply Conditional on Endogenous Amenity Values," *Forest Science*, 48(3), pp. 470-481.

³¹ "Economic Impacts of Pulp and Paper Industry Compliance with Environmental Regulations," EPA-230/3-76-014, Volume II: Price and Demand Effects on the Industry's Major Product Sector, US Environmental Protection Agency, Washington, DC, May 1977, Table II-5, p. 12.

³² Roger Brown and Daowei Zhang, "Estimating Supply Elasticity for Disaggregated Paper Products: A Primal Approach," *Forest Science*, 51(6), pp. 570-577, 2005.

then calculate the total welfare loss. For wood manufacturing, we estimate the welfare loss to be \$10 billion and for paper manufacturing, we estimate the welfare loss to be \$24 billion. These figures give an approximate value of the economic harm imposed on consumers when more costly certification standards are required. Not measured in this study are the additional welfare losses would also occur in many related industries, such as furniture manufacturing and home building.³³

These welfare losses are significant and demonstrate a sizable impact on consumers. A broader question is what are the economic and environmental benefits of imposing stricter standards on the US market relative to overseas markets? These benefits, if any, need to be identified and require additional work, and are outside of the scope of this study.

Conclusion

This paper investigates the added cost of stricter forest product certification and finds these costs produce significant consumer welfare losses. The FSC process may have some benefits but they need to be measured against the cost of the program. Since the FSC certification process puts some markets at a competitive disadvantage, its usefulness as a single standard is lost. Continuing the current model, which uses competitive certification processes, appears to overcome this problem and may encourage a wider participation in forest certification. More work is needed to identify the benefits, if any, of more costly certification, and the goal of balancing good forest management practices for protecting the environment, encouraging sustainability and producing affordable consumer prices. It is clear that the adoption of single and more costly certification process – a process that permits differences in standards from country-to-country – would not accomplish this important goal for society.

³³ These industry-wide welfare effects are not additive due to intermediate effects.

Appendix: The Significance of the US Timber-Based Economy

Wood is a vitally important renewable resource used for a myriad of purposes by producers and consumers. It is an input used in the construction of homes and buildings, and the production of furniture and paper products – from toothpicks to toilet paper. By some reports, forest products account for 5% of Gross Domestic Product,³⁴ but these products add additional economic output as they cascade through various stages of production – particularly in manufacturing, wholesale, construction, real estate and retail industries – all the way to consumers. As Figure 4 shows, the US timber-based manufacturing sector alone provides a significant economic impact, including \$238 billion in product shipments, nearly 700,000 direct jobs and other economic benefits. Since wood can often be substituted for other materials, such as concrete metals and plastics, its affordability is an environmental necessity.

Figure 4: Total Timber-Based Manufacturing - 2010
(Dollars Values Are in Thousands)

<u>Economic Characteristic</u>	<u>Wood Products</u>	<u>Paper Products</u>	<u>Total</u>
Value of Shipments	\$66,000,000	\$172,000,000	\$238,000,000
Number of Employees	329,592	351,931	681,523
Annual Payroll	\$11,767,471	\$19,158,898	\$30,926,369
Total Fringe Benefits	\$3,409,135	\$6,369,157	\$9,778,292
Emp. Health Insurance	\$1,400,956	\$2,521,022	\$3,921,978
Emp. Benefit Pension Plans	\$195,801	\$653,310	\$849,111
Emp. Defined Contribution Plans	\$194,624	\$470,928	\$665,552
Employer's Fringe Benefits	\$1,617,754	\$2,723,897	\$4,341,651
Avg. Annual Production Workers	264,474	274,764	539,238
Production Workers Hours	519,001	563,408	1,082,409
Production Workers Wages	\$8,202,997	\$13,124,520	\$21,327,517
Total Cost of Materials	\$41,149,455	\$91,185,311	\$132,334,766
Sales Cost	\$2,001,460	\$3,086,715	\$5,088,175
Contract Work	\$507,437	\$1,002,016	\$1,509,453
Cost of purchased fuels	\$595,969	\$4,389,303	\$4,985,272

Source: US Census Bureau, "Annual Survey of Manufacturers, 2010, Nov. 15, 2011; and
Census Bureau, Manufacturers' Shipments, Inventories, and Orders.

³⁴ For example, see the American Forest & Paper Association assessment of the economic impact of the industry at www.afandpa.org/ourindustry.aspx?id=35.