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**Trade Implications of
Timber Certification and Ecolabelling
in the European Union ¹**

by

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Trade Implications of Timber Certification and Ecolabelling in the European Union

1. Introduction

Growing interest in protecting the world's forests from deforestation have led governments, non-governmental organizations (NGOs) and consumers to lobby for increased sustainable forestry management (SFM). One of the proposed tools to promote SFM is timber certification, whereby an "ecolabel" is awarded to wood products originating from sustainably managed forests. The intent of the ecolabel is to inform consumers that the product meets specified environmental criteria and indicators. There are concerns, however, that an ecolabelling scheme, even if voluntarily implemented, will favor one type of producer over another and that some may not be able to bear the costs of certification. The trade implications of timber certification and ecolabelling schemes have become an increasingly discussed topic in numerous fora, including the World Trade Organization (WTO) and the United Nations.

The impetus to timber certification began in 1992 during the United Nations Conference on Environment and Development (UNCED), at which members adopted the non-binding statement of Forestry Principles. The Forestry Principles statement declares that sustainable forestry should be able to meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic which conserves the environment. Although countries attending the 1992 Earth Summit signed onto the Forest Principles statement, there is a lack of international consensus as to how to implement a universal accreditation system to evaluate the environmental criteria for sustainably managed forests, or whether one is even needed.

Timber certification and labelling have been used by several producers as a marketing tool, primarily in Western Europe, to provide information showing that the product originates from sustainably managed forests. Baharuddin and Simula (1994) reported that approximately 0.5 percent of internationally traded forest products are voluntarily certified. Presently, a variety of certification schemes exist and others are being developed. For example, several European Union (EU) countries with influential "green" movements, e.g., Germany, the Netherlands and Austria, have implemented voluntary ecolabels for forest products. In May 1996, the European Union approved the use of a voluntary ecolabel for fine paper, stating that "all virgin pulp shall originate from regions where sustainable forest management is applied." These developments are indicative of apparent consumer preferences for paper and wood products from sustainably managed forests.

Many governments have voiced their concerns to the WTO regarding the application of ecolabel requirements to trade in forest products and how they may impose a technical barrier to trade (TBT), especially if the ecolabel is mandated. Some are concerned that even voluntary certification could serve as market access barrier. Developing countries exporting tropical wood products are especially sensitive to this

issue and are concerned that such restrictions may limit their market access. Some industrialized countries, too, have reacted negatively to an ecolabel because of the potential added costs of certification and compliance. The likelihood that timber certification and ecolabelling schemes may pose a TBT to suppliers of timber and alter the trade patterns of forest product trade is worth analyzing. Using a computable general equilibrium trade model, this study examines the trade implications and economy-wide effects of a European Union timber certification and ecolabelling scheme, with a focus on the impacts to major suppliers. Before introducing the economic framework and assumptions to this study, the various approaches to timber certification and the organizations involved in timber certification will be discussed, as well as the associated costs known to certification.

2. Certification Schemes

Since 1990, when the Rainforest Alliance began its “Smartwood Program” and certified its first sustainably managed forest, there has been a surge of international and national accreditation agencies launching timber certification schemes. Presently, there is not one timber certification scheme that is overwhelmingly endorsed on an international basis due to a lack of accepted international criteria to assess forest management sustainability. There is also a lack of accepted accreditation processes for certifiers. Thus, there has been an appearance of different “third-party” systems based on two types of standards: (1) procedural (management) standards, and (2) performance standards. The primary accrediting organizations under these two standards are described below.

Procedural Standards: International Standards Organization

The International Standards Organization (ISO) is a worldwide federation of national standards bodies responsible for standardizing internationally trade goods and services. Shortly after the UNCED, the ISO set up a technical committee, TC 207, to develop environmental management standards series, called “ISO 14000.” The 14000 series framework allows the applicant to define the measures necessary to improve environmental performance. The Canadian Standards Association (CSA) is managing the technical committee's work which is organized into six subcommittees addressing the following issues: (1) Environmental Management Systems (EMS); (2) environmental auditing; (3) environmental labelling; (4) environmental performance evaluation; (5) life cycle assessment; and (6) terms and definitions. In addition to the subcommittees, there is a working group handling the environmental aspects of products standards.

Currently, the ISO 14000 standards provide a generic procedural framework for timber companies to reduce environmental impacts and risks. Under the EMS, the ISO is developing performance standards for

sustainable forestry management and assessment. Given the numerous positions on this issue, an agreement on such standards has been difficult to reach. Thus, the approach the ISO has taken is to develop an environmental management system (EMS) which would allow producers in various countries to start at different benchmarks, thereby providing for environmental improvement at differing rates. Industry groups in many countries, especially in developing countries, prefer this approach because it allows them to establish their own performance indicators, consistent with domestic environmental laws, and it does not extend the procurement chain to suppliers of timber. Critics see the weaknesses of such a certification system under the ISO 14000 series as two-fold. First, defined environmental performance standards for forestry management are not well specified, and, therefore no guarantees exist that the companies are practicing sustainable forestry. Secondly, there are no specific provisions for chain-of-custody, which means that the timber supply at the mill site, or at the retail level, is not required to be traced back in the supply chain. Although standards set by the ISO 14000 are not meant to be a basis for legislation, in the past, the standards have been adopted in many countries. Therefore, there is a possibility that some of the ISO 14000 series, specifically TC 207, could become part of national regulations.

Performance Standards: Forest Stewardship Council

The Forest Stewardship Council (FSC) is the first international accrediting organization to develop a process to set principles and criteria for forest management and a manual for performance standards and management systems, which can be adjusted regionally, for certifiers. Established in 1993, the FSC has the goal of "setting a worldwide standard for good forest management by promoting widely recognized and respected Principles of Good Forest Management." The structure of the FSC consists of a general assembly, a board of directors which primarily makes decisions on accreditation, a secretariat, technical and accreditation committees, and regional representatives from environmental institutions, forestry professionals, timber traders, indigenous peoples organizations, community forestry groups and forest products certification organizations.

The FSC's approach to timber certification is to establish standards for the companies which actually do the certifying. The principles and criteria set by the FSC are meant to apply to all types of forests, covering all ownership categories with different sizes of forest management units, and various socio-economic conditions. Many environmental NGOs which have been accredited by FSC include SmartWood Certification Program of Rainforest Alliance in the United States, the Forest Conservation Program (FCP) of Scientific Certification Systems (SCS), the Responsible Forestry Programme of the Soil Association and SGS Silviconsult Ltd. in the United Kingdom. One problem critics see with FSC's approach is that it emphasizes a verifiable chain-of-custody approach. Since chain of custody involves monitoring the process of production

from the forest to point of sale in the distribution channel, specified prescriptive criteria and indicators, and on-the-ground audits of performance to demonstrate sustainable forestry, the scheme tends to favor companies which own a significant amount of forest land. Thus, mills or companies which are supplied by small private landowners are disadvantaged by the FSC certification process.

National Certification Systems

In addition to the third-party systems, many national and regional certification schemes have begun to surface in the last few years. Nordic countries have initiated a scheme for Nordic Forest Certification which is built on international agreements and principles (including FSC's) on sustainable forestry, the conservation of biodiversity and Nordic Forestry Practices. In Indonesia, a national ecolabelling institute, Lembaga Ekolabel Indonesia, is finalizing criteria and preparing an ecolabelling scheme for consumer products. Malaysia is also considering the establishment of a timber certification scheme and has proposed the establishment of a National Timber Certification Centre. The Brazilian forestry industry has also developed a voluntary instrument, called a "Certificate of Origin of Forest Raw Material," for timber certification.

Many countries in the EU have conducted studies to examine standards for forestry management and associated costs and feasibility issues of timber certification. The Netherlands and Germany, in particular, have developed timber certification schemes which were initially geared towards tropical timber, but now extend to all types of timber. In April of 1995, many of the more active European environmental organizations involved in forestry issues, under the umbrella "Forest Movement Europe," met to initiate a declaration on forest certification. The declaration showed strong support for the FSC as the proper scheme for meeting environmental concerns. In general, however, the European perspectives reveal that an ecolabelling scheme should be voluntary, cost effective, transparent and independent, and internationally coordinated (DuBois, 1995).

3. International Organizations involved in Timber Certification and Ecolabelling

Governments, intergovernmental organizations, industry representatives and non-governmental organizations (NGOs) are currently discussing the need for and utility of timber certification, as well as the elements of a credible criteria and indicator scheme. The role of some of the more prominent players involved in this issues are discussed below.

United Nations Commission on Sustainable Development (UNCSD)

As indicated above, the United Nations played an active role in the development of worldwide forest

principles at the U.N. Conference on Environment and Development. In April 1995, the U.N. Committee on Sustainable Development (UNCSD) established an Intergovernmental Panel on Forests (IPF) which has begun to administer a work program, originating from the Forest Principles, to make recommendations regarding the UNCED forest decisions. IPF's program work includes the examination of criteria and indicators for sustainable forest management, trade issues in forest products, and a review of international organizations and national programs involved in the issue of certification. The UNCSD's efforts concentrate on providing recommendations to assist in the development of a set of criteria and indicators against which different types of forests could be measured. The issue of certification and ecolabels and impacts on trade are also being examined. The IPF's informal Experts Working Group (EWG) on Trade, Labelling of Forest Products and Certification of Sustainable Forest Management identified four priority issues which are being examined:

- 1) Market aspects focusing on the impact of timber certification from SFM, on the demand for timber products, and to what extent markets exist for labeled timber;
- 2) Trade aspects with an emphasis on certification and labeling as instruments within the framework of free trade and necessary measures to ensure they do not create non-tariff trade barriers;
- 3) Forestry aspects studying the impacts of certification on SFM and the existence of globally accepted criteria and indicators for certification; and
- 4) Implementation aspects: learning from experience of existing schemes and identifying their commonalities.

Given the limited experience with certification as one of the possible tools which can contribute to SFM, participants of the Experts Working Group have agreed that further examination of the many issues is necessary. At the international level, the EWG has proposed that arrangements be made for a "continuous exchange of information and experience on certification and labelling to ensure transparency and to facilitate further development of the instrument." The involvement of all interested parties, including the role of governments in market access issues, in the development of voluntary certification schemes was also recommended, which would enhance the credibility and effectiveness of such schemes. The Experts Working Group has also recognized the need to address the potential tension between certification schemes and open trade and competition, and therefore has emphasized parts of the World Trade Organization's (WTO) Technical Barriers to Trade (TBT) agreement which are relevant to proposals for certification and ecolabelling which include non-discriminatory treatment and transparency. In addition, the EWG has recommended that international, national and regional level policy discussions be initiated concerning several issues, including: international accreditation bodies; mutual recognition and harmonization of certification

systems; conflict resolution mechanisms to assure credibility of schemes; the special needs of small forest owners and community-based forest activities and their integration into forest certification schemes; and increased international cooperation for exchange of experiences and information concerning all aspects of timber certification and labelling. Finally, given the limited knowledge of potential markets for certified forest products, the IPF has recommended that research be conducted and data collected on consumer behavior and end-users, on the role of certification as a marketing instrument, on the impacts of demand, supply and substitution, and on the “green” price premium and price structure. It should be noted, however, that many governments do not agree with all of the EWG proposals and recommendations.

Food and Agricultural Organization

By providing technical expertise to less-developed wood producing countries, the United Nation’s Food and Agriculture Organization (FAO) is involved in the global movement for sustainable forest management. After the UNCED, the FAO’s Forestry Department was tasked to coordinate the follow-up to the Rio Earth Summit’s “land segment” decisions relating to forests. In March 1995, at the first Ministerial Meeting on forestry, the FAO emphasized the need to develop criteria and indicators for the sustainable management of all types of forests, taking into account regional and sub-regional conditions. It also agreed that additional analysis of certification schemes in promoting sustainable forest management should be conducted, and called upon the international community to advance the dialogue on trade in forest products.

International Tropical Timber Organization

The International Tropical Timber Organization (ITTO), founded in 1983 as a commodity organization, is the primary discussion and decision-making forum on tropical forest management and use. The ITTO membership consists of 25 producing countries and 26 consumer nations. Members of the ITTO developed “Target 2000,” the objective of which is to ensure that all trade in tropical timber is sourced from sustainably managed forests by the year 2000. The ITTO has served as a forum for discussion of the certification of timber issue and has developed its own list of criteria and indicators to examine sustainable forestry practices. All members are committed to the year 2000 objectives as part of the new International Tropical Timber Agreement (ITTA). The new agreement went into effect on January 1, 1997.

World Trade Organization

With the adoption of the Uruguay Round agreement in April, 1994, Ministers of the World Trade Organization (WTO), formerly the GATT, adopted a *decision* to form a Committee on Trade and Environment (CTE). The decision clearly sets the goal of promoting sustainable development and establishes

a forum in which appropriate recommendations on trade and environmental issues can be raised. The WTO has made it clear, however, that it is not an environmental organization and that its work is mainly limited to the trade effects of environmental measures. Any measures taken should be consistent with the "open, non-discriminatory, equitable trading system." One of the CTE's work program is to address *"the relationship between the provisions of the multilateral trading system and requirements for environmental purposes relating to products, including standards and technical regulations, packaging, labelling and recycling."*

Presently, the WTO Committee on Technical Barriers to Trade (TBT) is responsible for ecolabel issues and the WTO's rule of non-discrimination applies to labelling/certification schemes. The TBT agreement emphasizes the use of international standards as the basis of setting national standards. Opposition on this principle comes from those who believe that the international standards would undermine national standards for environmental protection. An important item on the CTE's work program is the applicability of the TBT Agreement to ecolabelling requirements. Under this agreement, WTO members agreed that using technical requirements, whether voluntary or mandatory, should not create unnecessary barriers to trade. Furthermore, governments agreed to provide public notification of a proposed rule and to request comments from interested parties which they would consider when deciding to adopt a rule. Although trade rules are in place to ensure that the "Most-Favored Nation" status is enforced (this entails granting equal treatment on trade to all members), many delegations are still concerned about the potential impact of ecolabelling. Some countries believe that additional disciplines and transparency of WTO rules regarding ecolabelling requirements may be needed, possibly by extending the coverage of the TBT Agreement.

4. Associated Costs of Certification Schemes

Primarily, three types of costs are associated with certification. First, forest owners need to hire the services of certifying organizations. Reliable data on these direct costs are scarce because only a few certifiers are willing to provide such information, which is considered confidential by private companies. The costs of assessment will depend mainly on the size of the forest land and inventory and adequacy of forest maps. For developed countries, where such information exists, the accreditation costs are estimated to range between US \$0.30 - \$0.60 per hectare (Baharuddin and Simula, 1994). For developing countries, rough estimates suggest that certification costs are in the range of 5-15 percent of logging costs (Baharuddin and Simula, 1994).

The second expense associated with certification is that of complying with sustainable forest management. These costs, which will vary depending on the type of forest and traditional forest practices, stem from: (1) setting aside of harvest areas; (2) additional silviculture and harvesting costs; (3) additional

costs of planning and monitoring; and (4) different distribution of costs and benefits over time (Ghazali and Simula, 1996). Estimates for compliance costs also vary, ranging from 10-20 percent of current average tropical log prices (\$350) for developing countries (Sikod). Related to the compliance costs is the third expense, specifically the opportunity cost of forgone harvests due to lower yield per unit in harvesting. A recent study by the London Environmental Economics Centre (LEEC) examined the implications of ecolabels under the assumption that logging costs would increase by 25-50 percent. Another estimate of the cost of achieving quality forestry suggests that there will be an increase of 20 to 30 percent in costs (Nussbaum *et al.*, 1995). As will be discussed in the following section, for the purposes of this study, we have used a lower range (4 to 20 percent) of cost increases for the regions specified.

5. Economic Framework and Assumptions

Economic Framework

In order to analyze the impacts of a European Union mandatory ecolabel on forest products, we extend the Global Trade Analysis Project (GTAP) framework developed by Hertel. A detailed description of GTAP can be found in Hertel and Tsigas, Huff, *et al.*, and Gehlhar, *et al.* GTAP is a comparative static, multi-region, computable general equilibrium model with price taking behavior for all economic agents. Commodity supplies are based on single-output production functions. Substitution in production between different inputs is modeled by nesting Constant Elasticity of Substitution (CES) functions. Demands for land, labor and capital are based on CES production functions. Demands for intermediate inputs and the primary factor composite are determined with Leontief production functions. International trade clears commodity markets, with each commodity being differentiated by its place of origin. Trade policies operate as *ad valorem* distortions, which in addition to transportation costs, form a wedge between domestic and world prices.

Land is employed in agriculture only, and it is imperfectly mobile across sectors. All sectors employ labor and capital, which are perfectly mobile across sectors in a region. Households maximize utility derived from private and government consumption and savings subject to regional income, which consists of primary factor payments and net tax collections. Regional production of new capital goods is financed by domestic savings and net capital inflow from all other regions. A price index for global savings is the numeraire.

Version 3 of the GTAP database has domestic and international information for 30 single-country and composite regions, and 37 commodity aggregates for 1992 (McDougall, 1996). For this study, we have aggregated the data to ten regions and ten aggregate commodities (table 1). We identify all three forest

commodities which are available in the disaggregate GTAP database: logs, lumber, and pulp. Logging represents harvesting of logs (i.e., International Standard Industrial Classification (ISIC) numbers 1210, and 1220). Lumber and wood products represents sawmills, wood products and furniture (ISIC nos. 3311, 3312, 3319, and 3320). Pulp, paper, and printing represents pulp, paper, and paperboard products and printing (ISIC nos. 3411, 3412, 3419, and 3420). As will be discussed later in this section, we utilize results from a survey to identify the share of production and trade in forest products that satisfies an ecolabelling scheme.

Table 1: Regional and Sectoral Specification¹

<u>Regions</u>	<u>Sectors/Commodities</u>
United States (USA)	Logging
European Union-12 (EU-12)	Lumber and Wood
European Union-3 (EU-3)	Pulp, Paper, and Printing
European Free Trade Area (EFTA)	Other Natural Resources
Central and Eastern European Countries and the Former Soviet Union (CEEC-FSU)	Agriculture
Canada	Processed Food Products
Mexico, Central and South America (Latin America)	Textiles and Apparel
Association of South East Asian Nations (ASEAN)	Other Manufacturing
Japan, Taiwan, Hong Kong, and South Korea (NE Asia)	Construction
Rest-of-World (ROW)	Services

Thus in our model, there two varieties of each forest commodity: one variety satisfies the requirements of an ecolabel, and the other variety does not.

As expected, there are strong inter-industry relationships between the logging, pulp and lumber industries. The GTAP database shows that in the United States, the pulp and lumber industries account for about 14 and 40 percent, respectively, of domestic demand of U.S. logs. In the U.S., the construction industry accounts for about 35 percent of domestic demand for U.S. lumber. Domestic final demand (i.e., demand for investment and private and government consumption) for forest products is also significant. In the United

¹The Central and Eastern European Countries are Poland, Hungary, Czech Republic, Slovak Republic, Slovenia, Romania, and Bulgaria. The ASEAN countries represent the major Asian producers and exporters of tropical wood, specifically Indonesia, The Philippines, Malaysia and Thailand.

States, final demand for lumber and paper products accounts for 42 and 24 percent, respectively, of total demand for U.S. production.

Our regional specification in table 1 identifies two groups of countries in the European Union. The EU-3 region represents the three countries of Austria, Finland, and Sweden which joined the twelve European Union countries (EU-12) in 1995. We keep these two regions separate to examine intra-EU trade and because there are differences in forest ownership that are important for this study. As expected, there is substantial trade between the two EU regions. The EU-3 region exports \$18.8 billion worth of forest products to EU-12 (table 2). The EFTA and CEEC-FSU regions are also exporting substantial exports to the European Union. The exports of the United States to the European Union are valued at \$5.1 billion and are the largest of non-European exporters. Canadian exports follow and are valued at \$2.8 billion. Most of

Table 2: Exports of Forest Products to the European Union, 1992, \$US million, FOB Prices

Exporting Region	Logs	Lumber and Wood	Pulp and Paper
USA	88.1	1,688.3	3,316.8
EU-12	293.7	2,018.4	2,785.1
EU-3	111.5	5,486.5	13,248.2
EFTA	160.1	1,194.5	2,609.1
CEEC-FSU	540.7	3,154.8	885.6
Canada	16.1	776.0	2,055.5
Latin America	111.5	448.5	1,028.1
ASEAN	14.2	2,067.8	197.5
NE Asia	6.8	502.7	565.2
ROW	717.4	1,721.7	627.9
Total	2,060.1	19,059.2	27,319.0

the trade is in pulp and paper products, except for CEEC-FSU, ASEAN, and the ROW which export more lumber and wood products. The ASEAN countries are the major exporters of tropical wood. The composite region of Japan, Taiwan, Hong Kong, and South Korea are major importers of forest products.

Assumptions

For the purposes of this study, the ecolabelling and timber certification scheme includes third party auditing of on-the-ground forest management against prescriptive criteria and indicators; the tracking of

chain-of-custody of wood from the forest to the end-user; and the labelling of wood and paper products at the point of sale. We have augmented GTAP by incorporating information from a survey conducted by the Economic Commission for Europe's Timber Committee (ECE-TC). In June 1996, the ECE-TC surveyed a Team of Specialists on Certification of Forest Products about the effects of forestry certification and product labelling on the supply of wood in several countries. A copy of the survey is attached in appendix 1.

For countries/regions for which we do not have survey results, we have assumed that developed countries practice sustainable forestry to a greater extent than developing countries. This assumption is made because in many African, Asia and Latin American countries, poverty and constant population increase have a bearing on the forest management practices. In addition to continuous agricultural activities on forest land, forest industries in developing countries generally face many constraints, such as lack of funding to produce and implement effective forest policies and management systems. Many developing countries, however, are positively pursuing some economic and political changes towards increased sustainability in forestry management.

Forestry management is influenced by the type of ownership and size of forest holdings. In general, it is accepted that sustainable forestry management practices are easier to develop in public and in large and medium-sized, privately-owned forests. Therefore, given the specifications of the ecolabelling scheme, we have assumed that countries with publicly owned forests will be able to meet certification requirements more easily than countries with privately owned forests. This assumption is also made because of the economies of scale associated with certifying logs produced on private lands, where forestry holdings are usually smaller and numerous, versus public lands where the marginal cost to certify is less.

To simulate the forestry certification and ecolabelling scheme in the European Union, we have used the same assumptions of the ECE survey which include:

- 1) There is universal demand and acceptance of ecolabelling of wood and paper products;
- 2) There is no consumer willingness to pay a "green premium," therefore suppliers bear all the costs to produce certified forest products;
- 3) In order to make a credible marketplace claim to show that the wood comes from sustainably managed forests, strict standards exist for tracking chain-of-custody wood fiber from the forest to the final consumer; and
- 4) There is universal application of specified criteria and indicators including:
 - a) no certification of wood from primary/old growth forests;
 - b) no certification of wood derived from forest lands converted to other land uses; and
 - c) no certification of wood from natural forests that are converted into plantations.

Based on the three criteria and indicators and the chain-of-custody, we have assumed that in each

country a certain percentage of log production satisfies the ecolabelling scheme (see table 3--the extent of certified forest products). For example, the ECE survey indicates that in Canada, which has a lot of old growth forests, 90 percent of its forestry removals would not meet the ecolabeling requirements due to the criterion that wood from old growth forests would not be certified. An additional 10 percent would not be certified due to the chain-of-custody requirement. For this study, we decided to assume that in Canada the volume of forestry removals which would achieve certification is 3 percent (table 3). We did some sensitivity analysis which showed that the results reported here do not change dramatically when the share

Table 3: Assumptions Regarding Extent and Costs of Certification, and Returns to Land

<u>Region</u>	<u>Extent of Certified Forest Products (%)</u>	<u>Cost Increase (%)</u>	<u>Land Cost Share (%)</u>
USA	47	9	2.27
EU-12	51	5	3.74
EU-3	53	4	6.07
EFTA	38	5	1.56
CEEC-FSU	15	14	2.71
Canada	3	7	1.10
Latin America	20	20	5.75
ASEAN	25	16	6.58
NE Asia	30	0	1.83
Rest-of-World	10	10	4.77

of certified wood supplied by Canada is greater than 3 percent.

In the U.S., where 65 percent of forest land is privately owned, difficulties of setting up a certification system derive from requiring almost one million forest land owners to claim that they are in compliance with applicable U.S. national laws when they deliver logs to saw mills. The ECE survey results indicate that 47 percent of its log production could be certified under the specified ecolabelling scheme. Thus, the remaining 53 percent of U.S. log production does not satisfy the EU's ecolabel criteria. Not all EU countries were able to answer the survey, therefore based on the few countries for which we had data available and the public ownership criteria, we estimated the extent of certification for the EU-12 and EU-3 as

51 and 53 percent, respectively. We also use the proportions in table 3 to identify the volume of production and trade of lumber and pulp products which satisfy the ecolabel's requirements. We assume that in the United States, 47 percent of lumber and pulp production satisfies the ecolabel's requirements because they use as intermediate inputs forest products (i.e., logs, lumber, or pulp) which satisfy the ecolabel's requirements. All other sectors use both types of forest products as intermediate inputs.

Private consumer demands for the composite commodities in table 1 are determined based on the Constant Difference in Elasticities demand system which is calibrated to price and income elasticities from the econometric literature (Huff, *et al.*). Consumer demands for individual certified and uncertified forest products are determined based on CES functions with high values for the elasticities of substitution between certified and uncertified varieties.

Certification will likely put some log producers at more of a disadvantage than others. For example, developing countries will be the worst off given their relative inability to meet the ecolabelling requirements compared to some of the developed nations, such as Canada and the U.S. The U.S. industry, relative to Canada's, would be faced with higher costs and may not be able to compete in some markets. We assume that the cost of logging will increase by 9 percent when U.S. producers change practices to meet the ecolabel's requirements (table 3). For Canada, we assume that for those producers who change practices to satisfy the ecolabel's requirements logging costs will increase by 7 percent. For other producers, logging costs will increase substantially more when they change their practices (table 3). Although the net exporters, Japan, Taiwan, Hong Kong and South Korea, of wood products would also have a cost increase if they applied for an ecolabel, we have assumed no cost increase because they will not be exporting these wood products to the European Union.

In the standard GTAP model, the response of the logging sector, like all non-agricultural sectors, is not restricted by any sector-specific input. To limit the responsiveness of log production, and to closely link the two wood producing sectors (i.e., log producers who satisfy the ecolabel's criteria and those who do not), we have identified the land input in log production. Table 3 shows our assumptions regarding cost shares for forest land. In the United States, returns to land are assumed to account for 2.27 percent of total costs. The supply of forest land to the two types of logging operations is modeled with a Constant Elasticity of Transformation (CET) function.

6. Experimental Design

The effects of a European Union (EU) mandatory ecolabel policy are examined using the GTAP model described in the previous section. In particular, we assume that the EU-12 and EU-3 implement an

ecolabel for forest products imported into European Union countries, including intra-EU trade. However, because our framework does not have a theory of consumer attitudes toward an ecolabel on forest products we focus here on the comparative static effects of trade policies that are necessary to reduce imports of uncertified forest products in the EU. In particular, we assume that the direct effect of the ecolabel is to restrict EU imports of logs, lumber, and pulp products which do not meet the requirements of the ecolabel by 10 percent. The 10 percent reduction in imports is achieved by levying a source-generic import tariff on uncertified forest products. In addition to this change in European Union trade policies, we assume that any induced expansion in certified logging operations will face additional costs as specified in table 3. In particular, we simulate these costs increases by lowering the productivity of logging operations. This simple experiment helps to evaluate likely impacts of an ecolabel policy in the European Union. Finally, we do not account for any environmental benefits that may arise from changed forest management methods.

7. Simulated Impacts of the European Union's Ecolabel on Forest Products

As a result of the European Union's ecolabel policy, producers which export to the European Union would do one, or more, of the following: (1) change their forest management practices in order to become certified, which, in turn, would drive up production costs, (2) increase their exports to non-EU countries such as Asia or Latin America, or (3) sell their products domestically instead of to the EU.

Due to the EU ecolabel policy, global demand for uncertified forest products declines. Resources move into production of certified forest products and their supply increases. As table 4 shows, the prices of certified products decline in most regions despite the additional costs of certification that producers bear as specified in table 3. In the European Union and EFTA these additional certification costs have a larger impact on prices because certified logging operations increase substantially more than in other regions. Log prices in the European Union increase by an additional 0.05 percent due to certification costs. The world

Table 4: Effect of EU Ecolabel Policy on Certified Forest Prices and Land Rents (percent change)

	<u>Certified Logs</u>	<u>Certified Lumber</u>	<u>Certified Pulp</u>	<u>Forest Land</u>
World Prices	0.042	0.009	0.008	
Domestic Market Prices:				
USA	-0.004	-0.007	-0.008	-0.101
EU-12	0.265	0.029	0.024	0.856
EU-3	0.249	0.049	0.032	0.260
EFTA	0.039	-0.004	-0.013	-1.797
CEEC-FSU	-0.085	-0.058	-0.054	-2.251
Canada	-0.045	-0.049	-0.051	-0.752

Latin America	-0.031	-0.018	-0.016	-0.285
ASEAN	-0.047	-0.030	-0.020	-0.588
NE Asia	-0.005	-0.006	-0.004	-0.088
ROW	-0.038	-0.018	-0.014	-0.503

price indexes for certified forest products increase because they incorporate price changes for EU and EFTA products.

As a result of lower prices for certified forest products in other regions, the European Union increases its imports of these products. The first two rows in table 5 show percent changes in aggregate European Union imports and exports of certified forest products. Because of substantial trade between the EU-12 and EU-3 countries, exports from the EU, as a whole, increase too. Table 5 also shows bilateral exports of certified forest products to the European Union. All regions increase their exports of certified products to the European Union. Exports of logs increase by more than lumber and pulp because the relative price of EU to foreign logs increases substantially more than the relative prices of lumber and paper.

Given the increase in the European Union's demand for imports of certified products, as shown in table 5, global supply of certified forest products increases (table 6). Most of the increase in global supply is due to increased production in the European Union itself, although other regions increase supply too. The supply of certified lumber and pulp is more price responsive than the supply of logs. As a result their supply increases by more than the supply of logs.

Table 7 summarizes the welfare implications of the EU ecolabel policy. Consumers lose out from the higher prices in the EU, with a .012 to .026 percent increase in their consumer price index. Regional EU household income, however, does slightly increase by .05 percent. In general, the welfare effects show that the European Union benefits from the simulated ecolabel policy, with a \$US 1,752.6 million increase in

Table 5: Effect of EU Ecolabel Policy on Certified Forest Trade (percent change)

	<u>Certified Logs</u>	<u>Certified Lumber</u>	<u>Certified Pulp</u>
Aggregate EU Imports	5.570	7.915	7.765
Aggregate EU Exports	2.426	3.712	4.338
Bilateral Exports to EU from:			
USA	5.963	8.012	7.781
EFTA	5.563	7.931	7.832
CEEC-FSU	5.791	8.234	7.968
Canada	5.915	8.240	7.933
Latin America	5.737	8.052	7.820

ASEAN	6.176	8.136	7.824
NE Asia	5.988	7.990	7.787
ROW	6.136	8.061	7.821

Table 6: Effect of EU Ecolabel Policy on Supply of Certified Forest Products (percent change)

	<u>Certified Logs</u>	<u>Certified Lumber</u>	<u>Certified Pulp</u>
Global Supply	0.941	3.754	3.283
Regional Supplies:			
USA	0.027	0.117	0.166
EU-12	5.067	8.243	6.805
EU-3	4.269	5.607	5.025
EFTA	1.512	1.844	1.946
CEEC-FSU	-0.774	1.152	0.575
Canada	0.029	0.389	0.609
Latin America	-0.120	0.203	0.368
ASEAN	-0.136	1.092	0.479
NE Asia	-0.003	0.026	0.059
ROW	-0.195	0.588	0.519

equivalent variation.² The change in EU welfare reflects the sum of three changes: (1) higher production costs due to expanding certified forest operations, (2) efficiency losses due to restricting imports of uncertified forest products, and (3) improvement in its terms-of-trade effect. The decline in EU demand for

Table 7: Effect of EU Ecolabel Policy on Welfare, Income, Consumer Prices, and Terms of Trade

	<u>Equivalent Variation</u>	<u>Household Income</u>	<u>Consumer Price Index</u>	<u>Terms of Trade</u>
	<i>US\$ million</i>	<i>%</i>	<i>%</i>	<i>%</i>
USA	-22.4	-0.007	-0.007	-0.002
EU-12	1577.8	0.049	0.026	0.032

²Equivalent variation is a measure of the benefit to the consumer, specifically it is the minimum amount that someone who gains from a particular change would be willing to accept to forgo the change.

EU-3	174.8	0.046	0.012	0.005
EFTA	-59.9	-0.033	-0.016	-0.028
CEEC-FSU	-80.6	-0.061	-0.051	-0.055
Canada	-94.2	-0.060	-0.046	-0.042
Latin America	-48.2	-0.020	-0.016	-0.013
ASEAN	-50.5	-0.027	-0.017	-0.016
NE Asia	-9.6	-0.004	-0.004	-0.001
ROW	-183.2	-0.022	-0.013	-0.015

uncertified forest products depresses the prices of these commodities. Thus, the EU needs to export fewer products to pay for cheaper imports. Therefore, EU supply prices increase relative to other regions. This results in a terms-of-trade improvement for the EU (fourth column in table 7). In this case the positive change in the EU terms-of-trade dominates the other two negative changes and welfare improves for the EU.

As a result of the ecolabel policy in the European Union, market prices for certified forest products decline in the U.S. and Canada (table 4). In our simulation, the consequences for prices depend on three factors. First, U.S. prices do not decline as much as they do in other regions because in the United States the harvesting of logs employs few sector specific resources (i.e., forest land), relative to other regions. Thus, it is easier for U.S. log producers to adjust to the EU ecolabel policy, than it might be for producers in ASEAN and Latin America. Second, the nature of demands facing producers is crucial. In our model, demand for Canadian certified logs is more price elastic than demand for U.S. products. This happens because in our model, Canada is not a major supplier of certified forest products to other regions and Canada exports a large share of its production. Thus, an expansion in Canadian certified logging operations would depress their market price more than a similar expansion in the U.S. As a result of these two factors, market prices for certified logs in Canada decline more than those in the U.S. (table 4). The third factor is the magnitude of additional costs due to certification that producers have to cover.

All other sectors in the U.S. and Canada also experience a decline in prices, revealing a magnifying effect of the price decrease of certified wood products. As a result of these price declines in the U.S. and Canada, consumer prices drop. As expected, however, income also declines. As shown in table 7, the economy-wide impact of the EU's ecolabel policy in the U.S. is that welfare declines by US \$22.4 million. Welfare in Canada declines by US \$94.2 million.

The EU's trade policy of restricting imports of non-certified wood products has the effect of forcing some foreign producers to produce in less efficient sectors. As a result, returns to forest land decrease for all regions, excluding the European Union.

Although the U.S. may be able to produce wood products which meet the EU's ecolabel criteria, other

producers which are already exporting to the EU will increase their production of certified products, although not without some losses. As seen in table 4, the EFTA and CEEC-FSU regions experience far greater reductions in forest land rents than other regions. This happens because they export substantial shares of their production to the EU and it is not easy for them to change trading patterns and avoid some of the effects of the EU policy.

8. Conclusion and Qualifications

This preliminary analysis of the economic effects of an ecolabel is the first known attempt to quantify the certification issue. Our results suggest that all non-European Union regions would experience losses which are small for the economy as a whole. However, most of these losses would fall on producers of forest products. The authors of this study have worked with the little known empirical evidence which presently exists. As more accurate information on the extent of production and trade in forest commodities that meets the requirements of an ecolabel becomes available, some of the assumptions will need to be revised to improve the study. It will also be important to revise the data once better estimates of costs of certification and compliance become available. Finally, we plan to improve the modeling of forest product sectors and consumer preferences regarding certified commodities.

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