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Certification of sustainable forest management practices: a global perspective on why countries certify[☆]

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Abstract

In this paper, we examine national conditions that encourage the growth of a private regulatory environmental system to govern forests. Economic, institutional and social capital variables for 117 countries are used to examine factors determining forest certification under the Forest Stewardship Council and domestic competitor schemes. Although economic factors, such as forest exports and GDP, are important in explaining the likelihood that a country's forest management practices are certified, the regression results support the idea that economic institutions and the social context under which firms and forest landowners seek certification matters. The ability of citizens to influence the political process is also significant; in particular, the likelihood that firms and forest owners will seek to certify their forest practices is significantly reduced if women have little or no effective voice in civil society.

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1. Introduction

A challenging task facing policymakers today is that of developing appropriate policy instruments for addressing environmental spillovers. Different instrument choices that governments can use to protect the environment and encourage sustainable development include command-and-control regulations that have historically been preferred and continue to be the instrument of choice (Stavins, 2002), and market-based incentives that promote flexibility in achieving

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environmental objectives (Porter and van der Linde, 1995; Lippke and Oliver, 1993). Market incentives include tax-subsidy and cap-and-trade schemes (Stavins, 2002; Weitzman, 1974). However, whether regulations or incentives are employed, state involvement is generally required, if only to determine the cap level and enforce and monitor the subsequent trading mechanism. Reliance on private transactions to resolve environmental spillovers, in the Coasian sense, is generally eschewed because empirical evidence of its success is lacking. The usual conclusion is that transaction costs of reaching agreements are onerous, so some form of state involvement is required. Even where firms have voluntarily agreed to “correct” an environmental externality, the explicit threat of state intervention is generally a prerequisite for such an agreement (Segerson and Miceli, 1998).

There is now increasing evidence of the emergence of non-state, market-driven governance structures for addressing environmental spillovers (see Cashore, 2002; Bernstein, 2001; Khanna, 2001; Kolk et al., 1999). Of such governance structures, private certification of sustainable forest management practices is possibly one of the more comprehensive examples (Kiker and Putz, 1997; Murray and Abt, 2001). Forest certification seeks to address environmental spillovers related to the “improper” and “unsustainable” exploitation of forests through private regulation that is enforced by the market, either through incentives provided by market premiums for certified products or the threat of boycotts by buyer groups and consumers. Sustainable forest management (SFM) certification can resolve problems of market failure stemming from asymmetric information of buyers and sellers of forest products with regard to the environmental impacts of wood production. To be effective, a certification system must be trusted by consumers, its criteria, standards and prescriptions must be consistent with extant definitions of SFM, it must include effective monitoring, and the rewards (premiums) or advantages of market access must offer sufficient incentives for suppliers to bear the costs of certification.

A number of authors have examined economic aspects of forest certification (e.g., Kiker and Putz, 1997; Gale and Burda, 1998; Murray and Abt, 2001). Vertinsky and Zhou (1997) demonstrated, theoretically, that voluntary certification coupled with a

minimum quality standard is preferable to state-enforced SFM standards from a welfare point of view, but Haener and Luckert (1998) found that certification schemes are not the best means for addressing environmental spillovers related to forestry activities. Theoretical research comparing mandatory and non-mandatory approaches to environmental spillovers is also inconclusive about which does more to enhance social welfare (Khanna, 2001).

Empirical research into these issues has focused on various parameters that determine why firms will voluntarily enter environmental agreements without the threat of state involvement. In addition to economic factors that affect profits directly or indirectly (through consumers), perceived pressure from shareholders, the environmental lobby and neighborhood/community groups, firm size, financial health, past environmental performance, and regulatory threats have been linked to firms’ decisions to meet environmental standards voluntarily. Firms seek stakeholder approval because it gives them the social license to operate in a manner that permits some environmental harm, since not all spillovers can be mitigated in any event. This is another form of the ethical argument of “corporate responsibility”—managers of firms feel that they have to behave in a socially acceptable manner. Managers may have a social conscience that needs to be assuaged. Both the behavior of managers and community pressure are cited as drivers of forest certification (Takahashi et al., 2003; Hayward and Vertinsky, 1999).

The focus in empirical studies of certification has largely been on the motives that induce firms voluntarily to certify forestland. In this paper, we examine national conditions that encourage the growth of a private regulatory environmental system to govern forests. We begin our investigation in Section 2 with a brief description of forest certification schemes. Our econometric model and data are developed in Section 3, while our empirical regression results are provided in Section 4. Our conclusions follow in Section 5.

2. Forest certification schemes

Failure to sign a global convention on forestry at the Earth Summit in Rio de Janeiro in 1992 led environ-

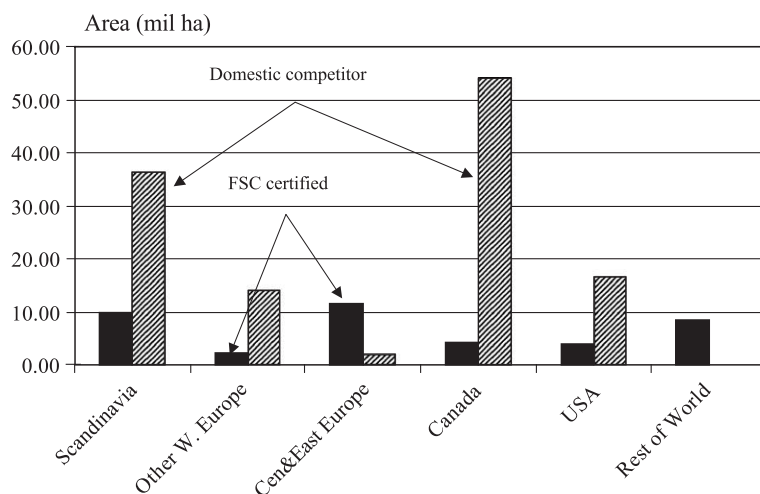


Fig. 1. FSC-certified area versus area certified under a competitor program.

mental, non-governmental organizations (ENGOS) to develop a private, non-mandatory regulatory scheme for sustainable forest management. In 1993, a coalition of environmental groups (led by the World Wide Fund for Nature, or WWF), foresters and timber companies formed the Forest Stewardship Council (FSC) to develop standards for SFM and certify companies that practiced sustainable forestry according to its rules (Cashore et al., 2004). In response to this effort, competing forest industry and forest landowner programs developed in Canada, the United States, Europe and other countries where timber harvests and wood products are important. As of December 2003, 164 million ha of forests had been certified globally (Fig. 1), but this constitutes only 4.2% of the world's forests. Yet, this is one-third more than was certified in June 2002, about two and a half times that certified in 2001, and more than four times as much as was certified in 1999. North America has 16.8% of its forests certified and Europe 7.3%, but other regions have less than 1% of their forests certified. Only 5.2% of all certified forests are in Asia, Africa and Latin America.¹ In the

next paragraphs, we briefly summarize the major programs that result in the certification of forests.

The FSC provides both SFM certification and chain-of-custody certification, although the latter presupposes the former. Our focus is on certification of forest management practices. As of January 2004, the FSC had issued only 116 certificates for forest holdings larger than 50,000 ha, but these accounted for 89.2% of the FSC-certified area. The FSC had certified 451 forest holdings smaller than 50,000 ha by 2004, an increase of nearly 60% since the end of 2001.

In Canada, the Canadian Pulp and Paper Association (now the Forest Products Association of Canada) asked the Canadian Standards Association (CSA) to develop a forest certification program based on a systems approach to SFM. To become certified, companies would have to establish environmental management forestry systems that include auditing requirements. CSA certification has built in flexibility to encourage on-going improvements in forest management. Although CSA certification was initiated by industry, its requirements are quite stringent; costs of obtaining and complying with CSA certification are now comparable with those of FSC certification, although it currently lacks the same global recognition as FSC.

In the United States, the American Forest and Paper Association's Sustainable Forestry Initiative (SFI) requires firms to file reports with SFI regarding their SFM plans. Like CSA certification, no attempt is

¹ Note that some environmental certification systems that relate to forest management regulate management processes not management activities on forestlands. Thus, certification programs, such as "Forest Care" in Canada, "Green Tag" in the United States, and ISO 14001 certification, do not constitute private regulatory systems for forestlands.

made to follow wood fiber through its various stages to the final consumer (chain-of-custody certification), although labeling of products is emerging (Meridian Institute, 2001). Because the United States is the most important market for Canadian wood products, about half of certified forestlands in Canada are SFI-certified. Indeed, Canada now accounts for about 60% of SFI-certified area.²

In Europe, it was landowners who developed their own certification program, because they felt that their needs and opinions were ignored by the FSC. The various national forest landowner associations began the Pan-European Forest Certification (PEFC) scheme in 1999. PEFC endorses national schemes that then rely on third-party certification. In Western Europe, PEFC accounts for 80.5% of certified forests (and FSC the remainder), while in Central and Eastern Europe, it only accounts for 14.3%, but that is likely to change as a result of EU expansion.

The main certification schemes operating in the tropics are the FSC and a national scheme in Malaysia, although some forests have been issued a Keurhout declaration signifying they are certified. However, due to lack of information and since the amount is insignificant, we ignore area certified under the Malaysian national scheme and Keurhout in the current analysis. Compared to FSC certification, PEFC and SFI have certified significantly more small holdings and community forests (Eba'a Atyi and Simula, 2002). There have also been meetings aimed at reaching agreement on mutual recognition, but these have focused mainly on the FSC and PEFC, and the tropical countries.³

² The American Land Alliance (2003) claims that the SFI is not a credible certification scheme. An anonymous reviewer of the current paper goes one step further, claiming that "it is questionable whether certification makes any substantial contribution to the enhancement of forest management. . . .(B)uyers of timber products don't put much weight on SFM in their purchase decisions. As a consequence, certification assumes many features of a symbolic policy instrument in the sense that the status quo is maintained and not changed."

³ The International Tropical Timber Organization (ITTO) has been involved in these discussions, but despite the fact that SFI has been widely adopted in Canada, ITTO only recognizes two international certification programs, FSC and PEFC (Eba'a Atyi and Simula, 2002). Unfortunately, such an attitude pits North America against Europe in the marketing of wood products.

3. Modeling forest certification

In this section, we identify factors that might explain why the share of certified forestland in some countries is higher than the share in other countries, and if there are differences between SFM certification and the domestic competitor schemes. We hypothesize that the emergence of private environmental regulatory systems in a country depends not only on the existence of appropriate economic incentives but also on the achievement of critical levels of institutional development and social capital. We consider these factors in greater detail below.

3.1. Economic reasons

Wood producers must see that there is some economic advantage to participating in forest certification, whether the benefit consists of a price premium, maintenance of market access, lower costs of production, or protection or enhancement of market share. Thus, markets determine in part whether firms enter environmental agreements (certify their forest operations) without state involvement. Firms in some countries may undertake unilateral action because it leads to a reduction in costs (by reducing wastage); goodwill benefits that accrue to the firm as a result of marketing an environmental program are then a nice side bonus.

In the forest sector, forest certification might cause a change in management practices that reduces operating costs, enhances fiber utilization and improves the quality of future harvests. While there exists empirical evidence in non-forest sectors supporting lower production costs as a factor motivating firms to participate in non-mandatory environmental protection (Porter and van der Linde, 1995; Khanna, 2001), this factor may not be as important in forestry as benefits accrue in the too distant future. There is also little evidence that wood from certified forests commands a price premium, with any premiums insignificant and unable to cover the costs of certification (Baldwin, 2001; Kiekens, 2000; Swallow and Sedjo, 2002).⁴ Rather,

⁴ Swallow and Sedjo (2002) provide a theoretical explanation as to why there may be no price premium, namely, that certification is essentially costless. Forest management already meets certification criteria as a result of strict government regulations related to logging on public lands (as in Canada) or a land ethic among landowners (as in Sweden).

forest companies are concerned about threats of product boycotts (loss of market share) or lawsuits related to spillovers (e.g., destruction of critical wildlife habitat, polluting of rivers with runoff from forest operations, emission of dangerous pollutants), which would increase costs or threaten a firm's survival. In the context of inter-country comparisons, the greater the extent to which a country's forest products are exported, the more likely are the firms in that country to seek SFM certification.

A second reason for participation is related to the first. Clearly, because the demand for environmental goods and amenities increases as income rises, the environment in richer countries has a greater opportunity cost than it does in developing countries. As incomes rise, people are willing to pay more to protect the environment—to reduce wastage associated with wood fiber utilization, to protect watersheds, to preserve critical wildlife habitat, and so on. Thus, the extent and likelihood of a country's forests being certified increases as GDP per person rises, because firms and forest landowners (including the public owner) respond to domestic preferences for greater emphasis on the environmental amenities from forestland.

Finally, high opportunity costs of forestland in other uses might reduce incentives to certify forest practices. In many especially less developed countries, forests are often converted to agricultural uses because these lead to higher returns. If this is the case, forest landowners are less willing to embark on forest certification since lands are harvested once and then converted. Since forestry is not sustainable in this situation, there is no incentive to certify. We hypothesize that forest certification is inversely related to agricultural activity, which is represented in our model by the proportion of the total population that lives in rural areas. Agrarian societies are characterized by relatively high rural populations, with forestry not contributing to rural employment (and population) on the same scale as agriculture.

3.2. *Institutions and social capital*

Over the past several decades, economists have increasingly been concerned with the role of institutions in economic systems. The institutional environment consists of human-made constraints that structure

political, economic and social interactions. It consists of both formal rules (constitutions, laws and property rights) and informal constraints (sanctions, taboos, customs, traditions, and norms or codes of conduct). Institutions constitute “a set of moral, ethical behavioral norms which define the contours that constrain the way in which the rules and regulations are specified and enforcement is carried out” (North, 1984, p. 8). Thus, the institutional environment not only delineates the rules of the game within which economic activities are coordinated, but also prescribes the rules of conduct within which human activities and actions take place. For example, the legal system is a framework that defines the ways in which property rights can be implemented and enforced.

In those countries where political, economic and social institutions are more advanced, firms are more likely to seek certification voluntarily. Mature institutions are needed to support a firms' certification claims, while ensuring buyers of certified products that they have recourse (through the legal system) should such claims prove false. Institutions reflect a collective commitment to public goods, while protecting the rights of the private provider.

The measures of the institutional environment that we use are three indexes relating to the “size of government”, the “structure of the economy and use of markets”, and the “freedom to trade with foreigners” (Gwartney et al., 2001). Data are available for 1990 and 1999, but we employ only those for 1999 since they are available for more countries (now some 123) and forest certification is a relatively recent phenomenon. Each index ranges from 0 to 10.

In developed rich countries, government plays a significant role in the economy. The “size of government” index is constructed from data on government consumption expenditures as a percentage of total consumption and on government transfers and subsidies as a percentage of GDP. The index is lowest for countries with the greatest government participation in the economy, and is particularly low for countries that account for the majority of wood product exports—Sweden (1.96), Canada (4.53), Finland (3.89), Germany (4.46) and Austria (3.82).⁵ The

⁵ For comparison, Denmark had the lowest score (1.84), while the United States scored 6.47.

highest score in our sample is associated with Guatemala (9.92), with most nations in tropical regions (where forest certification is low) scoring higher than 8. Thus, “size of government” might be considered as much an index of a mature, developed economy that has the institutions needed to facilitate forest certification.

The “structure of the economy” measures the extent to which production and allocation of goods and services occur via governmental and political mandate rather than private enterprises and markets. An index value of 10 indicates that allocation of goods and services occurs entirely via markets, while a value of 0 indicates that the government controls all economic activity. The “structure of the economy” index is constructed from four variables: the extent of public enterprises and public investment as a percentage of the economy, the extent of price controls, the top marginal income tax rate and the threshold at which it applies, and the degree to which a country’s military relies on conscripts. The index is lowest for Syria (0.00), the Democratic Republic of the Congo (0.00) and Madagascar (0.12), while New Zealand has the highest value (9.25); the value for the United States is 8.08. The likelihood that a country will certify SFM practices increases as the “structure of the economy” index rises, because forest certification schemes are examples of private environmental regulatory systems and not government-enforced schemes.

Finally, the “freedom to trade” index is indicative of firms’ abilities to produce and sell wood products abroad. It is based on taxes on international trade (revenues from taxes as a percentage of exports plus imports, mean tariff rate, and variation in tariff rates) and the actual size of the trade sector compared to its expected size (Gwartney et al., 2001). As this index increases, so is the guarantee that firms have that, by certifying forest management practices, they can use this as an export marketing strategy. The “freedom to trade” index is lowest for Myanmar (0.00) and highest for Estonia (9.15), while the value for the United States is 7.53.

There is more to institutional success than just formal rules, however. Also important is “the shared knowledge, understandings, norms, rules, and expectations about patterns of interactions that groups of individuals bring to a recurrent activity” (Ostrom, 2000, p. 176); these are often referred to as ‘social

capital’. Social capital may be correlated with good government (La Porta et al., 1997), but it can exist outside of good government. It is our contention that social capital is important to sustainable forestry and the desire of firms and forest landowners in a country to certify forest practices. In countries with higher levels of social capital, firms will be pressured to behave more responsibly towards the environment, and they are likely to be better corporate citizens.

One form of social capital is the extent to which a country’s citizens are empowered. Empowerment is an indicator of citizens’ abilities to influence political decisions concerning the provision of public goods, where these are public or private. One important measure of empowerment is a country’s overall literacy rate—countries with higher rates of literacy are more likely to have a greater proportion of their forests certified. Perhaps more important than literacy in terms of its impact on forests and the environment is the role of women in society (Rodda, 1993). Forest degradation can have a large negative impact on the poor in developing countries, particularly women. Women in developing countries rely quite heavily on a variety of products obtained from forests, but such activities do not contribute to forest degradation (Twarog, 2001). Therefore, in countries where women are suppressed or simply have fewer opportunities than men, the level of social capital will be lower and women will have less opportunity as stakeholders to influence efforts to protect forests. To represent the opportunity and role of women in civil society, we constructed a dummy variable that takes on a value equal to 1.0 if female illiteracy is significantly greater than male illiteracy.⁶ This variable is a surrogate measure of the extent to which females lack opportunities equal to those of men (excluded from education relative to males). We would expect certification to increase with literacy rates, but to be negatively correlated with our dummy variable representing females’ lack of opportunities or their suppression in society by males.

⁶ By significantly greater, we mean more than 10 percentage points. For some countries, however, the actual difference was either not known or considered “unrepresentative”. In these cases, we used other information about the country to assign a one or zero to the variable.

Finally, as noted in Khanna's (2001) survey, other factors might contribute to non-mandatory approaches to environmental spillovers. For inter-country comparisons, community and other stakeholders might be represented by variables such as population density, proportion of the population that is rural and forest area per capita. Each of these variables would be expected to have a positive impact on a country's likelihood of certifying its forest management practices.

3.3. Regression model

We examine the role of economic incentives, institutions and social capital in explaining why firms and forest-owners in some countries certify SFM practices and others not using a model to explain the proportion of certified forestland found within a country. For some countries, the extent of certification is zero. In the model, we investigate both FSC certification and overall certification (certification under any scheme, including FSC) using a logistics function to explain forest certification. The regression model takes on a logistics functional form that can be estimated using OLS as follows:

$$\ln\left(\frac{y_i}{1-y_i}\right) = \alpha_{0i} + \alpha_{1i}x_{1j} + \dots + \alpha_{ni}x_{nj} + \varepsilon_{ij}$$

(i = FSC certification, all certification),

where the dependent variable is expressed as a log-odds and y_{ij} is a variable measuring the proportion of total forestland that is covered by one or other certification scheme (arbitrarily increased by an extremely small number to avoid taking the natural logarithm of zero), α_{ki} ($k = 1, \dots, n$) are parameters to be estimated, $\varepsilon_{ij} \sim N(0, \sigma)$ are normally distributed error terms, and j refers to country.

4. Empirical results

Data was collected on 117 countries that had a forest cover exceeding 100,000 ha and/or forest exports that constituted 1% or more of total merchantable exports. Not all of the explanatory variables were available for all countries. If there were too few observations available for a given variable, it was not

included in the regression analyses.⁷ Other variables included in some of the preliminary regressions turned out to be statistically insignificant and thus were not included for further consideration. This was the case for certain components of economic freedom used to represent institutional differences across countries, foreign direct investment and change in FDI, inflation rates, population growth, population density, an index of sustainability (the ecological footprint), and, importantly, the square of per capita GDP.⁸ The remaining explanatory variables, along with the dependent variables, are summarized in Table 1. Also included in Table 1 is the expected effect that the variable will have on the extent to which, or the odds that, firms and forest landowners within a country will certify their forestry practices.

We examine factors that affect FSC certification and certification under a domestic competitor scheme separately, as well as overall certification of SFM practices. The final regression results are provided in Table 2. For each of these cases, we present one model with and one without the "freedom to trade" index, since this helps illustrate the robustness of the results—the number of observations increases from 94 to 106 when this index is dropped from the model. In addition, we examined the case of certification under any scheme with an FSC dummy variable included to determine the statistical significance of FSC certification on the intercept and slope estimates. The results indicate that FSC certification affects in a statistically significant fashion the coefficient estimates of per capita GDP, proportion of wood product exports, structure of the economy and literacy, but not the intercept or other coefficients. We do not show these results because they are evident in Table 2. Finally, White's (1978) correction of standard errors for possible heteroskedasticity and model misspecification is used.

Purchasing power weighted per capita GDP is inversely correlated with the likely proportion of

⁷ This was particularly true for the corruption perceptions index (which measures trust), divorce rates and the human development index, where available observations amounted to less than 70.

⁸ A variety of models were examined because, due to missing values, the number of observations retained depended crucially on the mix of variables in the models. The variables used in the final regressions were considered robust in that they were statistically significant in at least two of the preliminary regressions.

Table 1
Variables included in the regression models

Variable	Observations	Mean	Standard deviation	Minimum	Maximum	Expected sign
<i>Dependent</i>						
FSC certification	117	0.0254	0.0894	0.0	0.6646	not applicable
Non-FSC certification	117	0.0307	0.1548	0.0	0.9993	not applicable
All certification	117	0.0548	0.1760	0.0	1.0000	not applicable
<i>Economic regressors</i>						
Purchase power parity adjusted per capita GDP (US\$2000)	115	9128.5	9044.8	480	34 100	+
Proportion of forest products exported	111	0.0391	0.0654	0.0	0.3404	+
Proportion of population living in rural areas	116	0.4521	0.2269	0.033	0.939	?
<i>Institutional regressors</i>						
Size of government	112	6.6104	2.9541	1.84	9.92	-
Structure of the economy	114	4.8483	1.9306	0.00	9.25	+
Freedom to trade	100	6.5540	1.7068	0.00	9.15	+
<i>Social capital regressors</i>						
Overall literacy	116	81.0	20.07	16.1	99.8	+
=1 if females considered suppressed	113	0.6106	0.4898	0.00	1.00	-

Table 2
Certified proportion of total forest area: OLS regression results for log-odds model^a

Explanatory variable	FSC		Non-FSC		All schemes	
	#1	#2	#3	#4	#5	#6
Intercept	-18.44** (-4.75)	-17.21** (-4.76)	-18.89** (-6.64)	-19.83** (-8.19)	-20.16** (-5.14)	-19.14** (-5.07)
Per capita GDP	-0.0001** (-2.04)	-0.0001 (-1.09)	0.0004** (4.07)	0.0004** (4.13)	0.00001 (0.22)	0.0001 (0.85)
Proportion of forest products exported	8.050 (1.25)	6.036 (1.00)	17.095* (1.87)	16.631* (1.96)	19.259** (3.68)	16.728** (3.03)
Proportion of population living in rural areas	4.776 (1.55)	3.752 (1.16)	5.806** (2.22)	5.669** (2.49)	8.071** (2.62)	6.832** (2.05)
Size of government	-0.615* (-1.76)	-0.450 (-1.36)	-0.006 (-0.02)	0.086 (0.38)	-0.668* (-1.87)	-0.455 (-1.32)
Structure of economy	0.972** (3.90)	0.907** (3.43)	0.067 (0.34)	-0.013 (-0.07)	0.961** (3.85)	0.867** (3.17)
Freedom to trade	0.689* (1.87)		-0.187 (-0.73)		0.621 (1.64)	
Overall literacy	0.056* (1.72)	0.081** (2.71)	-0.015 (-1.03)	-0.020 (-1.49)	0.056* (1.73)	0.077** (2.47)
=1 if females considered suppressed	-4.839** (-3.37)	-4.459** (-3.01)	-0.964 (-1.42)	-0.980 (-1.54)	-0.964** (-3.60)	-4.487** (-3.19)
Number of observations	94	106	94	106	94	106
R ²	0.524	0.469	0.4308	0.4237	0.5730	0.5198
F-statistic	29.00**	23.83**	2.52**	2.84**	39.99**	31.66**

^a White's (1978) corrected standard error *t*-statistics provided in parentheses.

* Indicates statistical significance at the 0.10 or better level.

** Indicates statistical significance at the 0.05 or better level for a two-tail *t*-test.

forests that a country certifies under the FSC scheme. This is not as surprising as might first appear to be the case, because only developed countries have implemented their own certification systems, with poorer countries relying only on FSC certification. Given that Canada, the United States, Finland and, until very recently, Sweden have the greatest proportion of their forests certified under domestic competitor schemes (see Fig. 1), and these are also among the richest countries in the developed world, the proportion of forestland certified under non-FSC (competitor) schemes is positively and significantly correlated with per capita GDP (models #3 and #4).⁹ This provides some support for our contention that citizens do demand more environmental amenities, such as those provided by forests, as their incomes increase. However, when all certification schemes are taken into consideration, the effect of GDP disappears altogether (models #5 and #6); thus, this factor must not be very strong with other factors considered more important for explaining certification.

As expected, firms and forest owners that export a high proportion of their wood products are more apt to seek certification of their forest management practices. While this result should be strongest for FSC certification, it turns out to be a more important reason for domestic competitor schemes, as indicated by the fact that the estimated value and statistical significance for this variable is higher for the domestic schemes and when all schemes are considered than for FSC alone.

We argued that in countries with a proportionally larger rural population, economics would likely favor the conversion of forestland to agricultural uses, and thus forest landowners would not be interested in SFM. In contradistinction, rural people also have an interest in the timber and non-timber benefits that forests provide, and want to ensure their availability in the future. Given that many in rural areas have no ownership rights, forest certification provides a guarantee that these benefits will continue in the future. As stakeholders, therefore, they will pressure

governments to protect forests by certifying management practices. The empirical evidence suggests that, for the most part, the latter factor is more important than the former, although in the case of FSC certification the positive (expected) coefficient is statistically insignificant. As in the case of GDP, the rural effect seems to be stronger in developed countries. With some exceptions (most of Canada and parts of the United States), small rural landowners dominate in rich countries. The statistically significant and positive coefficients on proportion of population living in rural areas reflects the commitment of these landowners to forest sustainability, but it is tempered by the fact that they join certification schemes that they control—PEFC was started by landowners and not industry.

Countries' economic institutions do affect the likelihood that forest ecosystems are protected, as indicated by the extent to which forest areas are certified. The sign on the "size of government" variable is negative as expected—a lower value for this variable indicates that governments have a greater role in the economy, which is suggestive of stable institutions and a well-developed economy. Since there is little real difference between the size of government in developed countries, it is not surprising that this variable does not provide a statistically significant explanation of non-FSC certification. It is only significant in explaining FSC and overall certification, and then only weakly.

The remaining indexes relate to the structure of the economy and the freedom of individuals and companies to trade in international markets. For the most part, the coefficients on these two measures have the expected positive sign and are statistically significant, except in explaining non-FSC certification (models #3 and #4). Interestingly, the "structure of the economy" and "freedom to trade" indexes are statistically significant factors explaining FSC and overall certification. Thus, mature economic institutions that promote markets, economic freedom and trade do influence whether or not countries tend to certify their forest practices.

Finally, outside of economic factors, social capital has the greatest influence on whether or not countries certify their forest management practices. The results indicate that literacy rates have a strong positive and statistically significant effect on whether countries

⁹ We often refer to non-FSC schemes as domestic competitor schemes, but each is international in scope although perhaps not always acceptable. Because any country can adopt the CSA, SFI or PEFC scheme, we include all observations in the regressions.

participate in FSC and overall certification, suggesting that, where citizens are empowered to affect the political system and/or individual wood-product companies, more forestland will be certified. Again, this disappears as an explanatory factor when only CSA, SFI and PEFC certification are examined.

Gender is a major factor explaining countries' proclivity to certify their forest practices—to protect the environment.¹⁰ The likelihood that firms and forest owners will seek to certify their forest practices is significantly reduced if women have little or no effective voice in civil society. Our results appear to confirm observations in the literature (Rodda, 1993; Twarog, 2001) that women are most affected by the environment and therefore have a substantial stake in its protection. If they are not given a voice in matters related to the environment, there is less chance that it will be protected. This appears to be the case particularly with respect to forestry in developing countries, as indicated by the negative and highly statistical value of the estimated coefficients for this variable in the FSC and overall certification models. Although not statistically significant in the case of non-FSC schemes, it is interesting that the coefficient is still negative and significant at the 0.15 or better level.

5. Conclusions

The results support the idea that the institutional and social context under which firms and forest landowners seek certification matter. Considering all certification schemes, the higher the level of exports, the more motivated firms and forest landowners will be to seek certification. Surprisingly, while FSC certification is recognized internationally, concern about protecting export markets does not appear to be a strong reason why firms might seek FSC certification. But concern about export markets does appear to play a major role in explaining why firms and/or landowners participate in FSC competitor schemes. One explanation for this is that, since the FSC system is the only one established by environmental groups, firms that have pursued FSC certifi-

cation have not always done so for economic reasons, but simply out of concern for the environment.

Citizen empowerment is cited as a factor affecting provision of public goods (e.g., Eba'a Atyi and Simula, 2002). To the extent that literacy, the economic status of women and institutions measure this aspect, we note that the involvement of timber-producing countries in the certification of forestry practices will be enhanced as society improves upon these features. It is likely that empowerment as much as higher income is the reason why developed countries are more concerned to provide citizens with environmental amenities than is the case in developing countries. In other words, development is not simply a matter of increasing income, but of addressing other aspects of civil society as well (see Easterly, 2001).

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¹⁰ The gender variable turned out to be the most robust explanatory variable in all of the regression models investigated.

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