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Multiplication of Environmental Labelling and Information Schemes (ELIS): Implications for Environment and Trade

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MULTIPLICATION OF ENVIRONMENTAL LABELLING AND INFORMATION SCHEMES (ELIS): IMPLICATIONS FOR ENVIRONMENT AND TRADE - ENVIRONMENT WORKING PAPER No. 106

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Keywords: Ecolabels, Environmental reporting, Information policy approaches, Product environmental footprints, trade and environment

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ABSTRACT

This report explores potential effects of the recent rapid growth in Environmental Labelling Information Schemes (ELIS) around the world, with a focus on the implications of ELIS multiplication for environmental effectiveness and international trade. As empirical work on the environmental effects of ELIS multiplication is just beginning to appear, insights from the theoretical literature on label competition are presented. Modelling suggests that competition between labels may reduce environmental performance relative to a single label with strict environmental goals, though stylised modelling may not accurately reflect the complex real-world interactions of schemes. The analysis is complemented with an overview of empirical studies on environmental effects, including evidence that label competition has led to market-driven convergence of standards in some sectors, such as forest certification. However, it is important that convergence leads to more holistic and streamlined ELIS rather than acting as a weakening influence on the stringency and quality of standards or how schemes are implemented, to maximise environmental effectiveness.

Multiplication of ELIS could have implications for the ways that labelling schemes interact with international trade, particularly in terms of market access and international competitiveness. Although difficult to demonstrate empirically, the conditions that could lead to such effects are described conceptually in the report, noting particularities of certain types of schemes such as quantitative footprints. The report also documents a range of ways that government and non-government bodies have responded to ELIS multiplication, such as mutual recognition of schemes and creation of "focal" schemes or standards that can lead to market convergence. Such responses could also alter trade effects of ELIS under certain conditions, for example if a particular voluntary scheme becomes sufficiently dominant in a country to be perceived as a "de facto" market entry requirement by suppliers in other countries.

Keywords: Ecolabels, Environmental reporting, Information policy approaches, Product environmental footprints, trade and environment

JEL classification: F18, Q56, Q58, L15

RÉSUMÉ

L'objet du présent document est d'étudier les retombées potentielles de la multiplication des dispositifs d'éco-étiquetage et d'information environnementale (DEIE) observée depuis peu dans le monde, en particulier du point de vue de l'efficacité environnementale et du commerce international. Comme il y a peu d'études empiriques sur la multiplication des DEIE, les résultats des travaux de modélisation théoriques concernant la mise en concurrence des dispositifs sont présentés. D'après les exercices de modélisation théorique, la concurrence entre labels peut réduire la performance environnementale par rapport à un label unique visant des objectifs strictement environnementaux. Cependant, le caractère simplifié des modèles employés et la complexité du paysage dans lequel évoluent les DEIE limitent certainement l'intérêt de la modélisation pour la définition de l'action à mener. L'analyse est complétée par une revue d'études empiriques sur l'efficacité environnementale des DEIE. La concurrence entre labels semble entraîner sur la durée une uniformisation et une convergence des normes tirée par le marché, par exemple, dans le secteur de la certification forestière. Pour que les bienfaits écologiques soient optimaux, il importe que la convergence ne mène pas à l'abaissement du niveau d'exigence et de la qualité des normes utilisées.

La multiplication des DEIE pourrait influer sur leur lien avec le commerce international, en particulier en ce qui concerne l'accès au marché et la compétitivité internationale. Bien que ces effets soient difficiles à démontrer à partir de données empiriques, le rapport décrit les conditions en principe susceptibles de conduire à ces effets. Les particularités de certains types de dispositif dans ce regard sont notés, comme par exemple les labels « enceintes ». Le rapport s'intéresse également aux actions prise par les acteurs gouvernementaux et non gouvernementaux pour rendre le marché des DEIE cohérent et prévisible. Ces actions comprennent, par exemple, des accords de reconnaissance mutuelle ou la création de normes ou labels de « référence ». Ces actions peuvent également mener une influence sur le commerce international, par exemple si un dispositif d'application facultative gagne un part de marché qui semble constituer un critère *de facto* d'entrée sur le marché.

Mots-clés: Eco-labels, Rapports environnementaux, Politique d'approches informationnelles, Empreintes environnementales des produits, Commerce et environnement.

Classification JEL: F18, Q56, Q58, L15

FOREWORD

This report forms part of a larger project on the environmental, economic and international trade implications of the multiplicity in environmental labelling and information schemes. The work was conducted jointly under the OECD Working Party on Integrating Environment and Economic Policies (WPIEEP) and the OECD Joint Working Party on Trade and Environment (JWPTE), with inputs from the Working Party on Resource Productivity and Waste (WPRPW). The project benefitted from voluntary contributions from New Zealand and Switzerland. Other outputs from the project include OECD Environment Working papers numbers 62 and 105.

The principal author of the report Andrew Prag of the OECD Secretariat. Professeor Thomas Lyon, University of Michigan, drafted a preliminary paper that formed the basis of Section 3 and Annex C of this report. Aimee Russillo providing drafting assistance throughout. Delegates of the WPIEEP and JWPTE provided important comments on earlier drafts. OECD colleagues including Shardul Agrawala, Guillaume Gruère, Jehan Sauvage and Ronald Steenblik also provided valuable guidance and input. Pascale Rossignol and Katjusha Boffa provided editorial assistance. The authors are responsible for any remaining omissions or errors.

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ACRONYMS/ABBREVIATIONS

B2B	Business to Business
COSA	Committee on Sustainability Assessment
DEFRA	Department for Environment, Food and Rural Affairs (UK govt)
ELIS	Environmental Labelling and Information Schemes
EMS	Environmental management system
EPA	U.S. Environmental Protection Agency
EPCA	Energy Policy and Conservation Act
EPC	Environmental Performance Declarations
EPR	Extended Producer Responsibility
FAO	Food and Agriculture Organization of the United Nations
FSC	Forest Stewardship Council
GEN	Global Ecolabel Network
GHG	Greenhouse gas
GSCP	Global Social Compliance Programme
ISO	International Organization for Standardization
ITC	UN International Trade Centre
JWPTE	Joint Working Party for Trade and Environment
LCA	Life cycle assessment
LEED	Leadership in Energy and Environmental Design
MQS	Minimum quality standard
MSC	Marine Stewardship Council
NGO	Non-governmental Organisation
nprPPM	non-product-related processes and production methods
PCF	Product carbon footprinting
PCR	Product category rule
PEF	Product environmental footprinting
PEFC	Programme for the Endorsement of Forest Certification
PPM	Processes and production methods
SAI	Social Accountability International
SPPI	Sustainable Public Procurement Initiative
SSI	State of Sustainability Initiative
T4SD	Trade for Sustainable Development
TBT	Technical Barriers to Trade
TSC	The Sustainability Consortium
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFSS	UN Forum on Sustainability Standards
WPIEEP	Working Party for Integrating Environmental and Economic Policies
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

This report explores potential effects of the recent rapid growth in Environmental Labelling Information Schemes (ELIS) around the world, with a focus on the implications of ELIS multiplication for environmental effectiveness and international trade. Responses to this multiplication initiated by government and non-government actors are also considered, including possible implications of the market convergence caused by those responses.

The growth of ELIS in recent years demonstrates a strong interest in environmental information from many quarters. Schemes have been created by governments, non-governmental organisations and private sector firms or associations, in response to an identified need in each case. Drivers include creating standards that are more or less stringent than existing schemes (vertical differentiation) or that target environmental impacts not yet covered (horizontal differentiation). Schemes may also be introduced that aim to be better suited to particular production or market conditions, or to respond to particular consumer preferences. The resulting diversity of schemes can offer more choices to producers and users of ELIS, potentially driving innovation and consolidation through competition.

However, the increased number and diversity of ELIS has raised questions about their relevance and effectiveness as environmental policy instruments, and about their effects on international trade. The rapid international growth of ELIS has led to concerns among NGOs, policy makers and some firms, that there may now be too many schemes to be able to reasonably distinguish between the different scope and environmental quality of the underlying products and services. There are concerns, amongst others, that consumers and procurers may be confused by the multiplicity of labels, firms may bear excess costs in certifying to many different labels, and competition may drive down the stringency of standards as schemes bid for market share. Internationally, concerns have been raised that multiplication, and responses to multiplication, could be seen as barriers to trade.

Previous analysis carried out for this project provided a characterisation of 544 schemes currently in operation. The growth in schemes has been unequal across product categories and across label types. Although a large number of ELIS characteristics can be identified, the analysis highlighted two key growth trends: intensification and extensification. “Intensification” represents increased competition between traditionally dominant forms of label, typified by voluntary standards that are business-to-consumer, focusing on particular sectors and issues, and using seal-type logos to demonstrate certification. “Extensification” represents a more recent but faster growing form of ELIS. These can be typified by quantitative “footprint” schemes using life-cycle assessment approaches and covering either greenhouse gases or broader environmental footprints. Across both trends, there is increasing diversity in actors involved in ownership and operation of schemes. ELIS owned or operated by governments form a minority of overall schemes, with non-governmental bodies, either private-sector or non-profit, forming the bulk of schemes introduced over the past 20 years.

Environmental effects of ELIS multiplication

While the growth in numbers can be easily recorded, the impacts of ELIS themselves and of the ways that they interact are harder to measure. Measuring the environmental effects of schemes, even individually, is challenging, due to the difficulty of isolating those effects from other exogenous drivers of environmental changes. In theory, multiplication of ELIS could lead to a market-driven process of competition whereby weaker or less credible labels are driven out of the market by stronger, high-quality schemes, leading to enhanced overall effectiveness. However, a key question is whether the trend towards multiplication of ELIS could instead weaken the overall environmental effects of schemes and therefore decrease their utility for consumers. Such effects could arise through confusion due to multiple labels with overlapping purposes (leading to lower demand from consumers and commercial buyers and therefore less market penetration) or through competition leading to weakening or watering down of the environmental standards underpinning ELIS. As accurate data about market penetration is lacking, this paper focuses more on whether label multiplication could impact on the stringency of standards employed. To do that, it was necessary to also consider the trends in the stringency and quality of the standards used to underpin ELIS.

The diversity of different ELIS types, and the differing characteristics of the sectors covered, make it difficult to analyse changes in, and influences on, the stringency and quality of standards used. Thus, when considering how multiplication may affect overall environmental effects, this paper draws where possible on both theoretical and case-specific examples of how standards have and may continue to evolve, in order to highlight potential risks of label multiplication and competition on the quality of standards.

As empirical work on ELIS multiplication is just beginning to appear, insights from the theoretical literature on label competition can inform understanding of potential environmental effects. Theoretical modelling suggests that competition between labels may reduce environmental performance relative to a single label with strict environmental goals. This appears more likely when the labels involve multiple performance tiers, or if the labels are binary in nature but most firms in the industry face similar costs to achieve certification. More generally, theoretical work suggests that there is a tendency for markets with free entry to produce too many varieties of labels, with insufficient environmental quality. However, the stylised nature of the models used and the complexity of the real context for ELIS mean that the policy relevance of modelling may be limited.

In practice, there is some evidence that label competition has led to harmonisation and market-driven convergence in standards over time, for example in the forest certification sector. In the particular case of small-scale producers of coffee and cocoa, there is also evidence that certification to multiple sustainability standards (horizontally differentiated) can lead to productivity gains as well as environmental improvements for primary producers. However, this study does not measure changes to the stringency of standards over time. To maximise environmental effectiveness, it is important that convergence leads to more holistic and streamlined ELIS rather than acting as a weakening influence on the stringency and quality of standards or implementation of schemes. Although the data are not conclusive on how multiplication affects quality of standards in general, it is likely that effects will vary by sector and label type.

Trade implications of ELIS multiplication

Multiplication of ELIS could have implications for the ways that labelling schemes interact with international trade, particularly in terms of market access and international competitiveness. Government or non-government responses to multiplication could also alter trade effects if actions by governments or private actors result in market dominance of a particular label, to the extent that those voluntary but dominant ELIS become perceived as “de facto” market entry requirements. Although these effects are

difficult to demonstrate empirically, due to data challenges and because ELIS currently enjoy relatively modest market share for many products, the conditions that could lead to such effects are described conceptually.

The adoption of labelling schemes entails costs for producers and other supply-chain actors. If the costs are perceived to apply unevenly to producers in different countries, use of ELIS could have implications for trade in some circumstances. However, investing in ELIS certification can also have direct economic benefits for producers and exporters. Certification may attract a price premium for a product or may allow long-term contracts with buyers from major international firms. The production practices adopted in order to achieve certification may also lead to lower operating costs or higher productivity for producers. Such economic benefits can offset certification costs and be a trade-positive outcome of labelling. Co-existence of multiple overlapping ELIS could affect this cost-benefit balance for producers. In particular, the need to certify to multiple standards to gain market access can raise process costs for producers. However, the level of inter-operability of different schemes – the similarity of the standards used and the auditing procedures required, for example – can help to limit the costs to producers associated with multiplication.

Competitiveness concerns linked to ELIS could arise if a standard used for one scheme were to be perceived as treating products originating in different countries differently. A standard designed for one particular country's production conditions (e.g. agricultural cultivation) may provide an accurate signal of environmental impacts in that country, but may lead to an inaccurate signal in a country with different conditions. This could lead to "greenwashing" in cases where poorly performing products are given positive scores or signals by particular ELIS or "greenbashing" in cases where products with good environmental performance are scored badly.

Regarding potential implications of ELIS multiplication for competitiveness, the sheer number of schemes in operation is not in itself likely to create competitiveness concerns. However, some governments and exporters in smaller countries have raised concerns that the recent rapid growth in ELIS could increase the risk that foreign-based schemes apply standards that might inadvertently have uneven effects on producers in other countries. For example, the data-intensive and quantitative nature of footprint schemes could create uneven effects on producers in different countries if arbitrary scores or default values are used where data are lacking.

The likelihood of a voluntary ELIS creating trade concerns may depend on both the design of the scheme and on whether it becomes dominant enough to be perceived as a "de facto" market access requirement. This dominance is unlikely to arise directly from multiplication of ELIS, because a large number of schemes means that each one is less likely to become dominant in the market. However, if government or non-government actors were to respond to ELIS multiplication by encouraging market convergence on a particular scheme, the chosen scheme may then become dominant in the marketplace and so could come to be seen as an informal market access requirement. The potential trade effects are likely to be different depending on whether the emerging dominant ELIS has government involvement.

Responses related to ELIS multiplication

As the number of schemes in operation has grown, actions intended to encourage coherence and predictability in the ELIS market have increasingly been initiated by both government and non-government actors. These actions, some of which are specifically related to addressing multiplication of ELIS, generally aim to either promote higher-quality standards in the market or to encourage market convergence on one or more scheme, or both. The prevalence of these government and non-government responses to label multiplication is an indication of the extent that stakeholders in the ELIS market have sought to

influence market growth in a way that maintains high standards in the context of increasing numbers of schemes.

On the non-government side, some ELIS operators have collaborated to promote higher-quality standards by providing codes of conduct and standard-setting guides (e.g. the ISEAL Alliance). Individual ELIS operators have also struck mutual recognition agreements (e.g. Type I ecolabels), or have linked together to provide pathways for producers to "step up" to more stringent standards over time (e.g. vertically-differentiated coffee standards). More recently, several guidelines, benchmarking initiatives and tools have appeared to increase the transparency of schemes and their performance in order to help navigate the ELIS options and alternatives. These are being created and supported by a variety of actors covering a range of sectors. Examples include the Global Sustainable Seafood Initiative (IDH, GIZ and retailers), WWF Certification Assessment Tool or the Consumer Goods Forum's "Global Social Compliance Program".

In some cases governments have chosen to influence the ELIS market by creating or endorsing a particular standard, with a view to ensuring the quality and international appropriateness of the standard and any ELIS that chooses to use it; an example is the EU Product Environmental Footprint standard. Such government-initiated voluntary "focal" standards or labels have generally been introduced with the intention of building market confidence by establishing ELIS that are in the public interest and are accurate at reporting environmental performance. Design of such standards can be carried out with consultation with industry and other international stakeholders, to ensure relevance and consistency with international trade policy principles.

Expanding the use of high-quality ELIS in public procurement is another way that governments have sought to support high-quality ELIS. The credibility afforded to ELIS compliant with public procurement rules can lead to significant indirect market influence, and this can extend beyond government-run schemes. For example, the United States Environmental Protection Agency has drawn up draft guidelines for selecting non-government sustainability standards that federal procurers can choose to use. Best practice sharing in this area could be useful, in particular to help governments extend their public procurement mandates to use a wider range of ELIS.

Governments seeking to exert further positive influence on the growing ELIS market could choose to collaborate in a non-regulatory fashion to create trusted sources of transparent and comparable information across different types of scheme, both for public procurers and the wider market. Such initiatives could build on the experience of existing international benchmarking initiatives in the public, private and public-private spheres. Inter-governmental initiatives could act to further promote the concept of interoperable design of ELIS, given that a key determinant of the cost impact of multiplication on producers is the level of interoperability between systems (e.g. similar audit procedures).

1. INTRODUCTION

This paper has been prepared as part of a project on assessing the potential economic, environmental and trade impacts of the recent multiplication[1] of environmental labelling and information schemes (ELIS) with the main objective to provide policy analysis and guidance. The project is jointly overseen by the Joint Working Party for Trade and Environment (JWPTE) and the Working Party for Integrating Environmental and Economic Policies. The project began with a characterisation of ELIS and analysis of growth trends (Gruère, 2013). A review of public policies relating to ELIS has also been carried out as part of the project, focusing in particular on regulation of environmental claims made as part of or external to labelling schemes (Klintman, 2014).

In the context of this project ELIS are defined as "policies and initiatives that aim to provide information to external users about one or more aspects of the environmental performance of a product or service". This broad definition goes beyond the traditional view of an environmental label as a consumer-facing logo on product packaging. The definition covers users that include businesses (such as business-to-business communication within supply chains), governments (in the case of public procurement) and consumers. The definition also covers claims and declarations relating to environmental performance that go beyond the use of a single seal or logo. Such ELIS can include quantitative declarations (such as numerical information on embedded greenhouse gas (GHG) emissions or virtual water) and a wide variety of textual claims such as "biodegradable", "natural" and "sustainably sourced".

Over time there has been a vast increase in the number of ELIS on offer, with at least 500 currently in use (Gruère, 2013), not including self-made uncertified textual claims. The trends analysed by Gruère indicate a strong overall growth in schemes during the late 1990s and 2000s, and a possible slowing down of growth after 2010.[2] The analysis suggests that this growth has been unequal, with a shift from more conventional ecolabels and organic agriculture seals towards "single-issue" labels and numerical environmental declarations.

On the one hand, the increased number and diversity of ELIS offers more alternatives and choices, potentially driving innovation and collaboration. Multiplication of labels can also bring benefits to users, for example through positive competition between labels, as well as pressure to increase transparency and interoperability, decreasing costs. Governments may also have a role in this type of emulation, setting ambitious criteria in official ecolabels, or by promoting, through public procurement, labels and the highest standards.

On the other hand, multiplication has raised questions about their relevance and effectiveness as environmental policy instruments, and the potential trade effects they may have (Lohr, 1998; Marette, 2007; OECD, 1999 and 2009a). The multiplication of labels has led to concerns among non-governmental organisation (NGOs), policy makers and some firms, that there may now be too many ELIS to be able to

[1] The term "multiplication" refers in this paper to the recent growth and diversification of ELIS schemes internationally, resulting in co-existence of multiple ELIS, within and across sectors, whether overlapping or distinct in purpose and type.

[2] The dataset used combines information from the Ecolabel Index (www.ecolabelling.org) with information added from previous OECD analyses and other sources. It is referred to hereafter as the "combined dataset".

reasonably distinguish between the different scope and environmental quality of the underlying products and services and that there may now be too many labels displayed on some products. These concerns were noted as early as 1999 (Consumers International, 1999; OECD, 2003). Among the concerns raised are that users may become confused by the multiplicity of labels, firms may bear excess costs in certifying too many different labels, and competition may drive down the stringency of standards as different ELIS bid for market share. Internationally, concerns have been raised that multiplication, and responses to multiplication, could be seen as barriers to trade.

However, understanding the implications of the multiplication of ELIS is challenging because it is necessary to consider the different drivers that give rise to multiplication, from the demand side (consumers and private and public buyers) as well as the supply side (governments, non-governmental organisations and other ELIS operators). Further, it is necessary to consider how multiplication itself may impact on the effectiveness of ELIS, whether through flooding the market (leading to confusion) or by competition leading to downward pressure on the quality of standards. To assess the latter, it is first necessary to understand how the quality of standards used impacts on their effectiveness. It is also challenging to empirically measure the effectiveness of labelling schemes, and so equally challenging to measure the impacts of their multiplication. A mix of conceptual analysis, field studies and theoretical modelling, complemented with a look at ELIS quality and environmental effectiveness, is used to explore the potential impacts of multiplication, both positive and negative.

The rest of the report is organised in five main sections. Section 2 provides a basis for understanding the implications of ELIS multiplication, by examining the drivers influencing different actors in the ELIS chain and key growth trends seen to date. Section 3 then examines challenges of assessing environmental effectiveness of ELIS to explore potential effects of multiplication, taking both a theoretical and practical approach. Section 4 looks at potential implications of ELIS quality and multiplication for international trade. Section 5 surveys existing government and non-government responses to ELIS multiplication. Section 6 draws brief conclusions. Annexes to this report provide further detail on a number of the issues raised.

2. A BASIS FOR UNDERSTANDING ELIS MULTIPLICATION

Growth and multiplication of ELIS have come about due to strong and ongoing interest for environmental information from many quarters. Businesses, NGOs, foundations, and governments have invested significant resources in creating and operating the diverse array of ELIS documented in Gruère (2013) to meet their distinct needs. The resulting multiplication can have advantages as well as disadvantages for various actors in the supply chain. This section looks at the drivers leading various actors to continue to create and operate more schemes, and the resulting ELIS growth trends. This provides a contextual basis to consider the potential impacts on environmental effectiveness and international trade in subsequent sections.

2.1 Drivers leading to ELIS multiplication

The drivers that lead to ELIS creation (and therefore multiplication) are different across stakeholder groups, including civil society, governments and the private sector. The United Nations Forum on Sustainability Standards (UNFSS) flagship report analyses the "proliferation" of standards and labels from the points of view of producers, consumers, retailers and standard setters (UNFSS, 2013).[3] Some of the positive as well as negative implications for different actors are summarised in Table 1, broken down by different stakeholders.

Table 1. Positive and negative effects of label multiplication for different stakeholders

	+ Positive	- Negative
Producers	+ Diversity of standards can mean locally appropriate conditions and needs are considered + A range of standards with different stringency can encourage step-wise improvement of lowest performers + Can allow for increased trade opportunities by providing access to high-value niche markets	− Harder to determine which labels are valued by potential buyers in different markets, and which are appropriate to different production conditions − Increasing costs of compliance (auditing and certification) to adhere to multiple overlapping scheme requirements
Manufacturers & retailers	+ Choice of standards suited to particular markets and supply-chain partners + Allows for flexibility to align risk with strategy	− Increased cost (multiple compliance and customer communication channels) − Increased complexity of managing supply chains
Label suppliers & standard setters	+ Competition for credibility and market share could lead to improvement in practices and more stringent standards. + Ability to respond to evolving issues with	− Competition for short-term market share could lead to downward pressure in terms of standards stringency, with consequences for environmental effects

[3] UNFSS was convened as a joint collaborative initiative of five UN agencies: UNCTAD, UNEP, UNIDO, FAO and the ITC.

	+ Positive	- Negative
	specialised custom approaches	– Increasing costs for differentiation (branding)
Consumers	+ Greater choice allowing consumers to buy products with labels targeting issues that they care about	– Difficulty in differentiating criteria behind schemes – Confusion and misunderstanding of label meaning and environmental stringency, leading to loss of credibility and trust

To understand how these broad advantages and disadvantages may lead to potential environmental and trade effects, it is necessary to consider the roles of different actors in the ELIS market, and how they have contributed to growth and multiplication of schemes. Some of the same government and non-government entities have also taken action to respond to ELIS multiplication; these actions and initiatives are considered in Section 5.

2.1.1 Drivers for civil society and government

Civil society (through NGOs) has driven much of the rapid growth of ELIS, in particular voluntary sustainability standards (VSS), through advocacy and establishment of standards and certification schemes (see Box 1 for an overview of ELIS terminology). Some NGOs began to promote sustainability-focused certification systems as a less-confrontational form of environmental and social activism ("buy-cott not boycott"), or as a means to bypass political slowness in regulation. NGO schemes have generally focused on particular environmental issues or product sectors of most interest to each NGO. These ELIS tend to focus on one part of a product lifecycle (usually production).

Governments have also played a role in the development of the ELIS market, acting as creators, users and endorsers of schemes (RESOLVE, 2012; Gruère, 2013). They have established government (run or owned) national voluntary and mandatory schemes in cases where they have identified a gap in the market or a need for credible and "focal" ELIS (e.g. Blue Angel, national organic labels). They have also acted to support or endorse NGO schemes, sometimes through a role as ELIS user, notably through specifying particular schemes in public procurement guidelines (e.g. specifying Forest Stewardship Council or Fair Trade). Governments can also serve as framing institutions, providing guidelines or legislation that frame the use of ELIS by other actors, including regulating Type II claims.

Box 1. ELIS Terminology

Previous work in this project developed a comprehensive scheme to categorise different types of ELIS (Gruère, 2013). The categorisation comprises a total of twelve criteria: four of them describe the mode of communication that ELIS use: the communication channel (provider and intended user of the scheme), means of communication (seal, logo or other means), the category of good or service covered and the environmental attributes targeted (e.g. just GHG emissions versus overall environmental impact). The other eight criteria cover attributes of the standards used to measure environmental performance, including who owns and sets the standard, whether the standard is voluntary or mandatory, the level of transparency of the standard, the monitoring and auditing processes and the focus of the standard both in terms of the life-cycle of the product and its geographic application. This typology aims to complement the International Organization for Standardization's (ISO) basic series of standards for environmental labels:

- ISO Type I (ISO 14024) is the "classic" ecolabel which awards a seal or logo based on the fulfilment of a set of multi-attribute criteria. These are third-party-certified, voluntary labelling schemes that focus on non-food products. They are typically aimed at consumers. Many have been introduced by or with the contribution of government agencies. Examples include the Nordic Swan and Japanese Eco-Mark. The term "eco-label" is often used to generalise all types of ELIS; in this paper it is used to refer only to ISO Type I labels.

- ISO Type II (ISO 14021) are self-declared claims by companies, privately made, that describe a product

based on one or more characteristics following general guiding principles. They are not third-party certified but expected to be verifiable, and to use accurate and non-misleading information.

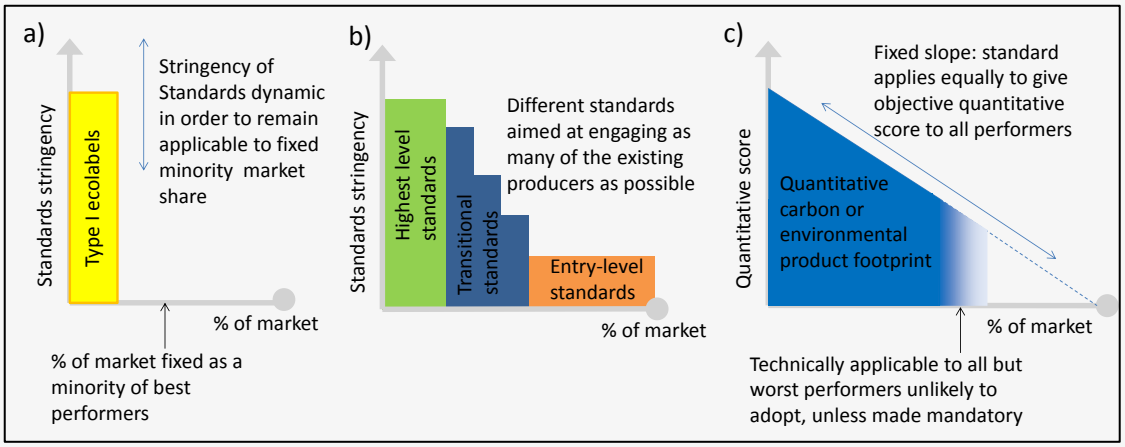
- ISO Type III (ISO 14025) focuses on environmental declarations, providing quantitative indicators of environmental performance based on life-cycle assessments for objective comparisons between products fulfilling the same function. These declarations are generally intended for businesses-to-business communication or used in public procurement.

Further distinctions between different types of ELIS can be important for understanding growth and multiplication of schemes. Most ELIS are based on underlying standards that specify the levels of achievement necessary. A key distinction is between practice-based and outcome-based standards. Practice-based standards require producers to implement better management practices according to criteria specified in the standard (e.g. the Marine Stewardship Council standard). Outcome-based standards aim to measure environmental effects of ELIS, without specifying how the outcome will be achieved, allowing flexibility (e.g. product carbon footprinting schemes).

Different types of ELIS can also be distinguished based on the share of the market that is targeted. Type I labels aim to offer certification to only the products with the best environmental performance, usually aiming at a percentage of market coverage (e.g. 20% best performing). In contrast, non-government voluntary sustainability standards tend to be vertically differentiated with different levels of stringency, so that taken together they aim to recognise not only best performers but also to "raise the bar" for the entire production chain (SSI, 2014). For example, the 4C coffee standard is less stringent than other coffee standards as it aims to encourage less well-performing producers to take steps towards improving their environmental and social impacts.

Figure 1 compares the market objectives of these different types of ELIS. Panel a) shows Type I ecolabels, whose standards evolve in order to always apply to an approximate percentage of the market. Panel b) depicts the complicated world of voluntary sustainability standards, where multiple standards with different levels of ambition aim to target different parts of the market. Panel c) depicts quantitative scoring or footprint type labels. The fixed slope is intended to show a single standard applying equally to give a quantitative score to all performers in the market. Although this could apply to all products on the market, it is unlikely that the worst performers would adopt the label voluntarily.

Figure 1. Comparing market objectives of different types of ELIS



Source: Panels a) and c): Authors. Panel b) adapted from RESOLVE (2012).

2.1.2 Drivers for the private sector

The private sector plays a crucial role in many aspects of the ELIS market. Businesses can be suppliers, users and even creators of ELIS, depending on scale and position within a supply-chain. Primary producers (e.g. farmers or manufacturers), processors and retailers all have different motivations for engaging with, adopting or creating particular ELIS.

Recent research concluded that consumer demand may no longer be the most important motivation for businesses to adopt and develop ELIS (RESOLVE, 2012). There is evidence that some businesses are increasingly sceptical about using consumer-facing environmental labels, with some pointing to an "apparently relentless trend towards fragmentation, made worse by a lack of consensus over qualifying criteria" (Seifert and Marti, 2012). Box 2 discusses the role of consumer demand in driving ELIS markets.

A number of other drivers may lead businesses to adopt ELIS, some internal to the firm and some external (RESOLVE, 2012). Within the firm, certification to ELIS standards can lead to direct market advantages, such as securing long-term supply of a resource and creating barriers to entry for rival firms. External to the firm, businesses may pursue certification to respond to pressure from investors or demands from business-to-business buyers, such as major retailers, or even from insurers who view certification as a risk-reduction tool. Other drivers for businesses to adopt ELIS can include risk mitigation from resource scarcity to conflict materials, and pre-empting potential future regulation (e.g. if governments move from voluntary to mandatory labelling schemes).

Given these diverse drivers, the influence of business on the ELIS market has become increasingly complex. Some major firms have made blanket purchasing decisions on behalf of their customers by stocking only products certified with a particular ELIS, taking the choice away from the consumer (e.g. McDonalds only sources Rainforest Alliance coffee). In recent years firms have become increasingly involved in supporting, investing in or even developing their own labelling or environmental information systems, with important implications for ELIS multiplication. A number of major producers have chosen to develop bespoke, in-house standards that are themselves often based on standards used by existing, third-party-certified labels, particularly in the agriculture and food sector (e.g. in coffee, with Nespresso's AAA programme and Starbucks CAFÉ practices). Using an in-house standard has the effect of streamlining environmental communication, thus minimising the multiplication of labels on their own packaging, while allowing the firm to retain control over the evolution of the standard used. However, to the consumer the introduction of in-house labels can appear to add to the multiplication of ELIS, even if the underlying standards are the same or similar.

Box 2. The role of consumers in driving the ELIS market

Green consumerism has become more mainstream in recent years, although the proportion of consumers responsive to environmental labelling remains variable between countries. A recent European survey found that on average 54% of European consumers seek to buy environmentally-friendly goods and 84% consider the environment a strong factor in their purchasing decisions (with strong variations between countries). In contrast, only 52% trust un-certified claims made on product packaging (EU, 2013). The OECD conducted a major household survey on environmental behaviour that highlighted in particular the consumer recognition of ELIS is generally poor, with the exception of energy-efficiency labels (OECD, 2014).

Most of the economic literature on ELIS takes a relatively simple perspective on consumer demand for environmentally friendly products. Consumers are assumed to differ with regard to the particular environmental impacts they care most about, e.g. climate change, organic agriculture, or toxic chemical emissions. They are also assumed to differ in their incomes and hence their willingness to pay for environmental quality. Findings from the US Natural Market Institute indicate that the basic economic model is broadly correct in those two drivers, also show that gender, age, social norms and political attitudes are all important

In recent years, the business-to-business (B2B) focus of ELIS has risen as it has become clear that consumer demand alone cannot drive the transformation of major sectors and industries. In major export commodities such as palm oil, soy, farmed seafood, and sugar, ELIS are increasingly targeted at the mainstream adoption of better management practices and pre-competitive industry collaboration (e.g. Roundtables, GSSI). Major brands and retailers are also committing to "sustainability" in their entire supply chain or product offering, rather than a single product line or ingredient. Some retailers are choosing to purchase only goods certified to certain standards. Essentially consumers are becoming one stage removed from ELIS purchasing decision.

2.2 Key ELIS growth trends

The drivers influencing ELIS creation have led to a large number of schemes concurrently operating within countries and internationally. To analyse interactions of the full set of ELIS would be an insurmountable task. Gruère (2013) however highlights two concurrent growth trends that can be thought of as typifying the main category types that have seen significant growth in recent years: "intensification" and "extensification". These are further developed here to provide context for looking at effects of multiplication. A further important dimension is the extent to which ELIS have spread across national borders.

2.2.1 Intensification Trend: Voluntary Sustainability Standards (VSS)

Intensification represents increased competition between traditionally dominant forms of ELIS. Many of the more familiar consumer labels are of this type, including Marine Stewardship Council (MSC) and Forest Stewardship Council (FSC).While growth has been slower in recent years, this is the most important group of introduced ELIS in absolute numbers over the past 25 years. Originally seen as business-to-consumer schemes, over time this distinction has blurred with B2B purchasers also using previously consumer-facing standards. Many VSS are referred to as "single issue" schemes as they tend to focus on particular aspects or behaviours rather than life-cycle impacts, though a more appropriate term is single phase (production) standard. While there are a variety of differences within this category, typical characteristics include targeting food, agriculture or forest products and being governed by a non-profit voluntary organisation. Although not based on life-cycle assessment, the fact that many of these standards focus on sustainability of production means that they distinguish final products based on "non-product-related processes and production methods" (nprPPM).

Some of these systems focus on one theme, taking into account a range of environmentally-relevant characteristics (e.g. organic agriculture labels). Others, even if they apply to only one product and one life-cycle phase (production), aim to address broad-based sustainability objectives (e.g. MSC for seafood). In the latter cases, some labels that historically focused on predominantly one aspect, have evolved to more holistic approaches (e.g. Rainforest Alliance and Fair Trade). This means it can be difficult to separate the environmental, social and economic dimensions of sustainability (SSI, 2014).

For agricultural products with a seemingly large number of competing label-type ELIS, the standards often tend to differentiate both horizontally and vertically. In the coffee sector, horizontal differentiation (understood as increasing the variety of labels) occurs through emphasis on attributes such as organic, bird-friendly, fair trade, shade grown and biodiversity. Vertical differentiation (understood as quality differentiation across labels) results from the various levels of stringency labels put forward. Some labels focus on a single attribute with very high standards, while others offer a range of attributes, all at a more moderate level of stringency.

2.2.2 Extensification Trend: Quantitative Scoring or "footprint" ELIS

The extensification trend identified in Gruère (2013) represents a smaller but faster-growing group of emerging forms of ELIS. These can be typified by offering quantitative outputs based on life-cycle analysis (similar to ISO Type III). Two important types of ELIS within the extensification trend are product carbon footprint (PCF) and product environmental footprint (PEF) schemes.[4] These use outcome-based standards that generally aim to measure life-cycle impacts for particular products across one or more environmental dimensions. Both types of footprinting depend upon the standards used to quantify life-

[4] More information on PCF and PEF can be found in Annex A.

cycle impacts, which are highly contextual and depend on local conditions. In addition to needing country-specific data, it is important that the overall methodology is transparent and agreed by all stakeholders.

PCF focuses on life-cycle GHG emissions. Many carbon footprint labels already exist around the world, all seeking to be a valid gauge of greenhouse gas emissions related to particular products. The apparent diversity of schemes – some government-run, some private – hides some consistency in the standards used, as many schemes are based either on the British PAS2050 standard or the Greenhouse Gas Protocol, convened by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). Although no country has introduced mandatory regulation for carbon (or environmental) footprinting, various governments have been involved with development of PCF standards (such as the British PAS 20050 standard) or with coordinating PCF pilots in the marketplace (e.g. in France).

The key to a life-cycle-based approach is in the product category rules used to calculate life-cycle impacts. Various international efforts exist to improve and collaborate on Product Category Rules, including a UNEP and US Environmental Protection Agency (EPA) initiative to promote intergovernmental cooperation in life cycle assessments (LCA). Uncertainty around the use of default factors and the scope of the LCA calculation can also have important implications. Default emissions factors will be important where data does not exist, but there is a risk that producers may choose to use a default factor even when better data is available, if it improves their score. This introduces further subjectivity. Regarding scope, the emissions from the production of capital goods and the end-use phase of the products are not always included in the footprint calculation and this can artificially reduce footprints (Bolwig and Gibbon, 2009).

Over the past few years schemes have been introduced that move from just carbon footprinting to a broader environmental footprint score. The result is a quantitative environmental score aiming to convey an assessment of the overall "environmental friendliness" of the product by focusing on a life-cycle approach for certain key environmental aspects. Environmental dimensions often include water and biodiversity impacts, amongst others. The inclusion of other environmental impacts makes PEF more challenging than PCF, due to complexities around measuring the material impacts of water use and biodiversity exploitation. Two government-led PEF initiatives stand out in particular. The French government co-ordinated a pilot involving private sector volunteers in 2011-12, and the European Commission is running a series of pilots in 2013-16, having released a guide to calculating PEF in 2013 (EU, 2013) (see Box 5 in Section 5).

2.2.3 The spread of ELIS beyond national borders

The intensification and extensification trends have been occurring internationally, but the geographic distribution of growth has occurred in different ways. Some ELIS are designed in one country with the intention of being applied only to products being sold in that country. Others are designed with the intention of being applied internationally and aim to be recognised in many countries. Yet others are designed with one country's market in mind but have spread internationally, either through demand driven voluntary market uptake in other countries, or endorsement by foreign governments.

To examine the spread of labelling schemes internationally, there are three different geographical properties of ELIS to assess: i) in which country the label originates and is managed from; ii) in which countries the label has a market 'presence'; iii) in which countries the label (and application of its underlying standards) may have an impact on producers. Gruère (2013) analysed the first property by looking at the distribution of ELIS according to their countries of origin, and found that while a majority of schemes originate in Europe and North America, more recent rapid growth has been seen outside of these regions.

The second property can give an indication of the extent to which ELIS are now being applied internationally. For example, the Blue Angel was developed in Germany but is now found on products in many OECD countries including Japan and Korea. The Carbon Trust's Carbon Reduction Label was developed in the UK but is now found in products elsewhere in Europe, New Zealand and the US. Data analysed for this paper suggests that 64% of all ELIS studied are nominally present only in one country. Of these, 28% are present only in the United States. Although this suggests a North America bias in the dataset, it does indicate that many labels are specifically targeted to one particular market. The data also shows that some country markets have a greater proportion of labels originating from other parts of the world, with some OECD countries having more than 50% of the schemes present in their markets originating in other world regions (See figure in Annex B).[5]

To fully understand the influence of the international spread of ELIS, it would be necessary to address the third property described above: to understand how labelling schemes might influence producers in other countries. For example, while 92% of sales of organic products occur in North America and Europe, 36% of the 1.9 million organic producers worldwide are based in Asia, with 600,000 small producers in India alone (FIBL and IFOAM, 2014). Unfortunately, no reliable data are available for tracking the influence of ELIS on supplier countries.

[5] The data were also analysed per product category to assess which product categories have more "home grown" labels than others. There is considerable variation between product categories. In general, food and agriculture, energy and transport and appliances appear to be the sectors where standards have tended to originate in the same region as they are present on the market. On the other hand, forest products, textiles and building and furniture tend to be dominated by ELIS originating in North America and Europe.

3. ENVIRONMENTAL EFFECTS OF ELIS MULTIPLICATION

Measuring the environmental sustainability impacts of ELIS is challenging, even before considering the effects of multiplication and label competition. Empirical studies on environmental effects of ELIS are sparse, and studies on effects of multiplication even more so. This section therefore begins by considering the challenges to assessing environmental impact for different types of ELIS individually, before going on to consider findings from theoretical studies of the effects of label competition. It concludes with a brief review of field studies relevant to ELIS multiplication.

Multiplication could impact the overall effectiveness of ELIS as an environmental tool through two main ways: i) confusion or distrust among users, reducing uptake; and ii) competition leading to either strengthening or weakening of the environmental standards used to implement ELIS, depending on the context. Given lack of reliable market data for the first of these aspects, this section focuses on the second. To understand how the recent growth and multiplication of schemes could impinge on the overall effectiveness of ELIS, it is first necessary to consider ways of assessing the environmental effects of individual ELIS of different types.

3.1 Estimating environmental impacts of ELIS

In addition to its market share, the environmental effectiveness of an individual ELIS is a function of the stringency of the standard being used, the appropriateness of the standard for the production (and supply-chain) circumstances in countries where it applies and the level of market uptake of the ELIS. Measuring the stringency and appropriateness of the standards used is challenging. In terms of approaches for measuring environmental effectiveness, there are key differences between practice-based standards and outcome-based standards.

Practice-based standards require producers (and other supply-chain actors) to adopt certain practices that are assumed to be better for the environment. The practices required can be tailored to production conditions in impacted regions. It is then relatively easy to track where and when producers have adopted the required practices (shade-grown coffee or low-impact irrigation, for example). It is however much harder to measure whether the changes in producer practices have a marked environmental benefit either for the individual producers or for the ecosystem as a whole. A literature review by Blackman and Rivera (2011) found that four out of eleven peer-reviewed studies measured significant producer-level economic benefits from certification. However, none of the studies found statistically significant evidence that certification improves the environmental performance of producers. A study by RESOLVE (2012) suggests that if non-peer-reviewed literature is taken into account too, the evidence base to judge whether certification has positive environmental impacts is relatively robust, though it is difficult to draw conclusions with confidence. There may also be substantial indirect positive impacts from certification, operating through slow-moving mechanisms like changing public perceptions or regulatory pressures (ibid).

Outcome-based standards such as PCF and PEF aim to directly measure environmental performance, without focusing on particular production practices. These ELIS allow flexibility for how and producers and supply-chain actors achieve the environmental outcomes required. However, issues within the

governance systems (e.g. relevant stakeholders not involved, oversight and implementation inconsistencies) could result in inconsistencies in the methods and standards used to measure performance. The communication of a quantified score to buyers may mask inconsistencies. This can lead to bad performers receiving good scores ("greenwashing") and good performers being penalised ("greenbashing").

Box 3 puts forward a simple matrix for comparing how accurately the signal transmitted by ELIS corresponds to the real environmental impact of the products considered, including extreme cases of greenwashing and greenbashing. Although the matrix can be better understood when applied to quantitative outcome-based ELIS, it can also be useful in assessing practice-based standards. For example, ELIS based on practice-based standards could lead to greenbashing or greenwashing if particular production criteria are not suitable to all countries where production occurs.

Given these challenges to making robust assessments of the environmental impacts of individual schemes, it is not surprising to find that relatively little empirical data exists looking at the impacts of ELIS *multiplication*. It is useful therefore to look at theoretical models of label competition, and how competition could affect the stringency of standards being used, even though the stylised models may be quite removed from the complex realities of the ELIS marketplace.

Box 3. Matching Environmental Performance with ELIS Signals

The environmental signal that ELIS transmit can deviate from the actual environmental performance of certified products. One way this can occur is if product performance is deliberately misreported or not subject to verification. ELIS based on self-certification and self-verification (i.e. Type II claims) may not allow consumers to objectively assess the environmental performance of a product relative to the claims made. Such misreporting is often referred to as "greenwashing" (e.g. OECD, 2011a; Gruère, 2013). Another way that greenwashing can occur is if standards used to assess environmental performance for ELIS are weak or inappropriate to accurately measure the environmental quality of a product, for instance when standards are not appropriately tailored to local conditions. Such inaccuracies may make a product look more environmentally friendly that it really is. However, the inaccuracies could also under-report a product's actual environmental performance. This could be described as "greenbashing" and could discourage producers of environmentally friendly goods to further invest in the sustainability of their products.

Table 2 below provides a structured typology relating the environmental performance of products (or services) and the signal transmitted to consumers by ELIS. Columns represent categories of signals that ELIS can convey with respect to environmental performance, namely negative, neutral (or no label), and positive. The rows of the table categorise environmental performance into low, average, and high. Instances of correct quality-signal matching can be found in the (green) cells along the diagonal running from the top-left corner to the bottom-right corner. Greenwashing (red) and greenbashing (yellow) – the most extreme cases of misalignment between label signal and environmental performance – are located in the top right and bottom left corner of the matrix, respectively.

Examples of moderate misalignment can occur along two dimensions. First, there might be under-reporting of the environmental performance of a product. This could happen if no appropriate ELIS exist for eco-friendly products. At the same time, underreporting may happen in the absence of a mandatory labelling regime when producers of low-performing products decide not to certify. Second, misalignment also happens in cases of over-valuation and under-valuation. Producers can use self-claims, i.e. Type II labels, to deliberately communicate average performance as environmentally friendly; likewise, inadequate methodologies to assess environmental performance under mandatory ELIS might categorise average environmental performance as negative. Overvaluation and undervaluation are attenuated forms of greenwashing and greenbashing.

Table 2. Matching environmental performance and label signal

Environmental Performance \ *Signal*	**Negative**	**Neutral *or* no label**	**Positive**
Low	✓ **Match** - Negative signal for low environmental performance (e.g. voluntary footprinting) - Can also occur under mandatory performance tier labels (e.g. energy use)	**Under-reporting (albeit worse)** - Unreported low performance or overvaluation - E.g. no mandatory ELIS exists for product - If widespread voluntary ELIS exists: non-certification may disadvantage producer	**Greenwashing** - Self-claim or award of label when the product clearly performs below average - Occurs under voluntary regimes - Detrimental to ELIS credibility in the long run
Average	**Under-valuation** - Average performance reported as negative - E.g. inadequate methodology to assess performance - Occurs under mandatory regimes	✓ **Match** - Neutral signal or no label for average environmental performance	**Over-valuation** - Average performance reported as positive - E.g. self-claim (Type II) - More likely occurring under voluntary regimes
High	**Greenbashing** - Strong environmental performance undervalued - Could occur for quantitative footprinting with poor methodology - May discourage further improvement of l performance	**Under-reporting (albeit better)** - Unreported high performance or undervaluation - E.g. no appropriate ELIS exist for product - Also deliberate decision not to display voluntary label	✓ **Match** - Positive signal for strong environmental performance - Theoretically best outcome for ELIS

Source: Authors, based on Gruère (2013)

3.2 Theoretical Models of Label Competition[6]

There is a large theoretical literature on the role of environmental labels. While these do not necessarily reflect real world conditions, overall the literature establishes that ELIS can play an important role in environmental improvement provided that the quality of information transmitted to consumers is high. However, for global issues such as climate change, even a fully-informed and concerned consumer might conclude that his own actions have such a small effect on global outcomes that it is not worth making changes to his purchasing behaviour. Standards and labelling are not by themselves a solution and must be seen in the context of broader policy including regulation and market-driven incentives.

The literature typically assumes there is only one label and that it is of binary nature rather than having multiple tiers for reporting environmental performance. The more recent, smaller literature on multiple environmental labels has two broad concerns. First, it explores whether label competition actually enhances environmental performance. Second, it looks at what happens when consumers are uncertain about the quality of various labels, and hence may be confused about which is more stringent. In brief, this literature finds that label multiplication can impair environmental performance, even when consumers have perfect information, and that consumer confusion makes matters worse.

3.2.1 Duopolistic label competition

Fischer and Lyon (2014a) offer the first theoretical analysis of two competing ecolabels with a fully developed game-theoretic underpinning. The authors develop a model that simulates the behaviour of many small producers with differing costs of achieving certification. In the model, producers can certify to either of the two labels (one by an NGO aiming at environmental improvement and one by an industry association whose goal is to increase industry profits) based on which is the more profitable for them. Sponsors choose the stringency of their labels strategically, taking the other's reactions into account. The authors show that competition between ecolabels with different goals may degrade environmental performance even under full information. This is the case when the distribution of producers' certification costs is narrow. However, competition can also improve environmental performance if there is a wide distribution of producer costs.

In Fischer and Lyon (2014b), the authors develop a further model to simulate duopolistic label competition for multi-tiered labels (e.g. the Leadership in Energy and Environmental Design, LEED) program, which awards energy efficiency labels for buildings at different levels). The study allows for two groups of price-taking firms, with the two groups differing in their cost of environmental improvement. When there is competition between multi-tier ecolabels, the model outcome shows two standards, one tailored to each group of firms, each set at the profit-maximising level for that group. This equilibrium is dominated by business rather than environmental concerns, and reduces environmental performance relative to a single environmental label run by an NGO seeking high environmental standards. One way to interpret these results is that if many labels were to be initiated by environmentally-motivated agents such as NGOs or government agencies then they would initially have market power to set stringent standards. As competition emerges from profit-oriented labels, however, the NGO label would lose its power to set tough standards and the equilibrium gravitates to an industry-dominated outcome.

In summary, these studies on strategic label competition demonstrate that competition between labels may reduce overall environmental performance relative to a single NGO-led label. This is more likely when the labels involve multiple tiers, or in the case of binary labels and a narrow distribution of producers' certification costs. However, it seems likely that consumers place greater trust in labels

[6] A more thorough discussion of the theoretical literature is included in Annex C.

sponsored by NGOs than they do in industry-sponsored labels. This may give NGO labels an advantage in the marketplace and provides a natural brake on the downward pressure on standards that competition can create. Furthermore, NGOs may be able to bolster demand for their labels by orchestrating anti-corporate campaigns against firms that do not certify to them (Conroy 2007; Baron 2011). Both these factors may prevent competition from driving standards down to the profit-maximising levels for different types of firms.

3.2.2 Monopolistic competition in markets with free entry of labels

Although the studies highlighted above provide insights into duopolistic label competition, the existing literature has not yet addressed competition between more than two labels. This is important to explore, since the ELIS market often involves dozens of competing labels and the multiplication of labels over time strongly suggests that entry barriers for some types of new labels are relatively low.

As a step in that direction, this section draws upon the literature on general horizontal and vertical product differentiation in order to sketch out a conceptual model of label competition with free entry. This literature offers some intriguing insights into how the ELIS industry may evolve (for example, Spence 1976; Dixit and Stiglitz, 1977; Mankiw and Whinston, 1986). Taken together, the models of competition in variety and quality have several interesting implications for label competition, many of which are already observed in the marketplace. First, ELIS serve to increase the degree of differentiation of products, especially in markets that are already mature. Labels are one way for companies to distinguish themselves from competitors. In turn, by increasing differentiation, labels can increase firms' market power and prices. This has a cost for consumers, who end up paying more, though they may at the same time gain through improved environmental quality.

Second, assuming consumers vary in their preferences for particular varieties of goods, products will tend to emerge that cater to particular market niches. This multiplication of varieties is socially beneficial, as it allows markets to provide products tailored to customer requirements. However, there is a tendency for markets to attract too many varieties of products. This is because each new entrant ignores its impact on the other firms already in the market. This is consistent with the often expressed concern that there is too much entry into the market for environmental labels.

Third, if customers seek higher quality but differ in their willingness to pay for it, then firms will try to differentiate themselves on quality so as to reduce price competition. In the ELIS market, for example, some firms will opt for stringent certifications and others will opt for weak certifications, consistent with the vertical differentiation observed. Furthermore, the theoretical literature suggests that when firms compete on both variety and quality, the forces of competition tend to be channelled toward variety rather than quality. As a result there tends to be too many product varieties in the market, with insufficient quality. This suggests that a government-sponsored minimum quality standard (MQS) would be beneficial. However, it is important for policymakers to approach a MQS cautiously, because the literature shows that if one firm has a competitive advantage in the provision of quality, the effects of a MQS may be counterproductive.

3.2.3 Interactions between voluntary labels and regulation

Interaction between voluntary and mandatory ELIS (or between ELIS and other mandatory regulation) is also relevant because strong growth or multiplication of voluntary schemes inevitably leads to more interaction with regulation. Voluntary ELIS could in principle either strengthen or weaken political pressure to impose stringent mandatory minimum quality standards, though it is not yet known under which conditions they are complements or substitutes. Heyes and Maxwell (2004) show that whether

certification schemes are socially desirable depends on this balance. Certification is beneficial when it works hand in hand with regulation, so that certification raises the standards for market leaders while regulation forces up the standards for laggards. In contrast, certification is harmful if it saps the political demand for legislation that would impose minimum performance standards, thereby weakening overall environmental performance across the market.

Heyes and Maxwell (2004) show that a label can weaken political support for mandatory government regulation, and thereby reduce social welfare. If the MQS and the NGO label can co-exist, then they are complementary to one another, and social welfare is higher with both in place than with either one separately. If the NGO label pre-empts the imposition of the MQS, then welfare is reduced relative to the case where there is no label, and the MQS is imposed first. Baksi and Bose (2007) find that government action can enhance the performance of ecolabels. In particular, firms may have incentives to adopt self-labelling because it is cheaper than third-party labelling. However, to maintain overall standards the government (or other organisations) would need to engage in monitoring and prosecuting false claims.

3.2.4 Imperfect knowledge of label stringency and consumer confusion

The theoretical models discussed above assume that the signal transmitted by ELIS labels give a perfectly accurate picture of the environmental quality of products, and that consumers have complete information about the stringency of each competing standard. If the signal deviates towards "greenbashing" or "greenwashing" then the effectiveness of ELIS will decline. For example, Mason (2011) shows that when certification can distinguish a "green" firm from a "brown" firm only with a certain amount of noise, labelling can either raise or lower welfare depending upon the cost and accuracy of the certification process. However, since brown firms have incentives to get their products labelled as green, but the reverse is not true, one can argue that intentional fraud by low-quality producers is a bigger concern. This is depicted as "greenbashing" in Box 3.

Hamilton and Zilberman (2006) develop a model in which producers can engage in greenwashing by fraudulently labelling their "brown" products as "green". They find that greenwashing becomes less likely as the number of producers decreases, as the cost of producing a green product falls, and as the cost of fraudulently disguising a brown good increases. In addition, they find that voluntary certification can decrease fraud, increase output, and raise profits per firm. This can be interpreted as a model of consumer confusion in which consumers are unsure whether the one ecolabel available truly represents that a product is green.

Harbaugh *et al*. (2011) consider what happens when consumers are uncertain about both the quality of a given firm's product and the quality of the label to which it certifies. A key insight is that certification decisions may affect both the reputation of the product and the reputation of the label. Even small amounts of uncertainty about the quality of labels can create consumer confusion that reduces or eliminates the value to firms of adopting them. Label multiplication aggravates the effect of uncertainty, and as the number of labels becomes large, labelling becomes completely uninformative. The study suggests that if one label becomes "focal" (that is, it comes to be a norm that is expected by consumers), this can alleviate the problem of multiplication. Failure to adopt the focal label is taken by consumers as a significant failing, and has a greater impact on sales than if the label were just one among many options. In fact, in a world with label uncertainty, a focal label plus multiple uncertain labels actually performs better than a single label, because firms that do not meet the standard of the focal label can still convey some information to consumers by meeting one of the others. This suggests that a government-backed label may be able to bring some order to a chaotic labelling market.

3.3 Field studies on label multiplication and competition

Empirical research helps test the accuracy of the various hypotheses that researchers have developed to understand the effects of label multiplication on the environment. Unfortunately, most of the field work in this area is still relatively preliminary and far from being able to answer the questions raised in this report and elsewhere. However, examining what has been done so far is helpful to understand where field research stands at the moment, where knowledge gaps exist, and what directions and areas experts might want to explore in the future. The following discussion highlights some key findings from studies of ELIS and their impacts across different sectors. More detailed summaries can be found in ANNEX C.

So far, there are few studies that use real data on consumer demand to identify the effects of label multiplication on the environment (in addition to effects of prices and market penetration of environmentally friendly products). Nevertheless, a valuable body of empirical knowledge is slowly emerging in related areas. It is important to note that some of the studies discussed here pertain to labelling regarding social rather than environmental performance. For several reasons, however, the authors of this report deem these studies to be appropriate to include. First, some of the early pressures for certification emerged within the apparel industry, including Nike being challenged over labour standards (Conroy 2007). Second, the tactics used by social movement organisations promoting environmental sustainability are very similar to those used to promote social change (Conroy 2007). Third, much of the empirical research on certification has examined Fair Trade certification, which is focused on social rather than environmental dimensions of sustainability (Blackman and Rivera 2011). For all these reasons, it seems sensible to include studies on certification of social performance in this section.

In the apparel industry, Fransen (2011) and Marques (2013) studied private governance regimes and found that increased proliferation of different standards result from a high fragmentation of the industry (with respect to geography, supply chains, and power relations) as well as increasing interest of businesses to define their own rules and principles. This has resulted in the failure of some NGO-led initiatives to harmonise labour standards. To counter attempts of civil society aiming to lead the process of standard convergence and fearing stronger engagement by government, firms have been increasingly active in creating their own standards. These business-led programs are the dominating form of governance in the clothing industry today. Examples for such initiatives include the Global Social Compliance Programme and the Sustainability Consortium created by Wal-Mart (Marques, 2013). Neither Fransen (2011) nor Marques (2013), however, drew definite conclusions on the effects of this development such as potential risk of creating downward pressure on stringency of standards due to strong business involvement in standard setting.

The coffee and cocoa industry are two interesting examples in the agricultural sector that witness the simultaneous convergence and differentiation of ELIS. Convergence occurs in objectives and certification practices, particularly as producers find it costly to deal with multiple certification standards with different procedures. Therefore, label setting bodies have promoted the mutual recognition of labels (e.g. the organic and Fair Trade label) by acknowledging one another's standards (or aspects thereof) as roughly equivalent. Harmonisation of standards also occurs through the adoption of industry codes of best practice, as promulgated through the ISEAL Alliance. Differentiation, in turn, affects distinctive features, target groups and stringency levels. In the coffee sector, companies increasingly try to emphasise attributes of their products or production process, such as organic, bird-friendly, fairly traded, grown in shade or preserving biodiversity (horizontal differentiation). Retailers also do more to differentiate their products along quality, by certifying them with labels of varying stringency (vertical differentiation; Reinecke *et al*., 2012).

Certification to more than one standard appears to lead to increased economic benefits for coffee and cocoa producers as well as environmental improvements according to an empirical study by the Committee on Sustainability Assessment (COSA) in twelve countries in Latin America, Africa and Southeast Asia

shows (COSA, 2014). Covering certifications for coffee and cocoa, including organic, Fair Trade, Rainforest Alliance, UTZ Certified, Starbucks C.A.F.E. Practices, Nespresso AAA, and 4C, the analysis found that on average, certified farms have 14% higher yields, 7% higher net income, receive 32% more training, employ 33% more water and soil conservation practices, and have 17% more biodiversity.

In forest products significant consolidation in ELIS has occurred, resulting in only two widely-recognised international voluntary standards for sustainable forest management: the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC). Labels issued by these organisations are strongly recognised by governments: some have used them to build national forest codes (e.g. Bolivia) and others integrate them in public procurement processes (e.g. Denmark and Japan; Carey and Guttenstein, 2008). By 2013, forests certified by the FSC and PEFC accounted for 9.1% of global forested area and 23% of managed forests, whereas 88% of all certified forests are located in North America and Europe (SSI, 2014). FSC is generally viewed to have more stringent standards than PEFC, but over time the two have gradually converged. In some cases, the same physical forests even carry certification from both organisations: estimations expect up to 10% of the certified forests to be double certified (UNEP, 2012; SSI, 2014). It is difficult to conclude whether convergence has had a net positive or negative effect on the stringency of standards.

The existence of only two primary forest-specific ELIS belies some overlap and potential confusion in consumer-facing labels, however. Firstly, most Type I ecolabels also cover forest products such as paper, and many forest product traders choose to demonstrate that products are certified to a local Type I label in addition to using wood sourced from FSC-certified forests (UNECE, 2012). Secondly, even within a single ELIS there can be multiplication of consumer-facing labels. The FSC has at least three different logos: 100% FSC timber, mixed FSC timber and 100% recycled wood or timber. Whilst surveys show the FSC logo to be highly recognised[7], the multiple versions of the logo could be confusing to users.

With respect to the seafood industry, ELIS created by major retailers and self-certification represent recent trends in labelling fish and other seafood, though recognised NGO labels such as Marine Stewardship Council and Friend of the Sea remain important (OECD, 2011b). Together, these ELIS generally attempt to communicate the environmental sustainability of seafood more comprehensively than some of the established labels often concerned with only one single issue (e.g. the "dolphin safe" label). While many self-declared claims are backed-up with recognised third-party labels, a study across 100 products in UK supermarkets showed that self-declared claims are often misleading, unverified or unverifiable (Client Earth, 2011). It is not clear how and whether this large number of uncertified textual claims affects the overall environmental effectiveness of third-party ELIS in the seafood sector.

In the home appliance sector, multiplication of ELIS has been rather limited. The most prevalent labels relate to the energy consumption of the product during consumer use. Energy-related ELIS include the well-established Energy Star label and mandatory energy efficiency grading labels for (large) household appliances in most OECD countries (Rohling and Schubert, 2013). Recently, some other labels have been created for electronics, including various Type I labels, a multi-attribute label called EPEAT® (www.epeat,net), and "made with renewable energy" labels signifying that the manufacturer purchased renewable energy (NREL, 2012). These broader sustainability standards, beyond just energy use, have been growing in popularity, yet, still represent a small fraction of total market share (Rohling and Schubert, 2013; Green Consumer Council, 2012).

Table 3 offers a summary of findings across the various sectors. It is important to note that these results represent only a small number of studies. The findings should therefore be read with caution as they may not be representative of production and market conditions in all countries.

[7] Between 15% and 68% of consumers across different OECD countries, according to FSC (2013).

Table 3. Empirical findings on competition and multiplication of ELIS in different sectors

Product Categories	Key Findings
Apparel	▪ Strong competition of labels; little consolidation ▪ Increasing domination of business-led programs and standards; push back of NGO standards ▪ High fragmentation of industry and heterogeneous interests make label consolidation difficult ▪ No assessment of effects of label multiplication on environmental impacts, prices or market
Coffee and Cocoa	▪ Consolidation and differentiation occurring at the same time ▪ Consolidation through mutual recognition among labels (e.g. organic and Fair Trade); adoption of best practice standards ▪ Differentiation of labels to address distinctive features, target groups and stringency level (horizontal and vertical differentiation) ▪ Multiple/double certification common and can be beneficial for farmers (various aspects); accepted by consumers (such in the United States)
Forestry	▪ Strong consolidation: FSC and PEFC dominant labels; have converged over time (very similar today) ▪ Some overlap: double certification, multiple labels from FSC, most Type I ecolabels also cover forest products ▪ No assessment of effects of label multiplication on environmental impacts, prices or market
Seafood	▪ Trend away from highly-specific single-issue labels ("dolphin safe") towards broader sustainability of wild capture and aquaculture fisheries ▪ Recent emergence of ELIS/claims by major retailers; increasing levels of self-certification ▪ Many of self-made claims are misleading, unverified or unverifiable despite often being accompanied by certified third party certification (UK market) ▪ No assessment of effects of multiple labels or vague claims on consumers' consumption decisions
Home appliances	▪ Limited competition due to strong presence of energy-related ELIS such as Energy Star, EU & US energy efficiency standards/labelling schemes ▪ Emergence of some ELIS covering environmental sustainability more broadly, not just energy, with evidence of international spread.

Sources: Apparel: Fransen (2011), Marques (2013); Coffee and cocoa: Reinecke *et al*. (2012); Forestry: COSA (2014), SSI (2014), UNEP (2012); Seafood: OECD (2011), Client Earth (2011); Home appliances: Rohling and Schubert (2013

In summary, the reviewed studies suggest that there is still a rather limited amount of literature that conducts actual tests of the effects of label multiplication on environmental effectiveness, as well as variables such as prices and market penetration of environmentally friendly products. Moreover, the availability of data that could help quantify potential benefits or problems is low. What might be concluded from this review, however, is that there is likely no general, explicit positive (or negative) impact of multiplication that applies to all sectors. Rather, the impacts of label competition vary by industry. In the coffee and cocoa industry, on the one hand, findings convey that double/multiple certification is related to economic benefits for producers as well as environmental improvements. On the other hand, in the seafood industry, many self-declared claims promoted by retailers are perceived as misleading or unverifiable. Again, no empirical data on how this might affect the environment, prices or consumer decisions are available.

4. ELIS MULTIPLICATION AND INTERNATIONAL TRADE

In addition to potential implications for environmental effectiveness, the multiplication of ELIS – and responses to that multiplication – may also have implications for international trade. This section reviews the potential implications of ELIS multiplication for international trade, set in the context of the broader debate about the interactions of ELIS with trade.

4.1 A brief overview of interactions between ELIS and international trade

The extent to which the use of different types of ELIS may or may not be compatible with international trade rules has been much debated in the literature since the early days of environmental labelling. Cases brought before the WTO to date have involved disputes over the application of single ELIS. There is no WTO jurisprudence covering interactions of multiple ELIS. As this report aims to assess where ELIS multiplication may have implications for trade, this section begins by summarising the range of environmental labelling issues that have been debated within the international trade regime, but it does not carry out detailed analysis of WTO jurisprudence.

The academic and WTO-related debate on the trade impacts and opportunities of ELIS has been wide-ranging. A number of authors have analysed under what circumstances ELIS may be considered as a trade measure under either the General Agreement on Tariffs and Trade (GATT) or Technical Barriers to Trade (TBT) agreement (for example Earley and Anderson, 2003; Stanton, 2012; CIEL, 2005). Issues include whether ELIS can be shown to violate key principles of the GATT in terms of market access (most-favoured nation and national treatment), whether labelling schemes should qualify for the environmental exemptions under GATT Article XX, and whether the provisions of the TBT agreement relating to standards and regulations should also be applicable to ELIS. A further key disputed issue is whether otherwise "like" products that differ only in their nprPPM should be considered different in the eyes of international trade law. If not, then it would be more likely that ELIS with standards cover the environmental impacts of production could be challenged under the GATT principle that measures should not discriminate between "like" products from different countries.

Another much-debated issue relating to ELIS and trade is the extent to which standards set and managed by non-government bodies would fall under the jurisdiction of the TBT agreement, and the level of influence that governments can exert over private bodies setting standards with significant market influence. This is important because the analysis in this report and in Gruère (2013) shows that much of the multiplication of ELIS (and responses to that multiplication) have been driven by non-government entities such as NGOs and private enterprises.

Regardless of compatibility with international trade rules, ELIS and ELIS multiplication can have real economic implications for producers and other businesses, creating both positive and negative trade impacts. Economic costs incurred due to adoption of ELIS can affect producers differently in different countries and could thus be perceived as contributing to market access issues. However, economic benefits of ELIS adoption may outweigh these costs. Also, ELIS can be perceived as having an impact on international competitiveness if the standards used are found to treat producers in different countries

differently. An important question is in what ways, and in what circumstances, ELIS multiplication may alter the balance between costs and benefits.

The trade effects of any particular voluntary ELIS are likely to be stronger if that scheme comes to enjoy significant market share for a product category in a particular market, to the point that the ELIS comes to be seen as a "de facto" market entry requirement for producers to access a particular market. As multiplication itself tends to lead to a large number of schemes, it is unlikely to lead to a large market share for any particular ELIS. However, some government or non-government responses to ELIS multiplication could lead to convergence of the market onto a particular label or standard, which could then come to be seen as a "de facto" market entry requirement. The rest of this section therefore looks both at potential implications of ELIS multiplication for costs, benefits and competitiveness, as well as considering how government and non-government responses to multiplication could affect the ELIS market internationally. Although these effects are difficult to demonstrate empirically, due to data challenges and because ELIS currently enjoy relatively modest market share for many products, the conditions that could lead to such effects are described conceptually.

4.2 Potential trade effects of ELIS multiplication

4.2.1 Costs and benefits of multiple ELIS application: implications for market access

The adoption of ELIS entails costs for producers and other supply-chain actors, as well providing direct and indirect economic benefits. If the design of certain ELIS means that these costs can be shown to apply disproportionately to producers in different countries, the scheme in question may in some cases be considered as a trade concern. However, investing in ELIS certification can have direct economic benefits for producers and exporters, both in terms of cost savings by adopting different practices and price differentials, which can offset ELIS costs and be a trade-positive outcome of labelling. This section looks at how multiplication could affect this balance of costs and benefits.

Producer costs incurred through adoption of ELIS

Costs for producers incurred due to ELIS include costs of switching to more expensive environmentally-friendly production methods and costs of adopting certification and audit procedures. Costs of the audit and certification process include the costs and availability of auditors, the capacity of producers to manage transparency requirements and the costs of gathering and updating necessary data on environmental practices. A lack of infrastructure required for certification and traceability requirements means producers in developing countries can face greater hurdles for certification, with proportionately higher cost implications.

In terms of multiplication, the cost impacts due to the intensification trend (notably VSS) are likely to depend on to what extent different standards engage in mutual inter-operability regarding their audit and certification processes. Inter-operability goes beyond mutual recognition of the content of the standards themselves, and is one way that cost concerns relating to the existence of multiple ELIS can be eased. Furthermore, the increased prevalence of ELIS due to intensification may have the effect of stimulating the entry of audit and certification companies in countries where producers are sited, including in developing countries. This can also help to reduce costs over time (ISEAL, 2011).

Another factor important to certification and process costs is data collection. The extensification trend, involving quantitative carbon footprints, is significant in this regard. It is likely that the cost of providing GHG data of a high enough quality for PCF can be perceived as a barrier that is disproportionately higher for smaller producers in all countries, both in developed and developing countries. Although some schemes may allow the use of default emission factors, to help with overcoming

initial certification costs, this may introduce a level of subjectivity that could be perceived as affecting different countries unevenly. In the French PEF pilot (discussed in Box 5 in Section 5), many participants noted that a key challenge was receiving high-quality data on environmental impacts from foreign suppliers. The experiment showed rapidly decreasing costs per product labelled as the number of products increased over 20, but these costs did not incorporate the costs to international suppliers to provide the data. Only 30% of participants said that their suppliers were interested in participating in the scheme, citing both confidentiality and cost as reasons for supplier reticence. However, some participants noted that Asian suppliers provided data more readily than domestic suppliers, presumably sensing a potential competitive advantage over suppliers from other countries (MEDDE, 2013). Some companies reported that they would prefer the scheme to be mandatory as this would allow greater leverage over their suppliers to cooperate with data collection and verification.

Investments are often necessary for producers to improve performance in order to meet environmental standards required by ELIS, both for practice- and outcome-based standards. Investment decisions all across the supply-chain depend on certainty of future policy and market requirements, and a multiplicity of ELIS can add uncertainty over which investments to make in order to meet which standard. If producers pursue certification to multiple ELIS based on practice-based standards, the changes in practices required might not be complementary (both in terms of escalating costs and in overall environmental impact).

Further, the capital required to invest in production changes necessary to meet standards could disfavour smaller producers, in particular those in developing countries. This is particularly apparent for products based on renewable natural resources, such as agriculture and fisheries; for example, increased costs due to certification may be met more easily by better-managed fisheries in OECD countries, thereby posing a disadvantage to small producers in developing countries (OECD, 2011b).[8] This effect could be magnified by market pressure for producers to certify to multiple ELIS. One way to mitigate this concern is allow particular procedures for small and medium enterprises to gain access to ELIS, and to ensure that procedures and costs are reasonable and accessible. Further, ELIS requirements should not be seen in isolation; they are an addition to what is already a long list of necessary market access requirements, particularly in the case of food products being imported to the EU and other OECD countries (Baddeley *et al*., 2011).

Price premiums and other economic benefits

ELIS adoption can lead to a range of economic benefits for producers. Producers may attract better or longer-term purchase agreements with foreign buyers (including price premiums), as well as being able to compete in foreign markets based on their environmental production credentials. Changing practices to comply with ELIS requirements can also lead to reduced operating expenditure, such as through lower energy use or less waste production. In addition, adoption of some ELIS can lead to broader improvements in supply chains, such as improved transparency on labour standards, thus helping countries to meet sustainable development goals.

Provision of price premiums to producers can be either written into a standard as a necessary criterion for achieving the standard, or premiums can exist due to market forces driven by consumer willingness-to-pay for greener goods. The State of Sustainability Initiative (SSI) notes that the provision of price premiums is rarely a criterion in sustainability standards (Fair Trade and Utz Certified being the exceptions amongst the standards studied), meaning that premiums associated with most standards are driven purely by market forces (SSI, 2014). Price premiums are therefore difficult to track on an aggregate level because

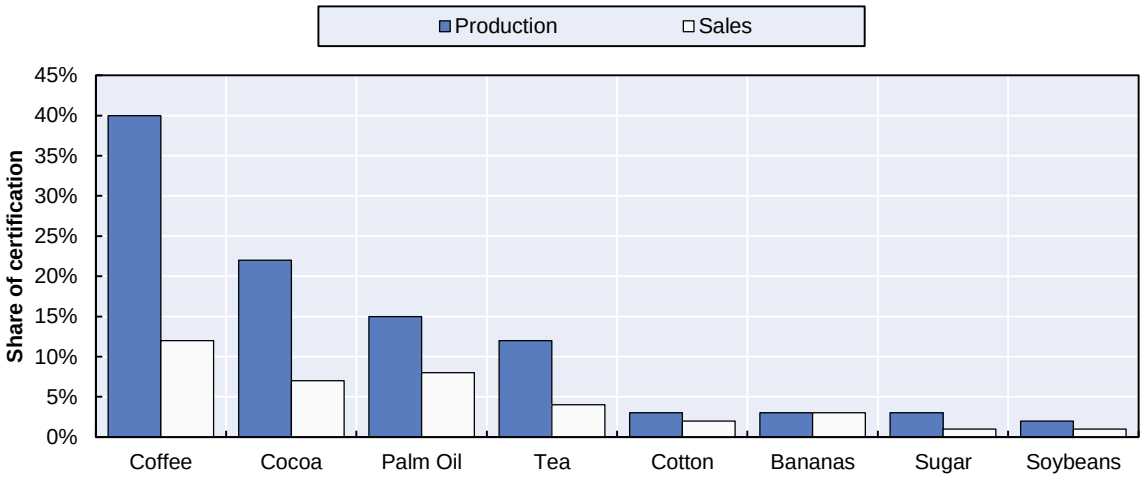
[8] A similar issue could relate to the overall effectiveness of certification schemes. The best-managed fisheries may need to make few changes to existing practices to become certified, so growth in numbers of fisheries certified may not relate directly to improvements in sustainability, up to a point.

they are part of confidential commercial discussions across many individual transactions. Nevertheless there is some evidence that price premiums for certified goods may be dwindling, with some producers seeking certification knowing that the price premium is likely to be low, particularly where multiple ELIS apply (RESOLVE, 2012). The COSA study also found that certification to multiple sustainability standards can increase yields and productivity, without recourse to particular price premiums (COSA, 2014). An exception is the organic agriculture sector, where certification continues to command significant price premiums over non-organic produce (FAO, 2008; UNEP 2012).[9] Outside of the food sector, Type I ecolabels with criteria that evolve to maintain a constant proportion of the total market achieving certification, may create price premiums due to a scarcity effect; however unpredictability in how the criteria are managed may counteract this (UNEP, 2005).

Other economic incentives are often at play. For example, a key incentive for producers to seek ELIS certification is the benefits of long-term contracts with suppliers, which may offer a greater economic incentive than short-term price premiums. An early example was Unilever's engagement with fisheries suppliers certified to MSC (UNEP, 2005). Furthermore, a recent overview of the use of sustainability standards in Brazil points to the beginnings of a domestic market for some certified products, including sugar, which could point to new incentives for producers to seek certification, not relying on price premiums for export (ISEAL, 2013).

While it is difficult to measure the relative costs and benefits of ELIS multiplication, a potentially important trend relevant to trade in certified goods is the increasing quantity of food products that are produced to be compliant with sustainability standards, but which are subsequently sold into the market as regular produce, with no corresponding ELIS at the final point of sale (SSI, 2014). This can be roughly measured by comparing the shares of certification in production and sales, as shown for a number of commodities in Figure 2. The differences are substantial and may suggest that cost barriers of certification are lower than is often assumed. Produce that is certified but not sold as such will not receive a price premium. The reasons for this effect are not clear and more analysis is required in this area. Notably, there is perhaps a tendency for producers to over-report their production figures, as this information is generally gathered ex-ante based on production estimates.

Figure 2. Certification production versus sales (2012)



Source: Authors, using data from SSI 2014.

[9] The reasons for this are likely to be complex, including production costs, consumer reasons for choosing organic produce (in many cases linked to health and lifestyle choices as much as environmental concern) as well as the perceived trustworthiness of organic certification due to government involvement in many countries.

4.2.2 Potential effects of ELIS multiplication on international competitiveness

The incidence of the impacts of well-designed ELIS, as with standards or regulations, falls differently on participants without implying discriminatory treatment. Indeed, one of the aims of ELIS is to provide a market incentive benefiting products and services with lower environmental impact. Nothing in this paper on the impacts of multiplication is intended to imply otherwise. However, concerns have been raised that ELIS could potentially lead to competitiveness effects once products are on the market (UNFSS, 2013). This could arise if the standard used for a voluntary ELIS is challenged as not treating domestic and foreign products in the same way (affecting the principle of national treatment in trade law) or treating trading partners differently (affecting most-favoured-nation principle in trade law). Standards focusing on nprPPM may not always be suited for all types of production in all countries. A standard designed around one particular country's production conditions (e.g. agricultural cultivation) may provide an accurate signal of environmental impacts in that country. The same standard applied overseas with a "one size fits all" approach may provide a less accurate signal of environmental impacts due to different production conditions (OECD, 2002). This could lead to misalignment of quality to signal, where ELIS appear in the bottom-left corner of the matrix representing foreign products with good environmental credentials being subject to "greenbashing" (see Box 3, Table 2).

While the intensification trend has led to a multiplication of logo-type ELIS, many of these are sector- and issue-specific and focus on commodities that are to a large extent grown in the global south. This specificity resulting from having multiple standards means that many VSS operating in the agricultural commodities sector have made significant efforts to make their standard-setting process more consultative and adapted to specific countries, as well as accessible to smaller producers (SSI, 2014). In the forest certification sector, while the market has converged onto two main international standards, both seek actively to ensure that the standards they use are flexible enough to be made appropriate to local conditions and therefore not affect competition between products from different countries. For example, FSC manages a series of National Standards Development Groups that adapt FSC international standards to the local context by adding country specific indicators, verifiers and guidance. PEFC, as an umbrella standard, in some cases acts to recognise local government-run labels, including in non-OECD countries (e.g. most recently recognising the China forest certification standard, see PEFC, 2014).

A different example of standard specificity can be found in electronic products. The United States and EU originally signed a mutual recognition agreement for Energy Star labels issued in the two regions, thereby eliminating the possibility that the standard could become a competitiveness barrier. However, since US Energy Star now requires full third party assessment, and the EU version does not, there is no longer a direct reciprocal agreement and in effect two parallel labels have been created where previously there was one. The EU assessed possible trade impacts and concluded that losing full two-way recognition would not have a large impact as most small and medium-sized enterprises do not export to the United States. Moreover, larger companies that do have extensive EU-US export market are already registered with US Energy Star (rather than EU) and so will anyway have to switch to more expensive third party certification. It is possible that the EU version of Energy Star could, over time, lose some market credibility relative to its US counterpart, but there is no sign of this as yet.

Turning to the extensification trend, in theory well-designed PCF and PEF schemes would provide objective life-cycle data on environmental impacts. If that is the case, then even with rapid growth of multiple schemes, they would not *a priori* pose any inherent risk of competitiveness impacts. However, the design and appropriateness of the standards used is key, in particular in how footprint systems tackle challenges of missing data. Concerns have been raised that rapid growth of schemes internationally could make it more difficult for producers and ELIS users to understand where footprinting schemes are balanced and where they may be giving uneven scores.

For PCF, where only GHG emissions are calculated, the heavy data requirements mean that default factors will need to be used in cases where emissions factors specific to local conditions are not available. Use of default factors by some producers but not others may be perceived as impacting on competitiveness. Further, a situation could arise whereby producers choose between locally-specific data and default factors for different parts of the footprint calculation, depending on what is more beneficial for their score. For PEF, the greater number of LCA calculations required may exacerbate this effect, in particular for hard to quantify metrics such as biodiversity. Some producers affected by the French PEF pilot noted that the biodiversity metric used by some supermarkets, based on land area per kg of meat produced, was an insufficiently precise measure of biodiversity (Ledgard *et al*., 2012). Separately, use of default factors was also noted as a problem in the trial for the agro-food sector, with many participants resorting to default factors from international databases (MEDDE, 2013). As a result, the French agency ADEME launched major projects to collect life-cycle data on food products and processes (Agribalyse I and II, Acyvia).

If a quantitative ELIS was to give particular emphasis to one life-cycle phase, such as transport, this could raise concerns. Such a scheme would discriminate suppliers based purely on distance to market factors even though transportation may be only a small portion of the life-cycle carbon footprint (e.g. transport to Europe represents only 5% of New Zealand lamb carbon footprint; Ledgard *et al.*, 2010). However, despite the rapid growth in schemes, no specific distance-related ELIS were found be still in operation, and Bolwig and Gibbon (2009) found no bias in the way the PCF methodologies treated long-distance transport relative to other emission sources. A related source of concern relates to new requirements that may alter the scope of an existing ELIS. In the UK for example, the Soil Association consulted in 2007 about introducing a "no air freight" requirement for imported produce seeking organic certification. There was strong opposition to this suggestion, mostly for trade reasons. However, in Switzerland, the Biosuisse "bud" organic label is still not awarded if produce has been air-freighted (Biosuisse, 2012).

4.3 Effects of responses to ELIS multiplication: "de facto" market entry requirements

Responses to multiplication of ELIS, whether initiated by government, NGOs or the private sector, are likely to lead to consolidation of the market around certain labels and standards. In time, this could lead to those ELIS becoming sufficiently dominant in the market that supply chain actors feel obliged to adopt them in order to gain market access or share, even though the schemes are in themselves voluntary.

"Mandatory" ELIS are those where legislation requires that products of a certain type carry a particular label to demonstrate adherence with a particular environmental standard. In other words, award of the label is a formal market access requirement. [10] In WTO terms, this kind of ELIS is likely to be seen as a technical regulation under the TBT Agreement and will need to comply with the more specific obligations in that Agreement (additional to those in the GATT) in order to be WTO-compliant. In the combined dataset used for this project, mandatory labels of this type currently exist only for energy efficiency of appliances, buildings and cars. These labels have not to date been challenged under the TBT agreement, even when combined with minimum performance standards. They are less controversial, in part because the labels apply to the use-phase of the product, with no bearing on the upstream processes and production methods used.[11]

[10] See also definitions in JWPAT document "Synergies between Private Standards and Public Regulations – Progress Report". [TAD/TC/CA/WP(2013)3].

[11] The relationship between mandatory quantitative performance-tier labels and trade could become more complicated if the scope is extended to cover upstream nprPPM impacting on the environment. The EU investigated extending the EU energy labels to cover upstream impacts, but studies recommended not pursuing in part

However, the market dominance of a particular *voluntary* ELIS can lead to producers and supply-chain actors perceiving that adoption of that scheme has become an informal *de facto* market access requirement. While dominance of one particular ELIS is unlikely to be a direct outcome of multiplication, it could potentially occur as a result of government or market-led responses to ELIS multiplication. For example, if one private sector actor (or group of actors) commanding strong market power voluntarily decides to adopt a particular label on its products, this could lead to both competitors and suppliers feeling obliged to consider adopting that same ELIS and its associated standards and certification processes. A strongly-promoted voluntary government label could potentially have the same effect, although the strongest market force is perhaps likely to come from major retailers and other private-sector consortia exerting pressure on their global supply chains (Golden *et al*., 2010).

Although the effects of a market-driven response to multiplication of ELIS are difficult to predict, Box 4 lays out a potential trade-off for governments, should they choose to respond to multiplication of quantitative footprint schemes. Under that hypothetical example, a privately-established *de facto* entry requirement may raise greater concerns for competitiveness than an ELIS designed, through a consultative government process, to be adaptable to different international production and market conditions. On the other hand, a government-run voluntary scheme may be more likely to be challenged as a market access barrier under the WTO, because WTO rules apply to government measures. The extent to which WTO rules can be applied to ELIS operated by non-government bodies using private standards is not clear, and different interpretations exist as to what extent governments can or should influence standards set by private bodies.[12]

Governments choosing to introduce a focal label or standard could ease this trade-off, by pursuing actions that simultaneously reassure trading partners that the government label does not create a market access barrier, for example by ensuring that procedures are clear and easy to follow, providing streamlined procedures for small and medium enterprises, ensuring that worse performers have an entry point, providing capacity building and information campaigns and so on.

of because of possible trade concerns (Bio Intelligence Service, 2012; Ipsos, 2012). Current proposals for PCF and PEF are not currently intended to be mandatory.

[12] For many privately-run standards aiming at broader sustainability objectives, standards set by "international standardising bodies" do not yet exist according to some interpretations of the WTO Technical Barriers to Trade (TBT) agreement. In particular, the US-tuna II appellate body ruled that not all 'transnational standardising bodies' are 'international' for the purposes of the TBT Agreement: rather, the 'international character' of the body should come from the fact that its membership is open on a non-discriminatory basis to the relevant bodies of at least all Members at every stage of the relevant standard's development (Epps and Trebilcock, 2013). Further, Cohen and Vandenbergh (2012) point out that WTO jurisprudence from the Japan-film case suggests that if "sufficient governt invnmeolvement" can be shown then even privately-run schemes could be considered to be bound by WTO rules.

Box 4. A potential trade-off between competitiveness and market access concerns

This box highlights one hypothetical example about possible trade effects due to multiplication of footprint schemes and introduction of a government-run footprint standard or label. It is included just for illustrative purposes.

The growing ELIS market could lead to a number of competing footprint schemes being developed and adopted in parallel by NGOs or the private sector, in the absence of a government scheme. The resulting large number of schemes would mean that no particular scheme acts as an informal market access requirement (although producers may still face high costs due to the need to follow multiple and parallel certification processes). However, it is possible that producers could raise concerns about competitiveness if certain schemes use standards that are more appropriate to production conditions in some countries and so do not deliver an accurate environmental signal if adopted internationally. Producers and other stakeholders may struggle to know which scheme is appropriate.

Faced with such multiplication, major private sector actors may respond by using their market power to force convergence on one particular quantitative footprint scheme that then becomes dominant. This could ease concerns of consumer confusion on the demand side, with firms in effect making the choice of label on behalf of their customers. However, the chosen label could become a "de facto" market entry requirement, with no guarantee to stakeholders that the chosen standard would be accurate, internationally adapted and in the public interest, given that the scheme was chosen by private sector interests. Competitiveness concerns could therefore persist.

Alternatively, a government could choose to respond to the multiplication by introducing a "focal" label – or a standard that other labels can be based on – created through a government-led process including international consultation. This could act to ease competitiveness concerns, assuming that the government label or standard is developed in good faith (not with protectionist aims) and that the standards used are designed in line with the WTO's TBT standard-setting code, including use of extensive international consultation with foreign producers, ensuring life-cycle methodologies and category rules are adaptable, etc. However, should the government label or standard be voluntarily widely adopted in the market place, the focal label may also become a "de facto" market entry requirement. Due to the direct government involvement, this focal label may have a higher risk of being brought under scrutiny at the WTO. Governments choosing to respond to multiplication by introducing a focal standard or labelling scheme therefore face a possible trade-off in the effects that the response could entail.

In practice, although many private-sector and NGO carbon footprint labels have been developed, in many cases there has been strong government involvement or support for the underlying standards developed (including UK, Japan and Korea). One of the conclusions of the French PEF experiment was that a law could be introduced requiring that any environmental index label should use an LCA approach meeting certain standards (MEDDE, 2013), similar to a recent French law requiring environmental claims made in the building sector to be backed up by LCA (République Française, 2013). This is an example of government involvement aiming to bring consistency into the marketplace of multiple ELIS, whilst seeking to limit trade concerns. The current European initiative to develop EU-wide PEF standards is aimed at reducing competitiveness concerns by providing a focal standard for PEF schemes (see Box 5 in section 5).

5. EXISTING MARKET AND GOVERNMENT RESPONSES TO MULTIPLICATION

Although empirical evidence relating to the effects of ELIS multiplication is scarce, responses to multiplication have been initiated by ELIS operators themselves, by the private sector, by intergovernmental organisations and by governments. The existence of these initiatives highlights the strength of concerns relating to ELIS growth and multiplication perceived by ELIS operators and other stakeholders, and how rapid growth and multiplication of schemes has created a demand among stakeholders to understand the credibility of different ELIS. Nebulous or meaningless claims may mix in the marketplace alongside credible, well-established ELIS.

This section briefly reviews non-government and government responses that have aimed to ensure effectiveness of ELIS as a whole and to reduce real or perceived concerns regarding multiplication. On the non-government side, Table 4 provides an overview of the main means by which ELIS systems and operators have interacted or collaborated. Some of the initiatives involve collaboration between individual ELIS in order to reduce complexity in the marketplace (such as mutual recognition agreements). Other initiatives are aimed at maintaining high standards and to increase the competitiveness of high-quality non-government ELIS. These include benchmarking initiatives and comparison tools that mostly aim to increase the transparency of ELIS systems and to help users to navigate the options and alternatives. Some of these explicitly address issues of multiplication such as the International Trade Center's Standards Map that aims to provide a solution to (inter alia) "confusion over the proliferation of standards applied in international markets"; the Global Sustainable Seafood Initiative (IDH, GIZ and retailers) targeting "the increase of schemes [that] has led to confusion among producers, retailers and consumers over how to recognise a credible seafood certification scheme" and the chemical company BASF's tool to help "customers compare the crowded world of eco-labels and certification".[13]

On the government side, some voluntary and non-regulatory initiatives also make explicit reference to the large number of ELIS in operation, such as the US EPA's draft guidelines for public procurers which aim to help procurers "sort through these hundreds of other products with non-governmental standards and ecolabels that claim to be safer or environmentally friendly".[14]

5.1 Interactions and consolidation between ELIS systems

Individual ELIS systems and operators have already taken action to interact in a number of ways. Harmonisation and mutual recognition by schemes can eliminate duplication and reduce costs. This means that if a product is recognised by one ELIS, it can claim recognition by the other scheme, and vice versa. This is the case for many Type I ecolabels where the Global Ecolabel Network (GEN) continues to provide an international forum allowing ecolabel organisations to harmonise development of criteria and to take steps towards mutual recognition. In cases where ELIS are vertically differentiated, a system of unilateral recognition may be adopted. In this way the more stringent ELIS is assumed to be sufficient to meet the

[13] See *www.intracen.org/itc/market-info-tools/voluntary-standards/standardsmap/*, www.environmentalleader.com/2011/02/17/basf-launches-eco-label-comparison-site/ , https://select-ecolabels.basf.com/Applications/EcoLabelManager.nsf accessed 29 April 2015.

[14] *www.epa.gov/epp/draftGuidelines/*, accessed 29 April 2015.

needs of the less stringent scheme, but not vice-versa. This is sometimes combined with a "stepping up" procedure providing incentives for producers to graduate from a less stringent to a more stringent ELIS over time (ISEAL, 2011). In cases of horizontally differentiated standards, a system of inter-operability may be adopted, whereby standards recognise parts of each other's systems. This could be a modular approach (a social sustainability standard being used as a social 'module' for an environmental standard which otherwise has no social aspect) or an agreement to use the same certification or auditing processes (Marx and Wouters, 2014).

Some of the better-known non-government ELIS collaborate through the ISEAL Alliance, a membership association for voluntary standard-setting bodies. ISEAL has created codes of conduct to act as a voluntary benchmark for other standards operating or entering into the market. This aims to boost the credibility of high-quality ELIS, thereby raising market expectations and pushing up the quality of standards across the board, including new schemes entering the market in a multiplication scenario. ISEAL also assists and encourages its members to conform with or surpass any requirements under WTO rules for recognition as legitimate standardisation bodies in order to avoid trade disputes (Bernstein and Hannah, 2008).

Table 4. Interactions of Standards Systems

	Description	**Examples**
Full Mutual recognition (equivalency)	Agreement among and between two or more ELIS whereby the systems and standards of schemes are assessed and agreed by each scheme as being equivalent to one another	Type-I ecolabels, as coordinated through the Global Ecolabel Network, product labels such as Energy Star, various national organic standards
Unilateral recognition and other means of "stepping up"	One-way recognition whereby all the systems and standards of one scheme are assessed as being equivalent by another scheme, but this is not reciprocal. Other means of "stepping up" include specifying that producers should graduate to more stringent ELIS	4C, Rainforest Alliance, UTZ (coffee) Controlled Wood - Forest management (FSC)
Harmonisation and inter-operability	Adjustment of differences and inconsistencies among different standards, systems or definitions to make them uniform or mutually compatible including sharing of assurance systems	Union for Ethical Biotrade and Rainforest Alliance
"Meta-regulation" or meta-coordination	ELIS operators, standards bodies and/or private sector stakeholders collaborating to reinforce a credibility advantage, at the same time acting to maintain more stringent standards and coordinate standards processes etc.	ISEAL, Global Sustainable Seafood Initiative, Sustainability Consortium

5.2 Private sector responses and multi-partner "meta-initiatives"

Major retailers and end-product manufacturers have responded to perceived confusion and multiplication in the ELIS market in different ways. Some have chosen, either individually or collaboratively, to adopt particular voluntary non-government ELIS, with the effect of that scheme becoming a dominant market standard. Others have decided to develop their own "be-spoke" ELIS, often by adopting parts of a pre-existing voluntary standard. This can be either a brand-specific label, such as Nespresso's AAA, or a collaborative ELIS driven by private-sector collaboration, such as being developed

by The Sustainability Consortium. An advantage of a retailer-based strategy is that it can radically reduce consumer search costs, and hence consumer confusion. If manufacturers and retailers with substantial market share adopt or agree on sustainability standards and environmental labels, these can rapidly take hold as a "de facto" market requirement. Whilst this can be a strong force for streamlining the ELIS market, it may not guarantee that the labels and standards chosen are the best for overall environmental effectiveness and minimising trade effects, as discussed in Section 4.

In addition, a number of collaborative programmes have been initiated with the aim of helping users navigate and analyse information about ELIS, in order to determine those with highest environmental quality. These are being created and supported by a variety of actors covering a range of sectors using high quality, globally accepted methodologies. These initiatives often involve input from the private sector, NGOs, intergovernmental organisations and national government agencies. In general the initiatives support evaluations of standards' performance against user-defined preferences and benchmarks, support mutual recognition between standards, and help users understand what influences the performance of standards. One category includes web-based comparison tools such as International Trade Centre's Standards Map (intergovernmental) and the "Sustainability Standards Comparison Tool" (government-NGO partnership). Another type of response includes systems for assessing compliance of ELIS against an agreed set of rules, such as the Global Social Compliance Program (business-led). A third type includes periodic reviews of particular standards, with a view to providing information to stakeholders on the effectiveness of programmes (e.g. SSI). An overview of such initiatives can be found in ANNEX E.

The range of examples listed here suggests that comparison and analysis tools or "meta-initiatives" are also multiplying. This could likely be due to different meta-initiatives serving different audiences, with different goals and purposes — similar drivers to those creating diversity and multiplication within the field of standards and ELIS more generally. However, some of these initiatives build on each other and other existing initiatives. For example, the Sustainability Standards Comparison Tool is based on the ISEAL Credibility Principles and Codes of Good Practice.

The ITC created Trade for Sustainable Development (T4SD) as a partnership-based programme to support sustainability practices in global supply chains. T4SD works with a diverse group of meta-initiatives which are using Standards Map in some form and recognise the considerable opportunity for leveraging efficiency and reach with so many different users carrying overlapping interests. This collaborative approach aims to drive harmonisation and convergence by building on existing resources and methodologies to ensure consistency, transparency and avoid duplication. This includes the launch of the T4SD principles on Sustainability, Harmonization, Transparency and Sustainable Development Goals (ITC, 2014).

5.3 Existing government responses in the context of multiplication

The various roles governments have played in the ELIS market as creators, users and endorsers of ELIS were outlined in Section 2. This section looks in more detail at how government roles have evolved in the context of ELIS multiplication, in particular in parallel with other non-government initiatives aiming to address transparency and accuracy of ELIS and ELIS multiplication.

Implementation of mandatory government-run ELIS has the collateral effect of limiting ELIS multiplication for the sectors concerned. Mandatory ELIS already exist in many countries, but are almost exclusively limited to product characteristics such as energy-efficiency of appliances (e.g. Energy Star, the EU energy label), cars and buildings; they do not cover PPM, whether product-related or not. No governments have implemented mandatory schemes that distinguish products based on nprPPM. This is likely partly due to the challenge of implementing and enforcing standards applying to complex global supply chains outside the jurisdiction of the implementing government, where there is a risk of measures

being challenged under WTO trade rules. It is also likely because defining a single minimum standard for environmental sustainability is extremely challenging (OECD, 2011b).

Governments have also created voluntary environmental labels that have become "focal" for consumers and business buyers, such as the US Department of Agriculture's Organic label and the Energy Star label. The current European Product Environment Footprint (PEF) programme, while not a labelling scheme in itself, could be seen as a focal initiative aiming at improving coherence across quantitative footprint ELIS. The PEF programme explicitly aims to reduce barriers to trade by reducing diversity in the approaches and standards used to calculate environmental impacts of products. The consultative nature of the rule-making process, involving diverse international stakeholders, aims to make the programme widely applicable to international supply chains (See Box 5). In general, focal labels do not prohibit other, more stringent labels from entering the market, but they provide reassurance to consumers and buyers who do not wish to take the time to investigate alternative labels.

Box 5. Product Environmental Footprinting initiatives in EU and France

As part of its Single Market for Green Products initiative, the EU is working towards establishing a harmonised, Europe-wide method to measure the environmental performance of products throughout their lifecycle. The PEF project strives to remove barriers created by the emergence of a multitude of different approaches and rules to assess corporate environmental footprints, developed by EU Member States and private sector initiatives. The PEF is intended as a voluntary initiative, and its future role in EU policy is still under discussion.

Since 2013 the European Commission has been conducting two pilots to develop and test product-group specific and sector-specific rules based on the PEF methodology (called Product Environmental Footprint Category Rules, PEFCRs). These pilots cover 25 diverse product groups, including food and non-food products. The availability of good quality life cycle data and pre-existing product category rules were factors in selecting the groups. The development of PEFCRs aims to be transparent and consultative, involving stakeholders along the supply chain of the products covered. Stakeholders submitted proposals for product groups to be covered in the pilots, participated in consultations and gave feedback on draft PEFCRs. Selected partners also test different communication vehicles to convey environmental footprint information. A background document provides guidance for participating companies on how they communicate PEF profiles. It allows for a wide range of media including performance labels, pictograms and business-to-business communication. It also sets forth a number of principles, including transparency, reliability, completeness, comparability and clarity that profiles should adhere to. These Principles will be tested in the last stage of the pilot, which will be dedicated to the communication of the PEF results. The second phase of the project will evaluate the results of the pilots.

The EU initiative builds experience gather by member states. For example, France carried out a two year pilot that attracted the participation of 168 companies with labels on over 10 000 products (MEDDE, 2013). Product categories ranged from food and drink to cosmetics to electronic goods. 78% of participants reported finding out more about the impacts of their supply chains; 50% have already improved them. 59% see labelling as useful for their brand and 78% would consider adopting labelling in future.

The French pilot allowed companies to choose the format and number of indicators to display. Whilst this led to considerable innovation in terms of communication mode of footprint information, participants reported that the diversity added to consumer confusion of labels. Participants had to at a minimum report on GHG emissions, and were encouraged to add quantitative information on a number of other indicators including resource use, air pollution, water pollution (including toxicity, eutrophication, acidification), water use, biodiversity impacts and soil erosion. Most participants chose to display at least one indicator relating to biodiversity, air and water in addition to GHG. A technical support methodology was provided, drawing where possible on existing standards, including those from other countries and international (e.g. the ISO 14067 technical specification, the PAS 2050.

One of the more popular displays chosen was an index relative to a median performing product in the same category. This results in simple communication to the consumer of whether the product performs better or worse than average across different environmental indices. Identification of the median product can be challenging, and this is now being taken forward in the European PEF pilot (where the median product can be theoretical and not tied to a real product) (EU, 2013). A clear result of the French experiment was a call for harmonisation of this diversity of consumer-facing displays. 95% of participating companies called for greater harmonisation of rules around footprint labels, with a call for publicly-led methodologies or rules. In addition, participants called for greater third-party certification (or at least verification) should the label move forward into a new (voluntary) phase. They also called for the provision, by public authorities, of generic life cycle databases."

The introduction of "focal" labels is often not led by government in isolation. The EU PEF programme involves extensive consultation with industry and other stakeholders. Some of the comparison tool initiatives listed above already involve partnerships between government agencies and business organisations. Such public-private partnerships could be one further way to ensure that ELIS being widely adopted by retailers are developed in a way that is the most beneficial for both environment and trade. Some governments have also initiated information policies aiming to provide trusted sources of comparison information across different types of ELIS. An example is a newly launched German government website providing comparison information on textile sustainability standards.[15]

Another way that governments have influenced the international ELIS market is through guidelines and rules for public procurement. It is well-known that the market power of government purchasing can be used to stimulate broader market demand and to raise standards. Public procurement amounts to 17% of the EU's gross domestic product and in some countries can account for as much of 30% of gross domestic product. While this is likely focused on particular product categories, thereby limiting direct market influence, the credibility afforded to ELIS that are compliant with public procurement rules can lead to significant indirect market influence. As part of the Sustainable Public Procurement Initiative, the United Nations Environment Programme coordinates a working group on the use of ecolabels in public procurement, which explores how governments can choose and reinforce credible environmental labels, in addition to only allowing government-owned schemes in procurement.

In the EU, the general public procurement directives were updated in 2014 and now allow for greater flexibility to choose on price-quality ratio, where quality can include environmental aspects (EU 2014). In parallel, Green Public Procurement rules allow reference to labels according to particular conditions. Labels cannot be referred to explicitly, but criteria underpinning the labels can be specified, and labels can then be used provided they are based on three criteria, generally aimed at Type I (including EU eco-label) but not ruling out voluntary standards[16].

In the United States, Executive Order 13514 requires federal agencies to make purchases that are energy-efficient, water-efficient, bio-based, environmentally preferable, non-ozone depleting, contain recycled content, or are non-toxic or less-toxic alternatives. More recently, the US EPA has drawn up Draft Guidelines for Product Environmental Performance Standards and Ecolabels for Voluntary Use in Federal Procurement. Whilst entirely voluntary, these guidelines could have an important effect for the broader market, by setting a benchmark list of voluntary standards that are considered credible. From an international perspective, it will be important to ensure that guidelines (and underlying criteria) of this type are equally stringent for all countries implicated in the supply chains of covered products. Best practice sharing in this area could be useful, in particular to help governments extend their public procurement mandates to use a wider range of ELIS.

[15] See www.siegelklarheit.de (in German).

[16] Non-government labels can be used if they are based on scientific information, adopted with the participation of all stakeholders (government bodies, consumers, manufacturers, distributors and environmental organisations and are accessible to all interested parties.

6. CONCLUSIONS

The rapid growth of ELIS in recent years demonstrates a strong interest and demand for environmental information from many quarters. The multiplication can have positive as well as negative effects on users and other stakeholders, as well as implications for environmental effectiveness and international trade. Each new scheme is created to respond to a need identified by its creators, either environmental or commercial. This has led to both horizontal and vertical differentiation. Horizontal differentiation refers to schemes targeting different environmental attributes or products. Vertical differentiation may lead to several ELIS acting on the same product category but with different levels of environmental stringency.

Measuring the impacts of ELIS on the overall environmental effectiveness of the schemes and on international trade has proven very challenging. Data and methodological challenges mean that the empirical literature has barely begun to explore the impacts of ELIS, much less the effects of multiplication. However, the theoretical literature provides some insights into the potential environmental impacts of label competition and multiplication. Although considerably simplified and so not necessarily reflecting reality, theoretical models suggests that label competition in a market with free entry could lead to a lowering of environmental standards, in particular where some labels are introduced by business entities seeking only the most profitable way to respond to more stringent ELIS already existing in the market.

In practice, there is some evidence that label competition has led to harmonisation and market-driven convergence in standards over time, for example amongst regional Type I ecolabels (e.g. EU Eco-label) and the forest certification sector. Vertical differentiation can lead to establishment of deliberately weaker lower-end standards. This can be beneficial as "entry-level" ELIS can attract worse-performing actors as a first step towards increased environmental performance. However, if vertical differentiation is misused to oversell the environmental benefits of weaker standards, a form of "greenwashing", this could be detrimental to overall effectiveness. In general, it is important that convergence leads to more holistic and streamlined ELIS rather than acting as a market-driven downward force on the stringency of standards or quality of scheme implementation. Although evidence is not conclusive, effects are likely to differ between different label types and sectors.

Although concerns have been raised that certain types of ELIS could act as barriers to international trade, adoption of ELIS can also provide trade opportunities at the producer level. Likewise, while existence of multiple ELIS for the same product sector and market could further increase certification costs for producers, one empirical study points to increased productivity gains for small farmers having adopted multiple certification standards. Further, the level of inter-operability of different ELIS systems, especially at the producer level, can be key to ensuring that costs do not increase as the labelling market grows. This is because the cost impact on producers due to multiplication is a function of the strength of cooperative and contradictory interactions between ELIS, rather than just the total number of schemes.

The likelihood that voluntary ELIS may raise trade concerns can depend on the design of schemes and whether foreign producers perceive them as "de facto" market access requirements. Although difficult to demonstrate empirically, this effect could potentially arise if a particular ELIS establishes a dominant position in a market. One way that market dominance could occur is if government or non-government

responses to ELIS multiplication lead to market convergence on one or more particular scheme. Such an ELIS may then be seen as a market access requirement, even if legally voluntary. For data-intensive quantified ELIS such as PCF and PEF, the design of the standard and how data challenges are overcome are important factors for ensuring that the ELIS applies even-handedly to producers across different countries. However, ensuring that standards are developed with international and cross-sectoral consultation can help to ease concerns about market access, as well as providing streamlined procedures for small and medium enterprises, ensuring that worse performers have an entry point, and providing capacity building and information campaigns.

A range of governments and non-government stakeholders have already taken actions that have affected the multiplication trend. Some of these actions are explicitly aimed at addressing multiplication; others aim more generally at improving transparency and maintaining high standards across the range of ELIS, but with the effect of "weeding" out lower quality schemes. Non-government actions include mutual recognition agreements between existing ELIS operators, establishment of voluntary codes and development of many comparison and benchmarking tools. Government actions have included introducing "focal" ELIS (or standards on which non-government ELIS can be based) and developing criteria to guide public procurement.

Governments seeking to further positively influence the development of the ELIS market could collaborate to create trusted sources of comparison information across different types of scheme, though such initiatives should build on the experience of existing international initiatives in the public and private spheres. A key determinant of the cost impact of multiplication on producers is the level with which different ELIS are designed to be inter-operable (e.g. similar criteria, audit procedures or mutual recognition). Inter-governmental initiatives could thus act to promote interoperable design of ELIS further.

ANNEX A. TECHNICAL CHALLENGES FOR QUANTITATIVE FOOTPRINT ELIS

Product carbon footprinting

The popularity of product carbon footprinting (PCF) grew during the early 2000s as public concern about climate change increased and retailers sought to better understand the GHG emissions related to the supply chains of their products. Many carbon footprint labels already exist around the world, all seeking to be a valid gauge of greenhouse gas emissions related to particular products. In addition to quantitative footprints, some schemes with binary seal logo linked only to GHG emissions also exist.[17]

So far, no country has introduced mandatory regulation for carbon or environmental footprinting. In their overview for the JWPTE in 2009, Bolwig and Gibbon (2009) identified a number of emerging standards and mapped them to the range of PCF schemes being developed, both publicly and privately – 15 schemes in total. At the time, the British PAS 2050 standard was the most widespread, the WRI-WBCSD Greenhouse Gas Protocol standard was starting to be used widely, and the specific ISO carbon footprinting standard (ISO 14067) was under development. Since then, the picture has not changed dramatically in terms of standards available: PAS 2050 and GHG protocol are still widely used, and the ISO process has moved to the Technical Specification stage but agreement has not yet been reached to release a full standard (ISO, 2013).

The voluntary market uptake for product carbon footprinting has been very variable. In the UK, for example, there was initially strong voluntary market interest, but major supermarkets have since back-pedalled on their commitments to add PCF labels to all of their products. They mostly cited the high cost of calculating and certifying footprints relative to lack of consumer interest and lack of commensurate action from competitors (e.g. see The Grocer, 2012). Whilst various privately-run PCF label schemes have persisted, these tend to apply to a small number of product types and have not gained widespread consumer recognition. Elsewhere, pilot PCF schemes have emerged in a number of countries including Canada, Australia, New Zealand, Korea and Japan, though market uptake has for the most part been slow.

While the PAS 2050 remains the most comprehensive and detailed public PCF standard, experience with applying the standard to specific products has shown that the methodology still requires some interpretation and a risk for value judgement in application of the standard (Brenton *et al*., 2009b).

A recent study comparing PCF schemes for food products, carried out for the French government, found that in most cases sufficient data was lacking to allow for clear understanding of footprints reported (EVEA and Martin Savet Associés, 2012). The study directly compared 14 footprint labels in several European countries as well as Australia, Japan and Korea. For most products, significant variance was found in the GHG footprint numbers resulting from different PCF schemes. In the case of milk, schemes different in their carbon footprints of the same product by a factor of 2.3. Also, significant differences in GHG score were found between different variants of the same product, even when using a single PCF calculation methodology (e.g. one type of milk was found to have a GHG footprint double that of another

[17] e.g. the Swedish a climate certification label for the food sector, awarded to products meeting criteria laid out in a bespoke standard. The scheme is run as joint initiative between KRAV (the Swedish organic agency) and Svenska Sgill, the food certification agency. It is voluntary and has been designed to be as modular as possible, so that it can be added as a climate component to other sustainability standards or other ELIS.

type). Furthermore, although all the schemes use life-cycle analysis, a breakdown of the results shows that, for the same products, the phases of the life-cycle having most influence over the GHG result are not the same for all PCF schemes. Reasons for this included a lack of transparent Product Category Rules detailing the calculation of footprints and a lack of basic emissions data available. While some variability among competitors' products GHG footprint scores is expected to allow consumers to choose between the best and worst performing products, the French study concludes that the variation found is so great as to raise questions about the reliability of the calculations used and the impacts of the results on products appearing in the marketplace (ibid). This makes the comparison of PCFs difficult and potentially open to trade disputes, due to tensions around accuracy and differences between methodologies. However, several initiatives aim to solve these challenges by developing integrated systems including product category rules, databases, calculators and verification solutions with the objective of enhancing reproducibility and comparability.

Uncertainty around the use of default factors and the scope of the LCA calculation can also have important implications. Default emissions factors will be important where data does not exist, but there is a risk that producers may choose to use a default factor even when better data is available, if it improves their score. This introduces further subjectivity. Regarding scope, the emissions from the production of capital goods are not always included in the footprint calculation (e.g. the original version of PAS 2050) and this can artificially reduce the footprint for highly mechanised production; possibly in favour of developed country producers (Bolwig and Gibbon, 2009).

At the other end of the LCA chain, some PCF standards include the use and disposal phase of the product, and others do not. Inclusion of this phase adds significant uncertainty, and assumptions need to be made about the behaviour of the end user. In addition to these methodological considerations, inclusion of use-phase emissions inevitably increases the overall footprint of the product, thereby reducing the influence on the total score of differences between countries of production.

Quantitative "footprint" schemes are inevitably strongly influenced by distance-to-market and transportation concerns, given that they take a life-cycle approach to impacts along the environmental dimension chosen. This can lead to concerns that ELIS might discriminate suppliers based purely on distance to market factors, although transportation may be only a small portion of the carbon footprint and the fact the goods travel further does not necessarily mean that more energy is used. However, no specific distance-related ELIS were found to be still in operation, and Bolwig and Gibbon (2009) found no bias in the way the PCF methodologies treated long-distance transport relative to other emission sources.

Product environmental footprinting

To broaden the concept of PCF, over the past few years some policy makers and private sector firms have been seeking to introduce product environmental footprinting (PEF) to measure the quantitative impact of a product for a number of environmental dimensions, usually including GHG emissions. The result is a quantitative environmental score aiming to convey an assessment of the overall "environmental friendliness" of the product by focusing on a life-cycle approach for certain key environmental aspects. Environmental dimensions often include water and biodiversity impacts, amongst others. This makes PEF more challenging than for the case of carbon footprinting, due to complexities around measuring the material impacts of water use and biodiversity exploitation.

On the private sector side, Type III Environmental Performance Declarations (EPDs) are often similar to publicly initiated PEF schemes. EPDs can be certified by a third-party, for example via the International EPD System (Swedish Environmental Management Council, nd). On the policy side, two PEF initiatives stand out in particular. The French government co-ordinated a pilot involving private sector volunteers in

2011-12, and the European Commission is running a series of pilots in 2013-16, having released a guide to calculating PEF in 2013 (EC, 2013).

As with PCF, the credibility of PEF depends upon the standards used to quantify impacts, which are highly contextual and depend on local conditions. In addition to needing country-specific data, it is important that the overall methodology is transparent and agreed by all stakeholders. The key to any life-cycle-based approach is in the product category rules used to calculate life-cycle impacts. Various international efforts exist to improve and collaborate on PCRs, including the European Commission, a UNEP and US EPA initiative to promote intergovernmental cooperation in LCA.

Water footprinting

Water use is usually a key element of PEF. Water footprinting can also be carried out independently of other environmental characteristics. The only water-specific ELIS to date are however targeted to the use-phase of products only, and do not aim to quantify a life-cycle water footprint. Water footprinting poses some unique technical challenges.

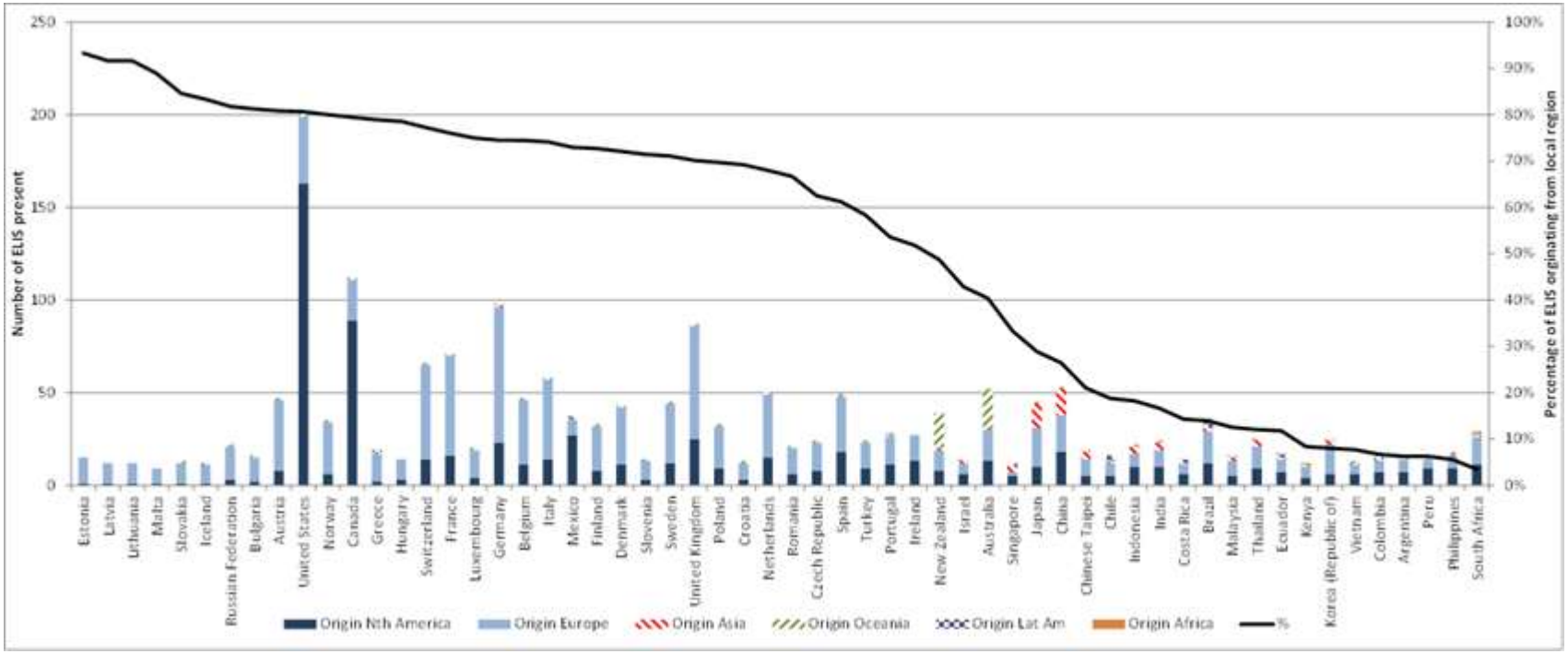
For a water footprint calculation to be meaningful, it is not sufficient to consider only the volume of water consumed during the life-cycle of the product, but also the impact. The impacts of water use are highly contextual and depend on local conditions. A water-intense production process will not have the same resource impact in a water-scarce area than in a water-rich one. Therefore, the costs and benefits of water use depend largely on the opportunity (scarcity) costs of water resources. The ways in which water is combined with other inputs in production and consumption is also important. Likewise, the environmental impact of water effluent from production processes varies depending on the sensitivity of the local environment.

Water footprinting has been informed by the literature on the concept of "virtual water trade". Developed to assess the water impacts of traded agricultural crops, this approach aims to estimate the net water use embedded in crops traded internationally, as a means to assess whether certain countries are net importers or exporters of embedded water. Whilst useful in raising awareness of policy challenges surrounding water resources, "virtual water trade" has been criticised as being insufficient for determining water-related policy due to lack of clarity on the underlying concept (Wichelns, 2010).

Despite these challenges, an ISO working group was launched in 2009. In 2014, ISO published ISO 14046:2014 which specifies principles, requirements and guidelines related to water footprint assessment of products, processes and organisations based on LCA. Only air and soil emissions that impact water quality are included in the assessment, and not all air and soil emissions are included. The result of a water footprint assessment is a single value or a profile of impact indicator results. Whereas reporting is within the scope of ISO 14046:2014, communication of water footprint results, for example in the form of labels or declarations, is outside the scope of this standard (ISO 2014).

ANNEX B. GEOGRAPHICAL ORIGINS OF ELIS

Figure 3. Origins of ELIS applied in various countries



Source: Author, using combined dataset from Gruère (2013). Countries represented in this chart are those with the highest number of active ELIS present, according to the dataset. The bars refer to the left-hand vertical axis (total number of ELIS), with different shading for different global regions of ELIS origin. The line refers to the right-hand axis, the percentage of ELIS originating in the local region.

ANNEX C. THEORETICAL MODELS OF ECOLABEL COMPETITION EXPANDED

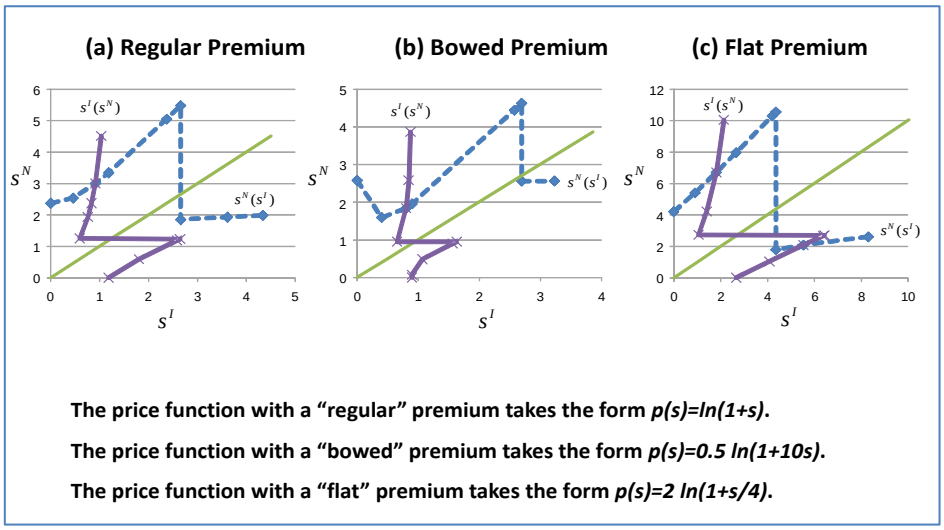
Fischer and Lyon (2014a) offer the first theoretical analysis of two competing ecolabels with a fully developed game-theoretic underpinning.[18] The authors develop a model in which there are many small producers with differing costs of achieving certification. They study competition between two ecolabels, one run by a non-profit NGO whose goal is environmental improvement, and one run by a for-profit industry association whose goal is to increase industry profits.

In the model, producers can certify to either label, based on which is the more profitable for them. The two sponsors each offer a binary ecolabel, that is, their labels do not offer multiple tiers of certification. Sponsors choose the stringency of their labels strategically, taking the other's reactions into account. Figure 4 illustrates the variety of forms that the players' reactions may take, depending upon the degree of curvature of the demand function; it assumes throughout a narrow and symmetric distribution of firm's costs of environmental improvement.[19] The symbol sN denotes the NGO label's stringency and the symbol sI denotes the Industry label's stringency. The reaction curves are generally upward sloping, which indicates that if the rival ecolabel increases its stringency, then one's own best response is to increase stringency as well. However, the reaction functions also display jumps at certain points, which means that the NGO label and the industry label can switch their relative levels of stringency. In all cases studied, it is a market equilibrium for the NGO to set a tougher standard than the Industry, but in some cases, such as that shown in figure 4, panel c, there may also be a "reverse" equilibrium in which the Industry sets the tougher standard.

[18] Ben Youssef and Abderrazak (2009) study a standard duopoly model of vertical differentiation in which there are two labels, and it is assumed it is impossible for more than one firm to use a given label. They assume it is more expensive to certify to the low-quality label than the high-quality label. The authors do not say so explicitly, but it appears that if a firm does not have a label, consumers assume its quality level is zero so the firm has no incentive to invest in quality and thus does indeed choose quality of zero. In this type of model, qualities are strategic complements, and price competition intensifies when the low-quality firm raises its quality. Thus, the low-quality firm has incentives to choose a quality level of zero, and indeed the authors state that the high-cost firm would earn more profits if it did not certify to the low-quality label. Nevertheless, they go on to claim that the low-quality firm certifies and chooses a positive level of quality. Proofs are not included in the paper, so the reader tries in vain to resolve these contradictions.

[19] The simulation employ a logarithmic price function of the form $p(s)=h\ ln(1+js)$. Varying h and j changes the curvature of the price function. The "regular" price function uses $p(s)=ln(1+s)$, the "bowed" price function uses $p(s)=0.5\ ln(1+10s)$, and the "flat" price function uses $p(s)=2\ ln(1+s/4)$.

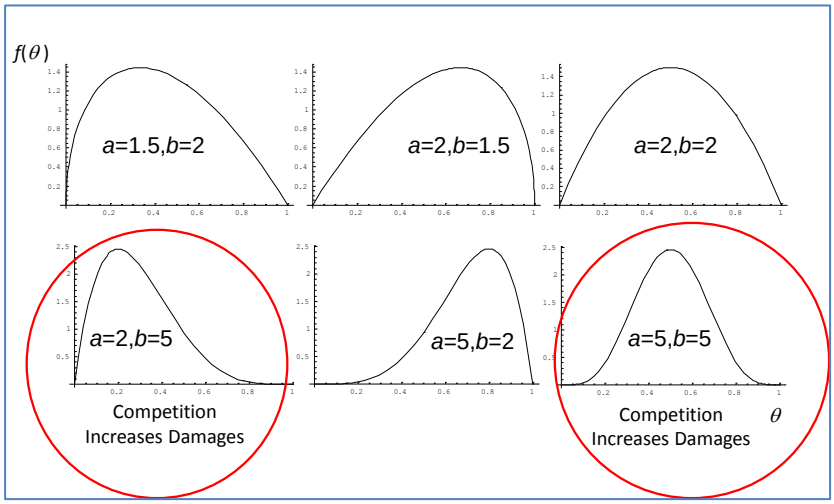
Figure 4. Reaction Function Examples (Narrow, Symmetric Distribution)



Source: Fischer and Lyon.

The authors show that competition between ecolabels with different goals may degrade environmental performance even under full information, and characterise conditions under which this is more likely. In particular, as shown in Figure 5, when the distribution of producers' certification costs is narrow, multiple certifications can reduce environmental performance. From an environmental perspective, it would be better to let the NGO have monopoly power in the standards market, and set a single, relatively stringent standard. If the industry label enters, it sets a lower standard and draws off some of the demand for the NGO label, and it may also induce the NGO to weaken its standard in response. However, competition can also improve environmental performance if there is a wide distribution of producer costs. In this case, a single NGO label cannot meet the needs of a large percentage of producers, and the NGO faces a dilemma of choosing either a stringent standard with relatively little uptake from producers, or setting a weak standard with a large amount of uptake by producers; in either case, environmental impact is limited. Thus, even though the industry label tends to be less selective than the NGO label, competition can increase overall environmental performance by increasing total uptake.

Figure 5. Examples with the Beta Distribution of firms' certification costs



Source: Fischer and Lyon.

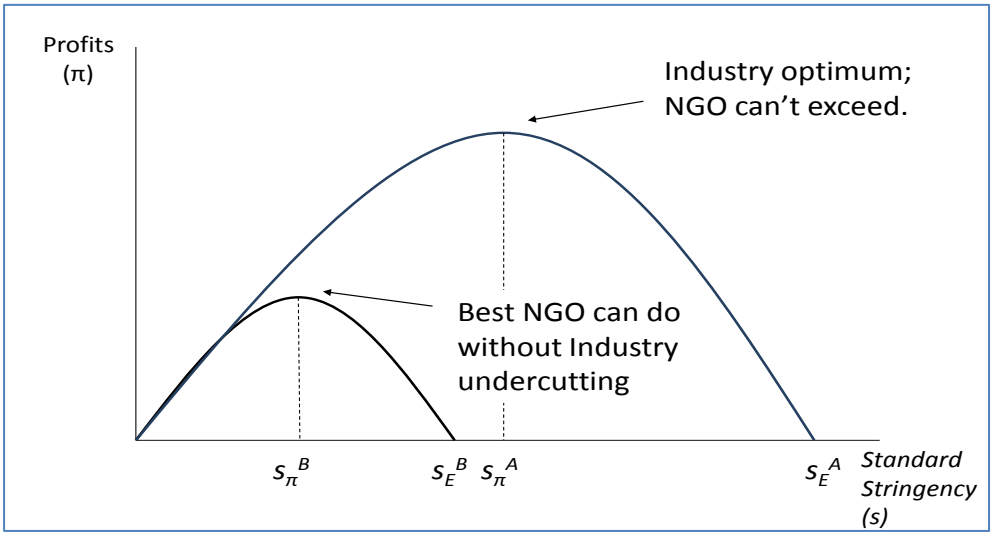
Fischer and Lyon (2014b) develop a theory of multi-tiered ecolabels such as Leadership in Energy and Environmental Design (LEED), which awards labels at the Certified, Silver, Gold and Platinum levels. This is in contrast to the more common binary form of ecolabel, which either grants a firm the label or not. They build on the familiar model of vertical product quality, but instead of a duopoly they allow for two groups of price-taking firms, with the two groups differing in their cost of environmental improvement. Type A firms have low costs of abatement, and type B have high costs of abatement.

The authors begin by analysing the incentives of each sponsor in isolation to use multi-tier or binary labels. Ideally, the NGO would prefer a multi-tier label that pushes each type of firm to the environmentally most demanding standard it can afford to meet, referred to as s^A_E and s^B_E, respectively. This type of label is not viable in the marketplace, however, because type A firms will opt for the less-demanding standard s^B_E, which allows them to earn higher profits. Thus, depending upon the relative costs of the two types of firms, and the mix of firms in the population, the NGO may: (a) set a stringent binary label at s^A_E , which only the low-costs firms can meet, (b) set a lax binary label at s^B_E , which both types of firms can meet, or (c) set a multi-tier label that includes a lax standard targeted at high-cost firms and a more stringent standard that attracts low-cost firms by being slightly more profitable for them than the lax standard.

The authors find that the industry prefers multi-tiered labels under a wider range of parameter values than does the NGO. When the industry sets a multi-tier label, it sets the standard for low-cost firms at their profit-maximising level, and distorts downward the standard for high-cost firms in order to soften price competition. The NGO always sets more stringent standards than the industry association would.

When there is competition between multi-tier ecolabels, there is a simple and unique equilibrium, which involves a standard for the low-cost firms that is set at their profit-maximising level and a standard for the high-cost firms that is set at their profit-maximising level. This outcome involves weaker standards than the NGO would prefer, but it is not the same as what the industry association prefers, because the standard for the high-cost firms is higher than would maximise overall industry profits. Figure 6 illustrates the profits of the low-cost firms (type A) and high-cost firms (type B), respectively, as standards become more stringent. The environmentally best standards are at s^A_E and s^B_E, respectively, but the equilibrium involves s^A_π and s^B_π instead. This equilibrium is dominated by business rather than environmental concerns, and reduces environmental performance relative to a single environmental label run by the NGO.

Figure 6. Unique Equilibrium in Multi-tier Competition



Source: Fischer and Lyon.

One way to interpret these results is that many labels were initiated by environmentally-motivated agents such as NGOs or government environment agencies. When they were the only label available, they had market power to set stringent standards. As competition emerges from profit-oriented labels, however, the NGO label loses its power to set tough standards and the equilibrium gravitates to an industry-dominated outcome.

These papers on strategic label competition demonstrate that competition may reduce environmental performance relative to a single NGO-led label. This is more likely when the labels involve multiple tiers, or if the labels are binary but most firms in the industry have similar costs of abatement. However, it seems likely that consumers place greater trust in labels sponsored by NGOs than they do in industry-sponsored labels. If so, this gives an NGO label an advantage in the marketplace, and provides a natural brake on the downward pressure on standards that competition can create. Furthermore, NGOs may be able to bolster demand for their labels by orchestrating anti-corporate campaigns against firms that do not certify to them (Conroy 2007; Baron 2011). Both these factors may prevent competition from driving standards down to the profit-maximising levels for different types of firms.

Monopolistic Competition in Labels with Free Entry

Although the existing literature provides numerous insights into label competition, it has not yet addressed competition between more than two labels. This seems like an important extension of the literature, since the ecolabel market often involves dozens of competing labels within a given product category. As a step toward such a theory, this section draws upon the literatures on horizontal and vertical product differentiation and uses them to sketch out a conceptual model of label competition with free entry.

Ecolabels differ both in terms of the attributes of production on which they focus, and the stringency of their standards. The former is a type of *horizontal* product differentiation, or "variety," while the latter is a type of *vertical* product differentiation, or "quality." Both dimensions are clearly important, but there is very little work incorporating both. Furthermore, the proliferation of labels over time strongly suggests that entry barriers for new labels are relatively low. Models of monopolistic competition based on Salop's (1979) "circle model" (described below) are well suited to capture environments where variety and free entry are important, but they usually do not incorporate quality. Fortunately, there is a literature in industrial organisation that extends the standard circle model to include vertical product differentiation as well. This literature offers some intriguing insights into how the ecolabel industry may evolve.

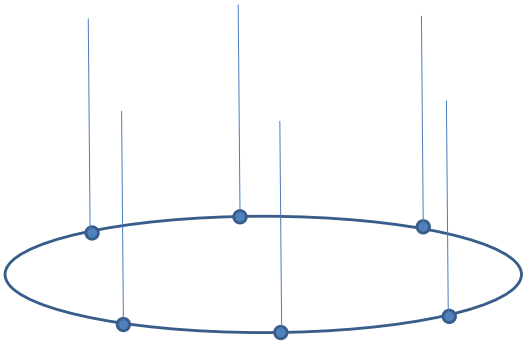
The literature on monopolistic competition with free entry has established that the amount of entry may not maximise social welfare (Spence 1976; Dixit and Stiglitz, 1977). Two forces are in tension with one another, a "business stealing" effect and a "product diversity" effect. On one hand, a new entrant steals business from existing rivals, which reduces the efficiency with which they exploit economies of scale, and hence which tends to induce excessive entry. On the other hand, a new entrant increases product variety, which produces consumer benefits that the firm cannot fully capture, and hence tends to induce too little entry (Mankiw and Whinston, 1986).

In addition to the question of how much entry occurs, there is the question of how closely the products of firms in the market resemble one another. The literature on product differentiation has hotly debated whether firms have incentives for minimal or maximal product differentiation, with most work concluding that maximal differentiation is preferred because it relaxes price competition.[20] When economists study

[20] Hotelling's (1929) seminal "linear model" of spatial differentiation argued for the principle of minimal differentiation. His classic metaphor was of two sellers located along a "Main Street" or along a transcontinental railway, with potential customers spread uniformly along the line. The customers must travel to reach any seller, and thus any purchases involve travel costs for purchasers as well as the purchase

competition between firms with different varieties of a product, they often envision customers to be uniformly distributed around a circle (Salop 1979). This has the virtue of treating all customers symmetrically, eliminating customers who are "trapped" at one end of the line. It is also a model that is well suited to analysing the equilibrium level of entry when there are fixed entry costs but no other entry barriers. Firms in this setting typically locate so as to maximise the distance between one another. Economides (1993) extends the circle model to include vertical quality as well as variety, as illustrated in figure 7. Firms locate themselves evenly around the circle, maximising the distance around the circle from other firms to the maximum extent possible. They choose identical levels of vertical quality. An important finding is that there is excessive product variety (i.e., entry) from a social perspective, but insufficient quality. Furthermore, the more varieties there are in the market, the lower is product quality. Thus, there is a rationale for public policy setting a minimum quality standard.[21]

Figure 7. A Circular City with Maximum Variety Differentiation and Minimum Quality Differentiation



Source: Lyon.

Deltas *et al*. (2013) study competition in a duopoly where consumers care about both product variety and environmental quality. They assume that one firm's product has an inherent level of environmental quality that is higher than that of the other firm, although both firms can also invest to increase their environmental quality levels further.[22] Results turn out to be rather counter-intuitive. For example, the

price. Taking these travel costs into account, the first seller wants to set up shop precisely in the center of the street. Confronted with this choice, the second seller's best move is to locate right beside the first seller, and take the half the market that is closest to him. This is sometimes referred to as the "minimal differentiation" result. However, D'Aspremont *et al*. (1979) identified technical problems with Hotelling's analysis, and found that if travel costs are quadratic in distance rather than linear, as Hotelling had assumed, then firms prefer maximal differentiation instead of minimal differentiation. Similarly, in models of vertical quality competition, firms want to maximally differentiate their products in order to soften price competition (Shaked and Sutton, 1982).

[21] Ansari et al. (1998) and Irmen and Thisse (1998) study extensions of a linear Hotelling duopoly to multiple dimensions of variety, with consumers distributed uniformly throughout the attribute space. Their key finding is that there is maximal differentiation on the dimension consumers are most sensitive to, and minimal differentiation on the other dimensions, lending support to the findings of Economides (1993).

[22] The model is based on that of Economides (1989), who developed a duopoly model that adds vertical quality to a "linear" model of product variety, where consumers are uniformly distributed along a line. He finds that the outcome of the game involves maximal variety differentiation and minimal quality differentiation. This model has been widely used in industrial organization, where authors often simply assume the existence of two firms located at opposite ends of the unit line. Deltas *et al*. (2013) introduce the idea that the firms are asymmetric, with one firm having an inherent quality advantage over the other.

low-quality firm's quality may increase with the cost of its provision or decrease with consumer willingness to pay for it, and a minimum quality standard leads the greener firm to lower its quality and can even reduce average quality. In addition, environmental quality is underprovided even if consumers fully internalise any environmental externalities. Furthermore, the effects of a policy intervention on the two firms can be very different from one another. In particular, an MQS can reduce welfare if the greenness of the high-quality firm exceeds the MQS, even when environmental quality is underprovided.

Taken together, the models of competition in variety and quality have several interesting implications for label competition, many of which are already observed in the marketplace. Assuming consumers vary in their preferences for particular varieties of goods, products will tend to emerge that cater to particular market niches. In the case of ecolabels, for example, as pointed out by Gruère (2013), some focus on greenhouse gas emissions, some on organic content, and others on workplace safety and equity. This multiplication of varieties is socially beneficial, as it allows markets to provide products tailored to customer requirements. However, there is a tendency for markets to attract too many varieties of products. This is because each new entrant ignores its impact on the other firms already in the market. This is consistent with the often expressed concern that there is too much entry into the market for ecolabels. If customers all agree that higher quality is more desirable, but differ in their willingness to pay for quality, then without horizontal differentiation firms will try to differentiate themselves on quality so as to reduce price competition. In the ecolabel market, for example, some firms will opt for stringent certifications and others will opt for weak certifications, as appears to be happening in practice. The models predict that when firms compete on multiple dimensions of product differentiation, the forces of competition tend to be channelled toward the most salient dimension of differentiation, with products tending toward similarity on the other dimensions. Furthermore, the theoretical literature also suggests that when firms compete on both variety and quality, the forces of competition tend to be channelled toward variety rather than quality. As a result there tends to be too many product varieties in the market, with insufficient quality. This suggests that a government-sponsored minimum quality standard (MQS) would be beneficial. However, it is important for policymakers to approach a MQS cautiously, because the literature shows that if one firm has a competitive advantage in the provision of quality, the effects of a MQS become complex and it may be counterproductive for government to impose one.

Interactions between voluntary labels and regulation

The linkages between the various channels that influence corporate behaviour remain an important topic for further research. For example, certification and labelling schemes may in principle either strengthen or weaken political pressures to impose more stringent mandatory minimum quality standards. Unfortunately, we know little about the conditions under which certification and government regulation are complements or substitutes. Adding urgency to the question, Heyes and Maxwell (2004) show that whether certification schemes are socially desirable depends critically upon its answer. Certification is beneficial when it works hand in hand with regulation, so that certification raises the standards for market leaders while regulation forces up the standards for laggards. In contrast, certification is harmful if it saps the political demand for legislation that would impose minimum performance standards, thereby weakening overall environmental performance across the market.

Heyes and Maxwell (2004) show that a label can weaken political support for mandatory government regulation, and thereby reduce social welfare. They study a model in which there are many small firms, with differing costs of improving their environmental performance. Consumers would like to buy greener products, and are willing to pay a premium for them, but they cannot discern the environmental friendliness of a given product themselves. Efficient firms with low costs of environmental improvement would like to offer greener products, but cannot by themselves convince consumers of the environmental performance of their products. Thus, there is a natural role for third-party certifying bodies to provide consumers with a credible evaluation of a product's green characteristics. In the paper, there is a non-

governmental organisation (NGO) that sponsors a certification and labelling program. The NGO attempts to maximise environmental quality, and sets a standard for environmental performance; any firm that meets the standard is certified, and receives a label that goes on its products. There is also a hypothetical welfare-maximising World Environmental Organisation (WEO) that can set a minimum quality standard (MQS). However, environmental regulations face political resistance from industry, and may be weakened in order to meet the demands of industry members. Heyes and Maxwell show that if the MQS and the NGO label co-exist, then they are complementary to one another, and social welfare is higher with both in place than with either one separately. However, the existence of the NGO label may increase industry political resistance to an MQS. If the NGO label pre-empts the imposition of the MQS, then welfare is reduced relative to the case where there is no label, and the MQS is imposed first.

Baksi and Bose (2007) find that government action can enhance the performance of ecolabels. They consider a model in which products are of only two types: green or brown, and firms can either make their own green claims (self-label) or pay a third party to certify the quality of their product. Government can require labelling of either type. Furthermore, government can require that brown firms label their products as brown (e.g., the tobacco labels required by the US Surgeon General), which economises on labelling costs if there are few brown firms. The analysis emphasises the costly nature of third-party labelling schemes, and the monitoring that is necessary when firms can put false claims or fake third-party labels on their products. They find that self-labelling is often the best policy, because it is cheaper than third-party labelling. However, the government must engage in costly monitoring of either type of label in order to keep brown firms from pretending to be green. (One can imagine that other monitors could do this job, too, although that is not explored in the paper.)

Bottega and De Freitas (2009) also find that labels can weaken government regulation. They study a monopolist that can certify its product using either a label sponsored by an NGO or a label sponsored by a for-profit certifier (PC), either of which can advertise to increase the public recognition of its label. The firm does not have to certify all of its products; instead, it prefers to produce a "brown" variant and a "green," labelled, variant. The authors find that a PC label can be better for society than an NGO label if environmental damages are not too great; the reason is that the PC takes into account profits and consumer well-being, which enter the social welfare function but not the NGO's objective function. Interestingly, the authors find that both types of certifiers lead to "excessive" differentiation between the brown and the green products. In other words, the label is too stringent from the perspective of social welfare because it does not take the consumer benefits of low prices into account. They go on to consider the performance of each of these labels when the regulator simultaneously sets a minimum quality standard (MQS). An important aspect of their model is that the regulator cares about consumer benefits and profits, as well as environmental quality. Thus, in the presence of a label with excessive product differentiation, the regulator attempts to compensate by reducing the difference between the products, which is accomplished by setting a MQS. Furthermore, when the label and the MQS co-exist, the government sets a weaker MQS than it would otherwise, and if the label is heavily advertised the government will abandon the MQS altogether.

In summary, labels and government involvement may be either complements or substitutes. As complements, government monitoring can underpin the credibility of labels. In addition, if a minimum quality standard coexists with an ecolabel, this combination can be socially beneficial; the role for government may gradually recede as ecolabels become better known. However, the existence of ecolabels can increase political resistance to potentially beneficial government regulations, so the two instruments may be substitutes instead of complements.

Imperfect Knowledge of Label Stringency and Consumer Confusion

The literature discussed above assumes that labels are perfectly accurate in sorting good products from bad products, and that consumers have complete information about the stringency of each competing standard. If either of these assumptions is violated, the performance of ecolabels will decline.

Mason (2011) shows that when certification can distinguish a green firm from a brown firm only with a certain amount of noise, ecolabelling can either raise or lower welfare depending upon the cost and accuracy of the certification process. This modelling approach allows for both Type I errors (the product is really green, but the test fails to recognise that fact) and Type II errors (the product is really brown, but the test calls it green anyway). However, since brown firms have incentives to get their products labelled as green, but the reverse is not true, one can argue that intentional fraud by low-quality producers is a bigger concern.

Hamilton and Zilberman (2006) develop a model in which producers can fraudulently label their "brown" products as "green." They find that even without individual product certification, market incentives may be able to support an equilibrium without fraud. This becomes more likely as the number of producers decreases, as the cost of producing a green product falls, and as the cost of fraudulently disguising a brown good increases. In addition, they find that voluntary certification can decrease fraud, increase output, and raise profits per firm. This can be interpreted as a model of consumer confusion in which consumers are unsure whether the one ecolabel available truly represents that a product is green.

Marette (2010) studies a duopoly situation with a representative consumer who values both variety and quality. Firms may spend money to be certified as high-quality, and if both firms choose the same certification decision there is no consumer confusion. However, if the firms make different certification decisions, then a given percentage of consumer demand is confused and mistakes the certification as an indicator of low quality. If the percentage of confused consumers is intermediate in magnitude, then two equilibria are possible; in one, both firms choose high quality and are certified, and in the other both firms choose low quality and are not certified. If the percentage of confused consumers is high, then both firms choose low quality and are not certified.

Harbaugh *et al*. (2011) study a model in which consumers may be uncertain about both the quality of a given firm's product and the label to which it certifies. They take both the product's quality and the stringency of the standard to be exogenous, rather than strategically chosen. A key insight is that certification decisions may affect both the reputation of the product and the reputation of the label. Specifically, if consumers believe the product is of high quality, but the label is not, then the firm's decision to adopt the label lowers the product's reputation but raises the label's reputation. Conversely, if consumers believe the product is of low quality, but the label is of high quality, then the firm's decision to adopt the label raises the product's reputation but lowers the label's reputation. The authors show that even small amounts of uncertainty about the quality of labels can create consumer confusion that reduces or eliminates the value to firms of adopting them. They also show that label proliferation aggravates the effect of uncertainty, causing the informativeness of labels to decrease rather than increase. Furthermore, uncertainty makes labelling and non-labelling equilibria more likely to coexist as the number of labels increases, so consumers face greater strategic uncertainty over how to interpret the presence or absence of a label. As the number of labels becomes large, labelling becomes completely uninformative.

The authors discuss two possible solutions to the problem of proliferation. First, if one label is "focal" (that is, it comes to be a norm that is expected by consumers), this can alleviate the problem of label proliferation. Failure to adopt the focal label is taken by consumers as a significant failing, and has a greater impact on sales than if the label were just one among many options. In fact, in a world with label uncertainty, a focal label plus multiple uncertain labels actually performs better than a single label, because

firms that do not meet the standard of the focal label can still convey some information to consumers by meeting one of the others. This suggests an important role for marketing and social norms in the ecolabel industry. Second, a mandatory label can serve the same function as a focal label, improving the performance of the labelling industry. This suggests that a government-backed label may be able to bring some order to a chaotic labelling market.

ANNEX D. FURTHER INFORMATION ON FIELD STUDIES

This annex includes expanded insights into the field studies on label multiplication discussed in Section 3.3.

Apparel

Fransen (2011) studies the evolution of private governance regimes in the garment industry, based on interviews with participants in the field. Overall, the study suggests that label competition may be inevitable in a fragmented industry where preferences are highly heterogeneous. The analysis begins with the observation that explicit attempts to achieve convergence between alternative standards have failed. In particular, the Jo-In Platform (Joint Initiative for Corporate Accountability and Workers' Rights), a collaboration between the major initiatives working on labour rights, was formed to harmonise various standards, but the effort fell apart in two years due to inability to agree on the appropriate level of stringency. The author argues that a set of political considerations have hindered convergence. One important challenge is that the industry is highly fragmented, which makes any kind of agreement difficult. In addition, the non-governmental organisations (NGOs) involved in the field have incentives to cling to the influence they currently have, making them unwilling to cede it in the construction of a larger merged organisation. Furthermore, there are important redistributive consequences from standards in the industry, making it difficult to find win-win solutions. .

Marques (2013) studies the evolution of certification schemes in the global apparel business, with a focus on how multi-stakeholder initiatives (MLIs) compete with business-led initiatives (BLIs). Overall, the study shows that over time labels in the apparel industry have become increasingly dominated by business concerns. The author finds that the early initiatives were established by NGOs as organised opposition to sweatshop labour, e.g. the Clean Clothes Campaign (CCC), formed in 1989. Starting around 2000, industry trade associations began to play a more important role in shaping the movement, with the formation of groups like Worldwide Responsible Accredited Production (WRAP) in 2000 by the American Apparel and Footwear Association. By the mid-2000s, label multiplication was becoming a concern, and there emerged various attempts to harmonise different standards. As discussed by Fransen (2011), the Jo-In Platform failed in its attempt to harmonise alternative standards. Industry stepped into the breach, with a series of efforts such as the Global Social Compliance Programme (GSCI) to harmonise standards and lead to global convergence of standards. Individual companies also launched their own initiatives, including The Sustainability Consortium (TSC) created by Wal-Mart.

Seafood

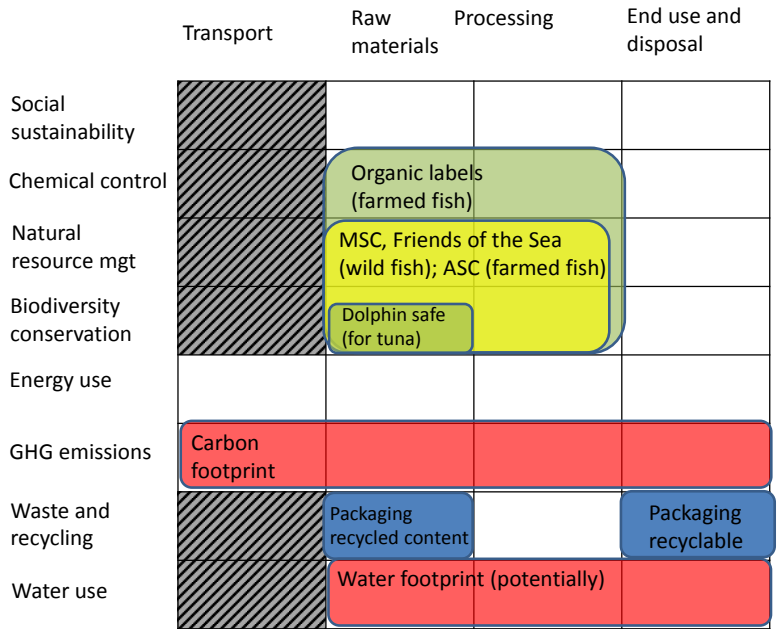
Seafood products have long been the subject of ELIS, beginning with "dolphin safe" tuna in the 1990s. As well as being a prominent case in international trade law (Smith and Caldwell, 2013), the "dolphin safe" label is insightful as a case of multiplication of ELIS in the face of multiple environmental concerns. The label is a true "single issue" label, in the sense that if focuses only on dolphin mortality and not on the overall sustainability of fish stocks: a major challenge for many fisheries (tuna and other species). A recent OECD study of fisheries and aquaculture certification, including eco-labelling, noted the growth of non-government sustainability labels relating to capture fisheries, with governments in some cases financially supporting fisheries to attain certification (OECD, 2011b). These include the Marine

Stewardship Council (MSC) and Friends of the Sea (FOS), consumer-facing labels that compete for packaging space with "dolphin safe" labels on tuna. In the case of farmed fish, the Aquaculture Stewardship Council has recently introduced a standard and accompanying packaging label, and traditional organic labels also apply.

In addition to the labels listed here, OECD (2011) notes that many major retailers have either introduced their own ELIS (or fish-related environmental claims), and fisheries companies have moved towards self-certification in the form of the International Seafood Sustainability foundation (ISSF), a membership organisation started by tuna suppliers (Kirby *et al*., 2014).

There remains nonetheless a potentially confusing area for consumers, in particular due to the prevalence of non-certified "Type II" sustainability claims. Recognising the great diversity of consumer-facing claims being made in supermarkets, ClientEarth (2011) examined claims across 100 products in UK supermarkets. They found six categories of claims in addition to "dolphin safe", referring to sustainable or responsible sourcing, protecting the marine environment and, in the case of farmed fish, to responsible farms. Many claims were found to be backed-up with recognised third-party labels such as MSC or FOS. However, 32 products carried claims that Client Earth found to be misleading, unverified or unverifiable.

Figure 8. Mapping ELIS for Seafood



The problem of Type II claims competing with third party labels such as MSC is compounded by relatively low levels of recognition of the MSC logo amongst consumers. As for other product types, such claims are subject to national fair trading and advertising standards regulations, but these are difficult to assess in the case of npr-PPM relating to complex matters such as fishery sustainability. At the European level, fish labelling regulations exist but extend only to species and catch area, not to specific environmental concerns (Client Earth, 2011).[23] Whilst a set of international "Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries" were agreed by the FAO in

[23] In some cases sustainability may be closely linked to the species and origin, for example in cases where a particular geographic fishery is facing critical stock declines. Producers are not however obliged to note these concerns when labelling products according to species and origin.

2005 and revised in 2009 (FAO, 2005), these are mostly process-oriented. They include principles for sustainable fisheries management, guidelines for monitoring and auditing, as well as indicating that ELIS should be in line with WTO trade rules.

Country of origin labels can be difficult to distinguish from true ELIS relating to environmental concerns, and a "buy local" message can be used as a proxy environmental message without justification. One study found price premiums for local fish that were as high or higher than premiums for sustainability standards (Asche *et al*., 2013).

Brecard *et al*. (2012) use data from a French survey into seafood preferences carried out on 911 respondents in 2010. Respondents were asked to rank their preferences for each of the three hypothetical labels. The health label was ranked first by 45%, followed by the ecolabel with 33%, and the fair trade label with 22%. The survey also gathered a substantial amount of demographic information, and the authors use this data to estimate the determinants of label rankings showing variances in demographics, education and issues of concerns among consumers.

Agriculture: Coffee and Cocoa

Reinecke, Manning and von Hagen (2012) conducted an in-depth case study of the market for certified coffee. The analysis is based on the contents of 40 semi-structured interviews with participants and stakeholders in the sustainable coffee market, particularly employees of Fairtrade, the SAN-Rainforest Alliance and 4C. They argue that two "mechanisms" determine the evolution of standards markets: "convergence" on objectives and certification practices, and "differentiation" of distinctive features, target groups and stringency levels.

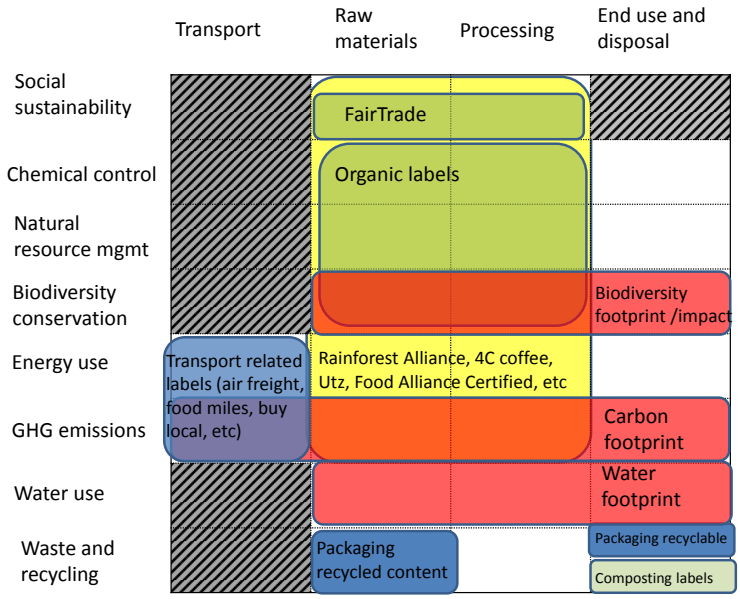
Pressure for convergence comes from producers, who find it costly to deal with multiple certification standards with different procedures. One response from standards sponsors is "mutual recognition," whereby they acknowledge one another's standards as roughly equivalent. For example, if a producer is certified organic, Fair Trade might not require that the producer submit to its own certification for environmental attributes. This mirrors efforts taken by Type I ecolabels (on non-food products) for mutual recognition of each other's standards. Harmonisation of standards also occurs through the adoption of industry codes of best practice, as promulgated through the ISEAL Alliance, which does not set specific standards but instead lays out best practices for the development and maintenance of standards.

At the same time, each ELIS tends to differentiate itself both horizontally and vertically. In the coffee sector, horizontal differentiation (or variety) occurs through emphasis on attributes such as organic, bird-friendly, fair trade, shade grown and biodiversity. Vertical differentiation (or quality) occurs through the stringency various labels adopt. The Committee on Sustainability Assessment (COSA) recently released an empirical analysis of coffee and cocoa certification in twelve countries in Latin America, Africa and Southeast Asia (COSA 2014). The study found that certification to more than one standard appears to lead to increased economic benefits for producers as well as environmental improvements. The assessment recognises that the use of a valid counterfactual control group is the most reliable way to establish statistical validity for the analysis, and had access to over 18,000 field surveys from the period 2009-2013. The certifications studied include Organic, Fair Trade, Rainforest Alliance, UTZ Certified, Starbucks C.A.F.E. Practices, Nespresso AAA, and 4C. It is an unusually thorough and wide-ranging analysis, with a lot of very interesting results. The analysis found that on average, certified farms have 14% higher yields, 7% higher net income, receive 32% more training, employ 33% more water and soil conservation practices, and have 17% more biodiversity on their farmland. Higher income was thought to be explained by the combination of higher yields, lower costs of production, and occasionally, higher prices.

Results showed that multiple certifications increased yields by a substantial magnitude, although the increases were not statistically significant beyond the first two certifications. For example, in Guatemala yields rose from 703 kg per hectare with one certification to 1030 with two certifications, 1157 with three certifications, and 1179 with four. Furthermore, there was a positive and significant relationship between number of certifications and net income.

A notable and common example of multiple ELIS application is "double certification" of organic agriculture and fair trade. This is prevalent for fruit and vegetables as well as coffee. Although these schemes do not appear to overlap in terms of scope, FAO (2008) notes that organic certification programmes increasingly include social criteria, and fair trade programmes are now more likely to include environmental aspects. Double certification leads to product packaging displaying one or more organic logos (national or regional) as well as the Fair Trade logo. In coffee, 78% of fair-trade coffee sold in the United States was also certified organic, and elsewhere the level is closer to 50% on average (FAO 2008). These high figures suggest that the labels are accepted by consumers as complementary rather than leading to confusion.

Figure 9. Mapping ELIS for coffee, fruit and vegetables



Forest products

Forest products constitute one area where significant consolidation in ELIS has occurred. In addition to Type I eco-labels covering some forest products such as paper, consolidation has resulted in only two widely-recognised international voluntary standards for sustainable forest management: Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC). The FSC is a classic NGO-led scheme formed in 1992. Privately-sponsored competitors sprung up almost immediately, including the Sustainable Forestry Initiative (SFI) promoted by the American Forest and Paper Association (AF&PA) in 1993, and the Pan-European Forest Certification (PEFC) in 1998-1999. In 2003, PEFC changed its name to the Program for the Endorsement of Forest Certification, and restructured itself to operate as a global not for profit group that recognises other certification standards in countries around the world with now over 30 certifications that are mutually recognised by the PEFC. Both major labels focus on environmental performance, but also address the health and safety of works, and community relationships.

By 2013, forests certified by the FSC and PEFC accounted for 9.1% of global forested area and 23% of managed forests (State of Sustainability Initiatives Review 2014). Whilst the two standards are present in 80 countries, there is a strong bias towards OECD countries (88% of coverage in North America and Europe, according to SSI, 2014). Nevertheless, increasing numbers of forests in developing countries are being certified (with FSC covering 28 million hectares in 40 developing countries according to Resources for the Future, 2014). Price premia for certified forest products vary greatly, and have been estimated at anywhere between 1-30% (State of Sustainability Initiatives Review 2014). As of 2006, 24% of industrial roundwood production came from certified sources, yet aside from the Dutch market only a small fraction reaches the market carrying a logo (Auld *et al*. 2008). FSC is generally viewed to have more stringent standards than PEFC, but over time the two have gradually converged.

Whilst these standards overlap in their purpose, they also overlap in terms of certification of the same physical forests in some cases. Aggregated data for double certification is difficult to come by, but it has been estimated that up to 10% of the certified area is double certified (UNEP, 2012; SSI, 2014). Many suppliers of forest products purchase timber certified by both organisations (not necessarily the same timber, but a supply chain that includes products certified to one or the other).

The existence of only two dominant forest standards nevertheless hides complexity in the underlying landscape of standards. Firstly, PEFC operates as an umbrella organisation recognising other, often nationally-focused certification standards. As with other product categories, some larger firms are turning towards more bespoke standards for sustainability of their forest products. For example, The Forest Trust (TFT) works with major retailers to tailor sustainability standards for their forest products, in part based on existing third-party systems such as FSC, which can then be communicated through corporate reporting rather than consumer-facing packaging labels. TFT also works with forestry companies to help them achieve conventional FSC certification (Pearce, 2014; www.tft-forests.org).

In addition to this "behind the scenes" complexity of standards for forest products, the existence of only two primary forest-specific ELIS belies some further overlap and potential confusion in consumer-facing labels. Firstly, most Type I eco-labels also cover forest products such as paper, and many forest product traders choose to demonstrate that products are certified to a local Type I label in addition to using wood sourced from FSC-certified forests. For paper and wood products, Type I labels cover many dimensions of environmental impact covering the lifecycle of the product, often including pollution from manufacturing and GHG emissions, as well as the sustainability of the sources of the wood itself. Some Type I labels include a requirement for virgin fibres to be sourced from sources certified as sustainable according to either FSC, PEFC or equivalent (e.g. the EU Eco-label; see EU, 2011). Similarly, other standards and labels exist for specific forest products and make reference to FSC and PEFC for certification of the wood used. An example is the Green Gold Label for wood pellets, which also requires extra certification for the pellet manufacturing process (UNECE, 2012).

Secondly, even within a single ELIS there can be multiplication of consumer-facing labels. The FSC has at least three different logos which can be used depending on the make-up of the product and the proof of chain of custody provided by the user of the logo: 100% FSC timber, mixed FSC timber and 100% recycled wood or timber. Whilst surveys show the FSC logo to be highly recognised[24], the multiple versions of the logo can lead to confusion about the meaning of the logo and, for example, the relation of the "recycled" label to waste-related labels concerning recycling – even though the purposes of such labels are entirely distinct.

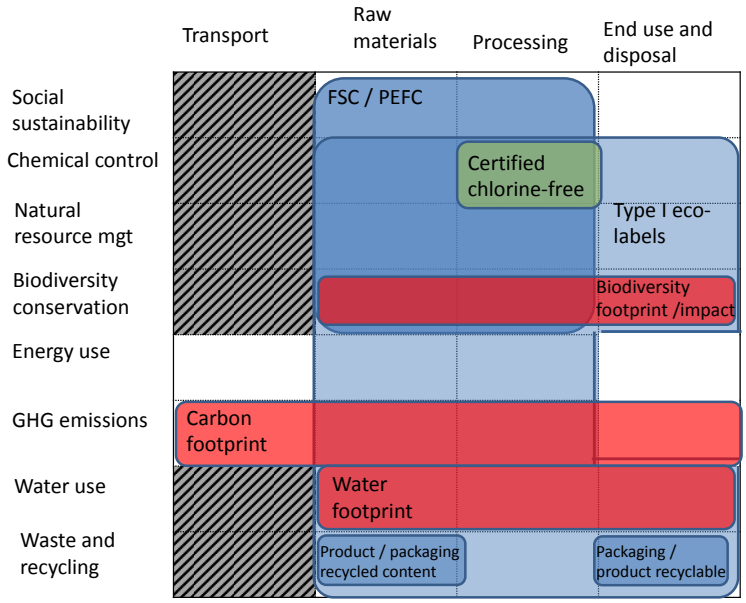
Although the two main forest management standards (FSC and PEFC) are run by non-government entities, there has been considerable government involvement in the standards around the world. Some

[24] Between 15% and 68% of consumers across different OECD countries, according to FSC (2013).

national and local governments have sought to certify their publicly-owned forests, for example the state of Acre in Brazil (ISEAL, 2013). Other governments have essentially built a national forest code using the FSC standard (e.g. Bolivia; Carey and Guttenstein, 2008) and a number of governments require FSC or PEFC certification in their public procurement guidelines (including Denmark and Japan; *ibid*). FSC and PEFC have also acted to revise their standards and certification process in the face of changing legislation, for example to meet the traceability requirements of the EU Timber Regulation (UNECE 2013).

Although there is some overlap of purpose of these ELIS regarding sustainable forest management, there is convergence in the underlying standards, with a strong level of government recognition of non-governmental standards, and a push towards ensuring that standards are locally-compatible for conditions in different countries. Multiplication of ELIS appears to be less prevalent in the forestry sector.

Figure 10. Mapping ELIS for forest products



Electrical appliances and IT equipment

The most prevalent ELIS for electrical equipment are those relating only to the energy consumption of the product during consumer use. However, schemes focusing on PPM do exist. In addition to Type I labels covering certain appliances, other ELIS include EPEAT (a multi-attribute label for electronics, similar in scope to a Type I ecolabel), "Windmade" signifying that the manufacturer purchased renewable energy, and waste-related labels signifying the presence of an Extended Producer Responsibility (EPR) scheme for the appliance.

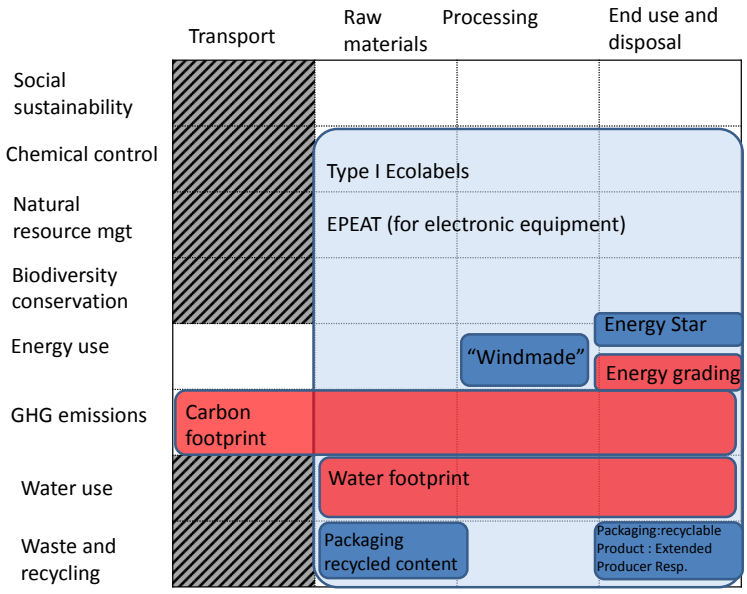
For ELIS targeting energy consumption in the use phase of the product, both seal type certification and quantified grading labels are widely recognised internationally. The most established seal internationally is Energy Star, essentially a government-run voluntary label developed in the United States but now recognised by legislation in many other countries, including the EU.

In addition to Energy Star, graded energy efficiency labels, often including minimum performance standards, have become mandatory in many OECD countries. These labels target the same environmental attribute as Energy Star – energy in the use phase of the product – and in some countries they are displayed

on the same product types. While research undertaken for the US FTC showed consumer confusion between the two labels, the two continue to be prevalent in the marketplace.[25]

In the EU, mandatory energy efficiency grading labels cover large household appliances (white goods) but, in contrast to the US, do not extend to office equipment. The EU rejected a proposal to extend EU Energy Labels to office equipment (which would provide the same format of graded labels as for household appliances, buildings, cars etc.) due to the market costs of this shift and because Energy Star is already officially endorsed for office equipment. There is therefore an unsymmetrical situation between EU and US. In the US, energy star is voluntary but has high market penetration across not only office equipment but also home appliances, commercial heating/ventilation, audio-visual equipment and lighting. In the EU, Energy Star remains voluntary for office equipment (although mandatory for public procurement) but the graded EU Energy Label on appliances is mandatory.

Figure 11. Mapping ELIS for appliances



EPEAT was originally an industry and NGO-led initiative with US government funding support, and it is now mandatory for US federal public procurement of office equipment (in addition to Energy Star). Since 2008, EPEAT has estimated its international influence by measuring products registered in countries outside of the US. There has been a substantial increase in such foreign registrations in the last 5 years, including in non-OECD countries, suggesting growing domestic markets for certified equipment. The growing international presence also signifies an increasing international interest in ELIS for appliances that goes beyond use-phase energy use and also distinguishes products based on upstream npr-PPM.

In conclusion, the most well-known ELIS for appliances focus only on energy-use and only on the use phase of the product. This is changing, with broader sustainability standards growing in popularity, as well as labels relating to product take-back requirements under EPR. Multiplication of ELIS has been limited in this sector, though consumer confusion between limited energy-use labels and broader environmental impact labels is potentially a problem.

Meta study

[25] www.consumer.ftc.gov/articles/0072-shopping-home-appliances-use-energyguide-label.

Turcotte *et al*. (2013) offer a high-level comparison of label proliferation in coffee, forestry and textiles. The study aimed to compare three general approaches to understanding proliferation, labelled the "economic," the "idealist," and the "political-institutionalist" perspectives. Its broad conclusions are that the perspectives are complementary and each have something to contribute, and that certification in one sector can have effects on other sectors. In coffee, there has been a robust competition between 8 different certification schemes. In forestry, competition between multiple labels has gradually converged to a global duopoly shared by the Forest Stewardship Council (FSC) and Pan European Forest Certification Council (PEFC) discussed in the Forestry section below. In textiles, the initial standards were firm-specific, created in response to attacks by NGOs. NGOs, in turn, introduced their own, more stringent standards, and industry responded with its own broader standards. Attempts at consolidation in the textile sector have failed thus far, and over 20 different standards continue to compete, a trend prevalent in other sectors. Several product categories were chosen to examine in the following in order to give a representative cross section of ELIS used in different sectors.

ANNEX E. OVERVIEW OF ELIS EQUIVALENCY TOOLS

Table 5. Overview International Equivalency Tools

Initiative	Tool	Main Purpose	Driver
GSCP- Global Social Compliance Program	GSCP reference Codes	Evaluate level of equivalence of compliance schemes against the requirements of the GSCP Reference tools. build comparability and transparency between existing systems	Business
GSSI - Global Sustainable Seafood Initiative	In development	Use for sourcing and recognition of seafood certification schemes by end users (e.g. retail, food service, public procurement)	Business + government (GIZ)
IDH- The Sustainable Trade Initiative	EquiTools*: Floriculture Sustainability Initiative – FSI Sustainable Spices Initiative – SSI	Assess standards against neutral reference - identify desired practice and to analyse the gap	Public-private partnership
International Trade Centre (ITC) Standards Map	Standards Map online database	A web-based tool enabling comparisons of private standards requirements at various levels of analysis, from social and environmental general requirements to very detailed criteria and indicators.	Intergovernmental
SSCT - Sustainability Standards Comparison Tool	SSCT*	analysis the of standards systems potential performance according to user-set preferences	Government (GIZ) + NGO Standards organisations (via ISEAL)
SSI - State of Sustainability Initiatives	SSI*	Unbiased, objective reporting on market reach and suitability of specific voluntary sustainability standards	NGO (IISD)
WWF International	Certification Assessment Tool (CAT)	formalised methodology to evaluate and compare standards and certification schemes against widely recognised set of sustainability indicators	NGO

*These tools are being built in collaboration with / with support from / in connection with ITC Standards Map.

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