Exploring Voluntary Sustainability Standards Using ITC Standards Map

On the Accessibility of Voluntary Sustainability Standards for Suppliers

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TRADE IMPACT FOR GOOD

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Abstract

Voluntary Sustainability Standards (VSS) have long become a usual attribute of international production and trade. Despite the fact that VSS are not obligatory to conform with in order to be a part of global value chains, they have become de facto mandatory, and non-compliance may lead to exclusion of producers from the value chains. The relevance of VSS is reflected by a growing literature across social sciences, in particular economics and political science. This paper describes a new database that collects comparable information on 180 standards and their governance structure, across a wide range of products and countries. We conduct a first empirical analysis of this data with a primary focus on two aspects of standards and their governance: their practices and features in support of producers, and their geographic availability. We find high variability of support and availability across standards systems and countries respectively. Finally, we identify standards- and country-specific features associated with higher support to producers and higher geographic availability.

JEL Classification: F13, L15, O10, Q01

Keywords: standards, voluntary sustainability standards, sustainable development, SME, Global Value Chains, Certification

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1. Introduction

Voluntary Sustainability Standards (VSS) have become an attribute of international production and trade. Between 2008 and 2014, areas certified by the Roundtable on Sustainable Palm Oil increased almost thirtyfold, while the Rainforest Alliance/Sustainable Agriculture Network's area of coverage expanded more than nine times. Similarly, the UTZ certified area grew by 6.5 times between 2010 and 2014 (ITC, 2016). Standards related to working conditions and the protection of basic human rights play an important role in supporting corporate social responsibility. The Ethical Trading Initiative (ETI) Base Code, Social Accountability 8000 (SA 8000) Standard, and the Business Social Compliance Initiative (BSCI) Code of Conduct are among the major social responsibility schemes currently applied worldwide.

A key driver behind the growth of VSS is internationalization of supply chains, or rise of global value chains (GVCs), as companies nowadays source products from all over the world. The rise of global value chains has facilitated efficiency gains and given consumers access to greater variety and lower-priced products. Supply chains have made production more complex. Lead firms need to be able to ensure that suppliers conform to quality and safety standards, and establish systems to monitor the production process, including the traceability of the origin and flow of inputs and processed products. Product and production process standards developed by the private sector are among several tools used to ensure that suppliers satisfy minimum quality, safety, social and environmental norms. VSS may become de facto mandatory as non-compliance can imply exclusion of producers from GVCs. Moreover, VSS are not a simple phenomenon: they are complex systems, whose status, defining components, and scope can vary significantly from one system to another. Some of these standards have been adopted by companies and others by consumer groups. Several initiatives overlap with each other and compete in the market. Producers may confront significant complexity and uncertainty over which standards to adopt. The same is true for consumers seeking to buy products that conform to environmental, social and quality standards.

Analyses of VSS have tended to take a micro perspective in the sense the focus is on the identification and definition of detailed typologies of VSS and their mechanics. This has generated a broad and interdisciplinary literature on the topic, populated by theoretical models and case studies. In this paper we complement this micro literature with a more macro perspective, providing an overview of the global VSS landscape. A macro perspective allows detecting common patterns across a representative population of standards system regarding the design and implementation of standards, their policy objectives and costs for producers. The analysis is based on a data collection project called Standards Map, launched in 2011 by the International Trade Centre (ITC), a joint agency of the United Nations and the World Trade Organization (WTO). The Standards Map database covers more than 200 VSS systems and offers an unparalleled coverage of the various aspects of their institutional design. Moreover, the data allows mapping the systems' operations to sectors and countries, providing a unique perspective on the global landscape of standards systems.

VSS are often considered costly for producers. In this paper, we examine determinants of such costs in terms of the governance of such standards and in terms of country characteristics. In particular, two specific aspects of VSS are explored: their practices and features in support of producers, and their geographic availability across countries. The database reveals there is great variability in both activities to support producers at the system level and the availability of VSS at the country level. We identify system- and country-specific features associated with greater support to producers and higher geographic availability. A more producer friendly design at the level of standards systems is significantly and robustly associated with participation in meta-standard frameworks such as the ISEAL alliance, which emerges as positively correlated with the likelihood of offering direct support activities to producers, more transparent practices and better shared implementation and certification cost schemes. A positive association is also found between producer friendliness and engagement of both producers and buyers in the management of VSS systems. Availability of VSS at the country level is strongly and statistically significantly correlated with country size and measures of institutional capacity.

The paper is organized as follows. Section 2 starts with defining standards systems and some of the concepts that are the object of subsequent analysis. Section 3 offers a selective overview of the existing economics and political science literature on social and environmental standards. Section 4 describes the Standards Map project and general structure of the database. Section 5 comprises an empirical analysis of producers' support and geographic availability of VSS. Section 6 concludes.

2. Terminology and concepts

The Standards Map spans a wide range of sustainability standards. Collectively, we refer to them as VSS – a term widely used in academic publications and policy circles. There is, however, no universally agreed definition of what exactly a VSS is. The United Nations Forum on Sustainability Standards (UNFSS), for instance, describes them as "specifying requirements that producers, traders, manufacturers, retailers or service providers may be asked to meet, relating to a wide range of sustainability metrics, including respect for basic human rights, worker health and safety, the environmental impacts of production, community relations, land use planning and others."[1] The standards covered in the analysis that follows can all be considered VSS according to the UNFSS' definition. The International Social and Environmental Accreditation and Labelling (ISEAL) Alliance – a London-based umbrella organization of VSS – uses the term "standard system" to describe "the collective of organisations responsible for the activities involved in the implementation of a standard, including standard-setting, capacity building, assurance, labelling, and monitoring and evaluation"[2].

This is also the definition used in this paper. More precisely, with regard to the standard systems listed in the Standards Map, we distinguish the following main attributes: (1) They are not compulsory or legally binding (i.e. they are voluntary from a legal perspective); (2) they focus on social and/or environmental aspects of sustainability (i.e. no purely technical standards); (3) they feature a discernible governance structure (i.e. they are not just a piece of paper but governance systems performing decision-making, standard-setting, verification, and dispute settlement functions).[3]

In addition to defining the main attributes of VSS, it is possible to distinguish different types of systems. Most systems are non-governmental and therefore fall in the category of private standards.[4] This, however, does not mean that they stand in direct competition to public standards. Often, the opposite is true, and VSS frequently reference international conventions in their standards. For example, in the sample of VSS studied in this paper, 56% refer to the core labour conventions of the International Labour Organization (ILO) (ITC, 2016). In addition to the public-private distinction, it is possible to distinguish between single-actor and multi-actor systems, on the one hand, and different sponsorship arrangements (private sector, civil society or collaborative sponsorship), on the other. Table 1 illustrates these different types of VSS, giving concrete examples of systems listed in the Standards Map.

Table 1. Types of VSS

Type of system/ sponsorship	Single-actor system	Multi-actor system
Private sector	Firm-level codes of conduct. E.g., McDonalds Supplier Workplace Accountability Audit System; Unilever Sustainable Agriculture Code	Standard systems created by industry consortia. Examples: Program for the Endorsement of Forest Certification (PEFC); GLOBALG.A.P.
Civil society	Standards developed and administered by a single NGO. E.g. Rainforest Alliance	Standard systems created by alliances of civil society actors (e.g. NGOs, trade unions). E.g., Clean Clothes Campaign (CCC)
Collaborative arrangement	Not applicable	Standard systems that are jointly governed by business and civil society actors. E.g., Forest Stewardship Council (FSC); Roundtable on Sustainable Palm Oil (RSPO)

[1] The United Nations Forum on Sustainability Standards (UNFSS, 2013, p. 3).
[2] ISEAL Credibility Principles, 2013.
http://www.isealalliance.org/sites/default/files/Credibility%20Principles%20v1.0%20low%20res.pdf
[3] VSS are not regulated by a central body at international level, in contrast to, for example, the WTO and its agreements on sanitary and phytosanitary measures and technical barriers to trade. Thus, their governance mechanisms, standard-setting, and verification procedures can vary significantly. For instance, some VSS like the Fairtrade Labelling Organization or the Rainforest Alliance use labels on products, whereas others do not.
[4] A small number of systems in the Standards Map have a public sponsor. One example is the Chinese National Organic Products Certification Program.

3. Related literature

Our analysis focuses on the governance of VSS and its effects on implementation costs for producers and their availability to producers in different countries. These are matters on which there is both an economic and a political science literature.

Economic research has examined the question what motivates standards (the rationale for voluntary standards), their economic effects and the governance structure of standards. One strand of the economic literature relevant for this paper is research on the use of labels to signal quality in a context of asymmetric information. The theoretical basis of work on this theme is the assumption that consumers have preferences for a number of so called `credence attributes' (Nelson, 1970), defined as quality attributes of a good or a service that cannot be assessed by consumers before or after purchase or consumption/use of the good or service. These attributes can be potentially assessed only through a verification process whose costs normally exceed the means of a single consumer. Concrete examples of credence attributes include the environmental/social sustainability of production processes, the ethical content of a business, and the impact of production/consumption on health or safety. In this literature, standards are typically modelled as intermediaries regulating the transmission of information from producers to consumers (or other interested parties such as players downstream the supply chain). Labelling is a prominent policy instrument to implement this transmission of information in practice.

In so far as many credence attributes are connected to public goods such as reduced emissions, biodiversity conservation or consumers' safety, standards systems can be viewed as economic institutions affecting/managing the provision of a public good. Therefore, the increasing role of private standards, and more generally, the presence of multiple standard setters/regulators from both the public and the private sector has motivated an economic research agenda on standards systems that draws from the analytical works on the private provision of public goods (see for instance Besley and Ghatak, 2001 and Besley and Ghatak, 2007). When applied to standards systems, these theoretical frameworks identify conditions under which the public sector's role in certification markets is inefficient and situations where a profit maximizing private entity and/or non-profit nongovernmental organization may be better placed to provide the public good and improve social welfare (see Baron, 2011; Auriol and Schilizzi, 2015).

Bonroy and Constantatos (2015) provide an excellent review of the literature relevant for policy interventions in a context of asymmetric information. They organize the literature along three sets of issues: i) the market structure effects of costless and fully revealing quality labels; ii) the implications of costly and or imperfectly trustworthy certification; and iii) the endogenous setting of labelling standards with multiple and heterogeneous regulators (public/private, for-profit/not-for-profit) and special interest groups.[5]

In the view of Bonroy and Constantatos (2015), the main implications of this research can be summarized in two points. First, the interaction between standards systems and the existing markets distortions is not always conducive to a first best outcome. Second, standards systems bring about distortions on their own, which can potentially originate from an imperfect certification process, from the preferences of the regulator/standard setter, and from the existence of lobbying pressures. A deeper understanding of standard setting systems is therefore important.

In this paper the focus is on VSS systems operating at an international level. In the international trade and development literature standards systems are usually embedded as trade policies in a North-South trade framework and their explicit objective is linked to the achievement of better living conditions for the poor in developing countries, as in the case of the Fair Trade labelling initiative.[6] The public good at stake can vary, such as a reduction in child labour, better working conditions, or stability and access to credit for poor workers/producers. A number of theoretical as well as empirical studies that take this approach are reviewed in Auriol and Schilizzi (2015). These authors document the ambiguous impact of standards systems on poor workers' welfare in the South. Podhorsky (2013) adopts a more specific focus on the

[5] Dranove and Jin (2010) offer a comprehensive review of the theoretical and empirical works on quality disclosure and certification without a specific focus on quality labels. A key line of research discussed in their review is that of the role of competition in the market for certification intermediaries. An important result here is that when competition is not perfect certifiers might strategically manipulate information in order to maximize their share of the economic surplus (see for instance Lizzeri, 1999).

[6] For a discussion of the economics of Fair Trade and a review of the relevant literature see Dragusanu, Giovannucci, and Nunn (2014).

trade implications of (public) standards' adoption rather than on their role for public good achievement. She highlights the protectionist role of a voluntary standard when unilaterally chosen in the North or when non-cooperatively set by trading partners.[7] One particularity of this literature is that it does not pay tribute to the relevance of the design of the standard system for the effect of a standard on trade flows of development outcomes. The standard system itself, instead, receives a lot of attention in the political science literature.

In the field of political science and bordering disciplines (sociology, law, and management studies), scholars have studied social and environmental standards from various angles. Work in the political science tradition has tended to have a stronger empirical focus than the related economic literature. However, much of this research is qualitative in nature due to the unavailability of data. The main strands of research comprise work in the governance literature, the collective action literature, and the critical theory perspective.

A first strand of research in political science is rooted in the literature on global and transnational governance. From this perspective, standards systems are seen as a form of private governance – i.e. institutionalized modes of social coordination to produce and implement collectively binding rules, or to provide collective goods (Börzel & Risse, 2010; Falkner, 2003). Scholars working in this tradition have focused on a variety of topics, such as their emergence and rapid diffusion in the global economy since the early 1990s (Auld, 2014; Gulbrandsen, 2010; Pattberg, 2005; Schleifer, 2016). Other major themes in this literature are the effectiveness and legitimacy of this "new mode of governance". In this context, scholars have studied business compliance with voluntary standards, their wider socio-economic consequences (Cashore, Auld, & Newsom, 2004; Kalfagianni & Pattberg, 2013; Locke, Amengual, & Mangla, 2009), and inquired into the normative and sociological legitimacy of their rule-making activities (Bernstein, 2011; Dingwerth, 2007). Finally, a fast-expanding segment of this literature, studies patterns of interactions (e.g., competition and coordination) between standards systems as well as private standards and public regulatory frameworks (Abbott & Snidal, 2009; Fransen & Conzelmann, 2014; Meidinger, 2006; Overdevest & Zeitlin, 2014; Schleifer, 2013).

A second analytical perspective draws on the collective action tradition in political science, management studies, and economics (Buchanan, 1965; Ostrom, 1990). The so-called club theory approach posits that firms join voluntary standards because they produce club goods in form of reputational benefits. Members can use the club's "brand" to signal their environmental performance to relevant external audiences (e.g., NGOs, consumers, and regulators). In return, they are obliged to adopt and adhere to the club's rules, thus producing social and environmental benefits for the wider society. Scholars working in this vein have explored how firms create and join voluntary clubs in response to problems arising from "common reputations" and "common sanctions" (e.g., NGO campaigning against the chemical industry after Bhopal) (Barnett & Hoffman, 2008; King, Lenox, & Barnett, 2002). In addition, the collective action literature has paid a lot of attention to questions of institutional design and how it affects the membership, reputation, compliance, and, ultimately, effectiveness of voluntary standards (Darnall, Potoski, & Prakash, 2010; Potoski & Prakash, 2009; Prakash & Potoski, 2012).

Finally, a third perspective adopts a more critical view on voluntary standards and private governance. On the one hand, these are works in the field of sociology that describe voluntary standards as the institutional settlements of political struggles and attempts of transnational elites to re-embed global production into a regulatory framework (Bartley, 2003, 2007; Guthman, 2007). On the other hand, there are studies in the tradition of critical research in International Political Economy. These works focus on multinational corporations and the role corporate power plays in the construction and governance of voluntary standards. They also cast a critical light on the distributional consequences and conflicts surrounding sustainability standard-setting, for example, between the interests of actors from the Global North and South (Clapp, 2005; Fuchs & Kalfaggiani, 2010). This literature is relevant for the discussion in this paper on the determinants of the incidence of the costs across actors of a standards system.

The discussion above has illustrated the existence of a broad, multi-faceted, and fast-moving literature of both theoretical and empirical nature. One type of research that has so far been missing in this literature is research that allows for comparisons across standards and their governance. While case study-based research abounds, quantitative studies that would allow generalizing findings across cases remain the exception and are often limited in scope (e.g., Darnall et al., 2010; van der Ven, 2015). This paper contributes to closing this gap using information from the Standards Map Database (SMD) on standards

[7] See also Staiger and Sykes (2011) for a model of trade agreements and quality standards.

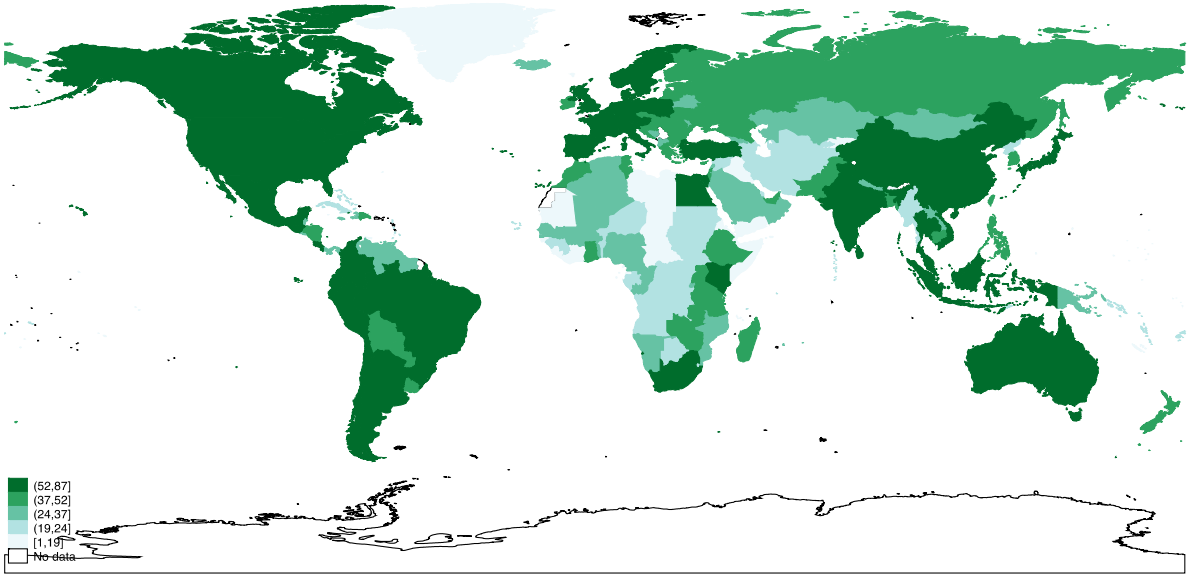
availability across countries and sectors, varying across requirement areas (environmental, social, economic etc.). Section 4 provides a brief discussion of the database, which includes detailed information on the institutional design of standards systems, including status (public/private, for-profit/not-for-profit), transparency/disclosure practices, operations along the supply chain, certification procedures, requirements, stakeholder (civil society, NGOs, public sector) engagement across a number of governance areas including standard setting, dispute settlement, verification, implementation and certification costs allocation schemes, harmonization, concentration and many others.

4. About the data

The ITC Standards Map covers more than 200 sustainability standards, audit protocols, codes of conduct and initiatives.[8] This makes the Standards Map to one of the most comprehensive data collection projects in this area. Another important project is the so-called Ecolabel Index (www.ecolabelindex.com) – operated and maintained by Big Room, a Vancouver-based B Corporation. Like the Standards Map, the Ecolabel Index lists standards, audit protocols, and codes of conducts in the field of sustainability. Currently, the Index contains about 465 standards. This is significantly more than the Standards Map is covering. However, the Ecolabel Index contains fewer data points per individual standard, 60 in comparison to some 1000 data points featured in the Standards Map.

The VSS included in the Standards Map database all satisfy the following minimum conditions: they cover at least one sustainability area (environment, social, economic and management, quality management system, or ethics and integrity), have a solid governance structure and a credible audit procedure (first-, second- or third-party audits).

Figure 1. Economies where voluntary standards operate and certify producers



Source: Authors calculations based on ITC Standards Map. The software that generated this map does not apply the United Nations definitions of national borders; **Notes:** The relative darkness of the colour indicates a greater number of standards initiatives that operate in each economy, i.e. have at least one producer certified. The statistics are based on 180 standards.

[8] The wide array of voluntary sustainability standards, audit protocols, codes of conduct and frameworks will be referred to as “standards”, “voluntary standards”, “voluntary sustainability standards” or “standards systems”. The number of VSS analyzed in this Working Paper was 180 when the research was conducted.

4.1. Product and geographic scope of Standards Map database

Standards Map contains information on VSS covering more than 80 sectors ranging from agricultural products to textiles, electronics and services. Three quarters (77%) of standards cover extraction, primary production or conversion and manufacturing; 14% cover services and 9% are "generic standards". The latter are VSS that do not cover specific products but rather present a set of general requirements applicable in any sector or product.

The top three product groups are vegetable products (72 standards), foodstuffs, beverages and tobacco (66 standards), and live animals and animal products (61). Voluntary standards are also frequently designed for textile and textile articles (36 standards), miscellaneous manufactures (35 standards) and chemical industries (35).

Standards Map captures two geographical dimensions for each standard: (i) the current scope of certified producers, i.e. the countries where VSS have producers who have gone through an audit and verification or certification[9] procedure and comply with the requirements of the VSS; and (ii) information on the location of the headquarters of each VSS system as well as any local offices (in many cases VSS establish local offices in the main countries of interest). In the sample used for this paper, 73% of VSS were headquartered in OECD countries. Figure 1 shows the current scope of certified producers.

Table 2. Sustainability areas

Sustainability area	Topic	Number of requirements indicators per topic
Environment criteria	Animals – livestock	22
	Biodiversity	42
	Chemicals / natural organic inputs	45
	Climate – carbon	16
	Energy	11
	Forests	19
	Soil	10
	Waste	26
	Water	16
Social criteria	Human rights and local communities	44
	Labour practices - conditions of work and social protection	32
	Labour practices - employment and employment relationships	42
	Labour practices - human development and social dialogue	23
Economic and management criteria	Economic viability	6
	Supply chain responsibilities	23
	Sustainability management	25
Quality Management System	Product / service quality management	27
	Non-food manufactured products technical specifications	24
	Food management systems	91
	Feed management systems	238
Ethics and integrity	Anti-corruption and anti-bribery principles and criteria	15
	Compliance to national, regional and international legislation	5

[9] All VSS are based on audit, which either conducted by a first-party (producer himself), second-party, a party related to a producer, e.g. retailer, or by a third-party, an independent body. If an audit process results in a certificate of compliance, the process is called "certification", in all other cases it is simply called "verification".

Structure of the database

The structure of the SMD - its sections, questions and indicators - is based on common attributes of VSS, which allows referencing any type of standard, audit protocol or code of conduct. VSS data are divided into two main categories or sections: requirements and processes.

The "Requirements" section captures data on various indicators, requirements, criteria[10] of VSS and is divided into five sustainability areas: environment, social, economic and management, quality management system, and ethics and integrity. Each area is then subdivided into sustainability topics, e.g. environment criteria are subdivided into such topics as water, waste, soil, chemicals, biodiversity, forests and energy. The second column of Table 2 illustrates this higher level of disaggregation into 22 topics. Finally, within each topic, there are requirement indicators against which VSS actual requirements and criteria are then analysed and mapped in the database. The last column of Table 2 reports the number of indicators per topic. For a detailed set of requirement indicators please refer to www.standardsmap.org.

In most of the cases VSS differentiate their criteria or requirements based on their criticality or a given time frame for implementation. In order to capture this information, SMD categorizes each requirement based on the degree of obligation, i.e. each VSS requirement is first mapped against a certain indicator in the database (e.g. soil conservation) and then the degree of obligation is specified for each requirement. Table 3 below shows the types of degrees of obligation as well as their definitions.

The following example illustrates the structure of the requirements and their degree of obligation. Global G.A.P. Crops specifies requirements under four out of five areas defined by Standards Map, namely environment, social, economics and management, and quality management system. In the area of environment this standard covers several topics, including "soil". The Standards Map taxonomy includes 10 indicators pertaining to soil (Table 2). Global G.A.P. Crops requires 9 out of 10 criteria, for example the requirements for soil conservation" and "Soil health (nutrients / fertility / productivity / biodiversity)" are "critical", "Soil maintenance / enhancement by use of cover crops" has "recommendations" as a degree of obligation, while "Soil preparation for specific crops / plant spacing" is not covered (see Table 3 for a complete list of the degrees of obligation and their definitions).

In addition to "requirements", Standards Map contains "Processes". The "Processes" section includes all the other information not considered requirements or indicators of the VSS. It includes such aspects as governance and transparency of a VSS and monitoring and evaluation procedures; standard setting process; conformity assessment and audits; traceability and chain of custody; claims and labelling; support, target groups and costs.

The structure and format of the database or data entry tool has been reorganized in order to make the data more suitable for statistical analysis. The distinction between information on requirements and on processes is kept in the reorganized version of the data. From the processes section we have defined 1,489 distinct variables. A small subset of these will be the focus of the empirical analysis presented below. As for individual requirements, the detailed description of all processes variables goes beyond the scope of a general introduction to the SMD.

[10] There is no uniform terminology used across the VSS. The terms indicators, criteria, KPIs, and requirements are considered identical when mapping VSS data in the SMD.

Table 3. Degree of obligation of VSS defined in Standards Map

Degree of Obligation	Definition
Requirements for immediate action	Critical requirements indicate that compliance must be met immediately, otherwise, applicants are excluded from certification/verification process.
Requirements to be met within 1 year	Short-term requirements indicate that compliance must be met in less than 12 months after initial registration/certification formalities.
Requirements to be met within 3 years	Medium-term requirements indicate that compliance must be met in less than 36 months after initial registration/certification formalities.
Requirements to be met within 5 years	Long-term requirements indicate that compliance must be met in a period of time that is defined as more than 36 months after initial registration/certification formalities.
Recommendations	Recommendations are those requirements that “should” be met but for which non-compliance is not a matter of exclusion or sanction.

5. Analysis using Standards Map

As a first empirical exercise we focus on two aspects of standards systems: their practices and features in support of producers and their availability across countries. These are crucial dimensions for the positioning of standards systems within a development discourse. Indeed, the extent to which standards' institutional design is conceived as `producers friendly' and the operational presence of the systems across countries is a necessary first step to assess the role of VSS for the successful integration of producers from developing regions into the value chain. It is important to state here what the present analysis is leaving unexplored, i.e. an empirical investigation of the actual impact of producer-friendly institutional design and operational presence of the systems on their market uptake and on the welfare of producers as well as of other actors involved such as economic agents downstream the supply chain and consumers. The main reason for this is the lack of a database that merges all VSS covered in the SMD with data at the producer-level featuring information on economic performance as well as on standards' adoption. To the best of our knowledge, this kind of empirical framework is now available only for individual or small sets of VSS. Assessment of the effects of different institutional designs of VSS on producers' adoption and economic performance will require additional data collection.

The empirical analysis that follows relies on the Standards Map unparalleled coverage of the various aspects of standards systems' institutional design and the global landscape of standards that can be extrapolated from the database. The empirical analysis that follows serves three purposes. First, illustrating the extent to which the systems in our sample are supportive of producers across different sets of practices and governance features. Second, characterizing which VSS are more `producer-friendly'; and third, identifying some key features of the countries where the standards systems in our sample are found to be more available to producers.

5.1. Producer-friendly design

We start by exploring three features of standards systems' organization and governance: (i) how standards systems directly support producers; (ii) how and how much standards systems disclose relevant information on their operations; and (iii) how standards systems allocate certification costs among different agents (producers, supply chain actors and the standards system itself). The general focus of this

analytical exercise is on the economic role of VSS for trade and development, by looking at the characteristics that make VSS more likely to be a tool for higher integration of producers into sustainable supply chains.

Standards systems' activities that provide direct support to producers represent a first and intuitive measure of `producer-friendly' design. Disclosure practices are equally important in understanding this economic role of standards system. On the one hand transparency allows small producers to select the standard system that is more adequate to their business and needs. On the other hand, transparency contributes to build the standards system's reputation toward the buyers (actors downstream the supply chain), which will be more likely to trust/assess the evaluation of a system that discloses information on its application procedures, its certification process, and its dispute settlement procedures.

Finally, cost allocation schemes are essential to understand the role of standards systems in improving the participation of small and medium-sized producers in GVCs where downstream producers/retailers/buyers often require production at all upstream stages to satisfy a number of sustainability conditions. The extent to which standards systems' institutional design is such that producers do not have to bear certification costs alone, or have access to dedicated support, provides an indication of how much standards systems are facilitating the process of integration into sustainable value chains.

For each of these three features of standards' producer friendliness the SMD offers a rich set of data points.

Support for producers

The Standards Map data contains variables capturing several dimensions of support activities. Table 4 lists the five variables that are used in this paper. Looking at these variables we find that the vast majority of standards (92%) provide support through guidance tools and other documents. In addition, 58% of the standards in the sample offer technical assistance to meet standard requirements. However, significantly fewer standards – 28% – provide technical assistance to improve productivity, efficiency or market access. And while 47% of standards facilitate learning, only 14% offer financial assistance.

Table 4. Support Indicators

Variable	Definition
Supporting documents	Assistance through provisions of guidance tools and other documents
Technical assistance to meet standards' requirements	Standard system directly provides technical assistance to help applicants get verified/certified (workshops, trainings, provision of equipment).
Technical assistance that goes beyond the standards' requirements (productivity, efficiency, access to markets)	The question is relevant for schemes which have capacity building approach. Technical assistance beyond requirements includes actions like providing resources, coordinating conferences or other peer learning activities.
Financial assistance	Advance payments to facilitate the purchase of produce from the farmers/suppliers, the existence of a support fund, or the payment of verification/certification fess via purchasing companies.
Learning assistance	Organizing learning forums, networking activities, conference.

Transparency

Standards Map contains detailed data about the information disclosure practices of VSS, or their transparency. For the purpose of this report, six areas that are of the most relevance to developing-country producers have been identified. These are free and unrestricted access to information on: (i) standards and national adaptation documents; (ii) certification and verification process; (iii) standards development procedures and policies; (iv) the application process for obtaining certification; (v) complaints and dispute resolution policies; and (vi) assessment methodologies. Table 5 reports the detailed description of these variables.

Table 5. Transparency Indicators

Variable	Definition
Standards and national adaptation documents	The standard system provides public access to its standard documents.
Certification/ verification operations (names, sizes and locations of all certified units, including expiry dates, etc.)	Information on certified operations is made accessible to stakeholders.
Standard development procedures and policies	Policies for standard setting and standard review procedures are documented.
Standard's certification application instructions and forms	Certification instructions and forms are made publicly available.
Complaints and dispute resolution policies	Complaints and dispute resolution policies on e.g. certification/verification decisions, work of auditors etc. are made publicly accessible.
Standard's assessment methodologies	Indication on the presence of publicly available assurance methodology

The key descriptive pattern here is that standards systems in the analysed population are not fully transparent across many dimensions. Only 36% of standards in the sample have publicly available assurance methodologies; less than half of the standards (48%) make complaints and dispute resolution policies publicly accessible. About 50% of them publicly disclose certification applications and forms as well as standard development procedures and policies. A higher number of standards (61%) makes information on certified operations accessible to stakeholders. Finally, 88% of the standards provide public access to its standard documents.

Costs

The SMD contains information on two types of costs: implementation and certification costs. Implementation costs include all the expenses on implementing the requirements of a VSS and may include, depending on the standard, improvements in agricultural practices, social practices, establishing management systems as per VSS requirements etc. Certification costs include direct costs of audits, i.e. costs of first-time and surveillance audits, VSS membership fees etc. Beyond the identification of these two types of costs, the Standards Map database allows to distinguish between different schemes of cost allocation. Costs can be either borne by producers or may be shared with the other actors along the supply chain and/or the standards systems themselves.

Producers are often the only actors paying for implementation (64% of cases) and certification (55%). Slightly more than 1 system out of four adopts a cost sharing scheme that involves both producers and supply chain actors in paying for implementation (27% of VSS) and certification (26%). In few cases – 4% for implementation and 11% for certification - supply chain players are responsible alone for the costs. Similarly, standard systems pay these costs alone only in 3% and 5% of cases, respectively for implementation and certification. Finally, cases where all three types of actors – producers, supply chain players and VSS – or just producers and VSS are sharing theses costs, amount to less than 5%.

5.2. What do more `producer-friendly' systems tend to look like?

Support activities, disclosure practices and cost allocation schemes, all pertain to the institutional design of VSS. We use the data to estimate patterns of correlations between these economic aspects of the systems' organization and different dimensions of their institutional design. We identify seven such dimensions that can be directly operationalized in variables of the SMD and use these to analyse how different characteristics impact on support to producers, transparency and the allocation of cost of VSS certification.

The first dimension pertains to the public status of the system. VSS can be established as public entities by a ministry, a governmental agency or any other branch of the public sector. Such direct connection with the public sector - embedded in the VSS' legal status – would capture the incentives scheme that is specific to a public status. This scheme can be extremely nuanced, encompassing welfare maximization motives as well as political economy ones, and leading to conflicting expectations regarding the sign of the relationship between public status and the various features of VSS' producer friendliness. Under the assumption that higher support and transparency as well as cost sharing schemes result in higher welfare for most stakeholders, welfare maximization could result in higher friendliness. On the contrary, political economy motives (such as visibility of government's action for electoral purposes) could be satisfied simply with the establishment of a VSS, without justifying additional costs to make the system effective in reaching out to producers. Therefore, the assessment of the sign of this relationship between public status and producer friendliness is ultimately an empirical question. We capture this dimension with a dummy variable that takes value 1 if the system has a public status.

The second characteristic of a VSS included in the analysis is the adoption of a for-profit business model. This should capture the incentives scheme of an economic agent that maximizes individual profits. Guided by the literature reviewed above as well as by simple economic reasoning, it is rather straightforward to identify a trade-off governing the degree of producer friendliness offered by a private, profit maximizing VSS. On the one hand offering support, losing private information through more transparent practices and designing cost sharing schemes entail clear economic costs and directly reduce the profits of a VSS. On the other hand, these practices can strengthen the VSS' uptake, the success of its certified producers and in turn its credibility. This could lead to higher revenues and, as a consequence, to higher profits. The net effect is again ambiguous. A properly estimated empirical correlation would then be an important benchmark for existing and future theoretical investigation. This second dimension is captured through a dummy taking value 1 when the system has a private status and it is not a no-profit organization.

As a third characteristic, we include the age of a system. An older VSS would reflect the incentive scheme of an incumbent while a younger system that of a new entrant. Due to the proliferation of VSS it is important to account for dynamics in the analysis. We operationalize this dimension with a variable counting the years of a VSS since its establishment. The specialized literature in the economics of voluntary standards is not particularly informative on this specific aspect of VSS, but a number of considerations can be derived from simple models of industrial organization. Incumbents might have the right incentives and the adequate resources to bear the additional costs embedded in a more producer friendly design. Depending on the structure of the game between the incumbent and the new entrant, the latter could also implement a strategy that entails the adoption of more producer friendly practices. This potential implications are already enough to motivate the difficulties in predicting an unambiguous theoretical relationship between age and producer friendliness. The empirically estimated sign for the relationship between these variables would shed light on the aggregate pattern relating the position of a system within a dynamic framework and its attitude toward producers.

Fourth, the empirical analysis accounts for the role of meta-governance, or, in other words, for the integration of VSS into meta-standard organizations. The already above mentioned ISEAL Alliance is such an organization. Essentially, ISEAL is a meta-standard setter, creating standards of good practice for VSS

systems. All organizations aiming at becoming a member of ISEAL need to go through an accreditation procedure in which their compliance with best practices – such as ISEAL's standard-setting code, assurance code, and impact code[11] – is verified. Compliant standard systems can then use their ISEAL membership as a signal of credibility. To capture the effect of meta-governance on producer friendliness, we include a dummy variable that takes value one whenever a system is a full member of the ISEAL Alliance. Given the best practice-orientation of meta-governance, we expect a positive effect of ISEAL membership.

Another dimension accounted for in the following analysis is the involvement of relevant stakeholders in the management of VSS. We look at involvement of producers as well as consumers. Under the assumption that the features we have identified as producer friendly have a concrete impact, producers' engagement in VSS' management with decision making powers should be intuitively reflected in higher producer friendliness of the system. Similar considerations hold for buyers that, assuming a certain degree of competition in producers' market, would indirectly benefit from lower costs for producers. These two characteristics of VSS' governance are directly captured by two variables in the SMD, both with a binary structure and taking value one whenever producers or consumers respectively are involved into the management of the system.

Finally, we consider as relevant characteristic whether the system is headquartered only in an OECD country (multiple headquarters cases are present in the database). A simple dummy variable taking value one whenever a VSS has a unique headquarter or multiple headquarters all located in an OECD economy is used as regressor in the empirical model. This variable can be seen as a proxy for the capacity or resources of a system, with a value of one reflecting higher capacity. Higher resources have a direct positive effect on the implementation of costly activities such as support and the adoption of cost sharing schemes. Therefore we expect a positive sign for the relationship between this variable and producer friendliness.

Direct support

The five support indicators described in Section 5.1 have been coded into five dummy variables, taking value one whenever the corresponding type of support is offered by the system. We denote these support variables as s^d where d is an indicator for the specific dimension of support. These variables represent the dependent variables in our first empirical exercise. Support dependent variables are merged with the seven regressors described above. Table A1 in the Appendix presents summary statistics for the estimation sample used to assess which features are systematically associated with higher patterns of direct support to producers. We omit from the analysis the dependent variable capturing support through documents as we observe no variation along this dimension of support (all systems offer support though documents) within our estimation sample of 155 observations.

We use the data to fit four binary probit models, one for each dimension d of support. These models are based on the assumption that, for each d, there exists an underlying unobservable (latent) variable capturing VSS' utility from offering support, $U(s^d)$ as a function of the seven explanatory variables discussed above. Formally:

$$U(s^d) = \boldsymbol{\beta}'\boldsymbol{x} + u$$

with u being an error term following a normal distribution with mean 0. Whenever utility $U(s^d)$ is greater than 0, we observe $s^d = 1$, when instead the utility is negative we observe $s^d = 0$.

Table 6 reports the point estimates and robust standard errors for the four probit models. The estimated parameters can be interpreted as marginal effects (only) for the unobservable utility $U(s^d)$. Given the scope of our analysis, which consists in assessing the sign of the relationship between several relevant features of VSS and their support practices toward producers (rather than quantifying the causal effect of a treatment on the probability of observing a certain outcome), the marginal effects with respect to the utility from offering support, $U(s^d)$, is directly relevant for our research question rather than just statistical

[11] ISEAL Alliance, Our Codes of Good Practice, http://www.isealalliance.org/our-work/defining-credibility/codes-of-good-practice

artefact. Indeed, the estimates in Table 6 capture a tangential relationship between the variables of interest.[12]

Table 6. Support to producers (estimated parameters of the probit models)

Dimension of support:	Technical assistance for requirements	Technical assistance beyond requirements	Financial assistance	Learning forums
	(1)	(2)	(3)	(4)
Public status	-0.404	-0.732*	0.378	-0.579
	(0.330)	(0.433)	(0.364)	(0.357)
For profit and private status	0.0577	0.148	0.384	0.400
	(0.382)	(0.414)	(0.480)	(0.391)
Age	0.0244*	0.0269**	0.0209	0.0136
	(0.0144)	(0.0137)	(0.0134)	(0.0140)
ISEAL full membership	0.348	0.545	0.810**	0.843**
	(0.361)	(0.345)	(0.354)	(0.351)
Producers in management	-0.0338	-0.142	0.426	0.554**
	(0.259)	(0.267)	(0.279)	(0.257)
Buyers in management	0.452*	-0.150	-0.164	0.385
	(0.270)	(0.278)	(0.297)	(0.273)
Headquarter(s) in OECD	0.441*	0.496	0.196	0.319
	(0.252)	(0.306)	(0.348)	(0.265)
Constant	-0.635**	-1.350***	-1.896***	-0.840***
	(0.314)	(0.353)	(0.418)	(0.314)
Observations	155	155	155	155
Pseudo R-squared	0.075	0.092	0.082	0.127

Note: Robust standard errors reported between brackets. * p<0.1, ** p<0.05, *** p<0.01.

For the sake of completeness, the four columns of Table 7 report the estimated marginal or discrete change effects computed at the median value of covariates (no public status, no private and for-profit status, 14 years old, not ISEAL member, no engagement of producers in decision-making, no engagement of buyers on board, headquarters located in OECD countries). These estimates are interpreted as the variation in the probability of observing support when the relevant covariate is increased by one unit – or, if the relevant covariate is a dummy, when it goes from 0 to 1 – while keeping all the other explanatory variables fixed at their median level. Take, for instance, the estimated coefficient of the public status dummy regressor in model (2). The implied marginal effect of -0.203 means that when considering the median VSS, the probability of observing technical assistance beyond meeting the requirements decreases by approximately 20% if the system changes its status from private to public. This result is also statistically significant at the 5% level. By construction, the patterns that emerge from the signs and relative importance of the estimates in Table 6 are fully confirmed in Table 7.

Public status tends to be negatively associated with support that goes beyond VSS requirements. The only positive point estimate for the public status coefficient is model (3), looking at support through financial assistance. Even though positive the point estimate is statistically insignificant suggesting the lack of any relationship between public status and this dimension of support or, alternatively, the absence of a prevailing direction within a number of conflicting forces. Lack of statistical significance characterizes the

[12] Beyond the sign and their relative importance, these estimates are not informative on the marginal effects with respect to the probability of observing support.

relationship between all dimensions of support and the private, for-profit regressor. Age seems to be positively associated with higher support according to the first two dimensions, suggesting that older systems might have higher incentives and resources than younger ones to invest in support activities. Similarly, ISEAL full membership is positively associated with higher support, with the relationship being statistically significant for support in the form of financial assistance and learning forums. As regards the engagement of producers or buyers the signs of the point estimates are not consistent across the various dimensions of support suggesting that different incentive schemes might be in place for each specific type of support. The only statistically significant relationships have a positive sign and link producers' engagement with higher support via learning forums and buyers' engagement with higher support for meeting requirements. Location of the headquarters in an OECD country is significantly associated with higher support to meet requirements. The estimated coefficient for this regressor is also positive across all other models but fails to reach standard levels of statistical significance.

Table 7. Support to producers (effects on the probability of observing support)

Dimension of support:	Technical assistance for requirements	Technical assistance beyond requirements	Financial assistance	Learning forums
	(1)	(2)	(3)	(4)
Public status	-0.160	-0.203**	0.0720	-0.189*
	(0.128)	(0.0902)	(0.0823)	(0.0997)
For profit and private status	0.0227	0.0544	0.0734	0.157
	(0.149)	(0.155)	(0.105)	(0.154)
Age	0.00961*	0.00958**	0.00310	0.00514
	(0.00570)	(0.00467)	(0.00188)	(0.00522)
ISEAL full membership	0.131	0.210	0.196*	0.325***
	(0.130)	(0.135)	(0.104)	(0.124)
Producers in management	-0.0134	-0.0486	0.0835	0.218**
	(0.103)	(0.0897)	(0.0624)	(0.0994)
Buyers in management	0.167*	-0.0514	-0.0216	0.151
	(0.0940)	(0.0932)	(0.0379)	(0.108)
Headquarter(s) in OECD	0.174*	0.151*	0.0253	0.112
	(0.0973)	(0.0869)	(0.0427)	(0.0898)

Note: Robust standard errors reported between brackets. * p<0.1, ** p<0.05, *** p<0.01.

The strongest relationship appears to be between support and ISEAL full membership. With respect to the baseline context of the median system, becoming an ISEAL full member significantly increases the probability of offering financial support by almost 20%, that of offering capacity building forums by 32%. The only feature which is significantly associated with lower support is public status, suggesting that political economy forces against higher support might be in place. Finally, being an incumbent, being headquartered in an OECD economy, and engaging producers or buyers in the management are all features positively and significantly associated with at least one dimension of support.

Transparency practices

We now turn to the empirical identification of the characteristics pertaining to the institutional design of standards systems which are systematically associated with higher levels of transparency. For each of the six dimensions of transparency described above we code a dummy variable that takes value one if information is publicly available and zero otherwise.[13] We then fit six binomial probit models with the same vector of covariates used in the support specifications above. The underlying unobservable latent variable here is the utility that VSS derive from the adoption of more transparent practices, $U(t^d)$ where t^d denotes transparency of type/dimension d.

[13] The zero category includes cases where information is made available only to board members or internal stakeholders. The Standards Map database indeed allows to distinguish among different levels of disclosure.

Contrary to the case of the support specifications, the size of the estimation sample varies 3 times across the 6 models for transparency dependent variables. For the sake of space we do not report summary statistics for each estimation sample,[14] but note that the median standards systems in terms of the values of the regressors remains stable but for the median age of standards. The other characteristics of the median standard system are constant across models. The median standard is not public, not private and for-profit, it exists since 14 years, it is not an ISEAL member, with no engagement of producers in decision-making, nor engagement of buyers on board, and with headquarters located in OECD countries.

Table 8 reports the estimates from the 6 probit regressions. The respective marginal effects are given in Table A2 of the Appendix.

Table 8. Standards transparency (estimated parameters of the probit models)

Dimension of transparency:	Info on standards and national adaptation documents	Info on assessment methodologies	Info on standards' certification applications	Info on standards' development procedures and policies	Info on verification/ certification	Info on complaints/ dispute resolution policies
	(1)	(2)	(3)	(4)	(5)	(6)
Public status	-0.283	0.509	0.499	0.0670	0.120	0.00867
	(0.382)	(0.409)	(0.467)	(0.336)	(0.345)	(0.335)
For profit and private status	-0.697	-0.216	-0.998**	-0.113	-0.702*	-0.153
	(0.500)	(0.466)	(0.440)	(0.411)	(0.409)	(0.392)
Age	0.0380	0.0171	-0.0109	0.00834	0.00443	-0.0202
	(0.0279)	(0.0151)	(0.0152)	(0.0133)	(0.0137)	(0.0126)
ISEAL full membership	Omitted as perfect predictor	-0.158	0.101	1.215***	1.261**	1.751***
		(0.339)	(0.376)	(0.430)	(0.514)	(0.483)
Producers in management	0.529	0.786***	-0.123	0.753***	0.280	0.254
	(0.526)	(0.288)	(0.283)	(0.260)	(0.264)	(0.254)
Buyers in management	0.137	-0.0377	-0.204	0.0743	0.388	0.0154
	(0.531)	(0.319)	(0.310)	(0.270)	(0.280)	(0.262)
Headquarter(s) in OECD	0.608*	0.490	0.181	-0.0597	0.00292	-0.0229
	(0.325)	(0.298)	(0.292)	(0.248)	(0.255)	(0.255)
Constant	0.381	-0.900***	0.625*	-0.350	0.0766	0.0709
	(0.484)	(0.336)	(0.366)	(0.304)	(0.325)	(0.299)
Observations	138	121	121	155	155	155
Pseudo R-squared	0.153	0.090	0.053	0.108	0.102	0.105

Note: Robust standard errors reported between brackets. * p<0.1, ** p<0.05, *** p<0.01.

The following patterns appear in the data. First, no statistically significant relationship emerges between public status and transparency: the signs of the point estimates are mostly positive but they all fail to reach statistical significance. Second, negative estimated coefficients across all models for the private and for-profit dummy reaching statistical significance when transparency is about certification application and verification (models (3) and (5)), seems to suggest a negative relationship between private and for profit incentive schemes and at least some dimensions of transparency practices. Age and involvement of

[14] These tables are available upon request.

buyers in management do not seem to be significantly associated with any stance in transparency practices. Conversely, ISEAL membership and engagement of producers are often significantly related with higher transparency. Finally, being headquartered in an OECD economy appears to be associated with higher transparency only according to model (1), i.e. more accessible information on standards and national adaptation documents.

Discussing some of the marginal effects for a more intuitive quantitative interpretation, we note the following results (Table A2). Becoming ISEAL full member (and keeping all other covariates at their median level) is associated with a 44% higher probability of publicly disclosing information on standard development procedures and policies, with a 34% higher probability of being fully transparent on verification and certification as well as with a 52% higher probability of publicly disclosing complaints and dispute resolution policies. Allowing producers to have influence in decision making is instead significantly associated with a 29% higher probability of being fully transparent regarding both assessment methodologies and standard development procedures and policies.

Cost sharing schemes

Finally, we assess the linkages between cost sharing schemes and our vector of regressors. For this exercise the cost variables have been recoded to take only two values: “0” when producers do not bear the cost alone (because supply chain players or the standards systems (SS) itself are bearing the cost, or at least part of it); and “1” when only producers bear the cost. The data are then used to estimate two binomial probit specifications, one for certification costs and the other for implementation costs. Tables A3 and A4 in the Appendix report summary statistics for the two estimation samples respectively. In the estimation sample for both specifications, the median standards system in terms of values of covariates is private, not private and for-profit, existing since 15 years, not ISEAL member, with no engagement of producers in decision-making, nor engagement of buyers on board, and with headquarters located in OECD countries. Table 9 reports estimates from the 2 probit regressions; Table A5 in the Appendix the respective marginal effects.

Table 9. Cost sharing in VSS (estimated parameters of the probit models)

	Producers alone bearing certification costs	Producers alone bearing implementation costs
	(1)	(2)
Public status	-0.624	-0.951**
	(0.446)	(0.470)
For profit and private status	-1.049**	-0.780
	(0.495)	(0.532)
Age	0.0126	0.0245
	(0.0176)	(0.0177)
ISEAL full membership	-0.954**	-1.444***
	(0.405)	(0.453)
Producers in management	0.519*	0.465
	(0.312)	(0.316)
Buyers in management	-0.603*	-0.587*
	(0.318)	(0.321)
Headquarter(s) in OECD	-0.687*	-1.038**
	(0.368)	(0.423)
Constant	0.638	1.083**
	(0.455)	(0.535)

Observations	108	107
Pseudo R-squared	0.120	0.180

Note: Robust standard errors reported between brackets. * p<0.1, ** p<0.05, *** p<0.01.

The utility from adopting a sharing scheme that involves other stakeholders beyond producers seems to be significantly increasing with for-profit and private status, ISEAL full membership, engagement of buyers and OECD location of headquarter. Counterintuitively, involvement of producers in management is positively associated with producers themselves bearing alone the costs of certification. Compared with the results above, this suggests producers might use their bargaining power in the VSS management to obtain more transparency and direct support rather than the adoption of cost sharing schemes.

Looking at the marginal effects in Table A5, ISEAL full membership is the feature that significantly appears as more linked to the adoption of cost sharing schemes that do not leave producers alone. In particular, acquiring ISEAL full membership from the baseline context of a median standards system is associated with a 35% (51%) lower probability of having producers alone bearing certification (implementation) costs. A similar but weaker relationship is observed for engagement of buyers in the board and OECD location of headquarters.

The empirical patterns emerging from these three analyses can be summarized as follows. ISEAL full membership is strongly associated with producer friendly practices across the measures of direct support, transparency and cost sharing schemes. This finding is in line with arguments made in the political science literature about meta-governance. In this regard, several scholars have described the norm entrepreneurship of organizations like ISEAL (Dingwerth and Pattberg 2009; Loconto and Fouilleux 2014). Other features of the institutional design of VSS are also positively associated with our measures of producer friendliness, although they are found to be less robust. These features are the location of headquarters in OECD countries, the engagement of buyers in the board or management of the scheme and the influence of producers in decision making. These findings as well link to current discussions in the academic literature about the importance of the domestic context and stakeholder participation in VSS (Darnall et al., 2010; van der Ven, 2015).

5.3 Why are standards more accessible in some countries than in others?

We turn next to the empirical investigation of standards systems' availability across countries, using the measure of geographic scope of current operations reported in the SMD (see Section **Error! Reference source not found.**). This variable allows to extrapolate an indicator varying at the country level and counting the number of standards systems in our population that have current operations in each particular country. We use this indicator as the dependent variable in a number of linear regression models. The purpose of the exercise is to identify relevant country level features that characterize economies with higher availability of standards systems.

The estimated equation takes the following form:

$$y_i = \boldsymbol{\beta}' \boldsymbol{x}_i + u_i$$

Where y_i is the number of standards operating in country i, $\boldsymbol{x}_i$ is a vector containing country-level regressors of interest, $\boldsymbol{\beta}$ is a vector of coefficients and u_i is an error term.

The parameters of interest are identified in the existing literature and include the size of the economy (as measured by its GDP), the level of income (as measured by GDP per capita) and several indicators of competitiveness.

The size of the economy is expected to be positively correlated with the number of standards in operation. First, a number of papers show the importance of third-party certification for the availability of high-quality credence goods in the presence of asymmetric information (Albano and Lizzeri, 2001; Dragusanu et al, 2014; McCluskey et al, 2008). This links the operations of standards setters to the functioning of the markets of third-party certifiers. As third-party certifiers are generally profit-maximizing entities, we expect a

higher availability of standards in the markets that certifiers find profitable. Second, only certain types of goods and services lend themselves to certification and larger economies are more likely to have them produced.

The relation between standards availability and the income level is *a priori* ambiguous. On one hand, we expect that standards availability to be increasing with income as sellers are more able to produce up to standards and consumers have more disposable income to pay for credence goods. On the other hand, if standards are set as a substitute for national institutions (with buyers abroad having more trust in independent certifiers than in national institutions), then we would expect a negative correlation between the number of standards and country's income, due to a strong negative correlation between the quality of institutions and the GDP per capita.

We expect a positive correlation between competitiveness and standards availability. VSS can potentially encourage better organization and production practices, including improvement in skills, management and monitoring systems, productivity, good farming practices, resource management and access to credit. For example, Balineau (2011) shows that the quality of Malian cotton increased as a result of VSS certification through the adoption of innovative agricultural practices. Furthermore, VSS can facilitate greater integration in value chains, with opportunities to improve post-harvest processing, product quality and supply capacity (Raynolds, 2009).

The inverse causal chain is also applicable, and again, the relation between standards availability and competitiveness is expected to be positive. Implementing standards requires resources, e.g. finances for implementation and certification costs, and capabilities, e.g. managerial skills. Hence standards setters and certifiers are likely to operate in countries, sectors and environments that can reach certain level of quality and competitiveness and more competitive firms will are likely to find it easier to satisfy VSS requirements. The value chains and value chain driven standards are also likelier to be present in countries able to produce competitively.

We construct the regressors as follows. The GDP is taken as a proxy for the size of the economy, and GDP per capita – for income. Both variables refer to year 2015 and are obtained from the IMF World Economic Outlook. The summary statistics of the sample is presented in Table A6 of the Appendix. Competitiveness is defined as the demonstrated ability to design, produce and commercialize an offer that fully, uniquely and continuously fulfils the needs of targeted market segments, while connecting with and drawing resources from the business environment, and achieving a sustainable return on the resources employed (ITC, 2015). The average competitiveness score across 107 countries in our sample is 47.4 with standard deviation equal to 11.7 (Table A6). The overall score includes sub-scores at three levels.

The competitiveness indicators are sourced from SME Competitiveness Outlook (ITC, 2016). They are scores [0-100] combining drivers of competitiveness across three levels – firm capabilities, immediate business environment and national environment. The firm-level of competitiveness measures whether firms have the capabilities to manage the resources under their control. Thus, this competitiveness level contains indicators to gauge whether firms follow best practices. For example, does the firm have a bank account, use e-mails in day-to-day operations, or have high capacity utilization? The immediate business environment level delivers the resources and competencies that help to shape whether firms are competitive. Therefore, this level covers factors that are external to the firm but still within its micro-environment. Access to power, access to a skilled workforce or the vicinity of a relevant cluster of economic activities are examples of immediate business environment indicators. The national environment level measure the fundamentals for the functioning of markets; government action in particular determines whether or not firm activities are facilitated. This level encompasses all structural factors that exist at the national level, such as policies on entrepreneurship and ease of doing business, trade-related policies, governance, infrastructure and resource endowments.

The results of the regressions, with models including size of the economy, income level and competitiveness, are presented in Table 10. The size of the economy is a significant determinant of the availability of standards at the country level: GDP is the strongest individual predictor of standards availability (R^2=0.53, column 1). The magnitude of the effect is large, with one percent increase in GDP associated with 6.7 additional standards. Once GDP is controlled for, per capita income is not significant (column 2).

Turning to the results correlating standards availability and competitiveness, we use GDP and GDP per capita as control variables, with GDP per capita expressed as a dummy taking value of 1 when the GDP per capita is below the sample mean – to mitigate high correlation between GDP per capita and competitiveness indicators (Table A7 of the Appendix). Column three reveals that, as expected, a higher competitiveness score is associated with greater access to standards. When distinguishing between factors affecting competitiveness at the firm level, in the firms' immediate business environment or at the national level (column 4), firm level capacity turns out to be the determining factor. Quantitatively, a one unit increase in the firm capabilities indicator (that ranges from 0 to 100) is associated with 0.4 additional standards. In other words, a one standard deviation increase in the score is linked to 4.6 additional standards. This result is driven by the capacity of medium-sized firms that is most strongly associated with availability of standards (column 5).

Table 10. Standards availability and competitiveness, controlling for GDP and GDP per capita

	Dependent variable: Standards availability				
VARIABLES	GDP	GDP, income	Competitiveness: overall	Competitiveness by level	Competitiveness by firm size
	(1)	(2)	(3)	(4)	(5)
Log GDP	7.223***	6.886***	6.291***	6.374***	6.661***
	(0.661)	(0.715)	(0.844)	(0.853)	(0.743)
Low income countries (dummy)		-3.472	1.552	1.190	1.303
		(2.546)	(3.012)	(3.226)	(2.995)
Overall competitiveness score			0.355**		
			(0.150)		
Competitiveness: Business environment				0.0582	0.171
				(0.158)	(0.152)
Competitiveness: National environment				-0.0220	-0.0182
				(0.124)	(0.130)
Competitiveness: Firm-level				0.351**	
				(0.149)	
Competitiveness: Firm-level (small)					-0.262
					(0.182)
Competitiveness: Firm-level (medium)					0.437**
					(0.192)
Competitiveness: Firm-level (large)					0.209
					(0.143)
Constant	14.23***	16.97***	0.0531	-0.0612	-18.90**
	(2.260)	(3.152)	(7.190)	(7.840)	(9.506)
Observations	107	107	107	107	107
R-squared	0.527	0.536	0.562	0.580	0.612

Note: Robust standard errors reported between brackets. * p<0.1, ** p<0.05, *** p<0.01.

6. Concluding remarks

The increase in consumer demand for sustainable trade has given rise to a growing array of social and environmental standards. The lack of a comprehensive source of comparable information on standards systems has to date impeded a comprehensive broad-based cross-country analysis of different VSS. In this paper we have used a new database that collects comparable information on 180 VSS and their governance structure across a wide range of products and countries to provide an overview of the global

landscape of VSS. We focused our empirical analysis on the determinants of support to producers offered by different VSS and their geographic availability. There is substantial variability in the support offered to producers and the availability of standards systems across countries, but that certain factors are associated with greater support to producers, notably participation of standards systems in meta-standards frameworks such as full membership in the ISEAL alliance.

The two dimensions of VSS we have focused on are important in understanding the role of standards and their governance structure for the process of economic development and the integration of producers into international supply chains. But they are just two dimensions of the information collected in the Standards Map database. Other relevant dimension of standards systems such as the structure of requirements, their product scope, and other aspects of institutional design such as verification procedures, stakeholder engagement, harmonization or convergence vs. competition between different schemes can all be analysed using Standards Map. These are issues that will be the focus of future research on the causal linkages between variables of interest. We hope the descriptive analysis of this paper will help mobilize greater use of the Standards Map database.

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Appendix

Table A1. Support models: summary statistics

Variable	N	mean	p50	sd	min	max
Technical assistance for meeting requirements	155	0.568	1	0.497	0	1
Technical assistance beyond meeting requirements	155	0.265	0	0.443	0	1
Financial assistance	155	0.142	0	0.35	0	1
Learning forums	155	0.497	0	0.502	0	1
Public status	155	0.135	0	0.343	0	1
For profit and private status	155	0.084	0	0.278	0	1
Age	155	15.394	14	8.176	3	49
ISEAL full membership	155	0.11	0	0.314	0	1
Producers in management	155	0.387	0	0.489	0	1
Buyers in management	155	0.323	0	0.469	0	1
Headquarter(s) in OECD	155	0.735	1	0.443	0	1

Table A2. Transparency: marginal and discrete change effects

	Info on standards and national adaptation documents	Info is made accessible on assessment methodologies	Info on standard's certification applications	Info on standard development procedures and policies	Info on verification/ certification	Info on complaints/ dispute resolution policies
	(1)	(2)	(3)	(4)	(5)	(6)
Public status	0.00146	-0.128	-0.0720	-0.0920	0.0242	0.0776
	(0.0462)	(0.156)	(0.113)	(0.126)	(0.127)	(0.112)
For profit and private status	0.00146	-0.128	-0.0720	-0.0920	0.0242	0.0776
	(0.0462)	(0.156)	(0.113)	(0.126)	(0.127)	(0.112)
Age	0.136	0.132	0.371**	0.0324	0.200	0.0204
	(0.114)	(0.157)	(0.158)	(0.140)	(0.140)	(0.140)
ISEAL full membership	Omitted as perfect predictor	-0.0447	0.0344	0.438***	0.343***	0.521***
		(0.131)	(0.112)	(0.116)	(0.0892)	(0.0843)
Producers in management	0.0381	0.286***	-0.0512	0.294***	0.0799	0.0927
	(0.0318)	(0.101)	(0.0967)	(0.0947)	(0.0980)	(0.100)
Buyers in management	0.0149	-0.0295	-0.0911	0.0353	0.121	-0.00651
	(0.0537)	(0.124)	(0.112)	(0.105)	(0.0988)	(0.101)
Headquarter(s) in OECD	0.145*	0.164*	0.0357	-0.001	-0.00430	-0.0344
	(0.0831)	(0.0994)	(0.0963)	(.)	(0.0969)	(0.0955)

Note: Robust standard errors reported between brackets. * p<0.1, ** p<0.05, *** p<0.01.

Table A3. Certification costs model: summary statistics

Variable	N	mean	p50	sd	min	max
Producers alone bearing certification costs	108	0.528	1	0.502	0	1
Public status	108	0.12	0	0.327	0	1
For profit and private status	108	0.074	0	0.263	0	1
Age	108	15.787	15	7.496	3	49
ISEAL full membership	108	0.139	0	0.347	0	1
Producers in management	108	0.463	0	0.501	0	1
Buyers in management	108	0.324	0	0.47	0	1
Headquarter(s) in OECD	108	0.769	1	0.424	0	1

Table A4. Implementation costs model: summary statistics

Variable	N	mean	p50	sd	min	max
Producers alone bearing certification costs	107	0.617	1	0.488	0	1
Public status	107	0.121	0	0.328	0	1
For profit and private status	107	0.065	0	0.248	0	1
Age	107	15.991	15	7.739	3	49
ISEAL full membership	107	0.131	0	0.339	0	1
Producers in management	107	0.467	0	0.501	0	1
Buyers in management	107	0.327	0	0.471	0	1
Headquarter(s) in OECD	107	0.766	1	0.425	0	1

Table A5. Costs and institutional design: marginal and discrete change effects

	Producers alone bearing certification costs	Producers alone bearing implementation costs
	(1)	(2)
Public status	-0.241	-0.365**
	(0.161)	(0.164)
For profit and private status	-0.374**	-0.304
	(0.145)	(0.198)
Age	0.00497	0.00899
	(0.00694)	(0.00663)
ISEAL full membership	-0.348***	-0.509***
	(0.125)	(0.118)
Producers in management	0.189*	0.150
	(0.112)	(0.0844)
Buyers in management	-0.234**	-0.229*
	(0.116)	(0.125)
Headquarter(s) in OECD	-0.240**	-0.266***
	(0.112)	(0.0844)
Observations	108	107

Note: Robust standard errors reported between brackets. * p<0.1, ** p<0.05, *** p<0.01.

Table A6. Standards availability and competitiveness: summary statistics

Variable	N	mean	p50	sd	min	max
Standards availability (No of standards)	107.000	40.093	38.000	17.479	3.000	86.000
Log of GDP (billion USD)	107.000	3.580	3.443	1.757	-0.273	9.340
Log of GDP PC (USD)	107.000	8.129	8.290	1.133	5.753	10.799
Low income countries, dummy=1 if GDP PC below the mean	107.000	0.439	0.000	0.499	0.000	1.000
Overall competitiveness, score	107.000	47.450	48.212	11.709	24.367	80.415
Competitiveness: Business environment, score	107.000	50.049	48.085	11.017	25.343	81.647
Competitiveness: Firm-level, score	107.000	49.566	48.932	16.621	15.892	86.814
Competitiveness: Firm-level, score	107.000	42.734	42.315	13.092	14.459	72.784
Competitiveness: Firm-level (small), score	107.000	35.692	33.027	13.163	12.090	68.330
Competitiveness: Firm-level (medium), score	107.000	51.174	53.879	13.037	19.658	77.458
Competitiveness: Firm-level (large), score	107.000	66.689	68.312	11.220	37.579	86.316

Table A7. Standards availability and competitiveness: correlations

	Log GDP	Log GDP PC	Standards availability	Low income dummy	Competitiveness	Competitiveness-firm	Competitiveness-business env.	Competitiveness-national	Competitiveness-firm-small	Competitiveness-firm-medium	Competitiveness-firm-large
Log GDP	1.000										
Log GDP PC	0.465	1.000									
Standards availability	0.726	0.364	1.000								
Low income dummy	-0.342	-0.835	-0.336	1.000							
Competitiveness	0.458	0.815	0.496	-0.689	1.000						
Competitiveness-firm	0.353	0.655	0.469	-0.571	0.830	1.000					
Competitiveness-business env.	0.368	0.529	0.347	-0.427	0.775	0.391	1.000				
Competitiveness-national	0.445	0.855	0.450	-0.723	0.945	0.707	0.666	1.000			
Competitiveness-firm-small	0.311	0.679	0.384	-0.593	0.848	0.959	0.439	0.744	1.000		
Competitiveness-firm-medium	0.231	0.606	0.413	-0.525	0.726	0.903	0.263	0.649	0.856	1.000	
Competitiveness-firm-large	0.172	0.437	0.374	-0.418	0.514	0.680	0.158	0.446	0.609	0.770	1.000