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Key socio-economic impacts of secondary retailer standards focussing on plant protection products

Report on results of a meta-analysis

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Executive Summary

The overall objective of this study – being a meta-analysis, i.e. a summary of existing literature findings – is to describe and discuss the key socio-economic impacts of secondary retailer standards (SRS) with special emphasis on implications arising from a more restricted use of plant protection products (PPP). It summarises the results of over 100 scientific analyses and focuses on farmers as well as all other economic actors up- and downstream of the food supply chain.

A rather complex picture of socio-economic impacts of SRS, namely of those dealing with PPP, can be drawn from the existing studies. All stakeholders of the food supply chain would be affected; some with benefits, others with losses. SRS influence the distribution of welfare more than the overall level of welfare. Economic benefits of SRS tend to concentrate in the hands of larger, more powerful and better skilled farms and firms, whereas economic disadvantages are more likely to be allocated to smallholders and weaker market players. This is so because the compliance costs associated with SRS are high.

It becomes evident from the studies that farmers are especially affected in the short term. Yield depressions, cost increases and income losses are very likely in the presence of SRS, in particular those with respect to PPP. In the long term, however, SRS may lead to considerable adjustments in the sector. Farmers able to adjust in terms of costs and compliance will be sustained in the market and gain economically while others will be forced to leave the market or become marginalised.

The findings also show that downstream of the food supply chains similar effects may occur as on the farm-level. Exporters and processors that are large, strong market players are more likely to survive and obtain additional market access; small-scale traders, middle-men, wholesalers and new market agents without substantial investment will tend to be excluded from affected market segments. Not surprisingly, retailers and supermarkets are the 'winners' of establishing SRS. They may force other food supply chain stakeholders to comply. Nevertheless, even retailers and supermarkets have to partially adjust.

Furthermore, it becomes apparent that new supply-demand relationships are a particular outcome of SRS. The entire agricultural marketing towards the final consumer is undergoing a fundamental reorganisation as SRS become dominant. Some consumers – due to their risk perceptions – might be better off in terms of well-being. However, average consumer welfare will not necessarily increase since e.g. higher prices that may have to be paid partly off-set the perceived gains.

The studies suggest that the consequences for the input suppliers should not be neglected; but need to be seen differentiated. Losses in affected market segments may partly or fully be compensated for in various ways. Nevertheless, particular input market suppliers and marketing channels will certainly suffer.

Finally, the overall society and international community is affected. Though SRS are not a subject of policy interventions, WTO agreements might and future international cooperation could become more challenging in this area.

List of content

Abbreviations and conventions

APAC	Agricultural Policy Analysis Center
CTA	Technical Centre for Agriculture and Rural Cooperation
ECPA	European Crop Protection Association
FAO	Food and Agriculture Organization (of the United Nations)
GAP	Good Agricultural Practice
IPM	Integrated Pest Management
ISO	International Organization of Standardization
MRL	Maximum residue level(s)
PPP	Plant protection products
SRS	Secondary retailer standards
UNCTAD	United Nations Conference on Trade and Development
WTO	World Trade Organization

The following has to be considered a meta-analysis that summarises literature findings on socio-economic impacts of secondary retailer standards. Hence, it ideally has to consist of numerous and meaningfully combined extracts from a rather broad spectrum of references. Respective direct or indirect quotations have been made in the following by providing the concrete reference in terms of an abbreviation. Each abbreviation includes the first and second letter of the family name of the first mentioned respectively the lead author of a particular reference which are followed by an underscore <_> and the year of publication.

The procedure differs somewhat from scientific accuracy usually maintained while writing academic papers – using quotation marks and the exact listing of all authors' names – but was necessary to be applied here in order to simplify. Otherwise, the extraordinary large number of included literature findings would have mean to type too many and too long references directly into the text causing substantial confusion while reading. Nevertheless, the quoted references are listed in detail at the end of the meta-analysis.

1. INTRODUCTORY REMARKS

Secondary retailer standards (SRS), also widely known as private standards (e.g. FA_2007, FU_2005, HE_2009, IS_2010, UN_2008, and many others), have been developed extensively in recent years and became a global phenomenon, especially with respect to food supply chains (HE_2005). A new world of standards, demanding significant changes in both agricultural production and marketing throughout the full spectrum of supply chains and within the individual chains, has been entered with private standards (KN_2009). The situation is not expected to change in the near future due to the fast extending scope of activities regulated by private standards in this sector (HE_2009, WI_2005).

Definition of the term SRS

By and large, the term SRS includes all (de jure voluntary) private standards as opposed to (de jure mandatory) public standards (see also LA_2009). Such private standards are usually much more specific than public ones and mainly regulate the outcome achievement (HE_2009). I.e. SRS essentially aim at and define the processes to achieve an outcome whereas public standards, predominantly, focus on its characteristics (UN_2007b).

Private standards are, thus, able to regulate diverse process variables and developments. Of particular importance here are very specific variables and developments defined by SRS: whenever possible, the impacts of banning or restricting the use of plant protection products (PPP) as well as the number of active ingredient residues in specific crops shall be emphasised and highlighted. Indeed, SRS specifically seem to promote the idea that agrochemicals must be reduced in or phased out of primary agricultural production (VE_2010) by pushing so called maximum residue levels (MRL) to the lowest extreme and/or prohibiting the pesticide use.

Objectives of the meta-analysis

The overall objective of this study – being a meta-analysis, i.e. first of all a summary of literature findings and not the author's own judgement – is to describe and discuss the key socio-economic impacts of SRS outlined in the various studies, with special emphasis on PPP-related implications. More particularly, the study aims at the following:

- Direct impacts on farmers should be analysed. The objective is to identify economic implications on the farm level, first: how are revenues, costs, income, etc. affected? Secondly, more indirect economic implications, such as changes in business relations and management decisions of farmers, should be highlighted.
- Farmers are only one part of the food value chains. Another objective of the study is to identify pros and cons resulting from SRS off-farm, i.e. with respect to other up- and downstream stakeholders of food supply chains. The full spectrum of stakeholders belonging to the chains should be considered in the discussion, including consumers and policy makers.
- The final important aim of the study is to formulate a set of conclusions related to the findings and results achieved during the analysis.

To reach the ambitious objectives, more than 150 data and information sources have been filtered and checked, out of which approximately 100 are included in the study and quoted. They offer particular insights into the rather broad spectrum of socio-economic impacts SRS (might) cause, and are considered as valuable for further reading and/or analysis beyond the scope of this desk study.

Structure of the report

The impacts of SRS on farmers will be discussed first. The following chapter 2 of the report summarises the findings and distinguishes the implications with respect to farmers directly affected by a private standard (chapter 2.1) versus those agricultural producers not targeted by specific SRS (chapter 2.2).

Not only farmers will be affected by newly established and sharpening SRS. All parties and stakeholders involved in international food supply chains will have to react to these developments (TR_2006). Respective impacts will be analysed in chapter 3 and chapter 4 of the report.

Chapter 3 deals with stakeholder implications following the supply chain downstream of the farmer. A distinction will be made between impacts on buying-in stakeholders (chapter 3.1), the standard-setting retailers and supermarkets (chapter 3.2), as well as the final consumers (chapter 3.3.).

Chapter 4 focuses on stakeholders upstream of the farmer and, in addition, out of the food supply chain. This mainly concerns the input suppliers and the landowners (chapter 4.1); specific findings with respect to policy makers and the overall regional and global society will be presented as well (chapter 4.2).

The report concludes with chapter 5 summarising the main findings of the analysis.

2. IMPACTS ON FARMS

2.1 Direct implications for affected farmers

The discussion of direct implications for affected farmers is considered a core issue of this study. Yet, it is also an ambiguous objective since only few empirical studies providing scientific or statistical evidence are available to appropriately assess the economic effects of SRS, in general (RU_2010), and of pesticide-related SRS, in particular. Nevertheless, various arguments could be obtained from scientific literature pointing at considerable changes of farming practices and outcomes.

These arguments will be discussed as follows: first, more general issues will be displayed; short term and long term implications for farmers will then be considered; impacts on smallholder farmers, a particularly vulnerable group of farmers with respect to SRS, will be discussed separately in greater detail; and finally the major findings will be generalised.

The following arguments are valid in general for both European farmers and farmers in other world regions. However, the intensity of described impacts

should generally be considered as positively correlated to the intensity of PPP use in agriculture. Hence, arguments particularly but not exclusively refer to the European farmers respectively the high productive agriculture, if not otherwise mentioned.

De jure voluntary setting of SRS becomes de facto mandatory

To begin with, it has to be mentioned that the vast majority of scientists consider SRS as actually de jure voluntary standards, which tend to play a de facto mandatory role (e.g. FU_2009, HE_2006, HO_2010, LI_2009, SM_2009, and many others) and become a collective standard (KN_2009) to be met by farmers in order to survive in business. This is already an important finding: compliance with the requirements acts as a driver of substantial change and may affect farmers throughout the world existentially.

Against this background and in general, i.e. across all farmers who at the time of cultivation do not know whom to sell the final products to, the rather broad spectrum of PPP-related standards available creates confusion, especially what concerns allowable pesticide tolerances (BL_2010): the main question is whether it is legitimate to transfer the crop downstream in a food supply channel. It has to be followed to what extend an active ingredient is approved by particular private standards (VE_2010) as valid for the supply chain segment the farmer's harvest is allocated in.

Fruit and vegetables sectors are mainly affected

Hence, being important in terms of the number of approved PPP and the amount of very particular PPP, respective SRS will not affect all farmers equally. Most impacts are expected in the fruit and vegetable sectors (see, e.g. GR_2007b, WI_2005, VE_2010), e.g. reports with respect to PPP that the retailer 'Marks and Spencer' declares the goal of making 75 percent (100 percent) of all fruit and vegetables residue-free by 2015 (2020). Other retailers set similar or only slightly diverging standards, mainly, but not exclusively for fruit and vegetables, which are sometimes also called minor crops (VE_2010).

Bulk commodities are also influenced

On average, farmers cultivating bulk commodities such as cereals and oilseeds are also but less affected by SRS than horticulturalists. First, public standards continue to dominate here (HE_2008) because so-called major crops (see, again, VE_2010) are more 'anonymous' and less differentiable goods (BO_2009). And second, it is often assumed that in certain cases alternatives and substitutes are easier to find if a particular PPP is restricted in the use in major crops. However, the following implications can be drawn with respect to bulk commodities if affected. The only difference is that with respect to major crops the level or amplitude of change/amendment should be considered as lower than that regarding minor crops.

Short term impacts on farmers with respect ...

Although not a main topic in scientific literature concerning SRS impacts, various implications can be drawn for the on-farm level and the short term. They mainly focus on terms such as product quantity and quality, management and costs of production, price of products, and farmers' income. Most of them are likely to be negative:

... to yield, ...

- Undoubtedly, yield depression will occur if PPP are restricted via SRS. Pesticides are a (if not the crucial) factor in reducing crop damage (SE_2007), and their absence or limited use will certainly lead to a lower

harvest under the circumstances where the proper substitutes are unavailable. In practice such alternatives are often lacking (SE_2007).

- In addition to the fact that yield reductions due to a limited PPP input are expected and reported to be higher in the fruit and vegetable sectors, i.e. for so-called minor crops, than for 'bulk' commodities, i.e. major crops (see, e.g. VE_2010), it can be expected that yield impacts are more adverse due to a cumulative effect the more pesticide categories are affected by a SRS.
- Furthermore, yield depressions are seen to be higher if the crop is produced for the fresh market instead for the processing market since marketable yields (to be distinguished from grown yield) count. Especially fresh market produce is not only affected in terms of yield quantity but also in regards to its quality, i.e. the fulfilment of cosmetic standards (e.g. SE_2007).
- However, exact figures on yield depressions caused by SRS are hardly available; only from studies discussing specific pesticide bans or reductions prior to the development of concrete and recent SRS (e.g. HA_1994, KN_1999, ME_2002) one might get some valuable 'impressions'. Accordingly, yield depression may be very high: although much lower in the majority of cases, reductions of up to 60 percent have been reported. Additional insights may certainly be gained by looking into 'regulatory efficacy trials' of pesticide use, but access to such tests is beyond the scope of this analysis.

... inputs and costs ...

- Pesticides provide an important input and are, hence, a major tool of what is regarded as the good agricultural practice (GAP) and integrated pest management (IPM). A restriction in using particular PPP endangers such input-focused management approaches (ME_2002, SE_2007): GAP and IPM in terms of inputs can be considered knowledge and information incentives, and, above all, very site-specific. Therefore, the usefulness of such GAP and IPM programs needs to be confirmed in face of PPP restrictions (see also below). Too many limitations may also lead to an endangering and a (partial) collapse of IPM systems (HA_2010).
- Furthermore, against this background, a restriction in PPP use (due to SRS) might be prohibiting the (entrepreneurial-behaving) farmers from adopting a first-best solution forcing them to adopt a second-best pest control approach (ME_2002) instead one that is less effective and more costly. Economically speaking: marginal costs increase.
- This can further be explained since more restrictive SRS are commonly seen to add costs to production (e.g. BO_2009, CT_2010a, FA_2006, GI_2008, LI_2009, VE_2010). These costs refer to a rather broad spectrum of 'inputs' such as the implementation of complex quality assurance systems and associated testing, i.e. chain management (UN_2007b), as well as investments in the new or adjusted production technologies.
- More precisely, SRS demanded reductions in pesticide use should, e.g. at least be associated with the increasing overheads for management and

capital replacement costs. A reduction of PPP certainly requires important management decisions in terms of other production practices and technologies, the kind and timing of plant protection measures, the frequency and intensity of pest controls.

- The 'normal' reaction of a farmer would be as follows: a decrease in the number of pesticide applications and/or the amount of PPP per application will certainly result in an increased use of other inputs (substitutes) to try to compensate. For instance, more labour might be allocated to crop growing in order to better deal with weeds; the crop is monitored more frequently to early identify the pest outbreaks, new machinery has to be acquired. In addition, available alternative PPP substitutes could be purchased and applied, but VE_2010 puts a question mark over the broad-based availability of such substitutes.
- The adding of such and other costs on-farm is particularly high and cannot or can only minimally be distributed (FA_2007) up- or downstream of the food supply chain. Indeed, farmers are seen as not being able to pass increased costs along to processors etc. but will be expected to absorb the new costs with no increase in prices (NO_2007), at least not in the short term.
- Microeconomic theory stipulates that all this would increase variable costs. In addition, prices for replacement inputs grow due to higher demand and alternatives are usually more risky. Marginal costs – see above – would, thus, exceed the market price signalling the need for the farmer to reduce production further to offset cost-increasing effects (see, e.g. a rather old but still very substantial publication, namely HA_1994). All in all, production becomes less effective and/or more expensive. This has to be so, because, otherwise, an entrepreneurial farmer would already have used the alternative production techniques prior to the SRS implementation.
- Another cost aspect exists next to the concrete PPP treatment and is associated with the fact that SRS require extensive documentation and inspection of production facilities due to the necessary certification (see, e.g. BO_2005). These certification costs are mainly 'delegated' from the retailer to the producer as a condition of sustained market access (see below and additionally LE_2006). Certification costs can be quite high (BO_2005, GR_2007a) and normally occur regardless of farm size and location (e.g. BO_2009). For larger farms these costs might be more affordable than for small farms (LI_2009).
- Again, it is difficult to measure the costs related to SRS as they are too site-specific (SE_2007). Nevertheless, it can be stated that next to the previously mentioned certification costs, standard-born costs related to the use of pesticides (and fertilizers) are particularly high (FA_2008) and, thus, rather important in terms of adjustment.
- Both the trend towards reduced yields and increasing costs will certainly lead to a comparably high increase in per unit costs of production. Al-

ready economic theory supports this finding (see also ZI_1999) since farmers would never have adopted pesticides as it is without an apparent cost benefit per unit of produce. This benefit is partially lost under more restricted or tougher SRS conditions.

... as well as product prices and income

- SRS do not necessarily ensure a better product or market price (VE_2010). Price premiums are, indeed, not considered a potential outcome for the farmers complying with pesticide-related private standards by various academicians (e.g. BO_2009, FA_2007, LI_2009). This is dependent on market power of downstream stakeholders (see respective arguments below).
- Hence, short-term income losses due to higher production costs and decreasing production quantities can be expected. Although concrete figures are, again, not available, the expectation can be assumed since already published prospects and calculations focussing on bans and reductions of pesticides in a similar setting (e.g. AP_1999, HA_1994, KN_1999, ME_2002) clearly point in this direction. As a 'rule of thumb' it can be argued that a yield reduction (here due to SRS specific PPP requirements) of 1, 2, 3 percent results in a respective income reduction of 2, 4, 6 percent (HA_1994 supported by ME_2002), taking the cost adjustments into consideration. Also SE_2007 denotes essential income losses.
- Short term implications for income may be even more devastating since stability of income is also affected: SRS may create huge yield depressions, namely if substitutes are not available or have only limited availability and pests occur, which could have been avoided with the PPP now restricted. This is so because the yield-securing effect of PPP integrated in GAP and IPM procedures is (partly) lost and also transitional difficulties potentially affect yield (GI_2008, VE_2010): crops, thus, become more dependent on local and weather conditions.

From the short term to the long term: the example of resistance

Resistance is a particular challenge with regard to plant protection. IPM programmes including the sustainable use of pesticides are established to, among others factors, maintain low pest resistance (ME_2002, WH_1999): the use of a variety of PPP and plant protection methods retains the effectiveness of each agent (SE_2007). Indeed, it is critical that farmers have a rather broad spectrum of alternatives available to prevent increasing resistance (CA_1993, ME_2002) and reduce crop damage (SE_2007).

In such an environment, the loss of a broad range of PPP may leave no or only resistance-prone alternatives for combating pests (WH_1999). Especially if a combination of agents required for rotation of applications of PPP is lost due to SRS-caused limitations and/or bans, resistance may build up (SE_2007) over time and increase in speed (ME_2002). The potential to manage pest resistance decreases with fewer alternatives (WH_1999); this is particularly the case with respect to minor crops (see also AP_1999).

Long term implications for farmers refer to ...

The short term and resistance impacts just described reveal considerable severities for farmers trying to stay in business facing new and tougher standards. Being entrepreneurs, however, farmers will (try to) adjust to new circumstances. The

periodic adjustment (costs) is (are) considered just another element of doing business (OE_2007); amortisation over time will occur. However, this holds true only for those farmers who have managed to survive. RE_2002 call them 'the lucky – a relative small subset of the original set of suppliers' (see also UN_2007c). This is already an important long term implication.

... adjustments in PPP application

What does it mean for the entire agricultural sector, be it in Europe or elsewhere? Will the sector be negatively affected or not? Mainly focussing on changes in PPP applications due to SRS the following adjustments and the most likely outcomes can be assumed:

- Although the needs regarding pesticide selection and application are considered a main constraint related to the changes required in agronomic practices following new or amended private standards (OE_2007), routines developed over time while applying PPP can and will be transformed by learning processes (UG_2010): farmers have to find and implement new technologies and innovations such as further developed IPM programmes and spraying schemes, acquire and train new competencies, complete skills and know-how, which can become significant drivers of additional change.
- Production decisions will be made (sooner or later) according to the changing conditions. If PPP restrictions apply, the farmers might, for instance, tend to minimise weed problems by postponing sowing or choosing more resistant crop varieties. Another option would be switching to semi-optimal but still allowed or newly developed pesticides. Farmers, in addition, will pay more or better attention to the correct and economically efficient use of inputs (GR_2007b), such as pesticides. Hence, pest and disease management becomes a more pronounced and important part of the farming practice (BO_2009). Farmers will be successful only if they are able to manage their land accordingly and to meet respective auditing structures (RO_2008).
- This does not necessarily mean that total pesticide use will shrink (AS_2008), especially not if substitutes are available and sub-optimal amounts of PPP (below economic optimum levels) have been used before the standard became mandatory as is often the case in developing countries and emerging economies (see, e.g. AS_2009). In addition, it can still be assumed – particularly but not solely for farmers in these regions – that a demanding standard fosters more managerial efficiency and competitiveness of some (leading) farms, allowing these farmers to expand, to cultivate more land area, and to use PPP on additional land. The use of pesticides on such (yet newly occupied) land units might have been limited before due to financial problems of smallholders (AS_2008) and/or a lack of knowledge and assistance, which is now provided via the standard setting bodies and its definition.

... and other changes

Long-term adjustments do not necessarily have to focus on PPP and their application alone. Entrepreneurial farmers will find other options to amend and fine-tune production processes according to one's needs.

- Another important approach is to shift acreage away from crops affected by the SRS to other less-regulated crops. That these processes take place is evident at least since HA_1994 and also OR_1999 have analysed pesticide bans and reductions in agriculture. The findings can simply be transferred here, since many SRS, by definition, also demand bans or reductions of PPP.
- Not only with respect to PPP, but in more general, new or upgraded technical skills are an appropriate adjustment. Such innovations in human and resource capacity are, indeed, considered a 'great deal' in SRS contribution to the improvement of agricultural practices (BO_2009) and an important stimulus to develop alternative pest management methods. The question, however, is whether this upgrade is really caused by SRS or if such technological progress bridging existing gaps would have materialised autonomously anyway. In addition, it can be assumed that it is not imaginable that such adjustments would take place at no cost.
- Of particular interest are, however, the adjustments and costs in terms of the risks associated with the sharpened PPP-related SRS (see also discussion of resistance above): already OR_1999 has discussed the higher likelihood of total yield losses due to a ban of pesticides; and VO_2009 points at the (increased) harvest risks fully transferred to primary producers. In future, farmers may purchase so called weather derivates and/or refined yield insurances. Such kind of risk management measures become more and more popular and enter the particular input market.
- Another emerging jeopardy is the risk of changes in specialisation imposed by SRS (BU_2007). The foreseeable development in land use will certainly affect the degree of specialisation a farm has achieved before the SRS has emerged and lead to additional adjustment costs over time in order to combat the imposed risk of a change. Another question here is what will happen with farms highly specialised due to SRS when the private standards change again, especially since the change frequency of standards is notably higher in the private than in the public sector (HE_2006).

... as well as costs and prices

- It should have become clear that adjustments over time cost: time, production of certain crops substituted by other (second-best) crops and certainly always financial resources. But farmers, in addition, have to and certainly will learn to better negotiate over the prices with 'bigger players' than before (DR_2008a) in order to compensate for increases in opportunity and real costs. Indeed, the higher adjustment costs will increasingly be covered by higher (market) prices in the long term since over time less production and higher costs would necessarily mean higher prices.
- Indeed, economic theory stipulates the following: without structural adjustments, the relative price increase would be at least as much as the relative cost increase – otherwise (after the short term remaining) producers cannot stay in business in the long term. Already WI_1986 has insightfully pointed out that without such 'price incentives', supply chain re-

lationships become unstable in the long term (see also discussed impacts on retailers and consumers).

Particular findings

Particular long term benefits to farmers complying with SRS are (a) a preferential long lasting market access due to upgraded product quality (BO_2009) and (b) an enhanced corporate image of the participating stakeholders (LI_2009). Maybe due to this specific nature and despite their discriminating market effects, SRS are also seen as 'agents of change' (NI_2005), specifically in developed countries, providing incentives to farmers to amend production methods. This has been exemplified, e.g. by MI_2008a providing a PPP-related case study focussing on amended pesticide use in table grapes production in Spain.

Altogether, the influence of SRS standards, especially those related to PPP, is considered as limited to the very particular production system (HA_2010) and not to the entire agricultural sector, be it in the EU or elsewhere. Evidence for direct economic returns from the application of such standards (in the long term) is less clear, although some first scientific attempts have been undertaken (GI_2008): some (of the remaining) producers face net economic benefits, others only a few, if any (see also MO_2010). Modelling exercises sum it up as follows: total producer welfare can still be maximised under private standards imposing 'a higher quality' (Note: an increase in welfare is not mentioned!), but only efficient producers may participate (FO_2008).

This revisits what has been mentioned above when starting the discussion of long term implications: economic disadvantages faced by producers stepping back from production and markets have to be taken into account as well. Redistribution of income among farmers becomes the dominant long term effect of (partly) cancellation of PPP (SE_2007).

Impacts on smallholders might be devastating ...

Apart from farmers growing perennial crops, which cannot change production systems quickly and where the long term perspective used above needs to become an outlook for the very long term to be valid, problems are seen to be faced by smallholders and/or farmers with comparably low resource capacities, be they in industrialised or developing countries (e.g. CT_2010a, LE_2006, UN_2007c, VO_2009).

By and large, and particularly with respect to pesticide requirements, private standards pose major challenges for small-scale producers in markets for high-value crops such as fruit and vegetables (AS_2008). They might be excluded from markets (e.g. LE_2009, WO_2009) respectively crowded out of business (e.g. VE_2010). First of all, this is so due to the fact that (a) most SRS were originally developed having in mind larg(er) farms in industrialised countries (BO_2009) and (b) smallholders – being under-resourced (BO_2009) – cannot easily bear increasing fixed and production costs as well as overheads (e.g. CT_2010a, FU_2007).

This holds true also for certification costs. It has already been stated above that such costs are usually per farm unit, regardless of size and location (BO_2009). Small farms (NO_2007) and farmers in poor(er) regions of the world find it more difficult to afford the costs than other farmers (UN_2007c, UN_2008) and call for their fairer apportioning (CT_2010b), especially if a multiple set of standards to be met applies (BO_2009). If costs are not shared somehow, this might directly force

them to step out of business or large market segments (WI_2005) while shifting supply to less regulated and controlled (domestic) markets (e.g. DO_2000).

Against this background, most marginalised producer groups face more limitations than potential benefits of using SRS and might, thus, more likely become non-competitive in a changed market environment (SE_2009). An increased divergence in market access across producers or countries or both will be a specific impact (FU_2005).

... especially in developing countries ...

It should become clear that all the above is not exclusively but specifically true for the developing world (OE_2007), where many farmers may not have the chance to compete since some of the constraints are external: poor infrastructure and lack of services, such as extension and laboratories, hinder them to assure traceability and, thus, to access markets highly influenced by standards even if they are able to bear (some) costs of standardisation. Other constraints here are low levels of education and agronomic knowledge as well as in record keeping (OE_2007); in addition, problems of land ownership and tenure need to be mentioned (UN_2007a) while discussing limitations.

This comes along with the assumption that in the tropics and other humid world regions, where most developing countries are located, pest pressures are exceptionally high. If this is the case, SRS are more challenging. In addition, and mainly with respect to fruit and vegetables, where many PPP-related SRS apply, it is observed that costs of certification tend to be transferred from importing (i.e. mainly developed) countries to exporting (i.e. mainly developing) countries (LI_2009).

... but could also act as incentives

But prospects do not necessarily have to be bad for smallholders and in developing countries. Various authors point at catalyst and incentive functions of standards (e.g. AS_2008) and necessary new production and market(ing) arrangements (e.g. BO_2009, BU_2007, BU_2008, GI_2008, GL_2002) such as out-grower schemes (VO_2009), micro-contracts (MI_2009), other contract farming, a new 'design' of producers, etc.

These kinds of cooperation and farm development accompanied by intensive farm assistance (MI_2009) are seen as able to facilitate substantial advantages to cooperating farmers (RA_2007), such as a transfer of technology and knowledge to previously less skilled farmers – enabling, for instance, better pesticides use (CT_2010b) and overall inputs control (GR_2010) –, access to inputs, credit, extension services (CT_2010b) and consumer-choice markets (GL_2002), communication of quality of products (BO_2009), dissemination of information and market data (DO_2009), etc. An improved understanding of profitable farming and management associated with higher yields will be an expected outcome (GR_2010). Higher welfare, more stable incomes, etc. (MI_2009) would certainly follow. Farms cultivating rather labour-intensive crops such as certain fruits and vegetables might profit the most from it (BU_2007).

After meeting the respective SRS requirements, (formerly as small-scale managed farms) production facilities tend to be larger (GR_2010) and have higher productivity, regardless of where they are located. This tendency is a particular consequence of SRS compliance (HA_2010). These farms are able to receive higher prices and gain additional income per working unit despite higher production

costs (per original farm unit) (DO_2009). Hence, CH_2007b concludes that small producers are not entirely disadvantaged in the SRS-related compliance process; to the contrary: they might be able to better access markets (international markets in the case of developing countries) and therefore new consumers, especially with certification (DO_2009).

Some additional and accentuated aspects

This potential outcome, however, needs a more thorough debate taking up again an already discussed argument – compliance:

- Compliance of a broad spectrum of farms with SRS, including and especially consisting of smallholders, might be achievable, but it needs a lot of solidarity among farmers (BL_2009). In a competitive and entrepreneurial environment this is considered as hardly manageable.
- Therefore, compliance, again, probably concerns only (former small-scale) actors remaining in the (yet grown) market. They are potential winners of the system change (BU_2007). But what about farmers not able to meet new market requirements? Certainly, the benefits of the complying stakeholders are accompanied by an out-selection of farmers who are not able to comply (DO_2009).
- It depends, then, on what will happen with the excluded farmers, in particular their working force. Some workers might still be able to participate in market developments as hired labour (e.g. MA_2009). In such a case their future is considered as secured via farm-based income (BO_2009), at least.
- Productivity increases, both with respect to labour and land, associated to the implementation of SRS, especially in developing countries, however, make it more likely that only the minority of former farmers remain in the sector as hired agricultural labour force and participate, this way, at the income development. The majority, thus, will fail to participate at all (e.g. BO_2009, CT_2010b, GR_2007a).
- It is also important to note that the few positive impacts to smallholders are expected to happen only if major prohibitive costs associated with certification and other requirements of SRS are (partly) covered by a system put in place (externally) to monitor, share and combat associated risk (see BO_2009). This might reduce per unit costs of change and can principally be provided by producer associations or other cooperative efforts.
- Counting on these arguments, it is certain that institutional improvements are needed in developing countries demanding societal resources which have to be reallocated (and will, hence, be missing elsewhere) respectively co-invested (see also impacts on international cooperation/donors discussed below).

The final picture for affected farms

Summarising, the economic picture and impact assessment on-farm becomes complex (GR_2010, HE_2009, NO_2007) for farmers in developed and developing nations. The short term outcome can be characterised by some negative implications. Various adaptations are needed but some of them will be difficult. The long-term outcome depends on investments in compliance but also in produc-

tivity, crop value, stability of contracts, group organisation, etc. At least, SRS, be they PPP-related or not, can and should be considered as a challenge for producers (BE_2005). Mastering this challenge means opening up the new opportunities to producers; missing it means their exclusion from markets or marginalisation (see also CH_2007b). Marginalised producers will still have the chance to look for on-the-spot deals; however, these markets offer significantly lower prices (UN_2007b) than the 'standardised' market.

By and large, these developments may lead to additional market access, but for a smaller number of suppliers. Distributional effects here are more visible than the level effects. Partially, SRS caused redistribution of resources may lead to income increase and also a reduction of poverty, especially in developing countries, but only if farmers 'grow' or (with respect to the farmers who had to leave the market) continue to benefit through the labour market as hired agricultural working force (MA_2009).

Scientific empirical evidence supporting these findings, however, is limited (MA_2006). Moreover, it should be kept in mind that most of the poor evidence, especially in developing countries and emerging economies, has been obtained from donor-driven projects which tend to report more positively than they are in reality (LI_2004).

2.2 Implications for other producers

Directly affected producers vs. ...

At first glance, SRS such as pesticide bans or reductions only affect farms which decide to implement them and farms which are integrated into the affected food supply chain(s) (HE_2009). The latter concerns farms not able to comply with the standard. An important issue here is the impact manifested with respect to producers which cannot adjust to higher SRS: income losses and restrictions in market access are reported (see above and, e.g. FU_2009). This is particularly the case for small-scale farmers and developing countries which face a disadvantage relative to 'well-equipped' farmers and developed economies (see, again, above and e.g. KN_2009).

... not directly affected producers

However, other producers (not complying with the SRS/not directly belonging to the food supply chain under consideration) will certainly be affected as well. This is apparent since markets, chains and regions are always interlinked with other markets, chains and parts of the world. A few examples shall be given:

- On the one hand as already discussed, suppliers do not necessarily need to cope with standards because they may still use traditional type market sales, where lead retailers do not play a particular role and consumers with rather low income and less-demanding preferences will shop (FU_2005), or they may switch to still existing wholesale and ethnic markets (LE_2006). These markets, however, offer a relatively lower price and are increasingly under pressure, hence, not very sustainable in most parts of the world with supermarkets occupying more and more consumer segments (see, e.g. BU_2007).

- On the other hand, there are still manifold agricultural and food commodities to be produced without requiring an adaption of private standards (HE_2009): producers are able to react flexibly and/or find alternatives in the production of cash crops or bulk commodities and will gain a comparable advantage vs. producers, who tend to specialise more and more in order to meet standards.
- Livestock producers, at least in the long term, will be affected as well. It has been noted that prices, ceteris paribus, will rise due to market shortages in feedstock created by SRS and in order to compensate for higher costs related to the implementation of the standard on the farm level. Without proper adjustments (which are beyond this analysis), this price increase of feedstock will certainly influence herd stocks, production quantities and income of livestock farmers negatively.
- If a PPP-related standard is valid for all farmers throughout the world, there might be a particular positive effect for some of them without any or only minor adaptations. They simply would not have to comply with a specific SRS and would win in terms of market access and income by seeking an economic rent because pressures created via pests vary depending on location and natural conditions. Regions which are less affected by a particular pest (because, e.g. an insect causing a pest might not find a proper environment to survive) would win in terms of competitiveness.

The final picture for all (affected and not affected) farms

The SRS, be they PPP-related or not, imply that – even if total (global or market) welfare is not affected – distributional effects occur: impacts on agricultural producers can be positive, not evident and negative. The impacts are more negative in the short term and if producers cannot comply with and meet the standards. The impacts are more positive in the long term if farmers can meet the SRS and respective certification and 'survive' as well as for producers not affected by the individual SRS at all. This consequences can be summarised with 'exclusion' of the weaker and 'rent distribution' towards the still participating economic actors (MA_2006). Income or in a broader sense: employment, hence, will develop unevenly and unequally leading to a possible worsening of social well-being (e.g. VA_2005) and sustainability (FU_2009) if not compensated.

3. IMPACTS ON DOWNSTREAM CHANNELS AND CUSTOMERS

3.1 Implications for buying-in stakeholders

Processing firms, exporters (and importers) are considered to be major buying-in stakeholders to be discussed here. It is commonly known that all these stakeholders, in general, face more challenges in the product handling, especially if PPP are restricted with SRS: post harvest losses (e.g. spoilage) or failures (e.g. imperfect skins) may occur more frequently and will certainly negatively influence

packing and marketing of agricultural products. There are many other implications as well.

With respect to exports and imports, it is widely accepted that SRS impact trade (e.g. LA_2009, LE_2006), which is considered hereafter as international trade, i.e. trade between, e.g. the EU and other parts of the world. Probably no other issue related to SRS impacts has gained more attention so far in scientific literature than this topic: trade. In summarising the thus manifold reports and analyses focussing on this particular implication cluster, it has to be stated that a dual outcome is apparent and a clear picture is not drawn, that is:

- SRS, on the one hand, may act as a considerable trade barrier.
- On the other hand, SRS can also be a mean of facilitating trade.

PPP play an important role, herein, since their associated risks seem to be a major challenge to trade (WI_2005), i.e. PPP-related SRS are under special consideration when it comes to discussing the various, partially diverging trade impacts of such standards. The twofold outcome can be regarded as follows:

SRS as a trade barrier

CT_2010a, FU_2005, HE_2009, KN_2009, LA_2009, SM_2006, TR_2006, VE_2010, and many others argue or see that SRS act as a barrier to international trade with the following reasons:

- First, SRS tend to exclude firms in a, yet, still competitive market (FA_2006) since certification to export/import is needed (LA_2009). Certification has a lot to do with compliance, and complying with standards is – as it has been the case for the farm level – associated with high costs for auditing, quality control, etc. (e.g. KN_2009, LE_2006). Not all existing traders can cope with this (HE_2009), especially since costs are considered a major investment for them (BO_2009).
- As these costs are mainly fixed and economies of scale can be assumed, rather small firms (and exporters from developing countries) with lack of finance, infrastructure and personnel capacity (GR_2010) are often unable to bear the costs and more likely to be excluded from markets than 'large' traders. Further concentration of market power might be the outcome; with small businesses being marginalised (BO_2009).
- The impact on international trade, therefore, may be deleterious. This is seen as especially true if the gap between a former (public) standard and a newly established private standard, which needs to be closed, is substantial for (mainly developing) countries' trading companies (HO_2010). Exporters need to gain better control of production and distribution of agricultural products in order to guarantee traceability of products and to operate in a comparably cost-efficient and, thus, globally spoken competitive way (TR_2006).
- The entrance of newly developing exporters is also made more difficult (HE_2009) since these firms/countries without previous investments have to devote even more resources for necessary compliance capacities, knowledge and experience. HU_2008 brought it to the point: the more (private) standards, the less competition (with all the negative economic

effects arising from oligopolistic structures for other market stakeholders and the society as a whole).

- A particular handicap for exporting firms (again, especially in developing countries), but also for producers in these countries (not particularly discussed above; see, e.g. LI_2004) is the increasing and highly intransparent multitude of different standards (e.g. OE_2007). In such an environment, structural adjustments and the development of new trade relationships are needed to continuously observe the evolution of the standards and operate in more and more restricted and regulated international markets (e.g. KN_2009).
- The alternative for traders is to specialise in terms of products and standards to be met. This, however, might be risky since market quantities may shrink. Moreover standards and related demands might change from one transaction to another (TR_2006) and with time make too narrow specialisation a risky business approach.
- In addition, SRS may hinder 'normal' trade since they are not established following principles and guidelines ruling trade between countries as negotiated within the World Trade Organization (WTO) and other bi- and multilateral trade agreements. This, again, can be considered a particular burden for developing countries' firms.

SRS as a facilitator of trade

Following these arguments, SRS may be seen as a substantial barrier to trade in agricultural and food products (MA_2006). Maybe because of measurable evidence on this still being piece-meal (WO_2009) a contrary view that private standards are increasingly being considered as a trade facilitator and catalyst providing incentives for improving (smallholder) efficiency and equity in the value chain is arising (e.g. BA_2005b, BO_2009, HE_2009, SM_2009).

The following point of view supports this: SRS are seen as one particular driver of changing competitiveness; while some countries and firms struggle to comply, others flourish in a new standard environment (HE_2009). Restructuring processes and enhancing capacities are the accompanying measures behind driving infrastructure improvements and investment, especially in developing countries (HO_2010), which leads to new global market opportunities and increasing trade flows.

Summary of and additions to the trade issue

Whether this situation is more distorting or enhancing the trade remains an unanswered question. Indeed, it is not easy to separate out the specific impact that SRS have on agro-food foreign trade; hard evidence is difficult to find (HE_2009). By and large, the final outcome remains unclear, but it can be summarised that (export/import) firms which are not certified will have no access to globalised supply chains whereas certified firms may gain the market.

Overall changes in trade are not significant (MI_2008b), and not systematic, at least not in terms of trading countries (DR_2008b). Nevertheless, it should be seen that the 'preferred sellers' to retailers and supermarkets appear (SE_2009); the likelihood to belong to such sellers decreases with the 'average' wealth (GDP/capita) of the country a firm belongs to (DR_2008b).

Investments of firms favoured are more and more foreign direct investments in nature (TR_2006) and will be amortised over long periods (BO_2009). The main result is an even smaller number of larger and more capable trade firms (HE_2009) which are more productive and export more than before the SRS setting (LA_2009). Oligopolistic organisation forms of trade, mainly in importing developed countries face some benefit, herein, against – speaking in terms of market power – weaker mainly exporting firms from developing countries (VO_2009). Belonging to the trade network once complying/certified enables the firms to save some transaction costs (e.g. LA_2009) since business with fewer market participants reduces the information needs, market observation time, etc. and even more increases probability to export due to the absence of non-certified firms.

Overall impacts of SRS, hence and again, focus on the distribution of trade and associated welfare but not on the level. Statements made above with respect to farms principally could be repeated here. In other words: private standards can be trade increasing, diverting or reducing, the outcome differs from product to product and food supply chain to food supply chain (see also HO_2010).

Benefits for third party certifiers

Despite the concrete final outcome, there are always (considerable) costs to bear in order to maintain or increase (trade) access in markets substantially influenced or already dominated by private standards. Especially certification costs (e.g. LA_2009). Very soon after initial standards were set, the SRS setters have realised that this turned to be out very costly for them. Using increasing market power, costs have been delegated (as discussed above). Not only in terms of auditing farms but especially in terms of trade certification, so-called third party agencies in charge for auditing and monitoring were encouraged to be developed (see, e.g. HE_1998).

These third party agencies can be considered a major benefactor of increasing SRS (HE_2005) and are widely acknowledged, (RO_2007). UN_2007b also refers to the specific value added by these and other outsourcings and effects related to the establishment of SRS. Despite this, it should be questioned whether this particular development is an unproductive rent-seeking activity similar to what can be considered as the substantial costs incurred by a bureaucracy managing the public standards.

Processors and wholesalers

Agricultural products are not always traded internationally to reach the consumer but may be channelled and processed beforehand. Processing firms and wholesalers are, hence, other important stakeholders to be judged in terms of SRS.

Processing firms are obviously less affected by SRS than primary producers, although costs of certification are sometimes also transferred from retailers to the food industry (HA_2006). This is so because (a) processors normally envisage no major break with the pre-existing controls if a new SRS is set (see, e.g. HE_2009), (b) the costs are manageable, and (c) firms still may 'delegate' (costly) responsibilities to producers (where the standards require substantial change, see above) due to their market power vs. the primary producer.

More difficult might be the situation for wholesalers since the particular value chain segment becomes less important (BU_2007) when more centralised suppli-

er-buyer relationships between primary producers and exporters, on the one hand, and importers and retailers, on the other hand, are established with SRS. Indeed, mergers and acquisitions as means of more market concentration bring the various functions of wholesale traders and other produce distributors under individual company control and cut out middlemen from the food supply chains (UN_2007b, UN_2008), especially if the retailer and/or a supplier of primary products (e.g. a yet larger exporter/importer) use market power (VO_2009). BU_2007 calls this process a reorganisation of agricultural marketing (see also BU_2008), which can be considered as fundamental.

3.2 Implications for retailers and supermarkets

SRS are set by retailers and supermarkets, mainly located in developed world regions such as the EU, being (the most) powerful actors in many food supply chains. Hence, it can be assumed that such market stakeholders exercise buyer power (FE_2007) and benefit the most from an increasing and more complex spectrum of private standards (RE_2002). This hypothesis is strongly supported by the scientific literature:

Higher profits

- There is, first of all, a financial and economic impetus in guaranteeing the food safety which many associate with private standards (BO_2009). On the one hand, SRS are an effective and widely used instrument of supply chain management, and especially of control (FU_2009); it outsources the food safety risks (HE_2008), mainly to (primary) suppliers (BO_2009). On the other hand, it assures sustainable and relatively high profits in the high-value and niche markets, which are price inelastic and mainly occupied by the wealthier consumers.

Better prices

- Retailers/supermarkets, hence, may bargain for price concessions (FU_2005) and gain from price premiums collected via the final consumer (see below and, e.g. LE_2006, SE_2007).

Lower costs

- But retailers and supermarkets are also in a position to influence the costs of their own services. The firms are in a fairly good situation while adopting SRS: they may abuse their power (DU_2003) within a mainly oligopolistic market (UN_2007b), can constrain the market access (e.g. BO_2009) and may force produce suppliers to accept new market conditions (e.g. FU_2009) as well as to cover the costs and risks associated with the standards (see above, BA_2005b, FO_2008, HA_2005, and MO_2010). This lowers their own costs and risks (HE_2005, HE_2008): costs, e.g. are reduced due to lower coordination and transaction costs in procurement simply because buyers cut the number of suppliers (HE_2006, UN_2007b).
- This, sometimes, enables retailers and supermarkets to offer higher prices to producers than the wholesalers may put forward; the latter will be forced to step out of the value chain (see above). Following this, and because spot markets lose importance, retailers and supermarkets may further reduce their transaction costs (BE_2005) due to the creation of more and more (standard-based) centralised purchases and other vertical rela-

tions with upstream value chain stakeholders (MO_2010). Indeed, SRS encourage organisational innovation implicitly through conformity with the criteria set (SE_2009): the creation of more direct and durable trade relationships is an outcome. Retailers' decision making becomes less risky; communication towards consumers becomes more accurate (BO_2009) since standards associated to labels and brands are seen as being rich in information and efficient in transfer.

Additional economic benefits

- SRS provide additionally to the above mentioned points economic benefits (UN_2007b) from brand protection, business improvement and efficiency as well (VE_2010). By setting SRS as a creative instrument (HE_2005), retailers prevent losses of market reputation (FU_2006) and shares. Price competition will be minimised; firms compete on the basis of quality (HE_2006, MO_2010) and differentiation of product (BO_2009, HE_2005, SM_2009).
- Against this background an interesting note can be made: success of retailers in this price and market competitive environment highly depends on new institutions such as individual private standards (HE_2005). Hence, product differentiation might already be and is potentially the main reason behind the setting of additional SRS (HE_2008), and it can be assumed that food safety arguments are in decline as a major reason while defining new private standards.
- Despite this, it is also argued that green washing of their images is still another benefit that retailers and supermarkets add to their business portfolio by setting higher standards (RU_2010).
- Finally, a very particular benefit shall be mentioned. By setting SRS, firms, on the one hand, support governments (mainly in developed countries) in the improvement of certain processes, which they could influence only at much higher costs without the private standard. This, on the other hand, creates so called 'institutional rents' (SE_2009) supporting retailers by providing new opportunities to interact with the governments.

Difficulties

By and large, it can be summarised from the above arguments that leading retailers are 'the' winners of the system by assuring market concentration and increased buyer power (FU_2005). Despite this, there are also a few aspects discussed by science to be mentioned pointing at the difficulties for retailers.

One aspect is the existing multitude of standards. Already TR_2006 reports that alone in the EU more than one hundred SRS exist. In total, the number is very likely greater today and probably still increasing. Such a situation might threaten both suppliers (as discussed above) and retailers since food supply chains become somewhat chaotic (NO_2007). Higher coordination costs (this time mainly for retailers) are a very likely follow-up (CH_2010). These additional costs as well as a reduction of network economies (HE_2006) cannot simply be transferred and demand adjustments on the retailer side, namely new collective SRS.

Sooner or later, this will demand further (privately organised) harmonisation in order to avoid policy interventions (see below) but also market shortages. Such limited supply may occur if too many enterprises – being confused and not able

to manage the full spectrum of standards to be met during transactions – step back from or reduce the particular production. The retailer might be at risk if supply/trading relationships stop (see also, e.g. BO_2009). Collaborative arrangements between suppliers and retailers/supermarkets (OF_2005) and technical assistance to be provided by retailers to suppliers (SE_2009) are seen as part of a solution. MO_2010 calls this the creation of vertical alliances (sharing benefits!) between producers, manufactures and retailers. With respect to pesticide use, examples are available providing evidence that retailers, for instance, assist participating farmers in changing production patterns (e.g. FR_2009).

Market shortages can be considered a real danger for retailers due to another reason as well. Among other means, they experience rapid market growth via SRS. A rapid market growth, however, means dealing with larger quantities (SE_2009). These quantities need to be assured by well-functioning and consistent value chain segments and sophisticated logistics (FU_2005) able to supply in time and in the amounts needed. The inherent chain dynamics, although not fully clear yet, may generate indirect (or partial) economic benefits to other stakeholders than the retailer (SE_2009).

A particular market bottleneck may appear with the restricted use of PPP due to SRS. PPP in the fruit and vegetables sector have been used extensively in the past due to cosmetic standards, which also can be defined as SRS specified by retailers (HA_2010): it will be interesting to see what will happen to retailers if the trade-off between less PPP input and continued high cosmetic norms (e.g. perfect skins unachievable without certain PPP) becomes apparent and the final consumer becomes disappointed.

The overall perspective

Although these difficulties will limit rent-seeking and profits of retailers and supermarkets somewhat and, speaking in terms of a liberal market economy supported by FE_2007: there is considerable room for improvement concerning a more equal distribution of wealth created by SRS.

Looking sector-wide, the particular findings regarding the retailers and supermarkets should not be overestimated. It should not be forgotten that the global retailer food market is mainly driven by the number of people and the food preferences of consumers. People will not just eat more or less overall because of private standards. SRS may influence specific food choices but not the overall caloric or nutritional intake. In such an environment, SRS set brands and raise the importance of labels, but rarely scale up to significant levels of percentage of the entire business (BO_2009). The amount of total food to be consumed is finite and, hence, less affected. This may limit the economic effects.

3.3 Implications for consumers

As has just been mentioned, the consumer finally decides what will be eaten by maximising his own 'subjective' benefit. It will be interesting to look at the economic consequences consumers face with regard to SRS.

Increasing well-being of some consumers ...

An often quoted argument in the studies is that consumers' well-being is increasing due to SRS since food safety issues are better taken into account (e.g.

FU_2009), particularly since the agrochemicals are restricted. Indeed, respective consumer concerns are existing and moving. Private standards seem to keep up with these concerns better and faster than the public legislation can do (BO_2009), thus increasing well-being of individual consumers via a subjectively felt quality upgrade. In addition, studies outline that the individually experienced well-being of the final customers may increase because SRS offer a clearer navigation enabling consumers to shop more purposely (see, e.g. BO_2009).

The increase of the well-being of consumers as briefly discussed, however, is a rather narrow argument. It can be demonstrated that an increase in well-being has a very individual component and becomes manifest only to some but not the entire group of consumers. At least two aspects need to be taken into consideration while discussing implications for consumers resulting from SRS: consumer perceptions and the distinction between the two terms 'perceived well-being' and 'real welfare', i.e. economic returns to the consumers.

... is based on risk perceptions ...

The very important factor of risk in food consumption is often, due to the absence of quantitative information, based on qualitative concerns frequently linked to ideological and media beliefs (KN_2000), confidence as well as psychological (FR_1999), behavioural and demographical characteristics of a population (GI_2010). In such an environment, food choice is based on individual risk perceptions instead of measurable real risks; and risk perceived by consumers does not always correspond to the actual level of risk in the market (GI_2010). GI_2010 also points out that there is a misperception, i.e. an overestimation of risk, which – if high enough – encourages companies (such as retailers) to supply respective products in order to benefit from the consumers' willingness-to-pay for perceived higher safety. Therefore, firms use communication referring to brands and private labels based on the definition of specific production conditions (BA_2005a, FE_1998, GI_2006), i.e. SRS.

... but has to be distinguished from welfare of consumers

Benefiting from the willingness-to-pay as just mentioned means to earn a price premium (see also above). This and the fact that in the long term the price of food must increase to bear SRS-associated costs leads to the following conclusion: finally, the consumer is the one who has to pay for the implementation and management of a particular standard (LE_2006, SE_2007). Welfare for participating consumers, hence, is only equal to the increase of the subjectively perceived utility of these risk-averse consumers (value of additional 'health' per unit consumed) minus objectively measurable costs (higher price per unit consumed) they have to pay. However, consumers who are not risk-averse will certainly experience a welfare loss.

In addition, consumers' welfare could be negatively affected since too many SRS confuse them and may increase opportunity costs (CT_2010a). In particular, it is very questionable if the consumer – with an ever increasing number of SRS – has more control over the food handling and preparation. Probably the opposite occurs.

Low-income consumers

Even more questionable is whether all consumers participate at the same level. Higher standards may have some positive effects on consumers in industrialised countries (e.g. FU_2009), and the same applies to wealthy, risk-averse consumers

in emerging and developing economies. In addition, spill-over effects on domestic markets, mainly in developing countries, are imaginable (e.g. JA_2004): produce will simply become safer and sustainably produced (AS_2008) and/or available at local markets (BO_2009) if excess supply of standardised export production flows into domestic markets (HE_2009). Nevertheless, it is frequently expected that there is an increasing quality gap in different market segments, i.e. with respect to domestically available and exported food (e.g. HE_2009, VE_2005).

Against this background, SC_2005 expects a real danger for consumers in developing countries – also for low-income population in more developed nations the same can be assumed – namely that the costs increasing due to standards may carry food prices out of reach of the poor. This adverse impact on food demand satisfied by markets and, hence, on nutritional requirements of the population, i.e. hunger and malnutrition, may negatively affect health (SE_2007). The perhaps positive net health effects regarding wealthier consumers in wealthier nations has to be distinguished from a less-positive, maybe negative gross health effect in global terms.

Additional arguments

SRS can introduce new sources of risk into the food supply affecting first of all the consumers. Especially with regard to PPP, certain pests, diseases or toxins might survive and be carried by produce not treated appropriately. Not only may this cause health problems, it may also result in more perishable crops, greater spoilage, shorter periods of durability and storability due to damage and softening, and less aesthetically appealing fruit and vegetables (SE_2007).

The term 'less aesthetically appealing fruit and vegetables' adds another argument: consumers need to be willing to accept produce that is blemished or infected with certain pests. Hidden opportunity costs exist here.

Finally, consumers are a rather heterogeneous mass: it probably still can be assumed, that the overwhelming majority of global consumers still buy products on the basis of taste and cost, and less on what may be included (or not). This argument has been made clear by BY_1994 – stating that price is a very sensitive issue and will negatively affect the probability that consumers would shop for residue-free/residue-minimising produce – and is nowadays supported by, e.g. JA_2005 arguing that European consumers' preferences are very diverse. Also TR_2006 points at this direction. Hence, parallel food production and chain systems will emerge in an environment of SRS satisfying consumers at different levels of added value (low-income, middle-income, high-income) markets.

Summary

Again, the final outcome with respect to the average final consumer is not very clear. Pros and cons are discussed above. Some consumers will certainly feel better with SRS, especially related to perceived risks associated with agrochemicals, calling this additional well-being; others, especially poorer income groups and consumers with less risk perceptions, however, may be negatively affected. Once more, the discussion of distributional effects seems to be more relevant than an evaluation of the impacts on the overall economic welfare level.

4. IMPACTS ON UPSTREAM SUPPLIERS AND THE POLICY SETTING

4.1 Implications for input suppliers

Particular weak science base

With respect to input suppliers, it has to be stated, first of all, that no single one of the manifold identified references particularly focuses on this chain segment. It can still be considered a 'black hole' of scientific research. This limits the following discussion. The arguments are hence mainly theoretically based and partly grounded on conventional and perhaps over-generalised assumptions. To be more precise, particular industry knowledge is needed while research is missing.

Will PPP markets shrink due to SRS?

With respect to PPP, in the short term, the chemical industry will certainly lose some revenue (and profit) in certain market segments affected by a SRS bans or reductions. Nonetheless, the effect on the industry as a whole needs to be differentiated:

- The majority of SRS affect fruits and vegetables, i.e. so called minor crops; most of the bulk commodities, i.e. so called major crops, are less affected. It depends on the market portfolio of a corresponding firm if this contributes more or less to the economic returns.
- But even if particular PPP-restricting SRS apply to certain bulk commodities, farmers will adjust. E.g. they will devote land to less regulated crops and cultivate more intensively.
- In addition, substitutes of PPP will be used when- and where-ever possible; their demand will increase signalling firms to sell more and to increase prices.
- Despite this, regionally speaking, losses in certain markets might be high and could endanger part of the industry and particular marketing channels.
- Other market segments, however, will win in terms of revenue and economic importance. The pressures created by SRS increase innovation. Bioengineering might become more interesting, for instance; and new PPP which add value to farms will be developed in the long term.
- Evidence also shows (AS_2008) that there is no significant difference in the total quantity of pesticides used in developing countries and some emerging economies after private standards have been put in place: this as in addition to the formerly mentioned facts, that is, pesticide use has been below the economic optimum beforehand.
- More globally speaking, another important effect should be considered. Prohibiting the use of PPP via SRS causes yield depressions. At the same time, food, feed and fibre are demanded at ever increasing amounts. The question is: where will it come from? The answer is: in a global market entrepreneurs will certainly find ways to produce the demanded food, feed or fibre somewhere or somehow else. This production will be done

on additional land and/or by increasing productivity. Both can lead to additional PPP demand.

Effects on land as an input

Land is a very particular agricultural input that cannot or only to a limited extent be used elsewhere. JE_2004 predict negative land use effects if pesticides are reduced. This may result in a downward pressure on the economic return to this factor and, hence, in decreasing land prices. This will be in favour of farmers renting land; but it will certainly affect the land owners negatively. In the short term, this might be a theoretically correct outcome. However, in the long term, the associated product decline needs to be compensated. It depends, then, on how much of the decline is compensated via intensification and productivity increase of already cropped land vs. via bringing additional agricultural land under cultivation, if this effect sustains.

The argument of JE_2004, therefore, needs to be considered a rather narrow one. In addition, it has to be noted that land cannot be traded easily. Land contracts are usually mid-term to long-term oriented and prices cannot change in the short term. With higher prices of crops, necessary to cover investment costs associated to SRS in the long term, an opposite effect may occur: prices for land may increase as well. Which effect is greater depends on manifold circumstances; again, a clear statement remains open and the outcome will certainly be very particular for every case observed.

4.2 Implications for policy makers and the overall society

In past decades, a lot of progress has been made in removing the barriers of trade. Against this background, an interesting debate has already started (see e.g. CT_2010a): should private voluntary standards, i.e. SRS, be regulated? Is there an increasing need for harmonising public and private standards in order to avoid an undermining of still functioning international trade systems, such as the WTO agreement on SPS measures', by SRS (e.g. BO_2009)? Do we need new and improved 'quasi public' rules as substitutes for private standards (FA_2006, FU_2005) to maintain trade barriers at least as low as they are?

Potential policy actions are discussed

Currently, policy makers are reluctant to play a more pronounced role herein, although enforcement by governments is suggested (see, e.g. CO_2005), especially if it comes to a situation when SRS are de facto creating a non-tariff barrier (CT_2010b). The situation, however, might change over time despite the fact that private standards are not directly addressed by WTO agreements (UN_2007b).

Yet, interventions are very unlikely

Indeed, history shows that most of what are now considered as public standards started earlier as 'private' standards or requirements. First indications seem to arise on the horizon (see, e.g. SU_2010) pointing at policy initiatives 'in the pipeline'. Yet, no distinct policy activities, i.e. regulatory interventions, are apparent. Guidelines have been formulated only occasionally, like most recently those by the European Commission (EC_2010).

While studying respective documents it becomes apparent that policy makers only tend to recommend but not regulate developments. From a societal point of

view this is a sound perspective as long as impacts on stakeholders of the food supply chain resulting from SRS are as diverse and complex as described above with more pronounced distributional, but only limited level effects. In such an environment, SRS are considered just another input factor that needs to be taken into account while doing business (OE_2007). This holds particularly true for farmers; one should therefore not expect that, e.g. the Common Agricultural Policy of the EU will react unless strong market distortions become apparent.

Specific policy costs and benefits

Nevertheless, policy costs occur, i.e. tax payers' money is being spent, to discuss compliance, harmonisation and verification of private standards. VE_2010 e.g. displays the international (policy) efforts underway to strengthen harmonisation of SRS: many international and national policy stakeholders are involved. In addition, there is a need for extensive dialogue between public and private standard setters (VE_2010). Against this background, HE_2008 states that sooner than later the number of new SRS will decline and private retailers will 'stand back' from governing additional food safety. History stipulates: this 'job' will eventually be done by the international harmonised standards, being more public in nature.

One reason why certain policy makers are still hesitant to act is a benefit they experience: private actors already demand tougher standards than governments can enforce or would like to have enforced (UN_2007b). By meeting more sophisticated standards, less ambitious policy goals are being achieved at no or only little direct (budgetary) cost and especially without intervening and dissatisfying some voters.

International cooperation

Policy makers are already in a limited way trying to cope with the negative effects of increasing SRS in industrialised and developing countries. E.g., in developed economies, research and development programmes have been launched in order to help farmers and other market stakeholders to meet more restricted pesticide requirements (e.g. CT_2010a, LI_2009). Considerable additional research is needed, for instance, to discover, develop and implement alternative pest controls, to create and establish new IPM systems. Probably substantial private but also public resources are therefore required.

Even more pronounced are the policy interventions with respect to developing countries. These economies suffer from internal financial, technical and infrastructural constraints making it more difficult to implement, monitor and verify compliance applied to SRS on the farm-level and downstream of the food supply chain (e.g. CT_2010a). Technical assistance, both from public and private donors is needed (UN_2007b, WO_2009) in order to avoid an exclusionary effect on products originating from producers in developing countries (WO_2009):

- It has been reported several times above that rather small-scale farmers, exporters etc. are more likely to be unable to bear the costs associated with the compliance with a new SRS. Governments and international donors, hence, might have an important role to play for strengthening grower, trader, and/or processor organisations (e.g. CH_2007a, KN_2009). If not, a lack of export market access may occur in some developing countries.

- Actions to come should, according to e.g. GA_2008 and WI_2005 focus on horizontal coordination, financial support, operational export infrastructure, i.e. tracking and tracing systems, consolidation of national food safety systems, i.e. auditing agencies, and the recognition of accreditation bodies such as laboratories. Against this background, donors are already covering compliance costs in developing countries 'in the name of making markets work for the poor' (LE_2006).
- But doesn't it legitimise and further strengthen the position of retailers (see also UN_2007b)? Indeed, there is a trade-off with respect to technical assistance, because by helping to apply the SRS, unsupported, less and least developed countries may be further marginalised from international discussions and debates (CT_2010a), be it at the WTO level or within the framework of other bi- and multilateral trade or privately organised negotiations. Again, technical assistance would be necessary to counteract this development.

Impacts on rural livelihood

It has already been mentioned above that farmers may step out of business or be forced to switch to hired labour due to SRS (in particular in the developing countries). Moreover, jobs may be lost in the supply chain, e.g. if middlemen are cut out from the market. This might lead to undesirable side-effects such as rifts in the social and rural structure (UN_2007b) associated with income losses which will be particularly high for those who are already in greatest need, such as the smallholders (UN_2007b). Their future looks bleak (BU_2008).

Additional impacts on the overall society

That's not the only reason why the society as a whole may be affected by SRS beyond what has been discussed so far:

- SRS can be considered as adding volatility to markets since food and agricultural raw materials supplied to niche markets or certain market segments created by the standards are not available for the 'normal' markets anymore. Economic theory stipulates that the lower the volume of a market the more likely are food shortages and price peaks. Especially regional and periodic lacks of supply can be assumed if reduced or banned PPP application lead to pests and, hence, yield depressions close to harvests.
- Against this background, it is noteworthy that observable market prices do not necessarily reflect major supply-demand relationships anymore (see, e.g. FA_2007) and may send not very accurate price signals to market participants. Misallocations of the resources would follow.
- One of the upcoming drivers of agricultural markets will be water availability. It is meanwhile well known and supported by literature that a positive relation between PPP and water use exists (NO_2010): the water use per unit of agricultural yield produced can significantly be reduced by applying PPP, especially with respect to irrigation cultivation. Hence, ever scarcer water resources can be used more efficient. The absence of certain PPP due to stricter standards may give yield depression effects (not reported so far in this study), first of all in Europe and North America

(NO_2010) and decrease water efficiency in future when a higher input efficiency is urgently needed.

- Feeding a growing and certainly more meat and (bio)energy consuming world population would become more complicated with partial lower yields due to SRS (SE_2007) adding further pressure not only on water resources but also on remaining non-agriculturally used land resources (see above). Neither additional water nor land requirements can be met at short notice but both need considerable investments.
- The land use aspect indicates another societal impact. If more currently non-agriculturally used land is needed to provide enough food, feed and fibre with SRS, this land has to be brought into cultivation, releasing huge amounts of stored carbon. The carbon dioxide balance of agriculture would become worse (see, e.g. VO_2010).
- Finally, it may be seen as positive that tougher SRS, especially in developing countries and emerging economies, may lead to different income strategies of the agricultural labour force: not only new crops might be taken into consideration by farmers but also off-farm employment and new business practices (BO_2009). This will increase mobility of resources out of the (in terms of GDP) potentially shrinking agricultural sector towards growing industries and services in the various regions.

5. CONCLUDING REMARKS ON MAIN FINDINGS

15 theses

The findings above can be summarised within the context of 15 theses:

1. Private standards, i.e. SRS, are a relatively new object of research on the food supply chain landscape (SM_2009). Although already some remarkable observations on socio-economic SRS impacts can be made, it has to be stated, first of all, that this research topic is still very much in its infancy. Especially the economics of pesticides is still a relatively young research topic (SE_2007), limiting the evidence that may be found in the scientific literature and respectively summarised within this study.
2. Nevertheless, in light of the findings it is apparent that a rather complex picture of the socio-economic impacts of SRS, namely of those dealing with PPP restrictions, can be drawn. All stakeholders of the food supply chain will be affected somehow.
3. Yet the picture is diverse: each broader group of stakeholders faces both positive and negative impacts. Which impact dominates is a matter of various conditions. There will always be winners and losers in each stakeholder group and food supply chain segment.
4. Hence, SRS impacts will influence the distribution of welfare more than its overall level. Economic redistributions will occur across economic agents and countries, along food supply chains and in the overall society (see al-

so MA_2006). Already existing imbalances in the distribution of income will become even more manifested, i.e. economic benefits of SRS will tend to concentrate in the hands of the larger, more powerful, richer, better skilled, etc. farms and firms, and economic harm is more likely to be allocated to smallholders and weaker market players along the food supply chain, be it in terms of land, capital, or human capacity.

5. This is so, because costs associated with the implementation of SRS, be it PPP-related or not, are high and complex (see, e.g. WI_2005 for a rather full spectrum of costs related to SRS in the supply chain, i.e. involving all stakeholder groups). Certainly not all entrepreneurs – especially those in developing countries – can bear such costs. Less efficient suppliers will be excluded as respective quality standard requirements rise; however, complying producers may enjoy an increase in welfare (FO_2008) and/or market access.

6. Farmers are especially affected in the short term. Yield depressions, partly due to developing resistance, cost increases, which are not compensated by higher prices, and subsequent income losses are very likely. Negative effects are expected to dominate here.

7. In the long term, however, SRS, and particular those with respect to PPP, may lead to considerable adjustments in the agricultural sector. Farmers able to adjust in terms of costs and compliance associated to SRS will be sustained in the market and may – economically speaking – gain, while others are forced to leave the market or be marginalised.

8. For the standard-adapting farmers, business may become more risky due to potential changes of contractual agreements, less options to prevent yield losses and a higher degree of specialisation making producers less able to cope with future changes in the standards and other shocks.

9. Farmers not directly affected may absorb some of the production loss caused by SRS establishment but could also suffer, e.g. if costs are being transferred via higher prices for agricultural input factors.

10. Downstream of the food supply chains similar effects will occur as at the farm-level. Exporters and processors, being large and already strong market players and having a comparative advantage, will more likely survive and obtain additional market access; small-scale traders, middlemen, wholesalers, and new market agents without impressive investment have to be wary of being excluded from standardised market segments.

11. Not surprisingly, retailers and supermarkets are the 'winners' of establishing SRS. They may force other food supply chain stakeholders to comply and adjust. Nevertheless, retailers and supermarkets also have to adjust in order to not endanger the continuous market supply.

12. New supply-demand relationships are a particular outcome of SRS. The entire agricultural marketing will undergo a fundamental reorganisation process if SRS dominate.

13. Some consumers – because of their risk perceptions – might subjectively be better off, at least in terms of individual well-being. Objectively, average consumer welfare will not necessarily increase since higher prices will have to be paid and other distortions may occur. These both partly overcompensate the perceived gains in well-being.

14. Consequences for input suppliers should not be neglected; but need to be seen differentiated since losses in SRS-affected market segments may partly or fully be compensated in various ways, be it through higher prices for other inputs, farm-level adjustments and own innovation. Despite this, particular input market suppliers and marketing channels will certainly suffer.

15. The overall society and international community are also affected. Governmental and non-governmental stakeholders may call for new policy action; however, respective interventions are not yet apparent. In addition, WTO agreements might and international cooperation could become more challenging and demand technical assistance. Furthermore, important drivers of future agricultural and food change such as water and climate change have to be taken into consideration.

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