The Good, the Bad and the Ambiguous: Standards and Trade in Agricultural Products

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Abstract

Do countries use standards to protect their agricultural sectors from imports? This question has taken center stage in the agricultural trade-policy debate for years. This paper empirically evaluates three commonly made claims: (1) country-specific agricultural standards uniformly hinder trade, (2) harmonization of standards uniformly promotes trade in agricultural goods and (3) within trade-blocks, both harmonized and country-specific standards have a different effect on insiders than on outsiders. We argue that these claims ignore important economic trade-offs: Country-specific standards hinder trade, since they enforce costly testing or adaptation of products, but they also provide essential information about markets. Harmonization of standards eliminates product adaptation costs, but also reduces variety, thus reducing trade. Trade blocks form coalitions that allow choosing optimally which standards to harmonize and which ones to leave as country-specific. Outsiders are therefore harder hit by country-specific standards than insiders. If outsiders of a trade-block harmonize their standards with those of insiders, they benefit from increased trade with them. Not surprisingly, we only find partial evidence for the first two, but strong evidence for the third claim.

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1 Introduction

"Safety first" – is a frequent response of European institutions to requests from other countries to open one of the largest common markets to imports. It reflects a fairly strict application of a principle known as the precautionary principle, which suggests avoiding any action that may be potentially irreversibly harmful, even if scientific proof that this may happen is not available (Wikipedia 2006). Examples of the application of this principle such as in the cases of hormone beef, genetically modified plants and mad cow disease made headline news. They also had disruptive effects on trade, and extensive bi- and multilateral consultations can be required to re-establish trading relationships after any violation of existing regulations has been found or suspected. While estimates are hard to obtain, potential welfare losses can be huge.[1] The ongoing disputes between Europe and the United States, some of which have been brought to the WTO (European Commission 2003) further highlight the importance of the issue.

Spectacular cases are fodder for newspapers and case-studies, but also form the rationale behind calls for the design and enforcement of national standards.[2] As the examples in the previous paragraph show, some of those were able to disrupt trade at least temporarily and added costs to imported goods permanently. Whether standards hinder or promote trade in general is far less clear. The prevailing notion is that standards are helpful for coordinating economic agents' activities within a unified national or regional market, but are a barrier to imports from outsiders. For agricultural standards, there seems to be little doubt. Study after study (e.g. Otsuki et. al, 2001, Maskus et. al. 2005, Debaere 2005) documents how standards either increase costs of trade or how they hinder trade directly.

Moenius (1999, 2004), however, paints a far more complex picture: empirically, even standards of importer countries can have either a negative or a positive effect on trade, and the same is true for harmonized standards. More specifically, importer standards tend to hinder trade in simple goods (including agricultural products) and promote trade in complex goods (like machinery). The explanation is straight forward: standards increase costs of adapting products to foreign markets or

[1] Japan reportedly imported beef worth $ 1.4 Billion in 2003, just before a case of mad cow disease was found in the US. Beef imports from the US were halted, and only eased in December 2005 for imports of cows 20 months or younger. Only one month later, officials found spine bones considered a risk for transmitting the disease in an American beef shipment, again bringing American beef exports to a standstill. As of May 2006, talks just resumed on how the ban could be lifted again, but no final answer has been found yet (Watanabe 2006).

[2] The precautionary principle explicitly calls for standards in its application. See Tickner et. al., first edition.

meeting process requirements. But they also lower search costs both for producers who want to adapt their products to a specific market as well as for consumers who would otherwise have to search for a certain minimum quality. Moreover, harmonization reduces both product adaptation costs as well as variety, and it depends on which effect dominates in each of these two cases whether standards are trade creating or trade reducing.

Despite the importance of agriculture and the prominence of disputes in the public eye, no broad evaluation of agricultural standards in terms of their effect on trade has been undertaken so far.[3] Moreover, trade-blocks have been largely neglected in empirical standards research, despite some theoretical discussions (Gandal and Shy 2001, Fisher and Serra 2000). This paper tries to shed some light on both issues. It empirically evaluates the effect of agricultural standards on trade flows. It gives special attention to trade within a group of countries that institutionally harmonized their standards system, namely the EU, versus imports from outsiders into EU countries. In particular, it tries to evaluate the following hypotheses: (1) country-specific agricultural standards uniformly hinder trade, (2) harmonization of standards uniformly promotes trade in agricultural goods, and (3) in trade-blocks, both harmonized and country-specific standards have a different effect on insiders than on outsiders.

We evaluate these hypotheses using readily available trade data and a proprietary data set on country-specific as well as bilaterally shared standards. The data-set covers 15 countries and 80 different agricultural industries annually from 1980 to 1995. The data is employed using standard methodology, namely gravity equations where multi-lateral resistance terms as required by Anderson and Van Wincoop (2003) are controlled for with dummy-variables. The analysis is undertaken both at an aggregate as well as disaggregate level, where we distinguish between the effect of country-specific exporter and importer standards as well as harmonized standards that are identical in the importing and exporting country. We present results for trade between EU countries, as well as exports from non-EU countries into EU countries.

The results are as follows: On average, importer standards are a barrier to trade, and exporter standards promote trade. Harmonization of standards, on average, *reduces* trade in agricultural products. This suggests that for importer standards the product adaptation cost outweighs the benefit of coordination across borders. Harmonization of standards decreases variety and this effect seems to dominate the elimination of adaptation costs. The results are divergent for trade between EU members and imports from outsiders: country-specific standards for agricultural products within the EU do not hinder intra-EU trade, to the contrary, but they significantly reduce imports from outsiders. The reverse picture is drawn by the effect of shared standards on imports: outsiders benefit from harmonization, since they face substantial adaptation cost otherwise, but insiders find their trading opportunities reduced due to

[3] Studies on single or small groups of products or standards, however, exist. See Vancauteren and de Frahan 2004 and the literature cited therein.

lack of variety. Further analysis shows that EU standards have become more restrictive for trade over time.

This paper proceeds as follows: In the next section, we describe the claims and their implications for empirical analysis. Then we describe our empirical strategy in detail, followed by a data description. The fourth section states the empirical results. The final section concludes.

2 The Claims in the Agricultural Debate Revisited

As mentioned above, there is by now a large and growing list of how standards were employed to hinder trade in agricultural goods. A prominent example includes the use of growth promoting hormones to raise cattle in the United States, which induced the EU to ban beef imports from the US (Hanrahan 1997). Famous are also the concerns around genetically modified products (Perdikis et. al. 2001) and the differential regulations in the US and EU. However, there have been much less spectacular cases documenting how agricultural standards affect trade. This can happen either directly through stronger requirements that are hard to meet by exporting countries (Otsuki et. al. 2001) or by enforcing those standards on a case by case basis as in the dispute over the salmonella-standard affecting American poultry-exports to Russia (Mathews et. al 2003). The arguments put forward to implement or enforce these standards are almost perfect reverberations of each other: consumers need to be protected from potentially harmful foreign products. Moreover, the theoretical literature (e.g. Fischer and Serra 2000) indicates that minimum standards are always protectionist.

This literature largely ignores that standards have a viable function to coordinate agents' activities. This is not only true for compatibility standards in industrial products. Standards generally provide a description of the technical and economic environment of a country. This allows potential exporters to that country to adapt their products more easily to local specifications (Moenius 1999).[4] In the case of agricultural standards, they describe preferred domestic specifications for producers in foreign countries, can establish trust and reduce search-costs for consumers. This brief discussion indicates that standards in general can either be set to coordinate economic activity or to protect domestic producers. This paper puts forward a simple framework that allows distinguishing those two claims. It then uses membership in the EU to identify empirically whether the EU uses its standards predominantly for coordination or protection, since standards of individual countries should have a different effect on members versus non-members.

In order to evaluate the effects of standards on trade in any kind of goods, it is important to realize that not all standards are created equal. The literature generally distinguishes between *de facto* standards, which emerge from network effects in the market process, *de jure* standards set by the legislature and

[4] This is true regardless of whether those local specifications are warranted or not.

institutional standards, which are negotiated in committees organized by international, regional and national standardization bodies such as the ISO, the CEN, the British Standards Institution or the German Deutsches Institut für Normung. Only de jure standards are absolute requirements for exporting to a country, which is generally enforced through testing and certification requirements. However, only a comparatively small fraction of all standards are de jure standards, and it is their gate-keeping ability that the previous literature found especially interesting. More numerous are institutional standards, which are voluntarily applied and therefore do not possess gate-keeping capabilities by law. But they can serve similar functions if consumers or large buyer associations require production according to standards to ensure perceived minimum quality or reduce liability. In these cases, institutional standards can therefore have the same effects as de jure standards. On the other hand, both institutional and de jure standards support coordination efforts of economic agents, as they reduce search costs for consumers, potential legal costs for buyer associations and search costs about the economic and legal environment of a target country for exporters. Although de jure standards have both coordinative as well as protectionist capabilities, numerous studies, mainly contributed by the World Bank, document their trade-reducing effects. In what follows, we therefore focus on the large group of institutional standards to identify whether they help coordinate international economic activity or protect domestic producers of agricultural products.

If a group of countries decides to optimally adjust and harmonize their standards for mutual benefit, one would expect that their choices benefit or at least not harm economic agents within the group. This automatically implies that country-specific standards within the group should not or at least not as much impede trade between group-members as compared to trade of group members with non-members. However, to get further insight, we find it is instructive to assess consequences of institutional standards in the context of some admittedly extreme assumptions, which reflect coordination benefits to consumers as well as the postulated optimality of the choice of the countries that joined the standards-group. Our assumptions are as follows: Agricultural products may or may not be governed by a institutional standards. Products consumed in a particular country may be grown in the home country, in a foreign country that belongs to the same standards regime as the home country or from a foreign country outside the regime. Relevant standards for these products can therefore be standards of the importing country or the exporting country.

Each consumer would like to buy her ideal variety of a product. She discounts the value of a product to her the further it is away from her ideal variety in product space. If the same type of product can be produced according to different standards, each of those is perceived as a different variety. Assume, without loss of generality, that consumers value standards from their home-country the highest, those

of outsiders the lowest and those of club members in-between.[5] Then the strength of the effect of standards may differ depending on whether the product's origin is the home-country, a club-member or an outsider. If two countries have a standard in common, we call this a shared or harmonized standard.

Institutional standards are voluntarily applied in principle, but can exhibit some protectionist features. In particular, we assume that standards from other countries inside the club are as much accepted as home-country standards, but foreign standards are not. Goods from foreign countries, both insiders and outsiders of the club, might not find a large market in the home country. This is more likely if they try to export products to the home country that are either produced according to standards that differ from the home country's or are produced according to no standard at all. Exporters from within the club can choose to adapt their products to the local market at a cost a_I. Outsiders can also adapt their products to the local market, but they have to submit their products to at least as stringent or even more rigorous testing at a cost a_O. We therefore generally assume that $a_I \leq a_O$. If exporters choose to adapt their products to the home standard, they lose a differentiation advantage but win access to the consumers who prefer goods produced according to the home-standard. We consider two types of protectionist regimes: either that countries selectively set standards that only hit outsiders, but not insiders of the club, or that a_O is very large, for simplicity $a_O = \infty$. As stated above, there are importer and exporter standards, both of which are country-specific, as well as shared standards in our simple consideration. We compare the effects of standards relative to the baseline case where standards exist neither in the exporting nor in the importing country. Then the effects of standards on trade flows will be as follows under either a protectionist regime (third column) or a regime that seeks coordination (fourth column):

Table 1 The Effect of Standards on Exports

Effect of Standards on Exports from ...			
	Type of Standard	**Protection**	**Coordination**
Insiders	Exporter	**0/+**	+
	Importer	**+/0**	+
	Shared	+ / −	+ / −
Outsiders	Exporter	**0**	+

[5] Note that this assumption matches our data-set of long-term members of the EU. However, it might not reflect consumer sentiment of some new EU members from central and eastern Europe accurately, who might regard western products as higher quality.

	Importer	–	+ / –
	Shared	++	++ / –

Each effect indicated in the table adds over all possible scenarios in the importing country. Let us consider the coordination regime first. If an exporter standard exists for a product, then an importer standard may or may not exist. In either case, exporter standards will increase trade relative to a situation where no exporter standard exists. Importer standards help adapt to the local market if the loss in differentiation advantage is smaller than the gain in market access net of adaptation cost. This leads to a mildly positive effect on trade. Since adaptation costs are assumed larger for outsiders, the effect on trade may either be positive or negative, especially since outsider standards are not accepted in the club. Shared standards increase the market relative to no standards and require no extra adaptation cost, but also offer lower variety, and therefore the effect can go either way. Shared standards for outsiders are more likely to have a positive effect, since their products are less likely to be chosen by consumers without standards as those of insiders.

In a protectionist regime, the effects of standards are as follows (see Fischer and Serra 2000 for a more sophisticated treatment): If countries selectively create standards for protection, they can only create standards that do not hurt insiders but increase costs for outsiders. Consequently, importer standards have a neutral effect for insiders and a negative effect for outsiders. If standards are created exclusively to keep outsiders out, they will not have any positive coordination effect for insiders. Exporter standards of outsiders have no effect, since they are not accepted within the countries of the club. In such a regime, shared standards for insiders are just joint protectionist measures, which should ideally have no effects on trade between insiders. If outsiders share standards with insiders, this should have an exclusively positive effect on their exports, since this is their only venue for market entry. If outsider countries simply face infinitely high adaptation costs, the effect on outsiders will actually be the same as in the previous case. However, both exporter and importer standards of insiders will have the same effect as in the coordination regime, since adaptation costs for insiders are the same as under the coordination regime.

The discussion produced three requirements and two questions onto our empirical analysis: (1) The coefficient on exporter standards of insiders has to be positive (2) the coefficient on importer standards of insiders has to be zero or positive, while the former may indicate a protectionist regime (3) whether harmonization within club members promotes or hinders trade is an empirical question (4) Only the coefficient on exporter standards of outsiders allows for a decisive answer about the protectionist nature of an insider standardization regime and (5) harmonization of standards with insiders should always be trade promoting.

3 Estimation Technique and Data

In this section, we first introduce the estimation technique, which is based on the traditional gravity equation while controlling for multi-lateral resistance terms as in Anderson and Van Wincoop (2003). The regression analysis is done both on aggregate as well as several disaggregate levels. We then describe data sources and their specifics.

3.1 The Estimation Technique Employed

Rauch & Trindade (1999) call the gravity equation the most successful estimation technique in international trade. While originally no theoretical foundation was available, following Anderson (1979), numerous authors identified that almost every theoretical trade model leads to a gravity type specification. Anderson and Van Wincoop (2003) identified an important shortcoming of most gravity specifications, namely that not only trade barriers between any two trading partners matter, but also the average level of trade resistance that each trading partner faces from all other countries. They therefore required the calculations of what they labeled "multilateral resistance terms". Feenstra (2004) showed that country dummies are capable of absorbing these multilateral resistance terms. In our specifications below, we use country-pair-year dummies. These absorb those multilateral resistance terms, but also control for bilateral exchange rate influences, average effects of preferential trading agreements as well as the usual gravity variables such as GDP, population, distance, language barriers, colonial ties and the like.

This leads to the following basic specification:

$$ln(IM_{ijkt}) = \alpha + \beta_1 ln(SST_{ijkt}) + \beta_2 ln(CSTE_{ijkt}) + \beta_3 ln(CSTI_{ijkt}) + F_{ijt} + \varepsilon_{ijkt} \quad [1]$$

IM_{ijkt} are the imports from country j to country i in agricultural industry k at time t. SST_{ijkt} is the number of shared standards in year t, industry k between countries i and j. *CSTE* is the country-specific[6] stock of standards in the exporting country, and *CSTI* is the country-specific stock of standards in the importing country, again counted per industry and year. All influences on imports that vary across country-pairs and years but not across industries are compounded in the fixed effects F_{ijt}. These are GDPs of the exporting and importing country, distance, and other factors that can promote or reduce imports.

In order to identify the effect of insider and outsider standards on trade-flows, the countries were split into two groups: insiders and outsiders. As will be shown below, we will employ the EU as our example of a standardization club, with non-EU members in our sample considered as outsiders. The

[6] Please note that the count of country-specific standards is always vis-à-vis each respective trading partner. Since, for example, Germany and the United Kingdom share a different number of standards with each other than Germany and France, there will also be a different number of country-specific standards for Germany relative to the UK as compared to Germany relative to France.

United States are reported separately for two reasons: first, many trade disputes are between the US and Europe, and second, the data-set on the US is not complete, but may still provide some interesting insight. This leads to the following specification:

$$ln(IM_{ijkt}) = \alpha + \beta_{11} ln(SST_{ijkt}) + \beta_{12} D_O * ln(SST_{ijkt}) + \beta_{13} D_{US} * ln(SST_{ijkt}) +$$

$$+ \beta_{21} ln(CSTE_{ijkt}) + \beta_{22} D_O * ln(CSTE_{ijkt}) + \beta_{23} D_{US} * ln(CSTE_{ijkt}) +$$

$$+ \beta_{31} ln(CSTI_{ijkt}) + \beta_{32} D_O * ln(CSTI_{ijkt}) + \beta_{33} D_{US} * ln(CSTI_{ijkt}) + F_{ijt} + \varepsilon_{ijkt} \quad [2]$$

The variables D_O and D_{US} are dummy-variables that assume a value of 1 if the exporting country is an EU-outsider or the US respectively and a value of 0 otherwise[7]. In this specification, the regression analysis is restricted to EU countries as importers.

In our final specification, we identify how uniformly standards affect trade flows. We therefore introduce dummy variables d_k, where d_k assumes a value of 1 if the observation belongs to agricultural industry k and 0 otherwise.

$$\ln(\mathrm{IM}_{\mathrm{ijkt}}) = \mathrm{a} + \beta_{11}\ln(\mathrm{SST}_{\mathrm{ijkt}}) + \sum_{k=2}^{n} \beta_{1\mathrm{k}} \mathrm{d}_{\mathrm{k}} \cdot \ln(\mathrm{SST}_{\mathrm{ijkt}}) + \sum_{k=2}^{n} \beta_{21}\ln(\mathrm{CSTE}_{\mathrm{ijkt}}) + \sum_{k=2}^{n} \beta_{2\mathrm{k}} \mathrm{d}_{\mathrm{k}} \cdot \ln(\mathrm{CSTE}_{\mathrm{ijkt}}) +$$
$$+ \beta_{31}\ln(\mathrm{CSTI}_{\mathrm{ijkt}}) + \sum_{k=2}^{n} \beta_{3\mathrm{k}} \mathrm{d}_{\mathrm{k}} \cdot \ln(\mathrm{CSTI}_{\mathrm{ijkt}}) + \sum_{k=2}^{n} \beta_{4\mathrm{k}} \mathrm{d}_{\mathrm{k}} + \mathrm{F}_{\mathrm{ijt}} + \varepsilon_{\mathrm{ijkt}} \quad [3]$$

where again all variables are as before, and n is the number of agricultural industries.

3.2 Data description

Export data were obtained from the World Trade Database of Statistics Canada for the years 1980-1995 for 471 four-digit SITC industries. The standards data used are the data described in Moenius (1999) and are more extensively employed in Moenius (2004). It is based on the PERINORM database published by the The German Deutsches Institut für Normung (DIN) together with the French Association Française de Normalisation (AFNOR) and the British Standards Institution (BSI). Comparison with other sources indicates that the data on the standards of American producers are incomplete. On the other hand, Blind et al. (1999) argue that the most important standards from the US have been included. Accordingly, we expect the standards of the US to be a reasonable representation of the total American standards data. But due to this incompleteness, we also expect the US data to have larger coefficients than standards of other countries and estimates consequently to be biased away from zero. Nevertheless, since many trade disputes about standards involved both Europe and the United States, the data for the US was not omitted, but judgment of the coefficients' interpretation is largely left to the reader.

There are a few issues worth mentioning about the standards data. Our unit of measurement is a count of the number of documents, since generally each standard is published in one separate document.[8] These documents were sorted into separate bins for each country, industry and year. The number of documents in each bin represents the stock of standards for a given country, industry and year. The original data includes links to related documents in other countries. These links between documents were counted as bilaterally shared standards. The number of standards that contained links to standards of a specific trading partner was then subtracted from the stock of standards to identify the count of country-specific standards of a country relative to this trading partner. Since the number of standards that contains links to trading partners differs by trading partner, the number of country specific standards necessarily also varies by trading partner and is therefore not identical with the stock of standards mentioned above.

Our selection of countries can be found in table 2. Both Spain and Austria were treated as outsiders till their year of membership in the EU.

[table 2 around here]

4 Results

Recall that our discussion about the effect of standards on trade delivered the following testable predictions: (1) the effects of both exporter and importer standards on trade within the EU are expected to be positive. (2) Shared standards within EU countries reduce international trade costs but also reduce variety. Which effect dominates is an empirical question. (3) If EU standards are protectionist, then EU standards will hinder imports into EU countries and exporter standards have little or no effect. If EU standards are mainly aimed at coordination, EU standards can actually have either a positive or a negative effect, but the effect of exporter standards should always be positive. Finally, (4) sharing standards with EU countries should always promote those countries' exports.

As stated above, we will examine these questions in three steps. First, we will investigate the effects of shared, importer and exporter standards on agricultural trade overall. Second, we will repeat this analysis separately for the EU as the importing country and other EU countries, the US and other non-EU countries as exporters. Finally, we will look at the distribution of coefficients on importer standards for all agricultural industries comparing the coefficients for all countries (including EU-members) with those for EU countries as importers separately.

[7] Note that the direct effects of the dummy-variables are absorbed in the country-pair-year fixed effects

[8] For a discussion on some important limitations of the use of count-data, see Moenius (2004). For summary statistics, see Moenius (1999) and Moenius (2004).

We start out with the first set of results. Moenius (2004) shows that for simple goods, importer standards generally hinder trade, while for more complex products, they actually promote trade. The rationale is the following: standards require exporters to alter or test their products to meet the specific requirements of import markets. This is a product adaptation cost. But they also provide specific information on how to alter the product, which reduces international transaction costs. The overall effect depends on which of the two effects dominate. In this context, agricultural products fall into the simple products group. Importer standards have a comparatively strong negative effect on exports. Exporter standards have a strong positive effect on trade, and shared standards seem to reduce trade through loss of variety rather than increasing trade through reduced international trade costs. Using robust standard errors, all coefficients on standards are highly significant. This indicates that, on average, country-specific importer standards are a barrier to trade, exporter standards promote trade and for shared standards, the variety-reducing effect seems to outweigh the benefit of reduced transaction costs. Since this regression does not distinguish between insiders and outsiders, we are not able to say whether any group of countries discriminates against outsiders.

In table 3 we show how these effects vary over time. We distinguish three time periods within our sample, namely 1980-85, 1986-1990 and 1991-95. The table reveals that the basic effect of standards on trade in agricultural products has not changed at all, however, the strength of the effect has diminished over time – in fact dramatically so. Can we conclude that standards have therefore become less important? While there is no definite answer to this question, the following argument points into a different direction. Since the regression technique uses a trans-log specification, the coefficients represent elasticities. Now in 1980, the average number of standards per agricultural industry in our data-set was 2.9, while in 1995, this number had increased to 4.9. The average number of shared standards at the same time increased from 1.1 to 1.4.[9] Assuming that more important (possibly more restrictive) issues are standardized first, we should expect a decline in the effect of additional standards that have been added later, possibly leaving the effect of earlier standards on trade unchanged.

[table 3 around here]

We will now turn to the two more interesting questions in our analysis: Are EU standards protectionist and, if yes, has there been a growing or declining tendency towards protectionism in the EU over the time period analyzed? In order to answer those two questions, we have to turn back to our hypotheses stated above. They require us to investigate the EU as an importer separately from all other countries,

[9] These numbers seem small. However, a large number of bilateral trade relationships are not governed by any standards at all, which reduces the average. On the other hand, some bilateral trade relationships exhibited quite large numbers. For example, in 1995, Turkey reported 152 standards that were country specific for their feeding-stuff for animals (SITC 081). In the same year, Germany shared 78 standards (document links) with Austria for

and also require us to analyze the countries of origin separately. We do so in table 4. We distinguish imports to come either from other EU members, from EU outsiders or the US. We also distinguish the effects for the same three time-periods separately as in the previous table.

[table 4 around here]

First, we note that importer standards within the EU have not been a barrier to trade – to the contrary, in two out of our three time periods, they seemed to have promoted trade in agricultural products. They, however, acted as a barrier for outsiders: with exception of the US, EU standards reduced imports from EU outsiders. The US data switched sign, which raises questions that we can only speculate about. It is noteworthy, however, that in the later part of the sample, US exporters faced similar problems as all other non-EU countries.

Second, exporter standards unambiguously have a positive effect, regardless of origin. Astonishingly, exporter standards from other EU members have a comparatively small, but increasing effect, while exporter standards from outsiders have a comparatively large, but decreasing effect. In fact, the effect of outsider standards – with exception of the US again – is almost negligible at the end of our sample period.

Finally, the data suggests that the loss of variety through standards harmonization within the EU outweighed the benefits of the removal of trade barriers, and this effect seemed to have been stronger in earlier years. However, outsiders strongly benefited from harmonization with EU-insiders in early years, but these effects have become very small, indeed negative, at the end of the sample period.

Revisiting the table of our predictions raises some important questions: In the first period, the strong negative effect of EU standards on outsiders and the strong positive effect of harmonized standards for outsiders suggest protectionist use of standards in the early part of our sample. However, this is contradicted by the fact that outsider standards had a strong positive effect on exports into EU countries. At the end of our sample, however, two contradictory effects almost go away, namely a strong positive effect from harmonization of outsiders with EU standards and a strong positive effect from outsider standards on their exports into EU countries. This leaves only a weakly trade reducing effect of EU standards on imports from outsiders. All this information almost uniformly points to the conclusion that the EU is using its standards for coordination purposes. Weak evidence against that exists in the form of an increasingly strong effect of EU standards on exports to other EU members combined with the fact that the US seems to have a harder time exporting into EU countries relative to before. Therefore, the same evidence could be interpreted that while the EU had used standards for coordination in the past, it may increasingly be moving towards a protectionist regime in its use of agricultural standards.

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buttermilk, yoghurt, and similar products (SITC 223), which covered all the standards both countries had in this

We try to shed additional light on this by further disaggregating our results to 4 digit SITC level, additionally controlling for industry-specific effects. Thus, we obtain coefficient estimates for importer, exporter and shared standards for each agricultural industry separately (see equation [3] above). We again distinguish the same time periods as above, but to get reasonably significant results, we only report results for all countries including the EU versus the EU as importer. This allows us to see how the effect of standards evolved for the EU versus all others. Instead of presenting a total of more than 700 coefficients, we present results summarized in figure 1 as well as table 5. In the histograms of figure 1, we collect coefficients on standards variables into bins for the first and the last period in our sample. The table presents average coefficients as well as standard deviations of the coefficients of each estimation.

[Figure 1 and table 5 around here]

We first note that in each estimation, the effect of standards varies quite dramatically by agricultural industry: while standards in some industries have positive effects, standards in other industries have negative effects. This is true for all three types of standards, namely exporter, importer and shared standards. For the overall sample, we find that both shared and importer standards became more trade promoting during the sample period, while exporter standards lost a little bit of their power. Almost the opposite is true when we restrict our sample to only EU-countries as importers: while exporter standards also lost power to promote exports, both shared and importer standards moved towards more negative coefficients. Again, this picture does not allow us to conclude that European standardization policy is protectionist, since the disaggregate analysis, as the more aggregate before, does not paint a picture consistent with protectionism outlined in the table above. However, what it does is it clearly documents that (1) shared and importer standards have become more trade promoting on average, but (2) the effect of European standards has gone counter to this trend and it has become harder for exporters to break into what is sometimes called “Fortress Europe”. While it is beyond the scope of this paper to identify the reasons and the specific nature of these trade-impeding effects, it seems worthwhile to suggest further research that may identify unwanted side-effects for a system of standardization designed for improving coordination on both a national and international scale.

5 Conclusion

Standards have been a highly contentious issue in international trade, and this is especially true for trade in agricultural goods. Accusations of hindering exports with standards sometimes seemed to have been more heavily traded than the goods that were presumably hindered. The above analysis presented a simple framework from a consumers’ perspective, which employed standards as a

industry.

coordination device, but also offered policy makers the ability to hinder imports with the help of standards. The predictions of the simple framework were taken to the data to analyze the effects of agricultural standards on trade. Special attention was given to whether the EU used standards to block imports from non-member countries. The analysis revealed that country-specific agricultural standards do not always block trade, and harmonization does not always increase trade. The former happens when the coordination benefits of standards dominate the additional trade cost, while the latter happens when the reduction in trade costs cannot compensate for possible loss of variety. The data also reveals that standards affect countries within a standardization regime in a different way than outsiders of this regime. As for the EU, the data does not exactly match either extreme, namely pure coordination or pure protection for the EU. Rather, the results indicated that the EU could be considered an "in-between" case, possibly attempting to coordinate with unintended protective side-effects. However, it also clearly revealed that during the sample period, the protective effects of standards in the EU increased, making it harder for non-members to penetrate the European markets with agricultural products. While the results provide insight how strong coordinative and protective forces in the agricultural sector for the countries in our sample are on average, it does not provide indication of what these forces are. More detailed, possibly case-study research, similar to the work done by the World Bank (e.g. Otsuki et al. 2001) is necessary to understand causes and design counter-measures.

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7 Appendix

Table 2 Countries

Group	Countries (Comments)
US	(Incomplete Data-Set)
EU	Belgium, Germany, France, UK, Netherlands
Non-EU	Japan, Austria (member since '95), Australia, Switzerland, Spain (member since '86), Norway, Poland (member since '04), Turkey

Table 3 Imports on Shared and Country-Specific Standards

(All Countries by Time-Period)

Regressors	1980-85	1986-90	1991-95
Shared standards	-0.21 (-4.30)	-0.09 (-2.70)	-0.11 (-3.33)
Country-specific standards importer	-0.25 (-9.20)	-0.13 (-6.35)	-0.05 (-2.03)
Country-specific standards exporter	0.44 (4.27)	0.19 (8.78)	0.10 (4.52)
Country-Pair-Year Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.34	0.34	0.37
Observations	40,060	52,530	37,546

The robust t-statistics of each coefficient estimate are reported in parentheses.

Table 4 Imports on Shared and Country-Specific Standards

(EU as Importer by Time-Period)

Regressors	1980-85	1986-90	1991-95
Shared standards:	-0.49	-0.20	-0.12
- EU -- EU	(-8.21)	(4.75)	(-2.66)
- EU – US	(missing)	(missing)	(missing)
- EU – Others	0.63	0.49	-0.12
	(9.77)	(7.44)	(-0.01)
EU - standards	0.09	-0.01	0.13
- EU vs. EU	(1.84)	(-0.18)	(2.75)
- EU vs. US	0.26	0.00	-0.19
	(1.25)	(0.03)	(-2.29)
- EU vs. Others	-0.42	-0.21	-0.10
	(-7.05)	(-3.46)	(-3.30)
Country-specific standards exporter	0.24	0.28	0.35
- EU vs. EU	(5.00)	(7.54)	(8.03)
- US vs. EU	1.32	0.67	0.93
	(2.12)	(1.21)	(2.81)
- Others vs. EU	1.10	0.58	0.12
	(11.04)	(4.85)	(-3.38)
Country-Pair-Year Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.40	0.40	0.44
Observations	18,663	23,567	15,978

The robust t-statistics of each coefficient estimate are reported in parentheses.

Table 5 Imports on Shared and Country-Specific Standards

(Summary-Statistics of Coefficients across 4-digit SITC Industries)

		All Countries			EU		
		80-85	86-90	91-95	80-85	86-90	91-95
Shared	Aver.	-0.12	-0.10	-0.03	0.22	-0.10	-0.10
	SD	0.85	0.64	0.52	0.88	0.78	0.72
Imp	Aver.	-0.11	0.01	0.10	-0.01	-0.18	-0.15
	SD	0.66	0.44	0.41	0.68	0.56	0.59
Exp	Aver.	0.42	-0.01	-0.05	0.60	0.08	-0.09
	SD	0.63	0.59	0.59	0.77	0.66	0.72

Figure 1 Imports on Shared and Country-Specific Standards

(Distribution of Coefficients across 4-digit SITC Industries)