



The Impact of Regulations on Agro-food Trade

**THE TECHNICAL BARRIERS
TO TRADE (TBT) AND SANITARY
AND PHYTOSANITARY MEASURES (SPS)
AGREEMENTS**

OECD



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The Impact of Regulations on Agro-food Trade

The Technical Barriers to Trade (TBT)
and Sanitary and Phytosanitary Measures (SPS)
Agreements



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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FOREWORD

This report describes pertinent agricultural trade issues related to food safety and other technical measures and examines possible measurement approaches concerning the economic and trade impacts of standards and regulations. It discusses implementation aspects of the WTO Agreements on Technical Barriers to Trade (TBT) and on the Application of Sanitary and Phytosanitary Measures (SPS) and reviews impact quantification methods and techniques both in terms of a general overview and as concrete case studies. The analysis thereby aims to provide analysts and policy makers with background information to help them design technical measures such that these are least trade-restrictive.

The report brings together work carried out in the OECD's Joint Working Party on Agriculture and Trade (JWP) during 2001-2003 in the context of the Horizontal Programme on Food Safety and the work programmes of the Committee for Agriculture and the Trade Committee. It complements and extends the earlier OECD study on "Food Safety and Quality: Trade Considerations", which focused on areas of existing or potential trade conflict concerning food safety and quality and the contribution that economic analysis could make in resolving contentious issues. Moreover, several reports on other economic aspects of food safety can be found on the OECD internet site (www.oecd.org/agr).

This report was prepared and edited by Wayne Jones and Peter Walkenhorst, who work in the Directorate for Food, Agriculture and Fisheries and the Trade Directorate respectively. It combines material prepared by the Secretariat and external consultants. John Beghin (Iowa State University) and Jean-Christophe Bureau (Institut National de la Recherche Agronomique) prepared the chapter 3 overview of approaches to quantifying economic impacts of technical measures. Norbert Wilson (Auburn University) contributed the assessment of model-based analysis in chapter 4. The final chapter on empirical trade flow analysis was authored by Timothy E. Josling (Stanford University) and is available as a stand alone OECD consultant's report, *Measuring the Trade Effects of the SPS Agreement*. The combined, multi-chapter report is published under the responsibility of the Secretary-General of the OECD.

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CHAPTER 1

BACKGROUND

Technical regulations and standards are used by governments to achieve domestic agricultural policy objectives, such as containment of health and environment-related risks or fraud, and to facilitate trade by ensuring the interoperability of technical systems and improving market transparency. Also, demanding technical requirements can sometimes contribute to reinforce consumer confidence and boost sales of products of both domestic and foreign origin. On the other hand, excessive or cumbersome measures have the potential to undermine market contestability, discourage imports, and thus, reduce economic efficiency.

Although often viewed predominantly from a domestic perspective, food safety, biosecurity and other technical measures can have significant trans-boundary implications. Technical regulations, rules, and procedures can facilitate and enhance trade, if they reduce the risk for consumers that they might purchase unsafe food and thereby increase confidence in imported products. On the other hand, such regulations can become barriers to trade, in particular if they place demands on importers that are more costly to meet than the requirements applied to domestic producers. For example, many developing country exporters encounter difficulties entering the food markets of OECD countries not necessarily because of insufficiently safe products, but often due to lack of monitoring, testing, and certification infrastructure that would make it possible for them to demonstrate compliance with existing import requirements.

One important policy challenge in this context is to design measures in a way, so that they meet domestic policy objectives while minimising adverse impacts on trade and the risk that measures may be misused for predominantly protectionist purposes. Regulations to safeguard human health, protect the environment and facilitate trade can take a variety of forms and use a range of different policy instruments. The latter include labelling requirements, rules on testing, inspection, and quarantine, specifications of product characteristics, and total prohibitions of imports. The trade effects of these measures vary

considerably, and it is often difficult to determine whether the underlying policy objectives are met with least cost for consumers, producers, and taxpayers.

The WTO Agreement on Technical Barriers to Trade (TBT Agreement) tries to ensure that regulations, standards, testing and certification procedures facilitate trade and do not give rise to unwarranted protection for domestic producers. The 1994-Agreement was part of the outcome of the Uruguay Round and extends and clarifies the 1979-Agreement that was reached in the Tokyo Round of multilateral trade negotiations. It requires that technical regulations and standards, as well as testing and certification procedures, be transparent, justified by legitimate objectives, such as national security, prevention of deceptive practices, human health and safety, animal and plant life and health, or environmental protection, and do not create unnecessary obstacles to trade. Countries have the right to pursue domestic policy objectives through technical regulations and conformity assessment procedures; however, when designing these measures, they are required to use relevant international standards, if these exist and would be effective and appropriate.

The TBT Agreement covers all technical measures (regulations, standards, testing and certification procedures) relating to any product or process and production method, except sanitary and phytosanitary measures, which fall under the auspices of the Agreement on Sanitary and Phytosanitary Measures (SPS Agreement), and technical specifications related to government procurement, which are covered by the plurilateral Agreement on Government Procurement. Examples of measures that might fall under the TBT but not the SPS Agreement include technical regulations and procedures concerning composition and packaging, marking and labelling, process and production methods, and final product characteristics. Measures based on product requirements are supposed to be specified in terms of performance rather than design or descriptive characteristics.

The SPS Agreement allows governments to implement border measures in pursuit of objectives relating to human, animal, and plant life or health. Governments are encouraged to use international standards when designing their policies and to recognise other countries' compliance procedures as equivalent to their own, if the same level of sanitary and phytosanitary protection is achieved. In cases in which countries wish to adopt measures that provide a higher level of sanitary and phytosanitary protection than international standards, they must ensure that their measures are based on an assessment of the risks to human, animal, and plant health, taking into account the risk assessment techniques developed by relevant international organisations; the Codex Alimentarius for food safety, the International Office of Epizootics for animal health, and the International Plant Protection Convention for plant

health. The objective of minimising negative trade effects is to be taken into account when determining the appropriate level of sanitary and phytosanitary protection.

The SPS Agreement is maintaining the sovereign right of any government to provide the level of sanitary and phytosanitary protection it deems appropriate, while ensuring that these sovereign rights are not misused for protectionist purposes and do not result in unnecessary barriers to international trade. A sanitary or phytosanitary restriction which is not actually required for health reasons can be a very effective protectionist device, and due to its technical complexity, a particularly deceptive and difficult barrier to overcome.

This report examines pertinent issues at the interface between domestic policy objectives, technical regulations and agricultural trade, and discusses approaches to measuring the trade impacts of food safety and other technical measures. Quantifying the economic effects of regulations is important in order to help policy makers design measures in a way that makes them least trade-restrictive. By outlining the underlying issues and possible measurement approaches, the report complements and updates the earlier OECD report on *Food safety and quality: trade considerations* (OECD, 1999a), which focused on areas of existing or potential trade conflict concerning food safety and quality and the contribution that economic analysis could make in resolving these discords.

The remainder of the report is organised in four parts. Chapter 2 reports on the implementation of the TBT and SPS Agreements during the first seven years after coming into force, with the focus being on trade issues that have raised concerns among WTO members. The question of how the economic and trade impacts of technical measures can be measured is addressed in chapter 3, discussing alternative measurement approaches, their application in existing studies and the practical validity of the methods. A more comprehensive synthesis of analysis based on formal models of SPS-related trade concerns, as the most highly structured measurement approach, is contained in chapter 4. Finally, chapter 5 reports on new empirical evidence on observable trade impacts of SPS measures, using trade-flow data analysis for specific country and commodity cases. Background information on the multilateral framework applying to technical measures and agricultural trade, *i.e.* the TBT and SPS Agreements, is contained in Annex 2.

CHAPTER 2

IMPLEMENTATION OF THE TBT AND SPS AGREEMENTS¹

The following discussion examines some aspects of the implementation of the TBT and SPS Agreements, drawing on OECD (2003) and OECD (2002). The description of issues concerning the two Agreements is thereby structured in a similar way in order to facilitate comparisons. In particular, an initial discussion of specific trade concerns that have been raised in the respective WTO Committees is followed by a review of the implementation of the transparency provisions under the Agreements and an overview of the cases that have been brought to formal dispute settlement procedures. The final parts of the sections each provide a brief evaluation of the operation and implementation of the Agreements, based on the WTO Committees' own reviews and other sources.

2.1 Agreement on Technical Barriers to Trade (TBT)

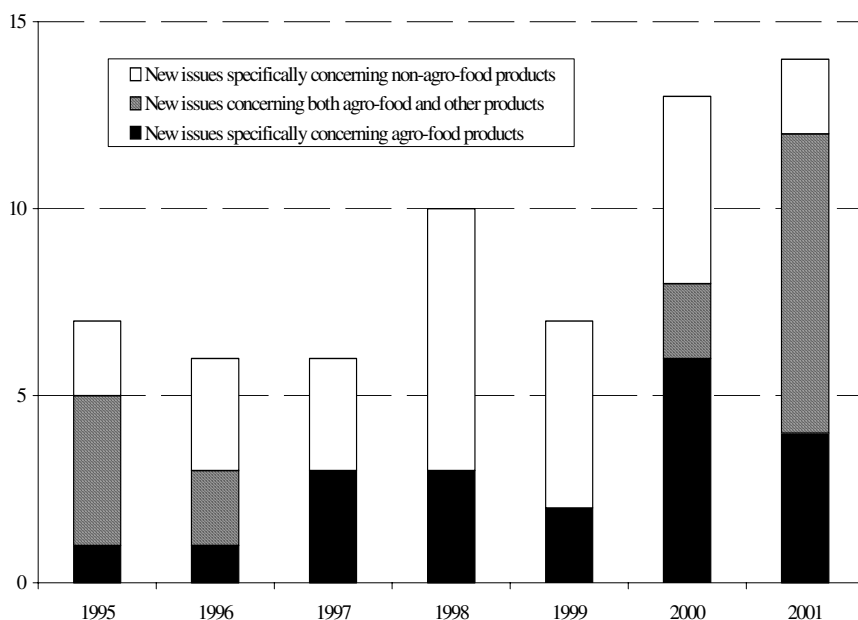
This section presents a survey of issues and concerns raised in the WTO's Committee on Technical Barriers to Trade, with particular emphasis on discussions related to agro-food products. Sub-section 2.1.1 provides an overview of the cross-notifications of specific trade concerns that have been made raised in meetings of the TBT Committee. Sub-section 2.1.2 reports on the implementation of the transparency provisions of the TBT Agreement, notably the designation of single government authorities and announcement publications, the establishment of enquiry points, and the notification of TBT measures. Sub-section 2.1.3 then discusses trade disputes related to TBT matters. Finally, sub-section 2.1.4 summarises some preliminary evaluations concerning the implementation of the TBT Agreement.

2.1.1 Specific trade concerns raised in meetings of the TBT Committee²

The TBT Agreement established the TBT Committee, whose role it is to oversee the implementation and operation of the Agreement's provisions. In particular, the Committee discusses trade issues related to technical regulations and conformity assessment procedures, reviews notifications, and develops policy and procedural recommendations. Over the period 1995 to 2001, the Committee held 26 regular meetings, as well as three special meetings on procedures for information exchange (November 1995, September 1998, and June 2001).

During the 26 regular sessions, a total of 63 distinct issues were raised by delegations concerning trading partners' policies or regulations. Questioning another country's measure or the way it is notified provides an opportunity to initiate discussion on the particular issue in the Committee. It can thereby help to resolve misunderstandings, clarify contentious matters, and possibly avoid trade disputes in the future. The number of new concerns discussed has shown an increasing trend over time, rising from six to seven per year during 1995-97 to fifteen in 2001 (Figure 2.1).

Figure 2.1. Number of specific trade concerns raised in the TBT Committee, 1995-2001



Source : OECD Secretariat based on WTO information (G/TBT/M).

Twenty specific trade concerns were directly related to agro-food products, 16 were of a general nature, and 27 concerned non-agro-food products.³ Agro-food related concerns have been raised about TBT measures in 20 OECD countries (counting the EU as 15 countries) and five developing countries. Conversely, 22 OECD countries and 17 non-OECD countries (counting ASEAN as 10 countries), including 16 developing countries, have raised or supported agro-food concerns.

Of all the specific trade concerns related to agro-food products, five referred to genetically modified organisms, four to livestock products and beverages, two to fish and tobacco, and one to wood, organic products, and

perishable products. Two-thirds of all cases concerned questions of labelling, *i.e.* measures regulating the kind and size of printing on packages and labels and defining the information that may or should be provided to consumers. Issues concerned missing or unclear notifications, as well as labelling requirements that were seen as unjustified in the sense of discriminating among "like" products. A brief description of the 20 specific trade concerns related to agro-food products, drawing on material from the WTO meeting summaries, is given in the Annex. It should be noted, however, that the material does not make it possible to evaluate whether a particular country is not satisfying its obligations under the TBT Agreement.

Countries are likely to have had additional concerns about trading partners' measures, which may have been raised and resolved bilaterally. The discussions of specific trade concerns in the TBT Committee might, therefore, be seen as primarily representing issues that could not be resolved bilaterally or were regarded as being of generic importance so to warrant the attention of the Committee. In this context, raising a concern in the Committee might be seen as an intermediate solution attempt before continuing on to formal consultations and dispute settlement.

2.1.2 *Notifications under the TBT Agreement*

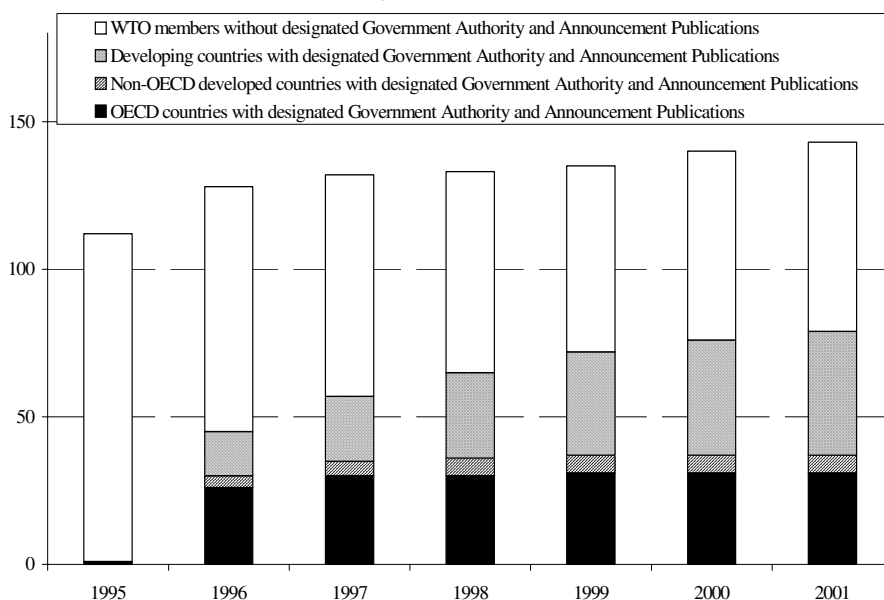
WTO member countries are required to designate a single government authority responsible for the implementation of the TBT transparency provisions and to specify publications that are used to announce that work on draft technical regulations and conformity assessment procedures is proceeding. They also have to establish enquiry points that are able to answer requests for information from other member countries. Further transparency provisions under the TBT Agreement concern notifications by WTO members of bilateral or multilateral agreements that they have reached on issues related to technical regulations, standards, and conformity assessment procedures and of standardising bodies that have accepted the Code of Good Practice. This Code provides transparency and other disciplines for the preparation, adoption and application of standards by central and local governmental, non-governmental and regional standardising bodies, and thereby helps to avoid duplication of standardisation work.

Moreover, countries have to notify other members through the WTO Secretariat of the proposed introduction of or changes to technical regulations or conformity assessment procedures for which no international standard, guide or recommendation exists or that differ from such international benchmarks and that may have a significant effect on trade of other member countries. Notifications are supposed to specify the products covered by the proposed technical regulation or conformity assessment procedure and contain a brief

description of the objective and rationale of the measure. Notifications are to take place at an early appropriate stage, *i.e.* normally 60 days before the measures are finalised, in order to make it possible to introduce amendments and take comments from other member countries into account. In case of urgent problems of safety, health, environment protection or national security, the comment period can be shortened.

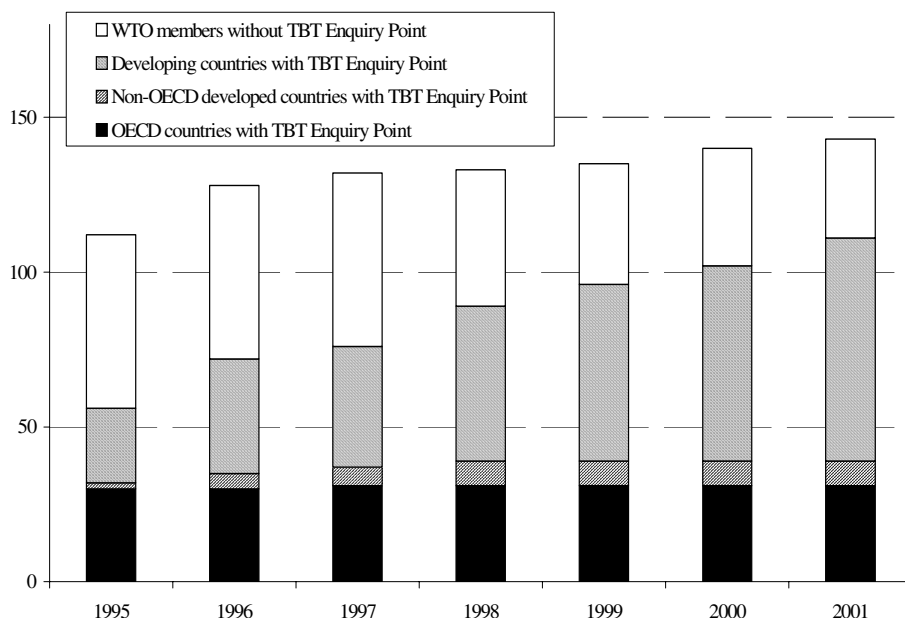
During the period 1995-2001, an increasing number and proportion of WTO members has designated single government authorities and announcement publications and established enquiry points (Figures 2.2 and 2.3). All thirty OECD countries and the European Union had reported enquiry points by the end of 1997 and named government authorities and announcement publications by the end of 1999. However, 32 WTO members, including 29 developing countries, had not reported enquiry points and 64 member countries, including 58 developing countries, had not named single government authorities and announcement publications by the end of 2001. In other words, by the end of 2001, 22% of WTO members did not meet the transparency requirement concerning enquiry point establishment, and 45% had not fulfilled the obligation to designate single government authorities and announcement publications.

Figure 2.2. Number of WTO members with and without designated Government Authority and announcement publications



Note: Information on WTO membership refers to end of the year, while data on the designation of Government Authorities and publications is based on WTO documents (G/TBT/2 and addenda) released during the same year. *Source:* OECD Secretariat based on WTO information.

Figure 2.3. Number of WTO members with and without TBT



Note: The information on WTO membership refers to the end of the year, while the data on the establishment on Enquiry Points is based on WTO documents (G/TBT/ENQ) that were released during autumn of the same year.

Source: OECD Secretariat based on WTO information.

It is unclear how effective the notification authorities and enquiry points are in providing timely information on new draft regulations and in replying to questions and comments, respectively. In some cases there seems to have been a lack of awareness at the national level of countries' obligations under the TBT Agreement or insufficient co-ordination between agencies involved in the notification process (WTO, 2000). Also, a survey of WTO members revealed that enquiry points are not always well equipped with electronic facilities, due to resource constraints and lack of technical know-how (WTO, 1999a). These deficiencies are likely to adversely affect the speed and quality of responses to queries and comments from other WTO members. Hence, in some of the countries that have designated single government authorities and announcement publications and established enquiry points these institutions might not be fully operational.

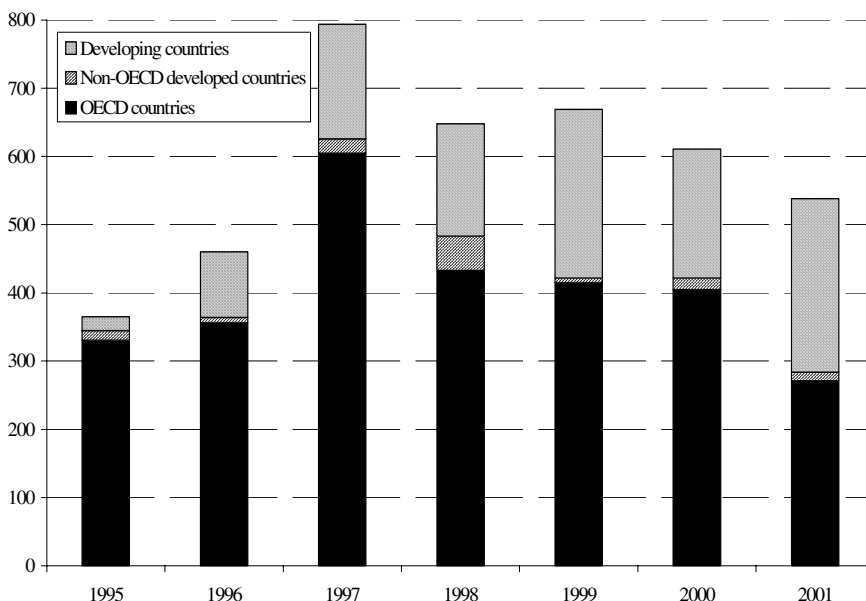
Concerning notification by WTO members of bilateral or multilateral agreements on issues related to technical regulations, standards, and conformity assessment procedures, 35 such agreements were notified during 1995-2001.

One of these applies specifically to TBT measures concerning agro-food products, six to all products, and 15 to non-agro-food products. Thirteen notifications did not specify the products concerned.

During the period 1995-2001, 138 standardising bodies from 94 WTO members have adhered to the Code of Good Practice. All OECD countries and the European Union have notified at least one standardising body. In addition, five non-OECD developed countries and 58 developing countries have submitted corresponding notifications.

From 1995 to the end of 2001, a total of 4085 technical regulations and conformity assessment procedures were notified under the TBT Agreement. The number of notified measures increased markedly up to 1997, but has since then generally been falling (Figure 2.4). Of the 30 OECD countries, only Hungary had not notified a TBT measure by end of 2001.⁴ Moreover, 40 non-OECD countries, including 33 developing countries, have submitted TBT notifications. Indeed, the share of notifications by non-OECD countries has increased almost continuously over time and accounted for half of all notifications in 2001.

Figure 2.4. Number of modified TBT measures, 1995-2001

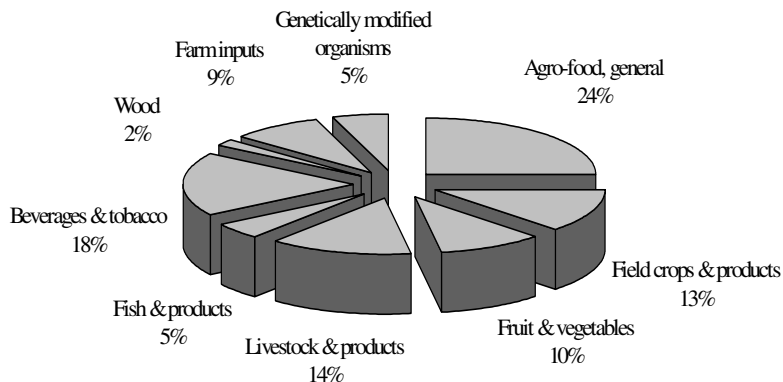


Source : OECD Secretariat based on WTO information (document G/TBT/11)

Of the 538 notifications made during 2001, 152 referred specifically to agro-food products. This corresponded to a share of about 28%. A quarter of all agro-food notifications under the TBT Agreement referred to broad categories of agriculture and food products, a further fifth to beverages and tobacco, and almost 15% each to field crops and livestock products (Figure 2.5). About 95% of the agro-food notifications during 2001 concerned technical regulations and the remaining 5% conformity assessment procedures. Emergency notification procedures were invoked for about 5% of all agro-food notifications. All agro-food notifications originated from authorities at the level of central government.

Concerning the stated objectives of the TBT measures for agro-food products notified during 2001, almost half of the notifications mentioned either consumer information and labelling, or prevention of deceptive practices and consumer protection. Consumer health and safety provided the rationale for measures in a fifth of all cases, and adoption of new domestic law and technology for a further 8%. Table 2.1 presents the breakdown of objectives and rationales, in accordance to criteria laid down in WTO document G/TBT/W/18.

Figure 2.5. TBT notifications concerning agro-food products by product group, 2001



Source : OECD Secretariat based on WTO information (documents G/TBT/GEN/N).

Table 2.1. TBT notifications concerning agro-food products by objective, 2001

Objective or rationale of notified TBT measure	Number of notifications[*]	Share of notifications
National security requirements	0.0	0%
Consumer information, labelling	19.0	13%
Prevention of deceptive practices and consumer protection	55.5	37%
Protection of human health or safety	34.0	22%
Protection of animal or plant life or health	2.5	2%
Protection of the environment	4.7	3%
Quality requirements	4.0	3%
Harmonisation	2.0	1%
Adoption of new domestic law and technology	11.5	8%
Lowering or removal of trade barriers	1.5	1%
Trade facilitation	7.3	5%
Others	5.0	3%
Not specified	5.0	3%
Total	152.0	100%

^{*}) When notifications state more than one objective, a weight of less than one was assigned to each particular objective, so that the sum of the objectives adds up to the total sum of notifications.
Source: OECD Secretariat based on WTO information (documents G/TBT/GEN/N).

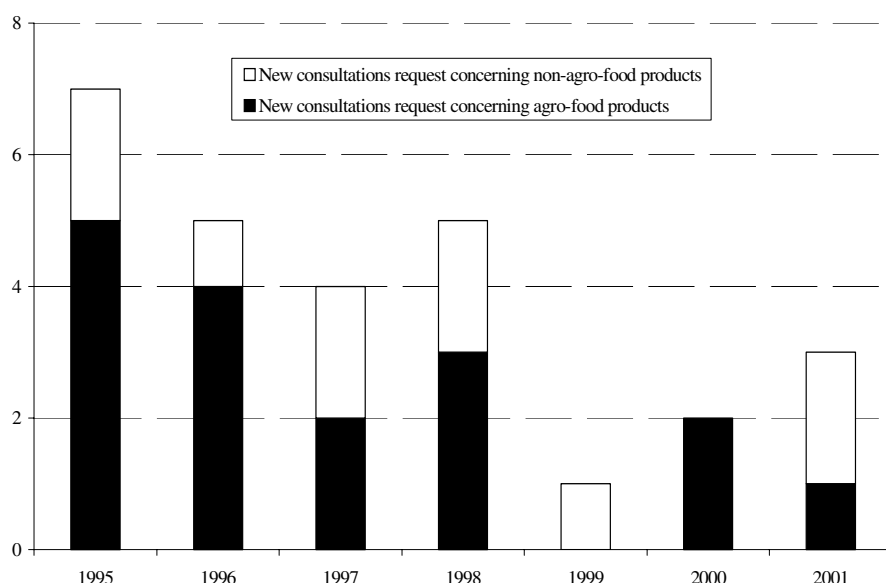
2.1.3 TBT-related disputes

In cases where bilateral or multilateral discussions have not made it possible to resolve a trade-related disagreement about technical measures between countries, member countries can ask for resolution of the issue according to the WTO dispute settlement rules. If formal consultations at the initial stage of the process do not lead to a mutually agreeable solution, the establishment of a dispute panel can be requested. This panel rules on the compliance of a measure with the provisions of international trade law, including the TBT Agreement. If necessary, the panel's ruling could subsequently be reviewed by the WTO Appellate Body.

Of the more than 240 requests for consultations that had been formally raised during 1995-2001, 27 concerned alleged violations of the TBT Agreement (Table 2.2). During 1995-98, there were four to seven new consultations requests per year, while subsequently the number of new cases fell to one to three (Figure 2.6). Seventeen cases, *i.e.* more than three-fifths of all TBT-related cases, concerned agro-food products. However, in all of these cases violations of other parts of international trade law were also alleged (see last column in Table 2.2), and panels and the Appellate Body may in such instances base their decisions on rules other than those under the TBT Agreement. For example, the consultation requests of 10 of the agro-food cases also alleged violations of the Agreement on Sanitary and Phytosanitary Measures (SPS Agreement) and concerned indeed often mainly SPS issues.⁵

The alleged violation of the TBT Agreement was in these cases generally related to some part of the regulation or standard that was not of a sanitary or phytosanitary nature, such as a labelling requirement. The seven agro-food related TBT cases that did not refer to the SPS Agreement related to the EU's trade description of scallops (three requests for consultations from Canada, Peru, and Chile), Philippines' complaint against US's import prohibition of certain shrimps and shrimp products, New Zealand's complaint against EU's measures affecting butter products, US's complaint against Belgium's administration of measures establishing customs duties for rice, and Peru's complaint against EU's trade description of sardines. Only in the latter case was the dispute primarily based on the TBT Agreement.⁶

Figure 2.6. Number of new TBT-related requests for consultations, 1995-2001



Source : OECD Secretariat based on WTO information (documents WT/DS).

In eight of the 17 agro-food disputes invoking the TBT Agreement the complaining party requested the establishment of a panel. Three panels dealt with the EC's trade description of scallops, two with the EC's import prohibition on meat produced with growth-promoting hormones, and one each with the EC's measures affecting butter products, the EC's trade description of sardines, and Belgium's administration of measures establishing customs duties for rice. Solutions for the three scallop, the butter, and the rice duties cases had been found by the end of 2001, and a brief summary of the disputed issues is provided in Box 2.1. Moreover, two of the nine cases for which no panel had been established (yet) were settled after consultations, while seven cases were still pending by the end of 2001.

**Box 2.1. TBT-related disputes that have been resolved
after establishment of panels**

In 1995, Canada, Chile and Peru requested consultations and subsequently the establishment of panels concerning the EC's **trade description of scallops**. According to an order by France's government, certain varieties of *pectinidae* (scallops) could after 1 January 1996 no longer be sold using the traditional description of "Coquilles St. Jacques" or "Noix de St. Jacques" on the French market, but had to use the trade description "pétoncle", which – according to the complainants – consumers associate with a product of lower quality. The complainants alleged violation of GATT Articles I and III, as well as Article 2 of the TBT Agreement, which requires that imports be treated no less favourably than 'like products' of national origin. The dispute was settled in July 1996 on a mutually satisfactory basis by the implementation of a new order by the French government. Scallops are henceforth to be marketed in France under the name "Coquilles Saint Jacques" or "Noix de St. Jacques", followed by the scientific name of the species. Moreover, the country of origin must be indicated on the label.

In 1997, New Zealand requested consultations and subsequently the establishment of a panel concerning the EC's **measures affecting butter products**. New Zealand claimed that, in addition to GATT Articles II, III, X and XI and the Agreement on Import Licensing Procedures, the EC was violating Article 2 of the TBT Agreement through its decision to qualify butter manufactured by two particular butter-making processes (Spreadable and AMMIX) as not being "manufactured directly from milk or cream" and, hence, to exclude such butter from eligibility for New Zealand's country-specific tariff quota established by the EC's WTO schedule. A mutually satisfactory solution was found in November 1999, when the EU's Council of Ministers passed a new regulation, clarifying that butter manufactured by using concentrated milkfat and/or the fractionation of such milkfat, such as in the Spreadable and AMMIX butter-making processes, should still be considered as being manufactured directly from milk or cream and, therefore, meet the EC's requirement for butter applying in connection with the country-specific tariff quota for New Zealand.

In 2000/01, the United States requested consultations and subsequently the establishment of a panel concerning Belgium's **administration of measures establishing customs duties on rice**. The US alleged that Belgian customs authorities had disregarded the transaction values associated with certain shipments of rice imported from the United States between 1 July 1997 and 31 December 1998, for purposes of establishing the relevant customs values and duties. Although the Belgian authorities approved the proffered transaction values prior to entry of the rice in question, Belgian customs authorities in November 2000 rejected the use of the same transaction values when assessing duties. The rejection of the proffered transaction value appeared to have been based *inter alia* on the application of an unpublished interpretative memorandum addressing the value to be assigned to specific, limited product characteristics. Belgium customs authorities applying this interpretative memorandum, which confined the category of product characteristics and the value to be assigned to such characteristics in establishing the customs value of the imports in question, were seen to have acted inconsistently with Belgium's obligations set forth in paragraphs 2, 4 and 5 of Article 2 of the Agreement on Technical Barriers to Trade. In addition, violations of GATT Articles I, II, VII, VIII, X and XI, the Customs Valuation Agreement, and the Agreement on Agriculture were alleged. A mutually satisfactory solution was found when the Belgian authorities, acting under EC law, redetermined the duties in dispute on the basis of new evidence.

Table 2.2. WTO disputes invoking the TBT Agreement, 1995-2001

Parties and nature of complaint	Countries supporting complaint	Consultations request	Panel request	Panel established	Panel report	Appellate body report	Decision on dispute	Implementation deadline	Solution reported	Comments
US complaint against Korea's shelf-life requirements for frozen processed meats and other products.	CAN, JAP	3 May 1995	-	-	-	-	-	-	20 July 1995	Also involving GATT Art. III & XI; SPS; Agreement on Agriculture
Canada's complaint against EU's trade description of scallops	Chile, ICL, JPN, Peru	19 May 1995	7 July 1995	19 July 1995	5 Aug. 1996	-	-	-	19 July 1996	Also involving GATT Art. I & III
Peru's complaint against EU's trade description of scallops	CAN, Chile, JPN	18 July 1995	14 Sept. 1995	11 Oct. 1995	5 Aug. 1996	-	-	-	19 July 1996	Also involving GATT Art. I & III
Chile's complaint against EU's trade description of scallops	CAN, JPN, Peru	24 July 1995	13 Sept. 1995	11 Oct. 1995	5 Aug. 1996	-	-	-	19 July 1996	Also involving GATT Art. I & III
Canada's complaint against Korea's restrictions on treatment methods for bottled water	EU, US	8 Nov. 1995	-	-	-	-	-	-	24 April 1996	Also involving GATT Art. III & XI; SPS

Parties and nature of complaint	Countries supporting complaint	Consultations request	Panel request	Panel established	Panel report	Appellate body report	Decision on dispute	Implementation deadline	Solution reported	Comments
New Zealand's complaint against EU's measures affecting butter products		24 March 1997	6 Nov. 1997	18 Nov. 1997	24 Nov. 1997	-	-	-	11 Nov. 1999	Also involving GATT Art. II, III, X and XI; Agreement on Import Licensing Procedures
EU's complaint against US restrictions on imports of poultry products		18 Aug. 1997								Also involving GATT Art. I, III, X, XI; SPS
India's complaint against EU's restrictions concerning rice imports		25 May 1998								Also involving GATT Art. I, II, III, VIII and XI; SPS; Agreement on Import Licensing Procedures; Agreement on Agriculture
Canada's complaint against EU's restrictions on pine wood imports due to nematodes		17 June 1998								Also involving GATT Art. I, III and XI; SPS

Parties and nature of complaint	Countries supporting complaint	Consultations request	Panel request	Panel established	Panel report	Appellate body report	Decision on dispute	Implementation deadline	Solution reported	Comments
US complaint against Mexico's measures affecting trade in live swine		10 July 2000								Also involving GATT Art. III and XI; SPS; Agreement on Agriculture
US complaint against Belgium's administration of measures establishing customs duties for rice		19 Oct. 2000	19 Jan. 2001	12 March 2001					18 Dec. 2001	Also involving GATT Art. I, II, VII, VIII, X and XI; Customs Valuation Agreement; Agreement on Agriculture
Peru's complaint against the EU's trade description of sardines	Venezuela, Chile, US, Ecuador	23 April 2001	7 June 2001	24 July 2001						Also involving GATT

Source: OECD Secretariat based on WTO information (documents WT/DS

2.1.4 *Summary of evaluations concerning the implementation of the TBT Agreement*

The TBT Agreement asks for a review of the operation and implementation of the Agreement through the TBT Committee every three years. The first such review was concluded in November 1997 and the second in November 2000. During the second review the Committee stated with respect to the transparency provisions of the Agreement that, given the considerable number of WTO members which had not named single government authorities and announcement publications, "the status of implementation needed to be improved" (WTO, 2000). Similarly, concerning the provision of information on TBT enquiry points by member countries the Committee considered that the "status of implementation was not satisfactory".

While acknowledging the increasing number of notifications made by central governments as well as the increasing number of notifying countries, the Committee noted "the low level of notifications of technical regulations and conformity assessment procedures of local government at the level below that of the central government of Members" (WTO, 2000). Furthermore, the Committee observed that "concerns regarding labelling were raised frequently in the Committee meetings during discussions on the implementation and operation of the Agreement. In this regard, the Committee reiterated the importance of any such requirements being consistent with the disciplines of the Agreement, and in particular stressed that they should not become disguised restrictions on trade." Moreover, the Committee noted that "international standardization was an area where developing country participation was still limited and constrained" and recognised the importance of technical assistance in this regard.

The Committee's evaluation of the operation and implementation of the TBT Agreement did not differentiate between sectors or product groups. But the description of TBT issues and concerns in this chapter suggests that problems associated with technical barriers to trade might be particularly pertinent for agro-food products. Agriculture and food products account for about 9% of world merchandise trade (WTO, 2001), but were specifically targeted in 28% of all notified TBT measures during 2001. Moreover, 32% of all specific trade concerns raised in the TBT Committee have concerned agro-food products, as well as 62% of all TBT-related disputes. Hence, technical measures and their possible trade impacts seem to be more controversial for agro-food products than for other merchandise. However, most TBT-related disputes also involve and are often mainly about alleged violations of other parts of international trade law, so that the absolute number of disputes should be interpreted with care. Nevertheless, the finding of an increasing trend in the number of specific

trade concerns raised in the TBT Committee suggests that trade policy makers and technical experts at standardising bodies might want to devote particular attention to contentious issues concerning agro-food products, such as food labelling, in order to minimise the risk of future disruptions of international trade.

Indeed, informal discussions on labelling have already been initiated in the TBT Committee in order to look at ways in which disciplines might be imposed on labelling regimes. One idea has thereby been to extend the application of the principles of the Code of Good Practice to labelling issues. These discussions are still ongoing in the TBT Committee as well as in other technical organisations.

2.2 Agreement on the application of Sanitary and Phytosanitary Measures (SPS)

In a similar manner as the previous section concerning TBT, the following description and discussion presents a survey of SPS issues and concerns as raised in the WTO's Committee on Sanitary and Phytosanitary Measures. Sub-section 2.2.1 provides an overview of WTO member attendance at meetings of the WTO's SPS Committee and of the specific trade concerns that have been raised in these meetings. Sub-section 2.2.2 reports on the implementation of the transparency provisions of the SPS Agreement, notably the designation of notification authorities, the establishment of enquiry points, and the notification of SPS measures, and sub-section 2.2.3 discusses trade disputes related to SPS matters. Finally, sub-section 2.2.4 summarises some preliminary evaluations concerning the implementation of the SPS Agreement.

2.2.1 Meetings of the SPS Committee

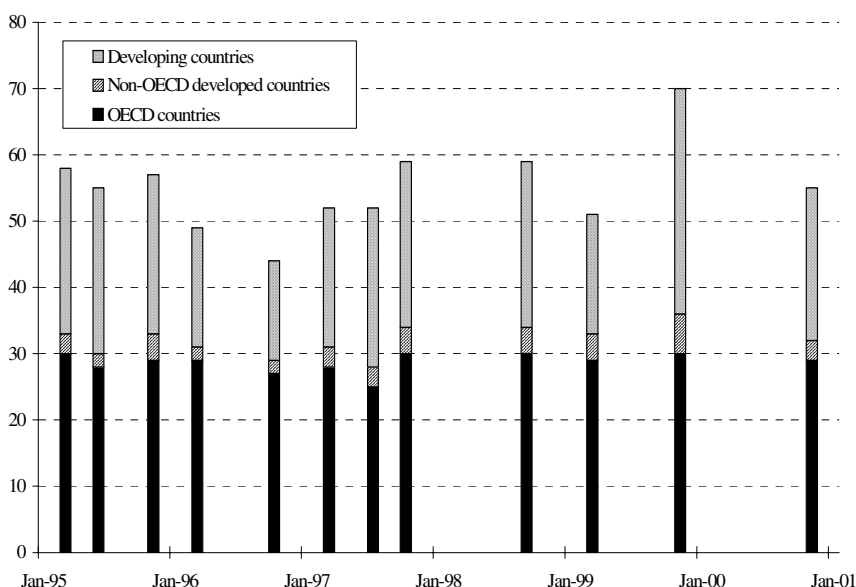
The implementation of the SPS Agreement is overseen by the SPS Committee, which is made up of delegations from WTO member countries. The Committee's role is to review notifications of SPS measures, develop policy and procedural guidelines, and discuss selected trade issues. The Committee held 22 regular meetings from 1995 to 2001, and two special meetings on transparency (November 1995) and equivalence (September 2001).

Meeting attendance

Not all WTO members have been sending delegates to meetings of the SPS Committee. According to information from "lists of representatives" that the WTO Secretariat compiles and makes available for selected Committee meetings, attendance has varied from 44 to 70 different delegations during

1995-2000 (Figure 2.7). Most OECD countries have always been represented. Yet, half to two-thirds of all WTO members, including a large number of developing country members, have not been present in SPS Committee meetings. A total of 47 WTO members, including 43 developing countries, did not have a representative at any of the 12 regular meetings for which information on attendance is available.⁷ The relatively low participation of developing countries could mean that these countries either have insufficient financial resources to send a delegate to the SPS Committee, lack the technical expertise to participate actively in the discussions, or see SPS issues not as being sufficiently important to warrant meeting attendance.

Figure 2.7. Number of WTO member countries represented at SPS Committee meetings



Note: The information refers to meeting participants that fill out and return the attendance sheets.

Source: OECD Secretariat based on WTO information (documents G/SPS/INF).

Specific trade concerns raised

During regular meetings, a total of 105 specific trade concerns have been discussed. Raising an issue makes it possible for countries to attract attention and initiate discussion about a particular concern, which might help to avoid disputes between trading partners or potential future trade problems. SPS issues raised included concerns over policy measures taken in response to foot-and-mouth disease outbreaks and BSE, maximum levels for certain food

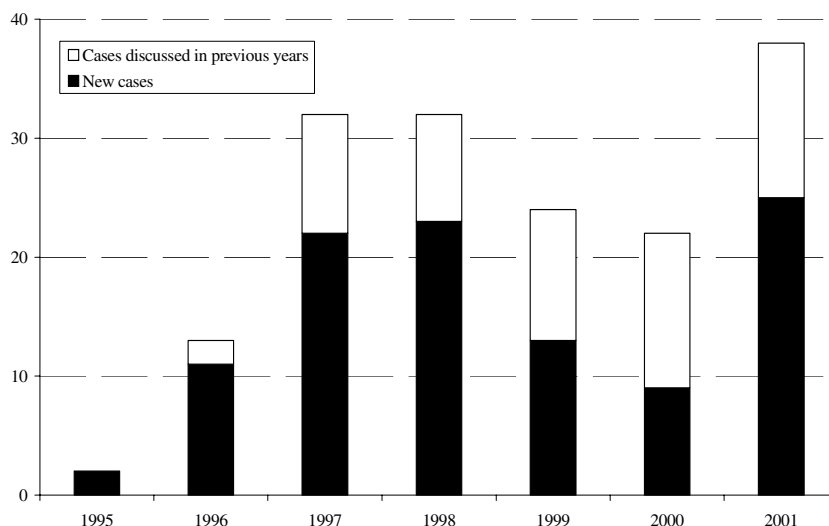
contaminants, and measures taken by countries that affect trade in particular commodities. Of all the specific issues, 27 related to food safety, 38 to animal health, 37 to plant health, and 3 to other SPS issues (WTO, 2002b).⁸

Specific trade concerns have been expressed about SPS measures in all 30 OECD countries⁹ and in 18 non-OECD countries, including 15 developing countries. Conversely, 29 OECD countries and 38 non-OECD countries, including 35 developing countries, have raised issues or supported complaints about SPS practices of other WTO members.¹⁰ The number of new and previously raised issues does not show a clear trend over time (Figure 2.8). It first peaked in 1997/98 and then again in 2001.

A breakdown by commodity reveals that almost two-thirds of all specific trade concerns arose either with respect to fruits, vegetables, and flowers or regarding livestock and livestock products (Figure 2.9). However, this distribution of cases should be interpreted with care, as the underlying trade concerns differ substantially in nature, scope, and severity.

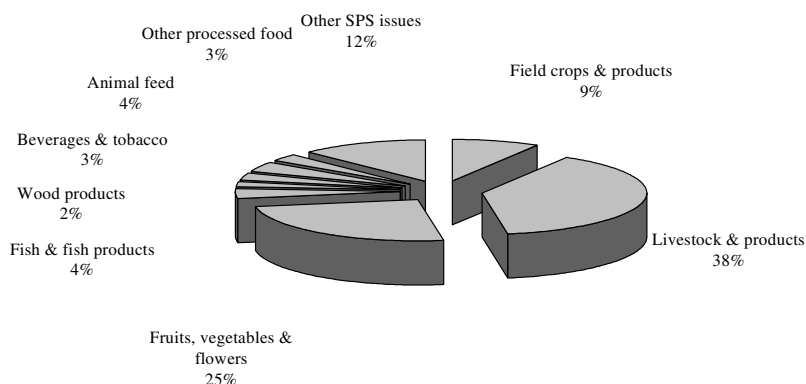
In almost a third of all cases, at least a partial solution to the specific trade concern raised was subsequently reported to the SPS Committee. Yet, there might be a number of other concerns that might have been settled through technical exchanges between the affected parties, without this outcome being reported back to the WTO.

Figure 2.8. Number of specific trade concerns raised in the SPS Committee, 1995-2001



Source : OECD Secretariat based on WTO information (document G/SPS/GEN/204/Rev.2).

Figure 2.9. Specific trade concerns raised in the SPS Committee by product (in %)



Note: Data for 1995-2001. "Other SPS issues" includes concerns about approval processes for modern biotechnology, translation of regulations, and measures that apply across a large range of products

Source: OECD Secretariat based on WTO information (document G/SPS/GEN/204/Rev.2).

2.2.2 Notifications under the SPS Agreement

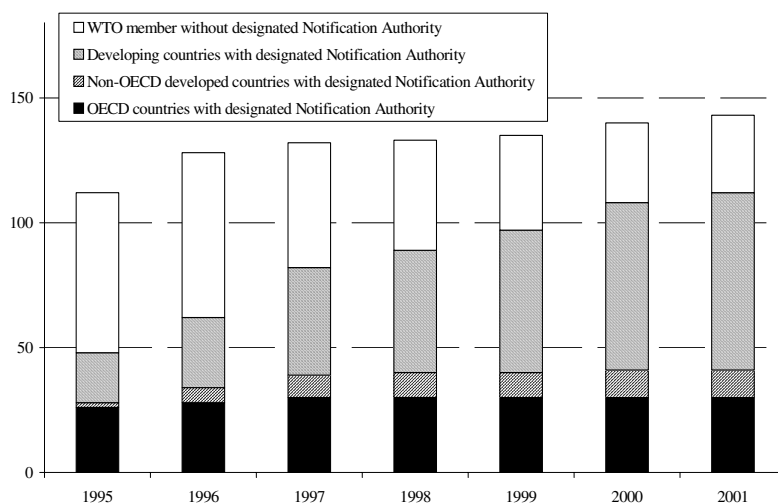
The SPS Agreement requires countries to designate national notification authorities, notify the WTO of new or amended measures that do not conform to an international standard, guideline, or recommendation and may have a trade impact, and to maintain at least one enquiry point to respond to information requests related to the notified regulations.¹¹ The standardised information in the notification concerns the justification of the proposed measure, the products to which it applies, and the international standard, if any, to which it refers. This notification process provides an opportunity for trading partners to comment on a measure before it is adopted, and thereby makes it possible to suggest regulatory changes that might help to avert potential trade disputes.

Even though the transparency disciplines of the SPS Agreement are obligatory for WTO membership, not all countries have so far been providing information on the national authorities responsible for the notification of changes in SPS measures and SPS enquiry points. All OECD countries have reported an enquiry point to the WTO since 1995 and on notification authorities since 1997, but a number of countries have not provided corresponding information. The share of WTO members that had not yet designated national notification authorities or established an enquiry point has decreased over time (Figures 2.10 and 2.11), but by the end of 2001, 31 of the 143 WTO members, including 29 developing countries, had not reported the information on national

notification authorities and 23 countries, including 22 developing countries, had not yet established SPS enquiry points.

From 1995 to end of 2001, more than 2400 changes in SPS measures were notified to WTO (not taking into account the more than 300 corrections, revisions and addenda to previous notifications), of which about 17% were emergency measures. All OECD countries have notified SPS measures, with the European Union reporting EU-wide regulations for its members and individual EU countries notifying national measures that fall outside the competence of the EU.¹² In addition, 49 non-OECD countries, including 42 least developed countries, have submitted SPS notifications. However, 64 countries have not introduced SPS measures that deviate from international standards since joining the WTO or had not yet notified the policy changes by the end of 2001.

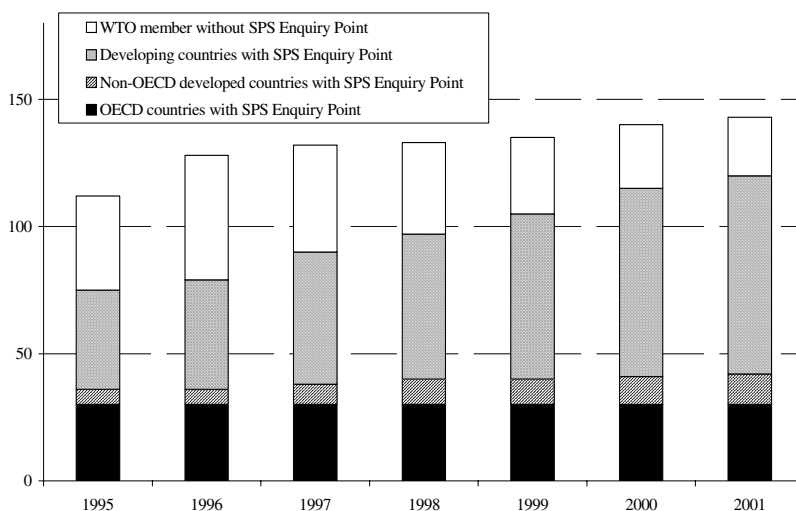
Figure 2.10. Number of WTO members with and without designated notification authorities



Note: The information on WTO membership refers to the end of the year, while the data on the designation of national Notification Authorities is based on WTO documents (G/SPS/NNA or, before November 2000, relevant documents under G/SPS/GEN) that were released during autumn of the same year.

Source: OECD Secretariat based on WTO information.

Figure 2.11. Number of WTO members with and without SPS enquiry points

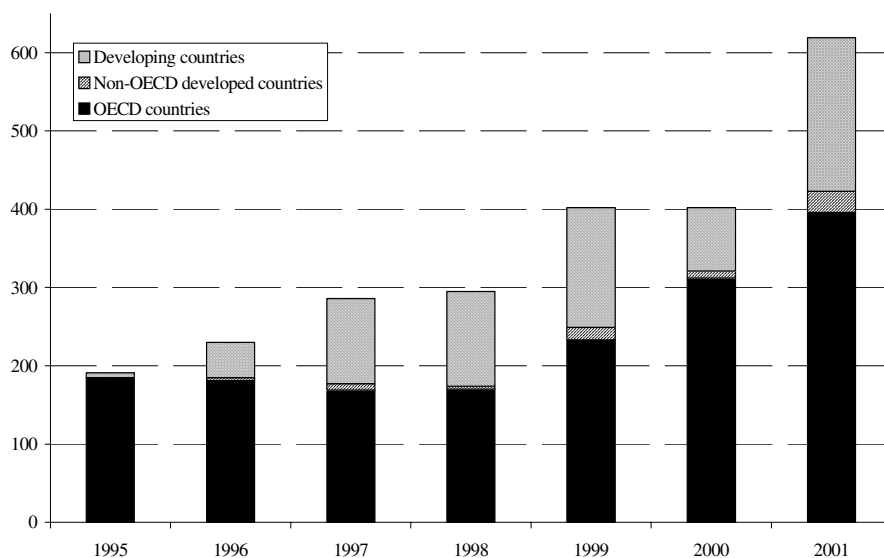


Note: The information on WTO membership refers to the end of the year, while the data on the establishment of Enquiry Points is based on WTO documents (G/SPS/ENQ) that were released during autumn of the same year.

Source: OECD Secretariat based on WTO information.

The number of WTO members submitting SPS notifications in a particular year rose from 30 in 1995 to 63 in 2001.¹³ In parallel, the number of notified new or amended SPS measures increased continually and more than tripled over the seven-year period (Figure 2.12). More than two-thirds of all notifications have been submitted by OECD countries. The increasing participation of countries in the notification process and the expanding number of notified measures might to some extent be due to increases in agro-food trade and the growing complexity of SPS policies. It also suggests, however, that the transparency provisions of the SPS Agreement are taken seriously, to the benefit of all WTO members, including less developed countries.

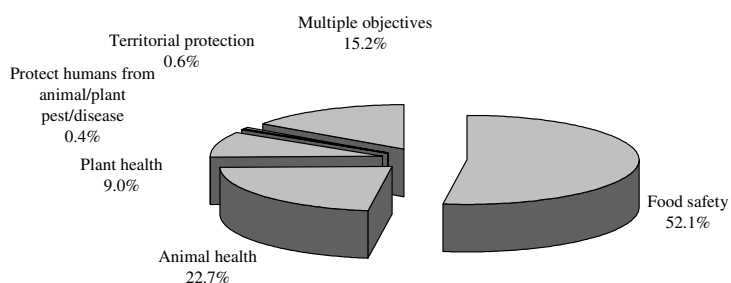
**Figure 2.12. Number of notified SPS measures
1995-2002**



Note: Corrections, revisions, and addenda to previous notifications of SPS measures are not included.

Source: OECD Secretariat based on WTO information (documents G/SPS/N).

**Figure 2.13. Objectives of SPS measures
notified during 2000-2001**



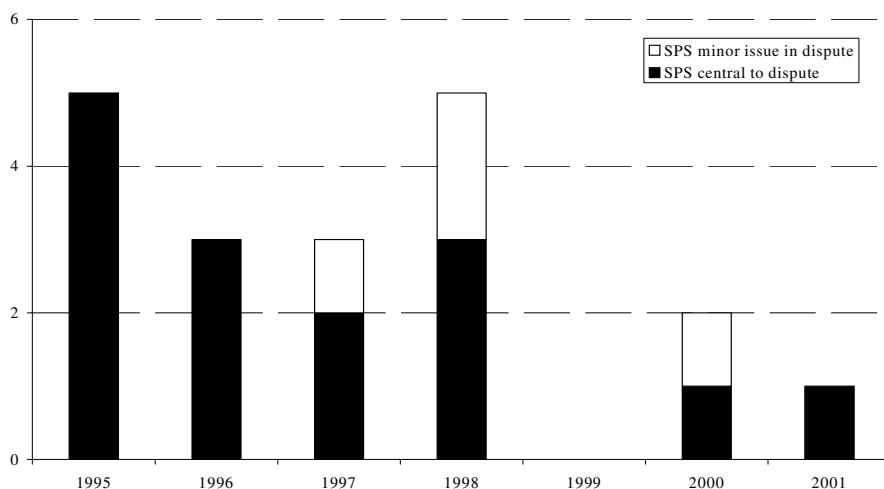
Source : OECD Secretariat based on WTO information (documents G/SPS/N).

2.2.3 SPS disputes

In cases where discussions at the bilateral or multilateral level have not made it possible to resolve a disagreement, WTO dispute settlement procedures can be invoked. In the initial stage this involves formal consultations. If no mutually agreeable solution between the parties can be found, a WTO member can request the establishment of a dispute panel that would rule on the compliance of a measure with the provisions of the SPS Agreement. This ruling could subsequently be reviewed by the WTO Appellate Body, if necessary.

Up to the end of 2001, more than 240 disputes had been formally raised under the WTO's dispute settlement system, of which 19 concerned alleged violations of the SPS Agreement (Table 2.3). Many of these SPS disputes occurred during the mid to late 1990s and the number of new disputes has declined since (Figure 2.14). Nine of the issues under dispute had previously been discussed as specific trade concerns in the SPS Committee.

**Figure 2.14. Number of new SPS disputes
(requests for consultations) 1995-2001**



Source : OECD Secretariat based on WTO information (documents WT/DS).

Table 2.3. WTO disputes invoking the SPS Agreement, 1995-2001

Parties and nature of complaint	Countries supporting complaint	Consultations request	Panel request	Panel established	Panel report	Appellate body report	Decision on dispute	Implementation deadline	Solution reported	Comments
US complaint against Korea's testing and inspection procedures for fresh fruits	Japan	6 April 1995								
US complaint against Korea's shelf-life requirements for frozen processed meats and other products	Canada Japan	3 May 1995							20 July 1995	
Canada's complaint against Australia's import restrictions on fresh, chilled or frozen salmon		5 October 1995	7 March 1997	10 April 1997	12 June 1998	20 Oct 1998	6 Nov 1998	6 July 1999	18 May 2000	
Canada's complaint against Korea's restrictions on treatment methods for bottled water	EU US	8 November 1995							24 April 1996	
US complaint against Australia's import restrictions on fresh, chilled or frozen salmon	Canada	17 Novr 1995	11 May 1999	16 June 1999					1 Nov 2000	

Parties and nature of complaint	Countries supporting complaint	Consultations request	Panel request	Panel established	Panel report	Appellate body report	Decision on dispute	Implementation deadline	Solution reported	Comments
US complaint against EU's import prohibition for meat produced with growth-promoting hormones	Australia, Canada, New Zealand	26 Jan 1996	25 April 1996	20 May 1996	18 Aug 1997	16 Jan 1998	13 Feb 1998	13 May 1999		US authorised (26-Jul-99) to raise tariffs by 100% on EU products worth USD116 mill. p.a.
US complaint against Korea's inspection procedures for fresh fruits	Australia, New Zealand, US	28 June 1996	16 Sept 1996	16 October 1996	18 Aug 1997	16 Jan 1998	13 Feb 1998	13 May 1999		Canada authorised (26-Jul-99) to raise tariffs by 100% on EU products worth CAD11.3 mill. p.a.
Canada's complaint against EU's import prohibition for meat produced with growth-promoting hormones	Australia, New Zealand, US	7 April 1997	3 Oct 1998	18 Nov 1997	27 Oct 1998	22 Feb 1999	19 March 1999	31 Dec 1999	23 Aug 2001	
US complaint against Japan's "varietal testing" requirements for fresh fruits		7 April 1997	3 Oct 1997	18 Nov 1997	27 Oct 1998	22 Feb 1999	19 March 1999	31 Dec 1999	23 Aug 2001	SPS minor issue

Parties and nature of complaint	Countries supporting complaint	Consultations request	Panel request	Panel established	Panel report	Appellate body report	Decision on dispute	Implementation deadline	Solution reported	Comments
EU's complaint against India's quantitative restrictions on agricultural and other products	Australia, Canada, Japan, New Zealand, CHE, US	18 July 1997	3 Oct 1997	18 Nov 1997	-	-	-	-	7 April 1998	
EU's complaint against US restrictions on imports of poultry products		18 Aug 1997								
Switzerland's complaint against Slovakia's BSE-related restrictions on cattle and meat imports	US	11 May 1998								
India's complaint against EU's restrictions concerning rice imports		25 May 1998								SPS minor issue
Canada's complaint against EU's (France's) measures affecting asbestos	Brazil	28 May 1998	9 Oct 1998	25 Nov 1998	18 Sept 2000	12 March 2001	5 April 2001			SPS minor issue
Canada's complaint against EU's restrictions on pine wood imports due to nematodes		17 June 1998								

Parties and nature of complaint	Countries supporting complaint	Consultations request	Panel request	Panel established	Panel report	Appellate body report	Decision on dispute	Implementation deadline	Solution reported	Comments
Canada's complaint against US restrictions on imports of live animals and grains		25 Sept 1998								
US complaint against Mexico's measures affecting trade in live swine		10 July 2000								SPS minor issue
Thailand's complaint against Egypt's GMO-related import ban on canned tuna with soybean oil		22 Sept 2000								
Ecuador's complaint against Turkey's import requirements for fresh fruit, especially bananas	EU, US	31 Aug 2001								

Source: OECD Secretariat based on WTO information (documents WT/DS).

In seven of the 19 disputes, panels were established: two regarding Australia's restrictions on imports of salmon, two regarding the EU's import prohibition on meat produced with growth-promoting hormones, and one each regarding Japan's variety-by-variety testing of certain fruit, India's quantitative restrictions on imports of agricultural and other products, and France's measures affecting asbestos and asbestos containing products. A detailed description of the background and proceedings of the Australian salmon, the EU hormone, and the Japanese varietal-testing cases can be found in Stanton (2001). The Indian quantitative restrictions and the French asbestos cases touch on SPS issues, but are mainly about compliance with other Agreements under the WTO.¹⁴ Four of the seven panel-cases had been resolved by the end of 2001. Of the 12 SPS disputes for which no panel had been established (yet), two had been settled after consultation, while ten were still pending.

OECD countries have been prominently involved in the SPS disputes. In 16 of the 19 cases, both the country raising an issue and the country concerned were OECD-30 members. In two cases, a developing country invoked dispute settlement procedures against import practices in an OECD country, and in one case developing countries were both the complaining party and the party complained about.

2.2.4 *Summary of preliminary evaluations concerning the implementation of the SPS Agreement*

The preceding discussion has provided a descriptive overview of issues related to trade and SPS measures, as observed during the implementation of the SPS Agreement. The participation of WTO members in the notification process and in the discussion of specific trade concerns in the SPS Committee suggests has been widening over time. The resulting transparency of SPS measures and the institutional framework for technical exchanges seem to have facilitated the reaching of mutually agreeable solutions to trade concerns, as indicated by the share of SPS-related trade concerns that have been resolved following their discussion at formal meetings of the SPS Committee or bilaterally and the relatively small number of SPS disputes.

During 1998, the SPS Committee reviewed the operation and implementation of the SPS Agreement (WTO, 1999b). The Committee emphasised that the SPS Agreement "had contributed to improving international trading relationships with respect to sanitary and phytosanitary measures, although a number of implementation issues gave concern to some Members, including a number of developing country Members." It noted that "the Agreement had significantly improved transparency in the application of

sanitary or phytosanitary measures. This was illustrated by the fact that Members are progressively, and in a more comprehensive manner, meeting their notification obligations." Moreover, the Committee observed that "extensive discussions on particular implementation problems at its formal meetings had helped to draw attention to specific trade concerns and related issues and to avoid potential trade conflicts."

Some observers have noted that there seem to be a number of cases where either the substantive obligations of the SPS Agreement or bilateral exchanges within its institutional framework have contributed to regulatory reform (Roberts, 1998a). For example, the US has moved to "regionalised regulation", allowing imports of uncooked beef from regions that have been recognised as free of foot and mouth disease, even if the whole source country has not achieved the same status. Japan has lifted a long-standing ban on US tomatoes, New Zealand has been accepting imports of Canadian salmon, and Australia has changed regulations to allow imports of cooked poultry meat. These changes might have come about anyway as a result of findings by regulatory scientists that import protocols could be designed in ways to reduce risks to acceptable levels. But the framework of SPS disciplines might have provided assurance that other countries would review their rules and procedures according to the same principles.

NOTES

1. Chapter 2 was prepared by Peter Walkenhorst (OECD Trade Directorate).
2. While the term 'specific trade concern' is not mentioned in the minutes of the meetings of the TBT Committee, the WTO Secretariat has recently released a document (WTO, 2002a), in which specific trade concerns are taken to be questions and concerns raised in the TBT Committee about trading partners' measures. In this study, the term is used accordingly.
3. This method of counting follows the approach of the WTO Secretariat (WTO, 2002a and 2002b) of tallying specific trade concerns in the form of distinct issues discussed in the TBT Committee. Alternatively, one could define the number of specific trade concerns as the individual interventions that delegations have made when raising or supporting concerns. If this procedure is used, there were 58 concerns specifically related to agro-food products, 57 were of a general nature, and 38 concerned non-agro-food products.
4. The EU has been reporting Union-wide measures and these are counted as notifications by all 15 member countries. In addition, ten EU members have notified national regulations or procedures.
5. In addition, Canada's complaint against EC's (France's) measures affecting asbestos, which does not directly concern agro-food products, alleged violation of both the TBT and the SPS Agreements.
6. The case, for which no mutually satisfactory solution had been reported yet by the end of October 2002, can be summarised as follows. In 2001, Peru requested consultations and subsequently the establishment of a panel concerning the EC's trade description of sardines. Venezuela, Chile, the US, and Ecuador later joined the consultations. The Peruvian authorities alleged that the implementation of Council Regulation (EEC) No. 2136/89, which prevents Peruvian exporters from continuing to use the trade description "sardines" for their products, violated GATT Article XI, as well as Articles 2 and 12 of the TBT Agreement. In particular, the Council Regulation was seen as an unjustified barrier to trade, as it did not correspond to the Codex Alimentarius standards that classified the species "*sardinops sagax sagax*" as being "sardines". In 2002, the Panel and the Appellate Body found the EC Regulation to be inconsistent with Article 2.4 of the TBT Agreement and

requested the European Communities to bring the EC Regulation into conformity with its obligations under that Agreement.

7. It should be noted that the "lists of representatives" only reflect those meeting participants that fill out and return the attendance sheets. Delegates that are not in the meeting room when the forms are circulated or that do not complete the forms are not covered.
8. Following the WTO Secretariat's classification, issues that concerns both food safety and animal health are included under food safety, except for BSE concerns, which are classified under animal health.
9. Concerns about EU measures are counted as complaints about policies of all 15 members. Moreover, specific trade concerns have been expressed about policies in seven individual EU member countries.
10. Concerns expressed on behalf of ASEAN are counted as being made by all 10 member countries. Four ASEAN members have raised or supported specific trade concerns individually.
11. Least-developed WTO members were allowed to delay the implementation of the Agreement until 2000
12. Up to the end of 2001, 10 of the 15 EU member countries had notified national SPS measures.
13. EU-notifications are counted as notifications by all 15 member countries.
14. In the Indian quantitative restrictions and the French asbestos cases, violations of the SPS Agreement were alleged in the initial requests for consultations, but not pursued in the subsequent panel requests.

CHAPTER 3

QUANTIFYING THE ECONOMIC IMPACT OF TECHNICAL MEASURES¹

The aim of this section is to present measurement methodologies that could be used for non-tariff trade barriers (NTB) in the agricultural and food sectors. While NTBs often include quantitative import restrictions, the analysis in the following is limited to sanitary, phytosanitary and technical regulations that can have an impact on trade. The focus is thereby on methods that provide some quantitative estimates of the impact of such barriers on market equilibrium, trade flows, economic efficiency, and welfare. Given the heterogeneous nature of these regulations, a unifying methodology does not exist. Instead, attempts to quantify the effects of such measures have been limited; often focused on a particular product and have relied on methods that belong to different fields of the economic literature. The subsequent discussion provides a brief description and an evaluation of the various methods that could be used for a more comprehensive assessment of the impact of NTBs on trade and welfare, and tries to identify promising areas for applied research.

The demand for better estimates of the impact of these regulations on trade matches several preoccupations of policy makers. First, domestic regulations may constitute major trade impediments and their use is proliferating. However, these NTBs may simply be becoming more visible, because of international scrutiny, or more trade restrictive, because of the decrease in tariffs. A comprehensive assessment of the actual impact of these regulations is necessary to address the role to be given to non-tariff instruments and barriers in a future trade agreement. Second, quantification of the economic effects of SPS and technical regulations is an important step in the regulatory reform process that OECD countries have been involved in since 1997 (OECD, 1997). Quantitative analyses help informing governments of the costs of their SPS policies, and provide the elements for defining more efficient regulations (Antle, 1995). Third, more satisfactory techniques for estimating the damage caused to a country by foreign regulations that may help solving disputes, and serve as a basis for calculating compensation claims. Finally, sectoral studies suggest that technical regulations in developed countries constitute a considerable obstacle to agricultural food exports from developing countries (Cato and Dos Santos de Lima, 1998; Otsuki *et al.*, 2001). During the Uruguay Round, developing countries saw access to Northern markets in the food sector as a main motivation for participating to multilateral agreements, where they felt they had otherwise a lot to lose (*e.g.* on intellectual property). Because they feel that their access to Northern market did not improve because of technical requirements,

they see little interest in participating in a new round. More information on the effects of regulatory barriers could help to account for developing country's claims, a key condition for successful multilateral negotiations.

Several recent papers have surveyed policy-relevant issues in the sanitary and phytosanitary area (OECD, 1999a; Orden and Roberts, 1997). Government agencies have listed regulations that they see as illegitimate obstacle to exports (EU Commission, 2000; USTR, 2001). Definitions of NTBs have been proposed and efforts have been made to identify the regulations that were designed to protect the local industry from regulations that aim at protecting consumers (Hillman, 1997; Roberts and DeRemer, 1997). The legitimacy of such or such regulation has been discussed, as well as the rationale of purely science based versus economic approaches (Nevasen, 2000; James and Anderson, 1998; Bureau and Marette, 2000). Frameworks for estimating the effects of such barriers have also been proposed (Bigsby and White, 2000; Roberts *et al.*, 1999; Maskus *et al.*, 2001; Ganslandt and Markusen 2000). However, a lot of work remains to be done in order to derive reliable quantitative estimates of the impact of regulations on trade.

3.1 Definitions of a non-tariff barrier

SPS and technical regulations are a sub-category of non-tariff trade barriers (NTBs). Hillman (1991) defines NTBs as all restrictions, other than traditional customs duties, which distort international trade. Precisely it is "Any governmental device or practice other than a tariff which directly impedes the entry of imports into a country and which discriminates against imports, but does not apply with equal force on domestic production or distribution." Thornsby *et al.* (1999) endorse this concept. Their definition includes standards of identity, measure, and quality, and SPS, and packaging measures. Roberts (1998b) and Thornsby (1998) have classified regulations by policy instrument, by scope of the barrier, by regulatory goal, by legal discipline, by type of market restriction, product category, and geographical region. Such a classification helps to identify differences in regulatory approaches among countries that could have different trade implications.

However, distinguishing NTBs from a legitimate regulation for protecting consumers can be difficult. This is the reason why other authors emphasise that the term "barrier" to trade should not be used for measures that may have incidentally the effect of restricting trade, but whose principal objective is to correct market inefficiencies. On the basis of a definition of NTBs given by Baldwin (1970), who restricted the concept to the measures that decrease the world global revenue, they consider that trade restricting regulations that have overall positive welfare effects should not be considered as NTBs. Mahé (1997)

definition of a NTB as a restriction other than tariffs that leads to a decrease in world welfare, falls into this category. The idea of qualifying as protectionist a standard if it differs from the one that would be chosen by a world welfare maximising social planner also relies on the same idea. Other authors suggest using cost-benefit criteria to define whether a regulation that affects trade has some legitimacy.²

A third definition of NTBs relies on the idea that a regulatory measure should be compared to the measure that would have been implemented if it had been designed for domestic purposes only (Maskus *et al.*, 2001). Fisher and Serra (2000), for example, characterise a standard (in an open economy) as non-protectionist if it corresponds to the standard that the social planner would use if all firms were domestic. This makes it possible to account for the welfare enhancing effect of a standard in the presence of negative externalities.

The distinction between a trade-oriented concept and a welfare-oriented definition of a NTB is not only theoretical. It has direct consequences on empirical measurement since the two conceptions lead to different approaches. Some methods rely on the measurement of possible trade impacts only (this is the case of methods based on price-wedge estimation, surveys, and gravity models). Other methods are grounded in welfare economics, and measure NTBs through a larger range of effects than trade alone (this is the case of methods based on comparative-statics or cost-benefit analysis and general equilibrium analysis). Welfare-based approaches are conceptually superior because they capture a larger range of effect (*e.g.* they account for the positive externality of a regulation that, say, protects consumers). However, because NTBs are debated in multilateral negotiations, negotiators focus on trade expansion, measuring the impact in terms of volume of trade for other countries is an issue of interest.

3.2 An analytical framework for measurement

Measurement in economics attempts to compress complex effects into one scalar. A possibility is to measure NTBs through their synthetic effect on the volume of import at world prices, for example. More general effects can be taken into account by assessing the effect of NTBs on welfare, which is the most synthetic indicator of the effects of a given measure on whole economy. If one wishes to account for the revenues that are diverted between the different agents, distributional effects of NTBs must be taken into account, for example through the use of a social accounting matrix that represents the effect on different categories of agents. General measures can also be based on the resource costs of NTBs. In such a case, the measure would include not only the deadweight losses but also the administrative costs of enforcing NTBs and the costs of the resources lost to rent seeking (Deardorff and Stern, 1998).

Measures of NTBs can be based on how a given regulation affects the overall equilibrium in the sector, or in the economy. Roberts *et al.* (1999) propose an analytical framework to analyse NTBs that summarises most of what the various authors have adopted. They distinguish three economic effects: i) the "regulatory protection effect", *i.e.* the fact that a regulation provides some rents to the domestic sector; ii) the "supply shift" effect, that focuses on the effects of imports on the domestic supply and the costs of enforcing compliance, and iii) the "demand-shift" effect, that takes into account the fact that a regulation may bring information and increase consumer demand for the product. Using comparative-statics in a partial equilibrium framework, they illustrate the different effects of these three components of NTBs, in particular in terms of welfare.

Compliance with a regulation involves a cost to foreign suppliers, which acts like a trade tax, resulting in a deadweight loss in the importing country, as well as transfers from consumers to producers. Because there is no tariff revenue, the welfare loss is potentially higher than with the tariff equivalent. This shows that all the methods relying on the construction of a tariff equivalent (described in some of the following sections, such as the price wedge method) are only appropriate for measuring trade volume effects, but do not give a tariff equivalent that has welfare interpretations.

The supply-shifts component of an NTB captures both the effect of imports on the domestic supply (in the absence of regulation) and the potentially beneficial impact of the regulation, should it limit the cost of pathogens, for example (even if this involves some additional costs of testing and detection). Other features can be added to the framework proposed by Roberts *et al.* (1999). In particular, the cost of regulations affects in a different way small and large firms, and regulations modify the structure of competition or the size of the relative markets, affecting mark-ups and rents (Nevasen, 2000; Fisher and Serra, 2000). Ganslandt and Markusen (2000) also account for the fact that standards can impose a fixed cost of entry that affects competition, and may also lead to multiple equilibria, an effect well known in the literature on industrial organisation. Maskus *et al.* (2001) account for the more or less discriminatory nature of the regulation towards imported products, through relative shifts in the excess supply curve of the exporting country and excess demand curves of the importing country.

Finally, the regulation affects domestic demand. This, as well as possible shifts in supply, opens the possibility for the regulation to generate welfare gains that could offset, at least partially, the losses involved by the "regulatory protection" effect. The large literature derived from industrial organisation has made it possible to account for more sophisticated effects than the simple shift

in supply curves. Bureau *et al.* (1998), for example, include specifically the information aspect in the "demand shift" effect. The regulation brings information and therefore avoids the "lemon problem," or reduce the cost that consumers face in assessing product quality. Casella (1996), and Fisher and Serra (2000), account explicitly for the public good effect of regulations. It is also possible to include the reduction of transaction cost induced by some regulations and standards. The analytical frameworks proposed by Roberts *et al.* (1999) can be extended to the multimarket case. This makes it possible to include extra effects of regulations, such as the fact that regulations (at least those that promote standards) can also raise the elasticity of substitution in demand, bring network externalities and even economies of scale by permitting producers to settle on a limited range of product characteristics or processes, or other forms of transaction facilitation (Harrison *et al.*, 1996; Maskus *et al.*, 2001).

There is however still a large gap between the ambitious analytical framework and the applied estimates of the effects of NTBs. In practice, the way regulations affect supply, the extra costs induced, the price differences between foreign and domestic products are key components of model simulations. Information on these aspects is still partial. Even when it is possible to observe what actually occurs as a result of the NTB, this does not in itself measure only the NTB but captures other information, for example the supply elasticity.³ The sophisticated effects of extra information and trade facilitation addressed in stylised microeconomic models are hard to quantify. The impact of standards on consumers' confidence and willingness to pay, for example for credence attributes (genetic engineering, ethical, animal welfare or environmental attributes) remain uncertain. While in theory, applied general equilibrium (GE) models are able to account for the complex effects of regulations on trade, in practice, many simulations rely on crude estimates at an aggregated level. Most of the time, the results are questionable. In the following sub-sections, a description and a brief assessment of the various methods that have been used in the empirical estimation of the effect of non-trade barriers is provided.

3.3 The price wedge method

3.3.1 Principle

Price wedge methods rely on the idea that NTBs can be gauged in terms of their impact on the domestic price in comparison to a reference price. The main use of this method is to provide a tariff equivalent. That is, the method is conceptually oriented toward measuring the trade impact of NTBs. However, the estimate of the price wedge (or the tariff equivalent) can be used as an input

in partial or even general equilibrium model, that focus more on the welfare effect of NTBs.

The tariff equivalent is estimated by calculating the price wedge between the imported good and the comparable product in the domestic market. The correct measure would be to compare the price that would prevail without the NTB to the price that would prevail domestically in the presence of the NTB if the price paid to suppliers were to remain unchanged (Deardorff and Stern, 1998). However, these prices are most of the time unobservable and actual measures of NTBs focus instead on a comparison of the domestic and foreign price in the presence of the NTB. Adjustment can be made for retrieving the price situation in the absence of NTB, using trading quantities and supply and demand elasticity's of domestic and imported goods (Laird and Yeats, 1990).

The domestic price of the imported good should be compared with the invoice price, *i.e.* the c.i.f. price of the imported good as paid by the domestic importer to the foreign exporter, inclusive of transport costs but excluding tariffs. If this price is not available, it is possible to use alternative measures such as the price of imports taken from a variety of exporters (although Deardorff and Stern, 1998, provide evidence of possible bias when this convention is used). The tariff equivalent of a regulation can be measured as a residue when the price difference is corrected for tariff, handling, and transportation costs and for product quality differences.

3.3.2 *Existing studies*

Such a method was used by Campbell and Gossette (1994) on a large number of sectors including food and agriculture. They made sophisticated quality adjustments to make products homogenous. The US International Trade Commission (USITC) uses the method on a regular basis. The USITC measures the price gap of US tariff equivalents by sector, and also adjusts for quality differences (USITC, 1995). The method was used in two studies specific to the agriculture and food sector. Calvin and Krissoff (1997) estimate the tariff rate equivalents of the technical regulations in the apple sector. In order to do so, they compare c.i.f prices (landed prices including freight and insurance costs) of US apples in a foreign country with wholesale prices in the foreign market. They assume that the price gap consists of the tariff and technical barrier tariff rate equivalent. They used monthly data, and attempted to focus as much as possible on the price of a like apple (*i.e.* same variety, grade, and size) during the same time period and at a similar place in the marketing chain. They constructed transport costs that correspond to the cost of bringing US apples to various wholesale markets. Once the difference in price between the US apple

delivered in the foreign country and the wholesale price for a similar apple in the foreign wholesale market was known, the monthly price wedge (in percentage terms) was calculated. The monthly price wedge was divided into the known tariff rate and the technical barrier tariff rate equivalent, which was the residual.

This approach was also used in a study for the EU Commission that compared monthly c.i.f. prices of US pig and poultry meat as well as apples in the EU with their wholesale price in the EU market (EU Commission, 2001). The difference in price between the US product and the wholesale price of the comparable product was calculated as the price wedge in percentage. Within the same EU sponsored project, a similar approach was implemented for the measurement of US non-tariff barriers in tomatoes and apples. While Calvin and Krissoff's report leads to the conclusion that the price wedge method can provide useful estimates of the tariff equivalent of technical barriers, the authors of the EU study are pessimistic about the practical validity of the method. In the case of tomatoes, their results are highly sensitive to the choice of a price series. Export prices show considerable variations over time and across various origins, while quality effects cannot explain this. The importance of the efficiency of the marketing channels, of existing relations is such that, for commodities like tomatoes, results were not reliable. Even with a relatively narrow list of commodities, there are quality differences that might affect the measure of NTB tariff equivalent as a price wedge residual. Calvin and Krissoff (1998), for example, acknowledge that, in spite of their efforts for working for like products, South Korean Fuji apples are different from the top Extra Fancy Washington apples.

3.3.3 *Practical validity of the method*

There are several limitations with the price wedge method. First, the method makes it possible to quantify the effect of a set of NTBs present on the market, but seldom makes it possible to identify what those NTBs are precisely. Second, formulas that measure the NTB in an implicit way, as a percentage price wedge between imports and domestic prices, are valid only under the assumption that imported goods are perfect substitutes. A barrier that raises the domestic price of an import good by 10% raises its price in the domestic market by less than that if imports are a small part of the market and if imports are a poor substitute for domestic goods. That is, comparisons between a good's domestic and international prices can be biased by cross-country differences in supply and demand elasticity. They can also be affected by differences in the ability of foreign and domestic firms to appropriate rents from non-tariff restrictions. If exporting firms are able to price discriminate, the price wedge methods will also reflect rents rather than NTBs.

The main limitation of the method lies in the practical difficulties. For large-scale studies, available data are often too aggregated to reflect differences in quality of imported goods. Even when one can observe prices at the border of the importing country, inclusive of international transportation costs, price differential calculations do not fully reflect the transaction costs of moving goods from the border to wholesale markets. Traded products are different from the domestic ones in some aspects. If domestic varieties are of higher quality than imports, such measures find protection even where there is none.

Overall, because of data limitations, the analysis can only be performed successfully on a few case studies, focusing on a particular product that is relatively standardised. For larger scale studies, the price wedge method does not appear reliable. Particularly questionable are the (numerous) studies where crude estimates of tariff equivalents of regulatory measures using the price wedge method have been introduced in large-scale models. The price wedge method applied to a level of detail such as the 2-digit level of the Harmonised System, or the Standard Global Trade Analysis Project classification are unlikely to reflect the true effect of technical regulations, but capture lots of other unwanted effects.

3.4 Inventories-based approaches

3.4.1 Principle

Inventory-type approaches can be used both in a quantitative perspective as well as in a qualitative perspective to assess the importance of domestic regulations as trade barriers. Three sources of information can be used: *i*) data on regulations, such as the number of regulations, which can be used to construct various statistical indicators, or proxy variables such as the number of pages of national regulations; *ii*) data on frequency of detentions; and *iii*) data on complaints from the industry against discriminatory regulatory practices, and notifications to international bodies about such practices.

Quantitative estimates can rely on the catalogue of all technical barriers (identification and description) on the basis of datasets that list the various regulations in the sanitary, phytosanitary and technical area.⁴ Simple statistics, such as frequency type measures can be used to provide an indication of the frequency of occurrence of NTBs. Such measures may be unweighted, or may be weighted by imports or by production. Measures include *i*) the number of restrictions; *ii*) frequency ratios (number of product categories subject to a NTB, as a percentage of the total number of product category in the classification); and *iii*) import coverage ratio, constructed as the value of imports of each commodity subject to a NTB, as a percentage of imports in the corresponding

product category. More refined indicators can provide some extra information, albeit under somewhat tenuous assumptions. For example, the percentage of standards based on international ones can be an indication of the overall compliance of national standard with widely used international standards.⁵

Data on detentions at the border is also a relevant source of information. In the United States, data are readily available on border inspection, reasons for detention and the frequency of rejected shipments for technical, sanitary, and phytosanitary reasons.

3.4.2 Existing studies

The inventory-based approach has recently gained momentum and two studies have related trade flows to measures of a country's stock of standards. Swann *et al.* (1996) use counts of voluntary national and international standards recognised by the United Kingdom and Germany in an econometric study, where they regressed British net exports, exports, and imports over the period 1985-1991 on variables including frequency indicators of standards. Moenius (1999) also uses the inventory-based method as an input in econometric approaches. Both studies use counts of binding standards in a given industry as a measure of stringency of standards. Otsuki *et al.* (2001) go further and employ a direct measure of the severity of food safety standards expressed in maximum allowable contamination. Fontagné *et al.* (2001) use a more sophisticated indicator for assessing the impact of environmental regulations and their potential use as trade barrier. The underlying idea is that when a barrier is set by only a limited number of countries, it is more likely to be used for protectionist purposes. On the basis of a large dataset, they use frequency statistics with different thresholds on the number of countries that have implemented a trade restrictive regulation for a given product.

In their study on food sector for the EU Commission, Henson *et al.* (2001) used several approaches to assess the importance of regulatory obstacles in the EU and the US, including the inventory approach. They compared the regulatory food quality and safety regimes of the EU and the United States and identified differences in food quality and safety standards by classifying these measures by policy instruments and regulatory goal or aim. They used a database of mandatory governmental regulations and standards from the United States (447 regulations published in the Code of Federal Regulation) and the European Union (279 regulations published in the European Official Journal).

Other studies have used data on border detention rather than regulations. For example, Lux and Henson (2000) have also performed an analysis of border detentions in the United States in order to assess how EU exports could be

harm by import procedures and border inspection. Their analysis shows that problems mainly arise in specific sectors such as dairy products. Henson *et al.* (2000) have studied the import rejections by the United States for products coming from Africa, Asia and Latin America for sanitary and technical reasons.

3.4.3 *Practical validity of the method*

Standards vary in importance across sectors and products. Different standards would not be expected to have similar effects and the number of standards, or the number of pages of domestic regulations is a poor proxy for the trade restrictiveness of the whole regulatory set. It is not clear if there is any correlation between the number of measures and their effect on trade. When based on international datasets, estimates based on the occurrence of the measure can also be misleading, because of the uneven reporting by countries and the non-uniform coverage of measures across countries. Measures based on actual detention at the border are more reliable but run into the limited availability of data. With the exception of the United States, countries do not make information readily available.

With these limitations, inventory-based approaches can be useful for directing attention to the frequency of occurrence of various types of NTBs and the trade or production coverage of NTBs. Inventory-based methods do not really provide a quantification of the effect of regulations on trade *per se*. However, they can provide useful indications on the importance of the problem, and on which sectors and countries NTBs are more likely to be found. An interesting use of this method is the construction of indicators that can be used in econometric estimates of trade. Their use as a proxy variable in econometric models (*e.g.* gravity models) is a way of research that deserves more exploration.

3.5 Survey-based approaches

3.5.1 *Principle*

Inventory-based approaches do not make it possible to identify regulations that have a major trade restriction effect from those that do not. By asking practitioners which measures have more impact on their activity; surveys make it possible to narrow the scope of the analysis and to focus on the relevant issues. When coupled to in depths interviews on a sample of the population surveyed, these approaches have sometimes provided some counter intuitive assessments of the importance of trade barriers.

Surveys can also be designed to provide some information (such as ranking the importance of the measures on a scale) that can be used in econometric studies. An extensive study conducted by the USDA on estimates of the trade impact of foreign technical regulations illustrates the interest of the method when basic information is missing. The econometric exploitation of the USDA survey shows that surveys can be used as a basis for more refined measures of NTBs (Thornsbury 1998).

3.5.2 *Existing studies*

Information provided from the industry that faces restrictions to their exports is an input for the annual report on US trade barriers (EU Commission, 2000) and the US Trade Representative annual reports on foreign trade barriers. In some areas (information technology industry in particular) the United States International Trade Commission also performs informal interviews of corporate executives, officers of trade associations and government officials for their views of the importance of standards as trade impediments.

The OECD (1999b) conducted a survey of 55 firms in three sectors in the United States, Japan, the United Kingdom, and Germany on exports impediments. One of the sectors surveyed was dairy products. In 1996 the USDA conducted a survey providing a cross-sectional accounting of technical barriers to US agricultural exports. The USDA cross-sectional data set was used to characterise the extent of economic-based protection provided. Several studies derived from this survey quantified the trade impact of questionable technical barriers on US agricultural exports (Roberts and DeRemer, 1997; Thornsbury *et al.*, 1999; and Thornsbury 1998).

Specific surveys were conducted on the problems developing countries face to meet the SPS requirements of the developed countries and in adhering to the provisions of the SPS Agreement. Henson *et al.* (1999) conducted surveys (by fax) coupled with in depth interviews. Rather than the industry, the questionnaires were sent to contact points (*e.g.* the contact point of the Codex Alimentarius in a given country) in developing countries. Several studies conducted by the University of Reading combined surveys to in depth interviews. This approach proved particularly interesting to identify most relevant issues and for debunking some common ideas. For example, from the work of Henson *et al.* (2001) for the EU Commission, it appears that one major complaint of European exporters to the United States is not the tariff or the sanitary requirements, but the administrative burden, both in terms of delays and in terms of lack of predictability.⁶ A finding of the OECD (1999b) survey on dairy was that few firms considered standards to be of great concern. In dairy

products there were problems in certification and approval delays for exporters of speciality products, but dealers in bulk dairy goods reported few difficulties.

3.5.3 *Practical validity of the method*

Survey-based methods are useful when other sources of information are lacking. Combined with interviews, they have also brought considerable light on the important issue of barriers faced by developing countries willing to export to the United States and the EU, for example. Another useful feature of the survey-based approaches is the ability to identify diffuse and hardly measurable barriers, such as the administrative ones. Survey-based methods also show that the regulations that are of more concern for the industry are not always those that economists would have thought of, and perhaps attempted to include in their models.

However, their ability to actually help quantifying NTBs is questionable. The firms consulted are likely to be biased if there is a perception that the agency conducting the survey would use it for policy purposes. Even experts surveyed can have the perception that their response could be used to initiate dispute settlement procedures.⁷ The definition of the questionnaire and the way the survey is conducted are likely to affect the NTB estimate. The cost of the method, in view of the results, suggests that it should be restricted to cases where no other sources of information are available.

3.6 Gravity based approaches

3.6.1 *Principle*

When trying to quantify NTBs, an obvious technique is to consider the foregone trade that cannot be explained by tariffs. A typical approach is to look at the residuals in economic regressions of trade flows on the various determinants of trade. In these approaches, gravity models are of particular interest since they have long been used as a way to estimate the "home bias" or the "border effect" in trade, a part of it reflecting national regulations that hamper trade.

The basic principles of gravity models are summarised by Head (2000). Gravity models rely on Newton's "Law of Universal Gravitation" formula, that holds that the attractive force F_{ij} between two objects i and j is given by $F_{ij}=G*(M_i*M_j)/D_{ij}^2$, where M_i and M_j are the masses, D_{ij} is the distance between the two objects and G is a gravitational constant. In a similar way, economists have found out in the 60s that the equation $F_{ij}=G*(M_i^a*M_j^b)/D_{ij}^2$ performed well at explaining trade flows if F_{ij} is the "flow" from origin i to destination j , M_i and

M_j the relevant economic sizes of the two locations, D_{ij} the distance between the locations, and G , a and b are constant (G , a and b have subsequently been related to the form of economic functions). For a long time, gravity models performed relatively well but lacked theoretical foundations. However, Anderson (1979) gave a theoretical foundation of the model in the presence of imperfect substitutability between goods, and further developments have shown that the gravity equation was consistent with situations characterised by monopolistic competition (Bergstrand, 1989; Deardorff, 1998). This foundation has provided a regain of interest together with new developments in this approach (Hummels, 2000; Anderson and van Wincoop, 2001).

An interesting application of the method estimates how much trade is foregone only because of the "border" effect. For example McCallum (1995) showed that in 1988 the US-Canadian border led to an effect that all things being equal (in particular distances and costs), intra Canadian province trade was 22 times higher than trans-border trade. Since that study, numerous attempts were made to include some explanatory variables in the analysis, including language, indicators of "remoteness," cultural differences, etc. Dummy variables have been introduced to deal with various types of local characteristics. However, administrative barriers have seldom been taken explicitly into consideration.

It seems possible to use information on regulations, for example, estimates using the methods described above (number, frequency of regulations, survey based impacts), or in certain cases the level of standards themselves, provided that there is some variability across countries or over time (*e.g.* the level of chemical residues, of aflatoxins, of antibiotics, etc.) as explanatory variables. Robust methods such as variance analysis or principal component analysis applied to the border effect term could help quantifying the impact of NTBs on trade. Gravity based techniques attempt to measure the trade impact of NTBs, rather than their welfare impact, and may therefore ignore some of the effect of the regulations that correct market failures but restrict trade. However, the sign of the variables that capture the NTB effect in the regression is not constrained, and it is possible to capture also the trade enhancing effect of regulations, when they act as standards that facilitate trade.

3.6.2 Existing studies

One of the most direct attempts to measure the trade impact of TBTs using gravity-based analysis of bilateral trade volumes is Moenius (1999). He focuses on the trade impact of standards (voluntary norms) rather than on regulations due to data limitations. Moenius' panel covers 471 industries in 12 Western European nations from 1980 to 1995. He finds that a shared standard has a large

trade promoting effect between the nations sharing the standard. He incorporates econometric refinements (correction for autocorrelation, causality testing, etc.). This makes it possible to estimate the impact of a one percent increase in the number of bilaterally shared standards on bilateral trade volume.

In the food and agriculture sector, Otsuki *et al.* (2001) use the gravity equation method to explain trade patterns between countries and to determine the effect of European aflatoxin standards on African exports. Their results show that new (and more stringent) EU standards are likely to be a major barrier to African exports of dried fruits and nuts. Although their approach is not characterised by econometric refinements, they exploit the possibility of using the level of standard itself as an explanatory variable, because the aflatoxin maximum residue shows statistical variation in their panel. Recently, several gravity equation models have been estimated, focusing on the food sector. They might provide a basis for measurement of NTBs (Hillberry, 2001; Burfisher *et al.*, 2001; Vido and Prentice, 2001).

3.6.3 *Practical validity of the method*

The caveats of these methods is that they attribute departures of trade from what the model can explain to a mix of national effects, including NTBs, while the model is unlikely to be able to explain correctly all trade flows, even in the absence of domestic regulations and other factors entering in the "border effect". When focusing on details products and spatial trade flows between given countries, the prediction is likely to be sensitive to the assumptions of the models.

However, many econometric refinements are possible with this type of approach. They could help sorting out the share of the regulations in the "border" effect. They could also make it possible to deal with binary variables (allowed or ban), or with discrete variables, that are often the only characterisation of NTBs, when standards do not show enough statistical variability to be used as regressors. Overall, these approaches, coupled with proxy variables from survey or inventory-based methods, are a promising area of research.

3.7 Risk assessment-based cost-benefit measures

3.7.1 *Principle*

Risk assessment approaches seem far away from the measurement of NTBs. However, these methods have been coupled to cost-benefit calculations, and indirectly contribute to the measurement of the effect of regulations, and

therefore of NTBs. Rather than quantifying the actual impact of this measure on trade, they provide some indication on what should be included as trade barriers on the basis of the effect of regulations on welfare. When SPS regulations aim at correcting market failures, one difficulty is often to identify the protectionist component of the regulation. There are only limited cases where the efficiency assessment is straightforward.⁸ In other cases, comparing the costs of compliance to the gains associated with the reduction of an externality, the prevention of contamination or pest infestation can help unravelling the efficiency and the protectionist effect of a regulation. By decomposing the welfare effects, it is possible to assess the welfare loss associated to a measure whose costs exceed benefits. This can be used to estimate the extent in which this measure qualifies as a NTB. When the benefits are found negligible, this approach provides a sufficient test of trade distortion. Such estimates can also shed a light on scientific and economic rationale for the regulation, and therefore help defining what regulation would have been implemented if there were only domestic firms. This provides a gauge against which present regulations could be compared in order to assess the presence of a protectionist component (Fischer and Serra, 2000).

3.7.2 Existing studies

Bigsby and Whyte (2000) have proposed to measure both economic effects and probability aspects of risk and have developed a methodology in the case of pest infestation. James and Anderson (1998) have used economic assessment of quarantine regulation. They conclude that there is a need for a comprehensive economic review of quarantine restrictions to determine those that pass the test of cost-benefit analysis. More generally, Arrow *et al.* (1996) argue for a more systematic use of the cost-benefit analysis in the environment and health sectors so as to assess the legitimacy of the regulations that can be excessively costly for taxpayers and consumers in view of their actual effect on health or the environment.

The analysis carried out by the US Department of Agriculture in the case of the trade policy with Mexico on avocados is a compelling illustration that the mix of science based evaluation and cost-benefit analysis can be useful in the estimation of NTBs as well as the settlement of SPS trade disputes (Orden and Romano, 1996). The evaluation of pest risk, the definition of measures that help reducing the risk of spreading pests at a low, albeit non zero, level and the combination of these assessments with a comprehensive evaluation of the potential costs to the benefits, including impact on consumers, were pivotal in the analysis. Pest infestation reduces domestic supply, generates costs, and affects prices. The economic assessment of a partial ban was tested against various probabilities of pest infestation. Overall, this approach showed that the

US import ban resulted in large transfers to US producers, through higher domestic than foreign prices, to avoid relatively small potential costs of a pest infestation.⁹ That is, this analysis proved useful in identifying the protection motive from the legitimate pest avoidance component of the ban.

3.7.3 *Practical validity of the method*

The combined use of scientific and cost-benefit assessment is one of the most promising areas of research in the identification and assessment of the effects of NTBs. The SPS Agreement pays little attention to economic analysis. Scientific evidence of contamination, or spread of a disease through trade is the relevant criteria (OECD, 1999a). Despite this lack of economic consideration, the idea of including more cost-benefit analysis in the assessment of NTBs and in the settlement of disputes has progressed a lot in international fora. Should this concept translate into more weight given to economics in international agreements in the future, the scope of the cost-benefit based method would even be greater.

The main limitations of this approach are the large uncertainty that surrounds the level of risks and the economic consequences. In the case of sanitary or phytosanitary measures, for example, it requires to assess the probability of contamination or spread of a disease or a pest, and the cost associated.¹⁰ There is also little reason for limiting the scope of cost-benefit analysis to sanitary or phytosanitary risks. Other regulatory barriers could be addressed with cost-benefit analysis. However, effect of standards on consumers' willingness to pay is perhaps even more difficult to quantify, especially in the case of imaginary risks, or the case of ethical characteristics of the goods.

3.8 Stylised microeconomic approaches

3.8.1 *Principle*

Cost-benefit analysis methods can be refined by accounting for more sophisticated effects in an analytical representation of producers and consumers. The effect of NTBs can be assessed by looking at the displacement of the market equilibrium induced by a regulation. Provided that microeconomic data (cross section or panel, preferably) are available, the effect of regulations on supply and demand can be measured by standard estimates of cost or profit functions, as well as utility or demand functions estimated econometrically. Duality theorems can be used to estimate a shadow price associated to the variable representing a standard, or a binding regulation for example. However, the classical framework of price taking firms and perfectly informed consumers

is seldom appropriate to assess the effects of regulations on supply and demand. A large body of literature, derived from research in industrial economics, has focused on the complex effects of regulations and standards. This body makes it possible to account for a variety of effects on competition, information, economies of scope or scale, when a regulation is adopted.

3.8.2 *Existing studies*

The literature that has dealt with these issues has remained largely theoretical, and the goal has often been to illustrate economic mechanisms at stake rather than providing quantitative estimates of the impact of non- tariff barriers. Some authors have included in stylised partial equilibrium models the effect of standards on the structure of competition between firms (Boom, 1995; Crampes and Hollander, 1995a). The strategic interactions between firms reacting to new regulations have been the topic of many papers (Grossman and Horn, 1985; Crampes and Hollander, 1995b). So has the way regulations modify the information available for consumers (Shapiro, 1983; Lutz, 1989; Donnenfeld *et al.*, 1985). For example, welfare effects of a regulation are different if consumers can assess or not the quality of the products, and if they can do it before or after consumption (Marette *et al.*, 2000). It has also been shown that regulations may change the costs of signalling quality (Falvey, 1989); and that they may result in network externalities and economies of scale (Katz and Shapiro, 1985; Barrett and Yang, 1999). Because of all these effects, a regulation has complex and sometimes opposite effects on prices and welfare.

3.8.3 *Practical validity of the method*

While there is still in gap in the literature between stylised models and large scale quantifications, a fruitful area of research would be to include more sophisticated supply and demand equations, with parameters estimated econometrically, in order to assess how much trade is foregone because of regulations, how much consumers preferences are affected, and what would be the effect for particular nations of harmonisation of regulations versus mutual recognition agreements.

A major obstacle to quantification of the effect is that the analytical framework that makes it possible to account for sophisticated effects become rapidly intractable unless one makes drastic simplifying assumptions on the shape of demand curves and on competition (*e.g.* duopoly or monopoly competing in prices or quantity). Limitation of these approaches is their robustness to the simplifying assumptions, and the difficulty to provide estimates of the various effects. The calibration of the demand functions, the response to standards that affect consumers' willingness to pay, for example, is

difficult, in particular when one deals with the demand for ethical or environmental attributes. So is the displacement of the various equilibria when the structure of competition is modified by standards that act as barriers to entry, for example.

However, accounting for imperfect competition, imperfect information and strategic effects often makes it possible to point out some non intuitive effects of standards on trade or welfare. Overall, the industrial organisation approach has mainly been useful for providing a "toolbox" for integrating competition or informational effect into more traditional quantitative approaches, such as partial equilibrium based estimates.

3.9 Quantification using sectoral or multi-market models

The distinction with the previous categories (cost-benefit analysis and microeconomic approaches) is quite arbitrary. Partial equilibrium models rely on microeconomic representations of supply and demand, and are most of the time used to assess effects of such or such policy on equilibrium, *i.e.* on the changes in price and quantity and welfare. They are a way to perform cost-benefit analysis. The distinction is nevertheless made in order to discuss relatively large-scale models, with parameters estimated so as to represent real life empirical cases, rather than the stylised mechanisms that characterise most of the time the microeconomic approaches discussed before.

3.9.1 Principle

Partial equilibrium models provide a framework for analysing tariff-rate equivalents of standards and technical regulations. The main interest, compared to gravity models, is that they make it possible to assess not only the impact of regulations on trade flows, but also on welfare. Compared to the stylised approaches used in industrial economics that focus on qualitative effects the main interest is to provide quantitative results.

Most of the models that quantify the effects of regulations use some of the techniques that were presented above (price-gap method, the inventory-approach or the risk-based assessment) to provide a more explicit summary of the effect of the regulations on production, consumption, trade, and welfare. These effects can be included in large-scale models that most often have focused on classical forms of protection, such as tariffs, and whose specification did not make it possible to account for effects of regulations. This sometimes requires including some particular specifications, for example imperfect competitions or product differentiation, although in a relatively simplified

framework (e.g. Spence-Dixit-Stiglitz or Lancaster based product differentiation). Important linkages to other markets are included.

3.9.2 *Existing studies*

Partial equilibrium models have been a natural extension of the approaches described previously. For example, an explicit specification of supply and demand functions was used by Orden and Romano (1996) to assess the costs and benefits of a ban on avocados as an extension of their risk based assessment. Calvin and Krissoff (1998) also combined the price wedge method to a simple partial equilibrium framework (using only estimated supply and demand elasticities) when they studied Japanese imports of US apples. Paarlberg and Lee (1998) included a risk-based approach to a partial equilibrium framework. They studied the case of US tariff protection against beef imports from countries that may transmit Foot-and-Mouth Disease (FMD). In their approach, the domestic government is assumed to maximise the country's welfare by setting the optimal tariff rate, where expected loss of domestic beef production due to the FMD infection to US livestock has been incorporated *ex-ante* into the tariff rate. James and Anderson (1998) also included the probability of contamination in a partial equilibrium framework in order to assess the costs and benefits of quarantine restrictions.

Some studies, however, put more emphasis on economic modelling, and estimate (or calibrate) more sophisticated forms of demand and supply function. Thilmany and Barret (1997) studied the implications of technical regulations for dairy exports from the United States within NAFTA. In their approach, the shift in the demand curve reflects the effect of standards to alleviate consumer uncertainty about product quality, and the shift in the supply curve is due to increased transaction costs of exports including compliance costs. They compared domestic and international prices to estimate the producer subsidy equivalent and import tariff-rate equivalent of these trade barriers. Summer and Lee (1997) explore the ways in which TBT's can impose costs at various stages of the marketing chain. They identify where in the food marketing chain SPS regulations, such as those intended to eliminate the risk of infestation, can impose costs. Their model is applied to regulations imposed by Asian importers on US vegetables.

An illustration of the usefulness of partial equilibrium multimarket approach is provided by the simple framework proposed that Overton *et al.* (1995) in the case of the EU restriction on chemical residues in tobacco. The low EU restriction on residues of maleic hydrazide (MH), not only affects US tobacco producers, but it affects the US and EU tobacco cigarette industries. The latter uses only a share of US tobacco in its blend, and for which the

maximum residue is not a problem (MH contaminated US tobacco is diluted with MH-free EU tobacco). A standard affects the relative composition of cigarettes as far as origin of tobacco is concerned, and leads to greater costs for foreign producers. The partial equilibrium models makes it possible to take into account the substitution in demand (foreign and domestic tobacco are substitutes) as well as increases in production costs, and provides quantitative estimates of trade flows, rents and welfare. While the model is quite simple, it shows some counter intuitive effects, for example that if the regulation is non binding for domestic manufacturers (because they use a low proportion of MH contaminated tobacco), the residue regulation that is protectionist in the tobacco output market can actually increase trade flows in tobacco input market. Further, under a fixed US production quota, the EU regulation could have a surprising anti-protective effect on EU growers. Surprisingly, US cigarette manufacturers appear to be the largest gainers from the EU regulation.

3.9.3 *Practical validity of the method*

The work by Overton *et al.* (1995) shows that even a simple two-market model can provide useful estimates of the trade and welfare effects of regulations such as SPS or TBT measures. Even if one is reluctant to use economic assessments of the sanitary aspects (using relatively controversial methods such as the Cost of Illness, or the Value of Statistical Life Saved, see Bowland and Beghin, 2001, and OECD, 1999a), such approaches make it possible to quantify the economic impacts, and these economic impacts can be compared against the effect of the measures on illness reduction and consumer valuation of SPS or other process attributes.

With the ongoing research in the field of econometrics of product differentiation and imperfect competition, the gap between the stylised models derived from industrial organisation and the applied partial equilibrium models is narrowing. This means that quantification of the trade and welfare effects of SPS and TBT regulations will be possible when taking into account more sophisticated mechanisms related to imperfect competition or consumers information in the future. This is clearly a promising area of research.

NOTES

1. Chapter 3 was prepared by John Beghin (Iowa State University) and Jean-Christophe Bureau (Institut National de la Recherche Agronomique). The views expressed are attributed to the authors and do not necessarily reflect those of the OECD or its member countries.
2. This could involve an economic analysis in a way similar to what is often used in competition policy, where non competitive practices are sometimes seen as legitimate if they are welfare improving. This idea, suggested by OECD (1999a) has been recently developed by Nevasen (2000).
3. Deardorff and Stern (1998) show that one cannot hold the import price constant and isolate the effect on the NTB, unless world markets are infinitely elastic. There are several conceptual obstacles to summarizing the effect of a NTB as a scalar (*e.g.* a tariff equivalent) in a general case. The various components include the direct effect of NTBs on the quantity of imports; the change in elasticity of demand for imports, the variability of NTBs over time, and the uncertainty of NTBs.
4. The database MAST compiled by UNCTAD and the data used together by Ndayisenga and Kinsey (1994) are examples of such an inventory. The UNCTAD database on Trade Control Measures (TCM) also provides quantity controls like automatic licensing, money and finance measures, price control measures, etc. The UNCTAD database relies on government notifications to GATT and WTO.
5. As an illustration, Barrett and Yang (1999) note that the US Congressional Research Service found that only 17 out of the approximately 89 000 standards recognized in the US had international origin in the whole set of industrial sectors (USHR, 1989). This indicator of the lack of compatibility between US and international standards suggests likely difficulties for potential exporters to the United States. However, it does not provide compelling evidence that trade is actually restricted by such standards.
6. When they conducted interviews to complement the survey, Lux and Bureau found out that large size firms in the European dairy industry did not mention foreign regulations as a major issue. These large firms have learnt how to cope with existing barriers, especially in the United States, either by defining

- a particular range of product for this market (pasteurized cheese adapted to US regulations) or by relocation of production. Some even used this experience as a competitive instrument and were not keen on international actions for easing these barriers.
7. Weyerbroek and Xia (1998) and USGAO (1997) therefore expressed reservations on surveys such as that of the USDA in 1996, when used for quantifications.
 8. For example, if a standard or its enforcement only raises cost (*e.g.* through delays in inspection or fees) it is inefficient for consumer protection and classifies at a NTB.
 9. Most of the costs borne by producers when lifting the U.S. ban on Mexican avocados that arose under high probability of infestation come from the effect of free trade on domestic prices not from pest infestations, see Orden and Romano (1996).
 10. It is difficult to base sound economic analysis on estimates that are subject to controversies, when the figures at stake are high: a general estimate has been made of USD 138 billion/year lost due to all invasive species — over 50 000 — that have entered the United States (see Pimentel *et al.*, 2000; Mumford, 2001).

CHAPTER 4

MODEL-BASED FINDINGS ON THE IMPACT OF SPS MEASURES ¹

While the literature on the more general topic of how regulations affect markets is extensive, the empirical research on the effects of regulations, especially SPS regulations, on trade is limited. Thilmany and Barrett (1997) argue, “Currently, little is understood about how regulatory barriers affect trade and investment volumes, nor how they affect the economic welfare of various global consumer populations” (p. 107). Otsuki, Wilson and Sewadeh (2001*b*) further this idea by stating, “Although the importance of providing estimates of how standards affect trade flows is clear, little baseline information has been produced to inform trade policy decision-making” (p. 262).

The purpose of this section is to provide a synthesis of results from the available empirical literature. The review is limited to research that provides estimates of the trade and economic effects of SPS regulations. By reviewing the literature from a regulatory (*i.e.* by type of regulation) rather than a methodological (*i.e.* by the type of economic model used) framework, the survey provides a basis to consider which types of regulations have not been investigated and which types of regulations need further analysis. Theoretical papers and surveys of exporter experiences are not considered because they do not provide quantitative effects of the regulations.

The main categories of measures that have been studied are import bans and technical specifications. The organisation of the review reflects this. For each policy type, a series of empirical articles is reviewed, explaining the results of the research and the new knowledge gained (or confirmation of previously known concepts).

4.1 Import bans

Import bans can either totally restrict the importation of a product (total ban) or partially restrict the importation of the product (partial ban). Examples of total import bans include the restriction of imports because of a known disease threat to livestock, such as a ban on beef because of Foot-and-Mouth disease (FMD). A partial ban may restrict the importation of a product for a certain season, for example bans on importation during the cycle of pest activity. Partial bans may also restrict the importation of a product or type of product from a specific region or country, either of which carries a particular disease or pest.

James, S. and K. Anderson (1998). "On the Need for More Economic Assessment of Quarantine Policies." *Australian Journal of Agricultural and Resource Economics* 42: 425-444.

At the time this article was written, Australia was free of banana diseases and pests that affect numerous banana-producing countries. Australia had a ban on imported bananas to prevent the establishment of diseases and pests from exporting countries. The paper investigates the welfare effects of this ban. The authors state, "The SPS agreement, like most countries' national quarantine policies, pays virtually no attention to the impact of SPS trade restrictions on consumer prices" (p. 426). The authors attempt to address this gap in the assessment of quarantine policies.

The authors use a partial equilibrium model to explore four scenarios of the removal of the import ban. The first scenario assumes a specific or fixed-proportion marketing margin. The other three scenarios assume an *ad valorem* or percentage marketing margin. The different marketing margins reflect the price transmission through the supply chain. The three *ad valorem* scenarios are differentiated by the supply elasticity of domestic banana production. With the first scenario, the removal of the ban would cause the consumer price to fall by 39% and the producer price to fall by 88%, assuming a supply elasticity of 1.14; domestic production would be eliminated. Consumer surplus would increase by AUD 192 million while producer surplus would fall by AUD 88 million with a net gain of AUD 104 million. In the second scenario, assuming an *ad valorem* marketing margin, the removal of the ban would cause the consumer price to fall by 58% and the producer price to fall by 59%. Assuming that no disease is spread and a supply elasticity of 0.5, Australian producers would supply 55% of the market. Consumer surplus would increase by AUD 301 million while producer surplus would fall by AUD 100, for a net gain of AUD 201 million. The third scenario is not discussed here because the results are between the second and fourth scenarios. In the fourth scenario, the supply elasticity is assumed to be 1.71 or greater because at this elasticity the importation of bananas would generate a domestic price so low that domestic banana production would cease. Consumer welfare would increase by AUD 301 million, and producer welfare would fall by AUD 59 million, resulting in a net gain of AUD 242 million. In every scenario, the gains in consumer surplus outweigh the costs to producers if the import ban is removed.

Calvin, L. and B. Krissoff (1998). “Technical Barriers to Trade: A Case Study of Phytosanitary Barriers and US-Japanese Apple Trade.” *Journal of Agricultural and Resource Economics* 23: 351-366.

At the time of this article, Japan had a tariff on Fuji apples from the US but also an SPS related import ban. For the other apples exported from the US to Japan, a number of SPS regulations existed that increased the cost of production for export. The disease of greatest concern was fire blight. The authors explore the effects of removing the SPS-related ban and also the tariff on Fuji apples from the US to Japan.

The authors use the price gap between the domestic and the world price (a proxy is used) to estimate a tariff-rate equivalent of SPS regulations in a partial equilibrium model. The authors use the tariff rates and tariff-rate equivalents of the SPS regulations to investigate the potential price effect of the tariff and the SPS regulation.

The tariff-rate equivalent of the SPS regulation is the percentage difference in the price gap between the domestic and world price after the tariff. If the tariff is removed, assuming no supply loss, the average short-run increase in trade volume and value is 22.1 million mt (8.2 million mt in the long run) and USD 38.0 million. If the tariff equivalent of the ban and the tariff are removed, the average short-run increase in quantity and value is 38.6 million mt (154.3 mt in the long run) and USD 66.6 million. The authors calculate the yield loss necessary to eliminate the long-term net gain for opening trade, which ranges from 5% to 62% and on average is 30%.

Orden, D., C. Narrod and J. W. Glauber (2001). “Least Trade-Restrictive SPS Policies: An Analytic Framework Is There but Questions Remain.” In K. Anderson, C. McRae and D. Wilson (eds), *The Economics of Quarantine and the SPS Agreement*. Centre for International Economic Studies, Adelaide and AFFA, Biosecurity: Canberra, Australia.

This article through the use of a partial equilibrium model describes and analyses the SPS dispute between the US and Mexico over Haas avocados. The US had placed a complete ban on Mexican avocados because of the potential importation of pests: fruit flies, seed weevil, stem weevil and seed moth. The complete ban was later negotiated to a partial ban that allowed avocados into the north-eastern US during the winter, which lowers the risk of the importation of pests.

The partial equilibrium analysis is similar to James and Anderson (1998) and Calvin and Krissoff (1998) in that supply and demand elasticities are used

to estimate the effects of the removal of the ban. However, Orden, Narrod and Glauber (2001) extend the analysis by using potential supply losses estimated in previous studies to determine the welfare effects of a supply loss due to the importation of Mexican Haas avocados. The authors present long-run (elastic) and short-run (inelastic) results as a type of sensitivity analysis, but only the long-run results are presented below because of the similarity between the two results.

Initially, the autarky price and quantity of Haas avocados is 1 385 USD/short ton and 132 430 short tons (st).² Consumer surplus is USD 134.4 million, and producer surplus is USD 91.6 million. If trade is opened with no disease, the price falls to 878 USD/st. Consumption rises to 222 722 st. Domestic production falls to 83 904 st. Consumer surplus increases by USD 87.5 million, and producer surplus falls by USD 55.2 million so that the net welfare gain is USD 32.4 million. If the probability of importing a pest is 1.0 (*i.e.* certainty), and the domestic production experiences a 60% increase in marginal costs and a 20% loss of yield (called a 60/20 loss), producer surplus falls by an additional USD 18.4 million relative to free trade and no change in cost or yield loss. Thus, net welfare gain is USD 13.9 million as compared to autarky. If the probability of importing the pest is 0.05, the expected producer surplus falls by USD 1.85 million and expected net welfare gains remain above USD 30 million.

When the ban is partially removed and no pest infestation occurs, the net domestic economic welfare gain is USD 2.5 million (USD 2.5 million for the north-eastern US and USD 33 337 million for the rest of the US). The small increase under the partial ban relative to complete liberalisation is because the consumer price falls less than under complete liberalisation. In the worst case scenario of a partial ban and a certain infestation with a 60/20 loss, the domestic price rises to 1 795 USD/st. Consumer surplus falls by USD 43.6 million. Producer surplus falls by USD 14.7 million, which is less of a reduction as compared to the free trade condition because of the price increase. Thus, net welfare falls by USD 55.7 million. Even in the case where infestation is not certain but has a probability of 0.05 and a 60/20 loss, the partial ban generates a reduction in domestic economic welfare of USD 1.85 million. Partial bans with lower probabilities of infestation and/or smaller supply responses generate small net gains of domestic economic welfare. Similar results are observed when the inelastic supply and demand curves are used; however, even with an inelastic supply (an increase in marginal cost of 20% and no yield loss) domestic economic welfare may still fall with a partial ban.

Paarlberg, P. L. and J. G. Lee (1998). "Import Restrictions in the Presence of a Health Risk: An Illustration using FMD." American Journal of Agricultural Economics 80: 175-183.

The authors state that prior to the completion of the Uruguay Round, the US Tariff Act of 1930 prohibited the importation of cattle, swine, sheep and some forms of meat from countries, which had Foot-and-Mouth Disease (FMD). At the completion of the Round and at the time of the article, the US Department of Agriculture was considering a classification scheme based on the risk of FMD from exporting countries. In this setting, the authors take a different perspective on the control of FMD. They consider moving away from a ban to a tariff. In particular, the authors investigate an optimal tariff³ plus an additional tariff to be applied to beef imports that carry a risk of spreading FMD in order to maximise domestic economic welfare.

The authors calculate the additional tariff based on the risk of importing FMD and the supply loss in the importing country from a partial equilibrium model. The additional tariff imposed on the country with a risk of FMD is 0.76 if the risk of outbreak is low (one outbreak in 24 700 thousand mt of imports⁴, or 4.05×10^{-5}) and the supply loss is 1.4%. As the percentage of FMD infestation and supply loss increase, the additional tariff increases. In the extreme case, the additional tariff rises to 929.42% if the supply loss percentage is 15.5% and the risk of FMD outbreak is high (one outbreak in 215 thousand mt of imports, or 0.00465).

The market impacts of the various FMD import risks help establish the result that if there is a high risk of outbreaks, the importing country should impose a prohibitively high tariff. Unlike the trade conditions that prevailed at the time of the article, the model predicts that the US would import beef from FMD countries under no risk and low risk scenarios. The no risk scenario is a hypothetical baseline assuming no FMD risk. In that scenario, the US would import 2 447.94 thousand mt from FMD countries (assuming no risk of the spread of FMD) and 116.17 thousand mt from FMD-free countries. The total tariff (optimal tariff plus the additional tariff given the risk of FMD infestation) imposed on FMD countries is 219.89 USD/mt and 59.67 USD/mt for FMD-free countries.

The second scenario discussed here is a low risk scenario. The authors present three cases of supply loss under the low risk scenario. Only the largest supply loss case of 15.5% is presented here. The other two cases, 1.4% and 9.0%, are intermediate cases between the no risk and the low risk with a 15.5% supply loss. In the case of a potential 15.5% loss to US supply because of an outbreak of FMD, the US would import 2 032.29 thousand mt from FMD

countries and 166.83 thousand mt from FMD-free countries. The tariff per metric ton for FMD and FMD-free countries would be 309.27 USD/mt and 85.69 USD/mt, respectively. While it is clear that there would be a small shift in purchases from FMD to FMD-free countries, as the risk and supply loss increase, the bulk of the imports still come from FMD countries if the probability of outbreak is low. However, in the high risk scenario, the tariff on FMD countries would be prohibitively high and all imports would come from the FMD-free countries.

Given the three cases of percentage supply loss (1.4, 9.0 and 15.5%) in the US, the authors calculate the risk of outbreak that would generate prohibitively high tariffs. If the probability of an outbreak were one for every 447.23 thousand mt of imports with a US supply loss of 1.4%, then the total tariff would be prohibitive. If the probability of an outbreak were one for every 2 785.52 thousand mt of imports with a US supply loss of 9.0%, then the total tariff would be prohibitive. If the probability of an outbreak were one out of 4 784.68 thousand mt of imports with a US supply loss of 15.5%, then the total tariff would be prohibitive.

Nielsen, C. and K. Anderson (2001). "GMOs, Trade Policy and Welfare in Rich and Poor Countries." In K. Anderson, C. McRae and D. Wilson (eds), The Economics of Quarantine and the SPS Agreement. Centre for International Economic Studies, Adelaide and AFFA, Biosecurity: Canberra, Australia.

The authors estimate the production, trade and welfare effects of GM crop adoption, by selected regions, without and with specific policy and consumer responses in Western Europe. The authors use the Global Trade Analysis Project (GTAP), a general equilibrium model, to make the estimation.

In the first scenario, where selected countries adopt GM cereal grains and oilseeds (modelled as a five-percent reduction in input use at previous production levels), the selected countries increase production of cereal grains by 0.4% to 3.8% and oilseeds by 1.1% to 4.6%. World prices of oilseeds and cereal grains fall by 4.0% and 4.5%. The decline in cereal grain prices leads to an expansion of the livestock and meat processing sectors in North America. The production of oilseeds and cereal grains falls in non-adopting regions in Western Europe by about 4.5%. In related markets in North America, India and China, the meat and livestock processing sectors increase production. In North America, the Southern Cone, China and India, the production of vegetable oils and fats increases.

Global welfare as measured by equivalent variation increases by USD 9.9 billion per year. Most nations/regions benefit from the technology, net-exporting GM-adopters experience a worsened terms of trade (the ratio of export to import prices) because of the lower world prices; however, these nations/regions benefit from increased productivity. Western Europe and high-income, net-importers benefit because of cheaper imports and from moving out of the production of certain crops. Only Sub-Saharan Africa, which does not adopt the GM-technology, is hurt in this scenario, a welfare decline of USD 9 million.

In the second scenario where Western Europe bans the imports of GM cereal grains and oilseeds, a dramatic shift occurs in global trade relative to the scenario of GM-adoption. Production of coarse grains in GM-adopting countries increases in the range of zero to 2.4% in the GM-adopting countries, while prices fall in the range of 4.9% to 6.7%. Production of oilseeds in GM-adopting countries falls between 3.6% and 11.4%, with a small increase in production in India, while prices fall between 5.9% and 7.4%. Oilseeds from North America experience a production decline of 10.2% while exports to the world decline by 28.8%. The authors argue that the US exports 18% of cereal grains of which 8% go to Western Europe. Therefore, the ban does not significantly affect North America except through a dampening of the benefits of the technology boost. Sub-Saharan Africa benefits from the ban because their exports are GM-free. Domestic production of oilseeds in Sub-Saharan Africa increases by 4.4%, while in Western Europe oilseed production increases by 66.4%. Because of the ban and the shift to consumption of domestic production, the cereal grains and oilseeds for livestock feed is more expensive; thus there is a decline in the production in Western Europe in the livestock and meat and dairy sectors by 0.8% and 0.5%. Likewise, Western Europe increases its imports of vegetable oil and fats by 5.5% while losing 15% of its exports. Western Europe is the only region to be hurt by the ban, losing USD 4.3 billion mainly because of a loss in allocative efficiency. Sub-Saharan Africa experiences an increase in welfare by USD 42 million. Despite the ban, net welfare increases by USD 3.4 billion from the gains of GM-adoption. However, compared to the base scenario two-thirds of the gains from GM technology are lost because of the import ban.

In the third scenario, where Western Europe has a preference for domestically produced goods with no GMOs relative to foreign goods that may contain GMOs, the results are between those for the first and second scenarios.⁵ In this scenario compared to the introduction of GM-technology, production of cereal grains and oilseeds increases in all adopting countries in the range of 0.4% to 3.4% and zero to 2.8% with a resulting decrease in prices in the range of 4.9% to 6.7% and 5.2% to 6.5%. North American exports increase for all

products with cereal grains and oilseeds exports increasing 6.6% and 1.4%. Western European imports of cereal grains and oilseeds decline by 23.5% and 17.7%. The resulting increase in global welfare is USD 8.5 billion. Only Sub-Saharan Africa experiences a decline in welfare, a loss of USD 5 million (in part because of the assumption non-European products may contain GMOs so Sub-Saharan products are affected by the hypothetical European policy).

4.2 Technical specifications⁶

Technical specifications represent another broad category of SPS regulations. Technical specifications include process specifications, product specifications, of which maximum residue levels are an important example, and packaging specifications. A process specification requires that the production of a product abide by a particular process, for example, requirements that a product meet specific time and temperature regimes in preparation. Product specifications require that the product be of a certain quality, size type, etc, for example the type of additive allowed in a particular food preparation. Packaging specifications may require, for example, that certain materials not be used in packaging because they may contaminate the food. All the papers in this review concern maximum residue levels.

Overton, B. J. Beghin and W. Foster (1995). "Phytosanitary Regulation and Agricultural Flows: Tobacco Inputs and Cigarettes Outputs." *Agricultural and Resource Economics Review* 24: 221-231.⁷

The authors state that at the time of the article some EU countries (Germany, Italy and Spain) restricted the level of maleic hydrazide to 80 ppm in domestic and imported cigarettes. Maleic hydrazide is a growth inhibitor used in the production of tobacco. The maximum residue limit exclusively affected US tobacco because it had exceeded the limit on average. However, the regulation restricted the presence of the chemical in the final product (cigarettes) not on the input (tobacco leaf). Since cigarettes produced in the US and the EU are based on different combinations of tobacco leaf from the US and the EU, especially Greece, cigarettes exported from the US and cigarettes produced in the EU could come under the limit because of the blending.

Because different levels of the market are affected by the regulation, the authors investigate the trade and economic effects of the maximum residue level on the input and output markets. By analysing the influence of the regulation on production costs, factor demands and trade flows, the authors simulate the effects of making the SPS regulation more stringent on tobacco production and cigarette manufacturing in both the US and the EU.

The results of a 10% reduction in the maximum residue level in cigarettes would directly affect cigarettes exported from the US. The ramifications of this change are seen throughout the market for cigarettes and tobacco. At the time of this article, the US had a supply control program with a quota; therefore, the authors consider the change in the SPS regulation under two scenarios. In the first scenario, the change in maximum residue level causes a reduction in demand for US cigarettes; thus to maintain the pre-policy price, the US reduces the tobacco quota, and US marginal cost increases. In the second scenario, a change in maximum residue level causes a reduction in demand for US cigarettes, and the US tobacco price is allowed to fall.

Under the first scenario, where the quantity of quota is allowed to change after the 10% reduction of the maximum residue level, the authors state that the demand for US cigarettes falls by 0.085%, while the demand for EU cigarettes increases by 0.02%. Because of the constant returns to scale assumption, US tobacco leaf exports to the EU increase. The increase in EU cigarette production, mitigates the 1.6% loss of US tobacco exports (leaf and in cigarettes). US tobacco used by the US declines by 7.1% and non-US tobacco used by the US increases by 12.9%. The lower use of US tobacco leads to a reduction of the residue level in European cigarettes by 2.8%.

Under the second scenario, where the quantity of quota is fixed after the 10% reduction of the maximum residue level, the authors state that the demand for US cigarettes falls by 0.013%. The price of US tobacco leaf falls by 0.26%; thus, the EU and the rest of the world demand for US tobacco leaf increases by 0.86% and 0.47%. Despite the increase in the demand for US tobacco leaf, total exports of tobacco (leaf and in cigarettes) decline by 1.51%. The increase in US tobacco leaf in EU cigarettes is the result of a substitution away from EU tobacco, a reduction of EU tobacco by 0.059%. This result shows that EU tobacco producers are hurt, if only slightly, by the maximum residue level policy. It is interesting to note that the model predicts that the increase use of US tobacco leads to no change in the residue level of European cigarettes.

Otsuki, T., J. S. Wilson and M. Sewadeh (2001a). "Saving Two in a Billion: Quantifying the Trade Effect of European Food Safety Standards on African Exports." Food Policy 26: 495-514.

This paper investigates the effect on the value of trade flows of a proposed, harmonised European regulation on maximum allowable aflatoxin⁸ levels for two food product groups: cereals and cereal preparations, and dried and preserved fruits and vegetables and edible nuts. Specifically the paper compares the status quo regulation (with different allowable levels on the individual European countries, an average 4.8 ppb of Aflatoxin B1); the proposed EU

regulation (2 ppb), which would harmonise the Member States and is more stringent than the status quo for most Member States; and the Codex regulation (9 ppb), which is less stringent for most Member States. The result of the changes in the regulation are linked to the differences in estimated health outcomes in terms of the number of liver cancer deaths resulting from the different maximum aflatoxin levels. The countries included in the model are 15 European countries (Norway and the Member States of the EU without Greece) and nine African countries (Chad, Egypt, the Gambia, Mali, Nigeria, Senegal, South Africa, Sudan and Zimbabwe).

With estimated elasticities, the authors calculate the impact of harmonising the various EU regulations to the proposed more stringent policy and to the less stringent Codex regulation. In 1998, the value of cereal and cereal product exports from Africa to Europe was USD 298 million. A move to the more stringent proposed EU regulation would generate a loss of export revenue for Africa of USD 177 million, a reduction of 59%. A move to the less stringent Codex regulation would generate a gain of export revenue for Africa of USD 202 million, a 68% increase. The reduction in African export value using the proposed EU harmonised regulation compared to the Codex regulation would be 76%.

The results are similar for the value of dried and preserved fruits and vegetables and edible nuts. In 1998, the value of edible nut exports from Africa to Europe was USD 472 million. A move to the more stringent proposed EU regulation would generate a loss of USD 220 million, a reduction of 47%. A move to the less stringent Codex regulation would generate a gain in trade value of USD 66 million, a 14% increase. The reduction in value of using the EU harmonised regulation compared to the Codex regulation would be 53%.

According to the estimated results and estimates from the FAO, the number of lives saved from liver cancer from more stringent aflatoxin regulations would be 0.9 per one billion persons. The loss in value of African food exports to the EU of moving from the status quo to the stringent EU aflatoxin regulation is USD 340 million. Comparing the EU regulation to the Codex regulation, the loss in value of African food exports would be USD 670 million and the gain in terms of human life would be 2.3 per one billion persons.

Otsuki, T. J, S. Wilson and M. Sewadeh (2001b). “What Price Precaution? European Harmonisation of Aflatoxin Regulations and African Groundnut Exports.” *European Review of Agricultural Economics* 28: 263-283.

The question concerns the trade effects on nine African countries (Chad, Egypt, The Gambia, Mali, Nigeria, Sudan, Senegal, South Africa and Zimbabwe) of a proposed change in a food safety regulation in the EU [14 EU member states (without Greece)]. The proposed change would harmonise all Member States (MS) of the EU to a regulation of 2 ppb for aflatoxin B1 in groundnuts. The proposed change in regulation would have been more stringent for all but four of the MS.

Using the estimated regulation elasticity, which measures the change in trade volume given a change in regulation, trade volume and prices in 1998, the authors show that a more stringent regulation of 1 ppb would generate a loss to African exports of USD 482 400, a loss of 72%. If the EU adjusted their regulations to the proposed regulation of 2 ppb, then the loss to African exports would be USD 238 900, a loss of 36%. If all of the member states of the EU adjusted their regulations to the Codex regulation of 9 ppb, the increase in trade value would be USD 480 600, an increase of 72%.

Wilson, J. S. and T. Otsuki (2001). “Global Trade and Food Safety: Winners and Losers in a Fragmented System.” *Development Research Group, The World Bank.*

The question that Wilson and Otsuki attempt to answer is what is the effect of harmonisation of aflatoxin regulations for cereal, edible nuts and dried fruit on trade of these products. The paper uses a gravity model to examine trade between 15 importing (of which four are developing) countries and 31 exporting (of which 21 are developing) countries. In the process of answering this question, the authors also investigate the differential effects on the different importers and exporters.

The authors provide five scenarios comparing different settings of the aflatoxin regulation. Only the three most relevant scenarios are presented here as they are those that provide some evidence of the effect of harmonising the regulation at different levels of stringency. As explained below, the scenarios are not well suited to answer the question, although they do provide estimates of the effect of the different regulations. Under the base case, the *status quo* regulation, all importers have different aflatoxin regulations. Under the first scenario, all nations move to the proposed, more stringent EU regulation. Compared to the status quo, the value of trade for cereals falls from USD 9 117 to USD 3 382 million or a loss of 62.9%. The change for nuts is from

USD 2 840 to USD 2 524 million, representing a loss of 11.1%. In the second scenario, only the EU nations move to the proposed EU regulation, compared to the status quo, and the value of cereal trade falls to USD 8 108 million for a 11.1% loss. Under the same scenario, the value of nut trade increases slightly to USD 2 854, a 0.5 percentage gain. In the final scenario, all nations move to the Codex regulation. The gain in value of cereal trade is USD 14 783 million, an increase of 62.1%, and the nut trade increases to USD 3 313, an increase of 16.7%.

The results follow the Otuski, Wilson and Sewadeh (2001*a* and *b*) papers in that the more stringent the regulation, the greater the loss in trade value. In terms of relative stringency, the proposed EU policy is the most stringent, relative to the status quo, followed by the Codex regulation. The results bear out this ranking except for the case of nuts and the proposed EU regulation for the EU countries alone. As stated earlier, the proposed EU regulation is as stringent when compared to the status quo regulations for four of the EU countries. At the time of the study, two of the countries had the same regulation as the proposed EU regulation of 2 ppb, and the two others had a more stringent regulation at 1 ppb. Thus, the increased trade from the two countries, which originally had a more stringent regulation than the proposed EU regulation, more than compensates for the loss in trade from the two EU countries, which would make their regulation for nuts more stringent.

4.3 Overall assessment of model-based analysis

One of the most useful contributions of the literature using model-based analysis is the wider view it provides on the costs and benefits of SPS regulations. The literature considers domestic economic welfare or some of the effects of policies in the regulating country on exporting countries. Nevertheless, from this broader perspective, the papers present evidence that SPS regulations might lower consumer surplus under certain circumstances. In several cases, the authors found that removing the regulation will generate welfare gains to consumers, which generates net gains to society (consumers compensating producers hurt by the removal of the regulation). It should be noted, however, that there could be a selection bias in the subjects that have been chosen for this kind of analysis. The research most often covers relatively small industries that *a priori* do not seem to have a comparative advantage in production in the regulating countries. It is possible that the same type of analysis applied to large, efficient and/or exporting industries would produce quite different results. Similarly, the results concerning net welfare effects could be different if it were possible to take into account the fact that a given pest or disease, if imported, could affect other industries or other markets (*e.g.* downstream).

A limitation in the available literature is that there seems to be an implication that the importation of the disease in question will not affect the demand curve. If the establishment of a disease or pest were to shift the demand curve to the left, then gains in consumer surplus would be less (even negative) and net welfare would be less (even negative) relative to what the models predict. These factors together suggest that future analysis, considering similar policy changes in different commodities, especially where the regulating country is a net-exporter of the commodity, would be useful.

None of the papers adequately address regulatory-induced demand changes, which are particularly important when considering food safety regulations. Because such regulations concern human health, they have the potential to influence the demand curve in a substantial manner. The change in the demand curve discussed here is the result of a change in perceptions by consumers that food is safer after regulations have been changed, even if the likelihood of disease is no different. By the same token, regulations governing diseases, pests, technical specifications, etc. that affect plant or animal life or health or the environment (territory) of the country may also influence the demand curve. Further research investigating how the demand curve may be influenced is particularly important. Thilmany and Barrett (1997) and Bureau, Marette and Schiavina (1998) show analytically that the imposition of food safety regulations improves global or domestic economic welfare under different circumstances, especially in light of asymmetric information. One of the challenges that Bureau, Marette and Schiavina (1998) point out is the need for more empirical studies that will help better assess the effect of regulations on the demand curve.

A related issue concerns the fact that changes in regulations have the potential to change the quality of the product. If the product quality is different, the underlying demand curves may shift. The underlying supply curves may shift also given the greater costs of production (Otsuki, Wilson and Sewadeh, 2001*b*). One issue that is not explored is the cost of adjusting to the new regulation. That is, how costly is it for a producer to reduce the level of aflatoxin in a shipment of product? Does the regulatory change generate a cost change that is prohibitive for some producers? Do trade flows change because of the increased cost of exporting to the country with the new, more stringent SPS regulation? Some work in this area exists (for example, OECD 2000*b*), but additional work may be useful in more fully assessing the impact of SPS regulations on trade.

There is an underlying assumption in much of the literature that SPS regulations restrict trade. This may also reflect the selection bias referred to above to the extent that researchers turn to issues that have attracted some

notoriety. In other words, the cases investigated have been those where there was a suspicion that the measure was restricting trade. The literature fails to explore the possibility that regulations may improve trade. The likely trade enhancing features of these regulations is the promotion of greater harmonisation or improved transparency. Nevertheless, disentangling the trade enhancing effects of SPS regulations from the other factors that may enhance trade is difficult. Therefore, a useful area of research would begin to look at whether regulations among nations actually achieve harmonisation and transparency, and thus improve trade and welfare.

James and Anderson (1998) and Overton, Beghin and Foster (1995) suggest that domestic policies can play a role in implementation and, by extension, on the existence of SPS policies. Further analysis of the influence of domestic policies on SPS regulations may provide useful insights into how domestic and border policies interact and affect trade flows, and welfare of importers and exporters.

A useful consideration for future research is an expansion of the geographic coverage. Studies that look at the effects of regulations imposed by a broader range of northern countries on a broader range of southern countries would be beneficial. As seen in the SPS Committee, more and more regulations are being developed in southern countries that are having an affect on other southern countries. Therefore, studies that further investigate the effect of trade between north and south and south and south will be useful.

In turning the view of the SPS regulations to the effects of the regulations on others, and not just on domestic producers, the gravity model papers and Nielsen and Anderson (2001) suggest that changing SPS regulations could generate differential effects on different countries, especially northern versus southern countries. Additional work would be useful to further investigate the differential effects of SPS regulations on different countries.

The literature on the trade and economic effects of SPS regulations is vital to informing the debate so that policy makers can develop the best policies possible. This literature has not made explicit statements in support of or against the SPS Agreement, but it has provided some assessment of the effects of specific types of regulations that fall under the SPS Agreement. It follows that research providing policy makers with information on the broader effects of SPS regulations, in terms of the magnitude of the impact and the distribution of effects, may help strengthen the SPS Agreement. Such information would help policy makers develop SPS regulations that generate the greatest benefit to consumers and producers, given a nationally determined level of SPS protection. The same research would contribute to the understanding of the effects of regulations on other countries and, in particular, could contribute to understanding about how to minimize negative spillovers.

NOTES

1. Chapter 4 was prepared by Norbert Wilson (Auburn University). The views expressed are attributed to the author and do not necessarily reflect those of the OECD or its member countries.
2. $1.0 \text{ st} = 0.9072 \text{ mt}$.
3. An optimal tariff is a tariff that a large country might impose in order to improve its domestic economic welfare because of more favourable terms of trade.
4. The probability is expressed in volume of imports, which may be imported over several years.
5. The third scenario mimics the case of labelling. A key assumption in this labelling scenario is that the consumer would have knowledge that the label accurately reflects the true origin of Western European products only, thus the GMO status of the product. Information requirements, like labelling, include an assortment of regulations that require certain information be readily available on the package or available in some other fashion. Examples of information requirements are labels that indicate safe handling of the good and regulations that prevent misleading or fraudulent packaging.
6. See also Wilson (2003).
7. This study does not deal with a SPS measure because tobacco and cigarettes are not food or beverages, and SPS applies to the risk to human health from pesticides residues only if in food, feedstuffs or beverages. However, the study does provide a methodology that could be directly applied to pesticides in foods/beverages and is useful in this respect.
8. Aflatoxin is a mycotoxin with carcinogenic effects produced from the *A. flavus* and *A. paraciticus* moulds. Aflatoxins can be detected in milk, cheese, corn, peanuts, cottonseed, nuts, almonds, figs, spices, and a variety of other foods and feeds. The commodities with the highest risk of aflatoxin contamination are corn, peanuts, and cottonseed (Aflatoxins).

CHAPTER 5

MEASURING THE TRADE EFFECTS OF THE SPS AGREEMENT THROUGH TRADE FLOW DATA ANALYSIS¹

This chapter identifies the different ways in which the SPS Agreement could affect trade; conceptualises measurement of the observable trade effects; reviews three economic methodologies for measuring these trade effects; examines the data and analysis needed to calculate the potential trade impacts; and reports on the results of five case studies using available data to illustrate the application of one methodology — trade flow data analysis. The search is for evidence that changes in domestic SPS measures, following a challenge to a country's policy in the SPS Committee, have improved or impeded market access conditions. The intention is not to “judge” the SPS Agreement *per se* but to explore the ways in which a quantitative link can be made, for the purposes of monitoring progress, between the changes attributable to the Agreement (as a result of challenges in the SPS Committee) and the trade patterns and conditions in the markets concerned. Nor is it claimed that the analysis captures the full impact of the SPS Agreement on trade flows: many policy changes could have taken place without any challenge from trading partners.

In this connection it is important to distinguish between the estimation of the trade impacts of SPS measures themselves (covered thoroughly by a number of studies such as Roberts, *et al.*, 1999), and the trade impacts of instrument changes as a result of the SPS Agreement, which has not so far been so extensively explored (though some progress has been made in Roberts, *et al.* 2000, and in Roberts and Krissoff, 2002). The difference lies mainly in the counterfactual used for comparison. To estimate the impact of an SPS measure on trade flows one has to make assumptions about the trade pattern that would have existed in the absence of the measure in question, including differences in trade patterns that may result from factors other than the existence or absence of an SPS measure. This requires, in principle, an analysis of the effectiveness of the measure. What would happen if the measure did not exist? If the measure aims to prevent the introduction of an animal disease or of a plant pest along with an imported agricultural product, the question is how would domestic production of similar goods be affected if that disease or pest were to be allowed to enter. If the measure in question is related to human health, then the questions relate to the public and private costs of disease prevention or the cost of an outbreak of such a disease if it should occur.

By contrast, the question of the trade impact of changes in policies that come about as a result of the application of the SPS Agreement may be estimated without knowing what would have happened in the absence of any SPS measure. The appropriate counterfactuals in these cases still need careful specification, as discussed below. But the information needs appear to be less, as the “no policy” situation is not the relevant comparator. On the other hand, it is necessary to be more specific as to what one might expect in the way of domestic SPS measure change as a result of the SPS Agreement. The trade-off is less knowledge of the technical basis for the SPS measures against more knowledge about the alternative policies that countries find acceptable and which may have a lesser effect on trade.² The main objective of the following analysis is to review alternative methodologies for testing to see whether there is evidence of policy changes in the domestic regulations and standards as a result of the SPS Agreement that have resulted in facilitating trade.

The remainder of the section is divided into four sub-sections. Sub-section 5.1 asks “what changes in government SPS measures might one expect to be attributable to the SPS Agreement?” and “how might one estimate the extent to which these changes have influenced trade flows”? Sub-section 5.2 discusses the alternative ways that data can be assembled and analysed to determine the trade affect of the SPS Agreement, while sub-section 5.3 illustrates one method of exploring the evidence on the actual impact on trade by examining a small number of policy changes related to the resolution of SPS disputes in the area of human health. Some general observations are provided in sub-section 5.4. Though not intended as a comprehensive study of these trade effects, preliminary evidence can indicate where trade appeared to be influenced by the solution to a trade conflict. Quantitative analysis of these questions requires a case country and sector specific approach as discussed in sub-section 5.3.

5.1 Defining potential trade effects of the SPS Agreement

The primary function of the SPS Agreement was to clarify the meaning of Article XX of the GATT. That article established the right of countries to use trade measures to protect animal, plant and human health. The SPS Agreement reaffirms that right but elaborates on the procedures that countries should follow to be sure that they are not unduly restricting market access for other countries. As such, it sets up a framework for national SPS measures so that countries may be sure that they are operating such policies in a way that does not infringe on the rights of trade partners; and it offers a “notification and review” process that allows countries to question or request clarification of those measures that appear to infringe on the rights of themselves and others.

The SPS Agreement is therefore designed to have an impact on trade. There are at least seven separable elements of the SPS Agreement that could have an impact on trade flows in agricultural and food products:

- The requirement that countries notify changes in SPS measures to the SPS Committee (“transparency”). Transactions costs should be reduced where the exporter gains better information about access conditions. However, this trade effect may be offset if the act of notification itself encourages a stricter import regulation that applied previously.³ Measures that were in place before the SPS Agreement came into force do not need to be notified.
- The requirement that measures be based on a risk assessment (“risk assessment requirement”). This is fundamental to the task of ensuring that there is not over-protection by regulations stricter than necessary on the basis of scientific evidence. However, the trade effect can be reduced if the encouragement of a risk assessment in fact leads to stricter regulations by over stressing risk at the expense of affordability and consumer choice.
- The obligation to seek harmonisation, regionalisation and equivalence (“harmonisation”). This is intended to facilitate trade by reducing the number of different standards that have to be met.⁴ Harmonisation on an internationally-agreed standard is specifically endorsed. However, there is no assurance that the harmonised regulations are indeed those that are “no more restrictive than necessary” or that they are the most appropriate for the country concerned.⁵ Similarly, equivalence can lead to more restrictive standards.
- The requirement that stronger-than-international standards, if used, be justified by scientific evidence (“science-based standards”). This is intended to prevent the use of strict regulations that reduce market access, possibly for economic protection of domestic industry, but that are not justified by scientific evidence.
- The intervention in the SPS Committee that allows members to comment on each others SPS measures and to bring before the Committee evidence of possible violations of the Agreement.⁶ These Committee interventions on national SPS measures by other countries is one of the most powerful ways in which trade restrictions can be reduced and trade can be facilitated as it allows a relatively inexpensive and low-key way of raising issues without going at once

to the dispute settlement process. It can lead to a removal of trade barriers by an importing country in response to a request for change or clarification by an exporter.

- The incorporation of the SPS Agreement in the “single undertaking” of the WTO, allowing the procedures of the Dispute Settlement Understanding (DSU) to be used in SPS disputes (“dispute settlement”). The incorporation of the SPS Agreement into the unified dispute settlement regime of the WTO was a major advance for the resolution of trade conflicts by facilitating resolution of disputes that have not been resolved in earlier levels of consultation.⁷ Negative trade impacts might, however, arise if the panels examining disputed SPS measures were to adopt a perspective that undermined consumer confidence or led to a weakening of the acceptance of the WTO and its trade disciplines.
- WTO members agree to facilitate the provision of technical assistance to other countries that need such help. This should result in stronger health protection for developing countries while enhancing their ability to export.

The provisions of the SPS Agreement appear to be widely acceptable to countries and the implementation of the Agreement has generally been smooth. Only three actual trade disputes relating to the SPS Agreement have gone to DSU panels. In view of the uncertainty of the sign of the impact on trade, care needs to be taken to separate the various impacts of the SPS Agreement and attempt to identify how these might have influenced trade patterns. The measurement of the trade impacts follows from the correct identification of these possible impacts.

Identifying the potential trade effects is a first step toward their measurement. The next is to define more precisely what it is that is being measured and how that can then be interpreted. To see the issues of measurement in perspective, consider five (potentially) different import protocols associated with an SPS measure (Table 5.1). The first (Policy O) represents a situation where trade is not restricted by any SPS measure. This is not often, of course, a satisfactory policy. As most SPS measures have some scientific rationale, unregulated imports will often result in higher levels of disease or human health problems than if some regulations had been applied at the border.⁸ It is however the usual counterfactual situation when considering the costs and benefits of a particular protocol, and is the common comparator in economic studies when examining the trade impact of an import measure.

The second policy listed in Table 5.1 (Policy A) is an autonomous policy measure imposed by the importing government with no specific regard to the SPS Agreement (or in place before the Agreement came into effect). In those (many) cases where this protocol is consistent with the Agreement there will be no reason to modify the importer behaviour. But there will also be cases where there are elements of economic protection (the attempt to increase income to or reduce the costs of domestic producers) that are unjustified by the scientifically appropriate import protocol. Attempts to measure the trade effects of the SPS Agreement are essentially premised on the identification of the impact on trade of movements from Policy A to some more acceptable alternative. But some of these policy changes may not be strictly as a result of the SPS Agreement. A move to policy A*, for instance, could be an autonomous shift in which the existing import protocol has been “improved” by the adoption of scientific principles, including economic cost-benefit analysis, and by the removal of the gratuitous economic protection in the protocol. Policy A* could be an improvement without being attributable to the SPS Agreement.

By contrast, policy types B and C are those that emerge from the application of the SPS Agreement. Policy B is consistent with the Agreement in that it is based on a risk assessment and, where deviating from multilateral standards, is supported by scientific evidence. Policy C is also consistent with the SPS Agreement in that it represents a domestic policy that is in line with standards set by the multilateral institutions recognised by the Agreement.⁹ Thus the difference between Policy B and C is the nature of the compatibility with the SPS Agreement.

Table 5.1. Representation of different import protocols to define counterfactuals

Import Protocol	Description
O	No SPS regulations in place. Imports enter without SPS restriction
A	Autonomous domestic SPS measure, put into place prior to, or without particular regard to SPS Agreement. Measure may give economic protection to domestic producers in addition to health and safety protection.
A*	Autonomous domestic SPS measure with economic protection removed but still not necessarily consistent with SPS Agreement (<i>e.g.</i> may not be least trade distorting).
B	Domestic measure consistent with scientific justification as mandated by SPS Agreement.
C	Domestic measure consistent with Multilateral Standards as encouraged by the SPS Agreement.

The identification of these alternative policies is useful in that it leads to a distinction between different types of “trade impact,” each with their own measurement challenges. Seven of the more important of these policy changes are shown in Table 5.2. The most commonly discussed trade impact is that represented by a move from Policy O to Policy A, in other words the introduction of an import protocol that impedes trade and that might include unjustified economic protection as well as justified scientific protection. The controversy over the use of non-scientific regulations to protect commercial interests is the starting point for most discussions in this area. This is where much of the economic, political and legal attention has been focused. But the trade impact of the O to A policy shift has proved hard to quantify: at root it needs the full gamut of information about the situation in the market with the introduction of imports to be compared against the situation where the regulation reduces the risk but changes the balance in the market. This estimation of the “pure” trade impact of an SPS measure is particularly data and analysis intensive, and relatively few attempts have been made to quantify this impact.¹⁰

**Table 5.2. Observable trade impacts of regulatory changes
and link with the SPS Agreement**

Change in policy	Trade impact
O to A	The impact on trade flows of the introduction of an autonomous domestic SPS measure. This includes the impact on the market of the scientifically-justified protection as well as of the gratuitous economic protection. Not directly related to the SPS Agreement.
A to A*	The trade benefits from removing the economic protection and the improvement of the domestic measure. This may be related indirectly to the SPS Agreement.
A to B	The trade effect of the improvement in the SPS measure as a result of the bringing into conformity with the SPS Agreement.
A to C	The trade effect of bringing domestic measures into line with multilateral standards. The standards, however, may not always be those that are best suited to the conditions in the country concerned or to the efficient functioning of the trade system.
B to C	The trade impact of moving to harmonised policies from those that might otherwise be justified under the “exception” clause of the SPS Agreement.
A to O	The abandonment of an SPS measure and the de-restriction of imports. Not directly related to the SPS Agreement.
B to A	The move from an SPS measure that is consistent with the SPS Agreement to one that includes elements of economic protection and unjustified restrictions. Movement is contrary to SPS Agreement and therefore not considered a direct result of the Agreement.

An important dimension of the measurement of the impact of such an SPS measure is the consideration of both the positive as well as the negative impacts of the policy. The importance of measuring the benefits as well as the costs of such an SPS measure is clear. Rarely are such measures introduced without some justification.¹¹ However, there is a strong case for not confusing such measures with the evaluation of the trade impact of the SPS Agreement as such. It may be true that some countries introduce an autonomous, non-compliant SPS measure in spite of the SPS Agreement, perhaps as a result of increased awareness of health risks and/or protectionism, but this is clearly a side-effect and should not be attributed to the Agreement as such.

A considerable amount of energy has also gone into measuring, or at least conceptualising, the shift from policy A to A*. This move is an attempted improvement in the domestic policy by the removal of the economic protection and the application of appropriate scientific evidence to refine the import protocol. In effect an economic cost-benefit analysis is called for, but the costs and benefits are calculated for the changed policy A* relative to the original policy A. Analytical work on this issue has been advanced recently by a number of studies reported in Anderson, McRae and Wilson (2000) that aim to bring economic calculations into the decisions on quarantine.

The question is whether these improvements can be attributed to the SPS Agreement? It seems appropriate to distinguish between “quantitative” and “qualitative” trade benefits of the Agreement. It is certainly true that the elements of transparency, notification, cross-notification and dispute settlement are integral to the Agreement, as noted above. But they are not in themselves quantifiable changes in policy.¹²

The more clearly “quantifiable” aspects of the SPS Agreement are those that can be tied to changes that relate to risk assessment, harmonisation, regionalisation, equivalence and justification of stricter-than-international standards. The changes in policy represented by the shift from A to B and A to C, in Table 1.5, should therefore be at the centre of the assessment of the trade impact of the SPS Agreement. The rest of this paper deals with such changes and the challenges that measuring the trade effect of such changes pose.

A policy change from A to B brings the autonomous domestic SPS measure into line with the SPS Agreement, though not through the adoption of multilateral standards. Such a change is clearly intended to remove trade frictions, usually by improving market access. This is the typical case where a notification of a policy change is made by (the importing) country or a Committee intervention is introduced by another (typically the exporting) country. One might assume that trade is likely to increase following such policy

changes, though it is important to look out for any cases where trade does not increase even with the policy change.¹³

Equally important in the assessment of the impact of policy changes in the direction of harmonisation of measures, notably by adopting the standards of the international standard setting bodies, Codex, the IPPC and the OIE, or any other institution identified under the procedures of the SPS Agreement. The change from A to C represents an attempt to reduce transaction costs in trade and move to a regulatory framework that is less likely to impede trade. However, it should not be taken for granted that such policy changes always result in more trade. It is possible that the move to uniform standards can represent an increase in the trade-restrictiveness in certain cases. By contrast, movements toward equivalence will usually improve market access (otherwise there would be no incentive for the exporter to request such a move) and the process of regionalisation, if scientifically appropriate, will also tend to remove trade impediments.

For completeness, two “reverse” movements are also worth defining. A move from A to O can on occasions be the result of the SPS Agreement. The removal of a trade-restrictive SPS measure that is not in compliance with the SPS Agreement should be accounted as a trade gain for the Agreement: indeed it can be thought of as an example of the move from A to B. This then also becomes a target for measurement (in contrast to the movement from O to A), in the same way as the movement from A to B or C should be attributed to the Agreement.¹⁴ In other words, if the SPS Agreement causes a country to remove an import protocol altogether one should attribute the trade impacts to the Agreement.

A move from B to A is also possible, if countries were to move away from a compatible policy to one that is not in compliance with the SPS Agreement. These movements should also in theory be quantified, as they represent cases where the existence of the SPS Agreement has not been enough to prevent the move. To ignore these cases would be to bias the results in favour of the Agreement, as no retrograde steps would be counted. These cases are considered below in so far as they provoke a challenge by the trading partner (exporter) in the SPS Committee. These various import protocol changes as they relate to the SPS Agreement are summarised in Table 5.3. This Table groups the impacts identified in Table 5.2 and summarises the rationale for the empirical discussion in the following two sections of the paper.

Table 5.3. Summary of the distinction between indirect and direct trade changes due to the SPS Agreement

Trade changes directly attributable to the SPS Agreement, and potentially “quantifiable.” These effects are in part related to the increased discipline brought to the system by the DSU and the use of the SPS Committee as a path for discussing grievances.	The trade effect of the improvement in the SPS measure as a result of the bringing into conformity with the SPS Agreement. (A-B) The trade effect of bringing domestic measures into line with multilateral standards. The standards, however, may not always be those that are best suited to the conditions in the country concerned or to the efficient functioning of the trade system. (A-C) The trade impact of moving to harmonised policies from those that might otherwise be justified under the “exception” clause of the SPS Agreement. (B-C) The move from a measure that is consistent with the SPS Agreement to one that includes elements of economic protection and unjustified restrictions. (B-A)
Trade changes not directly attributable to the SPS Agreement, though they might be thought of as “qualitatively” connected with the heightened awareness of the significance of the trade effect of SPS measures.	The impact on trade flows of the introduction of an autonomous domestic SPS measure that can include both scientifically-justified protection as well as the gratuitous economic protection. (O-A) The trade benefits from removing the economic protection and the improvement of the scientific basis for the domestic policy. (A-A*) The abandonment of an SPS measure and the de-restriction of imports. (A-O)

5.2 Data and analysis needed to calculate the trade impact

It is tempting to look for the evidence of the trade impact of the SPS Agreement in the trends of trade flows since the coming into force of the WTO. Unfortunately, the evidence of the trade impact of the SPS Agreement is unlikely to be found in aggregate trade flows of agricultural and food commodities. There is no simple way to relate the growth or reduction in trade of any particular product to the existence of the SPS Agreement. This is partly because the SPS rules governing any actual or potential trade flow are only a small part of the reasons for trade or the lack thereof. As one example, the SPS Agreement came into effect at the same time as other aspects of the Uruguay Round Agreement. Trade flows will therefore also be influenced by the Agreement on Agriculture and the changes in domestic and trade policies embedded in the schedules of tariffs and support levels. But, as emphasised above, it is also because the counterfactual is not clear-cut. What would have been the situation in the absence of the SPS Agreement? Countries would still have regulated trade to prevent health and safety problems. One might assume

that the alternative would have been more protective and un-scientific policies, but that is an assumption rather than an observation. Hence the approach in this chapter is to isolate more “measurable” elements of the SPS Agreement rather than attempt the task of evaluating its trade impacts as a whole or its effect on broad commodity aggregates.

If the aggregate trade flows are not useful, what are the alternative data sources for the types of measurements discussed above? Three broad sets of data are available for such measures. The first is “self-reported” data, from industry or governments, on the amount of trade being restricted by a particular SPS instrument. On the assumption that these estimates of the effect of the instrument are correct, the resolution of the problem or conflict might be assumed to increase trade by the same amount. Secondly, a model-based approach could be taken to simulate the impact of the removal of a particular SPS instrument or its replacement with one that is more compatible with the SPS Agreement. Thirdly, trade data for the product and markets concerned when the SPS instrument is in effect can be compared to the comparable situation after the resolution of the conflict. For this, quarterly, bilateral trade flows would appear to be necessary. These three approaches are discussed below, with an emphasis on their strengths and weaknesses (Table 5.4).

Table 5.4. Methods of data collection and analysis for trade effects

Method of data collection and analysis	Strengths	Weaknesses
Self-reporting, anecdotal evidence	Identifies those trade issues that are of most concern to the exporting industry and the government. Rapid feedback from industry as to changes in market access conditions. Quantification could be tied in with notification and reporting requirements.	Bias towards over-reporting of trade impact. “Large country” bias in frequency analysis of disputed policies. “Developed country” bias in cross-notification and in resolution of issues. Bias toward current trade flows and presently perceived “potential” trade flows.
Trade flow data analysis	Direct link between policy change and trade impact. Less bias in analysis and reporting as all bilateral flows can be monitored. Ability to monitor on a regular basis and apply more sophisticated analytical techniques as data became available.	Considerable data collection problems for product specific SPS measures. Lags in data collection may restrict usefulness in dispute resolution. Problem of separating out impacts of SPS measures from other developments in markets.

Self-reporting

There is no doubt that the simplest way of identifying the trade impacts of SPS measures is to ask those who face such barriers for their estimate of the amount of trade that is being “repressed.” Such self-reporting has indeed been used in the past and provides information that is difficult to obtain in other ways (Roberts and deRemer, 1998). It helps to prioritise government activities and identify problems faced by traders that may not have occurred to those who devise the regulations. It can be useful in increasing the amount of information about the conditions of safety in other countries and their sanitary and phytosanitary methods. On the other hand, it is subject to several inherent biases. There may be a bias toward an over-reporting of the trade effect, in order to put pressure on the importing government.

If self-reporting were deemed to be a useful way of estimating the trade impacts, some degree of uniformity might be beneficial. Countries could be required to give an estimate of the trade involved at the time that they raise a Committee intervention or lodge a complaint. Such information would be subject to comment by the responding country, to discourage the unreasonable inflation of the trade importance of the complaint. Moreover, the parties concerned, when reporting to the SPS Committee on the outcome of their negotiations, could also agree on an approximate amount of trade that could be generated by the solution reached. Such a routine quantification by the countries concerned could generate a useful database for estimating over time the trade impacts of the Agreement.

Unfortunately, there are disadvantages in going along with such a solution. First, evidence from trade conflicts or trade complaints is of limited value for estimating the totality of trade impacts. First of all, trade conflicts often occur in situations where trade is growing. Such conflicts may represent disappointed expectations rather than inappropriate policies. The expansion of trade can lead to the questioning of the regulations of other countries. But the conflict may be as much a matter of inadequate information and understanding as of deliberate protectionism. If one could be sure that trade conflicts identified the most egregious cases of disguised protectionism then the focus on such conflicts could be justified. But there is the possibility that countries adjust their vulnerable policies in order to avoid conflicts. So the threat of dispute settlement may be the most effective tool for the improvement of policies in this area. It may be the trade impact of the avoidance of trade conflicts rather than the resolution of them that should be measured.

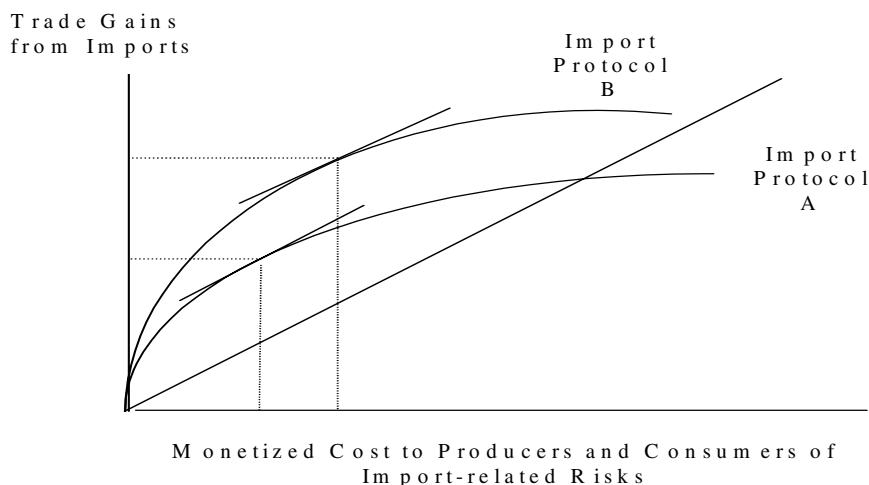
Models and simulations

A more complete and satisfying way of estimating the trade impacts of the SPS Agreement would be to model the situation in the markets concerned (and any related markets) and to use these models to simulate the appropriate counterfactual, such as the situation in the absence of particular SPS measures. Such simulation models are perfectly possible to devise in an abstract form but more difficult to construct in a way that is convincing to economists, scientists and regulatory authorities. This does not mean that such a task should not be undertaken, but there is a shortage of information on which to build such models for many markets and SPS environments.

The conceptual case is illustrated in Figure 5.1.¹⁵ The graph shows the trade-off between the burden imposed on domestic consumers from any illness or disease caused by increased imports of a product (or, equivalently, the cost of guarding against such disease) and the economic gains from the trade that is allowed in. The two schedules shown illustrate combinations of risk and trade gain from the different types of instrument. At zero imports, there is no trade gain but also no risk from imported pathogens or other threats to health. As imports rise so trade gains increase, eventually peaking at a “free trade” position. Meanwhile risks also rise until they may eventually offset the trade gains, at which point the schedule crosses the 45 degree line and net gains are zero (*i.e.* the same as with no trade).¹⁶ For each instrument the maximum gain is where the tangent of the schedule is parallel to the 45 degree line, indicating a maximum net gain. A shift in instruments, say from A to B, would change the trade-off between trade gains and domestic risks. Greater trade gains would be realised, even if increase in domestic risk would also be involved. In such a conceptualisation, the “trade effect” of an SPS measure, or the bringing of such a measure into line with the SPS Agreement, would include the impact on the gains from trade and the impact on the domestic producers and consumers.

The requirements for a comprehensive cost-benefit model of import risks relative to trade gains are extensive. Embodied in each of the schedules is information on the relationship between imports and the domestic risks for each feasible instrument. The types of models that can estimate such trade-offs would have to include parameters representing technical and scientific relationships as well as economic parameters and assumptions about the workings of the market. These would also have to be fed with convincing parameter values to be able to reproduce the existing market situation. Such models are possible, and when constructed will be valuable as tools to simulate the trade impact of SPS changes. But the extensive analytical demands of these models make it unlikely that they can be developed for all the SPS cases.

Figure 5.1. Trade-off between Trade Gains and Cost of Risk Mitigation



Moreover, there are a number of more complex trade impacts that are difficult to model. For example, it would be difficult to model the various trade effects of the following two cases:

- EU Notification G/SPS/N/EEC/155 introduces emergency measures in the form of a temporary ban on animal product imports from China, due to the presence of residues of a banned antibiotic in certain consignments. Several separate trade effects can be distinguished: the initial EU ban on Chinese products, secondary problems with neighbouring countries reprocessing Chinese meat products; and thirdly, the trade effects of the switch in supply by processors in neighbouring countries. Lastly, when such emergency measures are taken, they may create a domino effect, sparking restrictions by other countries.
- South African notification G/SPS/N/ZAF/12 introduces regulations relating to the application of the Hazard Analysis and Critical Control Point System, announcing the phased implementation of HACCP across various food sectors and/or categories of food handling enterprises for locally produced foods as well as the requirements for similar imported foodstuffs. For certain of South Africa's existing suppliers, particularly those in OECD countries, HACCP systems are already in place. For other suppliers in the immediate southern African region, the introduction of HACCP may further raise the cost of market entry and necessitate capital investment in both machinery

and system management. Hence, the economic and trade effects may be differentiated among trade partners.

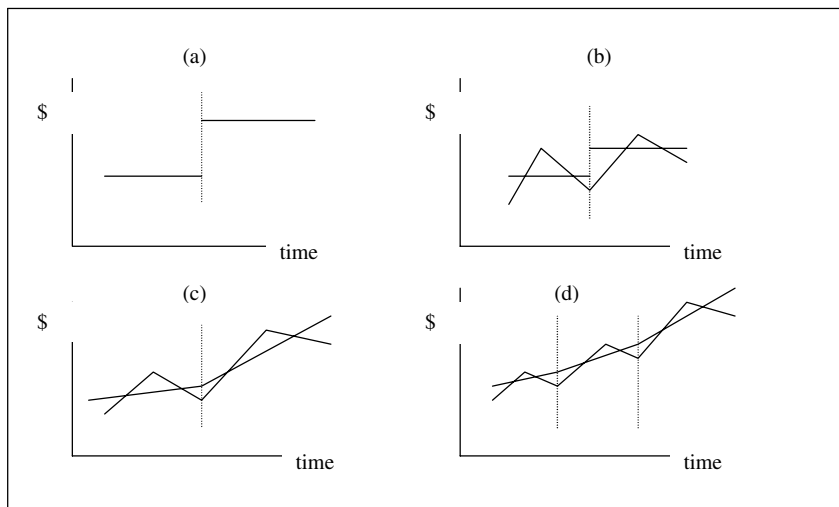
Quantitative analysis

In the interim before more formal model-building can be completed, simple analysis of trade data before and after the SPS measure shift may be the most feasible way to proceed.¹⁷ What quantitative evidence can one adduce to answer the questions posed about the trade impacts of the SPS Agreement if the parties concerned do not themselves report such estimates? An examination of the experience of the notification, conflict resolution and policy response can give a picture of the trade impacts. The cases discussed in the next section illustrate such a way to use trade data to estimate trade impacts.

To implement this methodology, one would ideally need to include quarterly, bilateral trade flow data, in both quantity and price terms, over the relevant period. The analysis of this data could be simple or sophisticated but essentially consists of testing the hypothesis that there is a difference in the trade flow resulting from the resolution of the dispute. A graphical representation of four possibilities is shown in Figure 5.2, below. A stylised trade impact is shown in part (a) of the figure, where a discrete import change takes place at the time of the policy change.¹⁸ This is somewhat unlikely to be observed in practice. More likely is a change in the average level of imports as a result of the policy change, as shown in part (b) of the figure. One could test for the statistical significance of this shift, but in practice the comparison of a period average of trade flows before and after the policy change could represent a reasonable estimate of the trade impact.

One stage more elaborate would be an econometric estimate of the trend in imports before and after the policy change. This is illustrated in part (c) of the figure, where a dummy variable attached to the time variable in a trend regression would pick up the change in the rate of growth of imports. Slightly more elaborate would be an estimated trend that took into account both the initial raising of the disagreement in the SPS Committee and the ultimate settlement of the problem. A double shift in the slope might be observed, as illustrated in part (d) of the figure.

Figure 5.2. Possible differences in trade flow resulting from a dispute



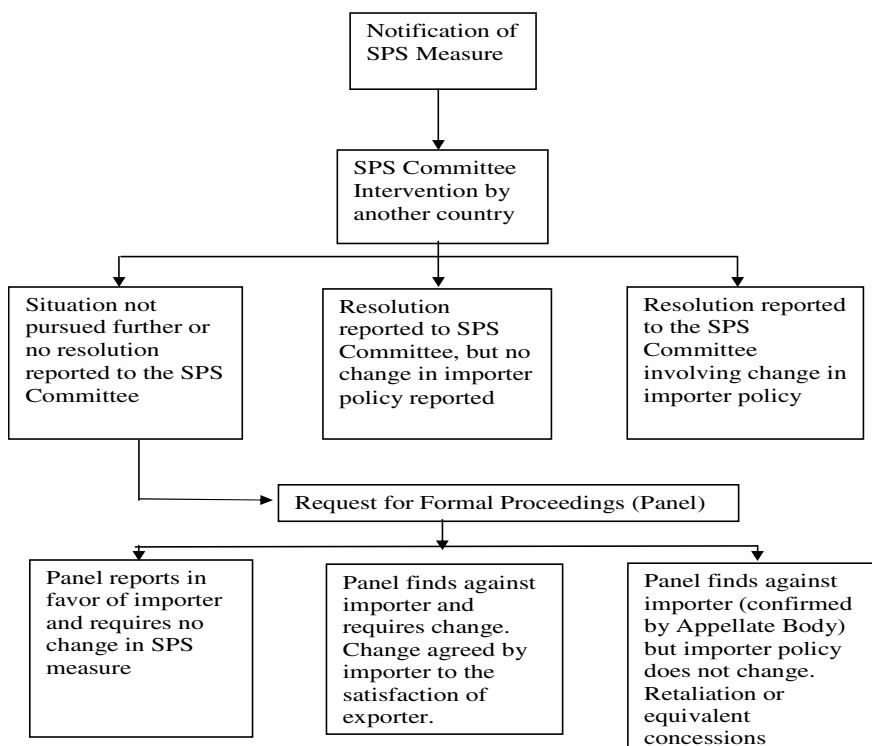
The main advantage of the examination of bilateral trade figures is that it is readily understandable and fairly easy to perform. The main difficulty is that it lacks some theoretical basis. In theory one would expect different levels of trade impact from different policy changes: the method of looking for a simple trade shift is in effect a test against the null-hypothesis of a zero effect and hence does not make use of any theoretical knowledge of the likely extent of the trade impact. In addition, such examination does not account for the effects of other exogenous factors, such as exchange rate movements, that can affect trade flows.

5.3 Some partial evidence of trade impacts of the SPS Agreement

As an illustration of the use of quantitative trade flow data to look for evidence of trade impact of the SPS Agreement, this section uses some information from actual domestic policy changes as notified to the SPS Committee. The challenges that have been made to this Committee, and the requests for consultation that have been received as a result of concern by the exporting country, identify a set of cases where the importer is considered by exporters to be at variance with the SPS Agreement. The issues are taken from the consolidated reports of the SPS Committee.¹⁹ Those SPS measures that are notified to the Committee are, of course, a small fraction of the total food safety standards and regulations in use. However, as a guide to the impact on trade of the SPS Agreement they define the set of policies that governments have chosen to raise before the Committee.²⁰

Figure 5.3 shows the destiny of all importer measures notified to the SPS Committee. A subset is met with a Committee intervention by one or more exporting countries. Bilateral discussions follow which lead to one of three outcomes. Issues that are not reported as resolved to the Committee have an uncertain status. It may be that they are not pursued further because the issue has been satisfactorily clarified or resolved (but not reported) or they may be unresolved but no longer of concern. They may remain on the agenda until a solution is reported or until the plaintiff initiates a request for formal proceedings, culminating in the establishment of a panel. Resolved issues either entail changes by the importer in the domestic regulation (import protocol) or are resolved with no overt change. The trade effect that is measured is the additional trade that comes about from the change in the importer policy.

Figure 5.3. Schema for classification of SPS notifications



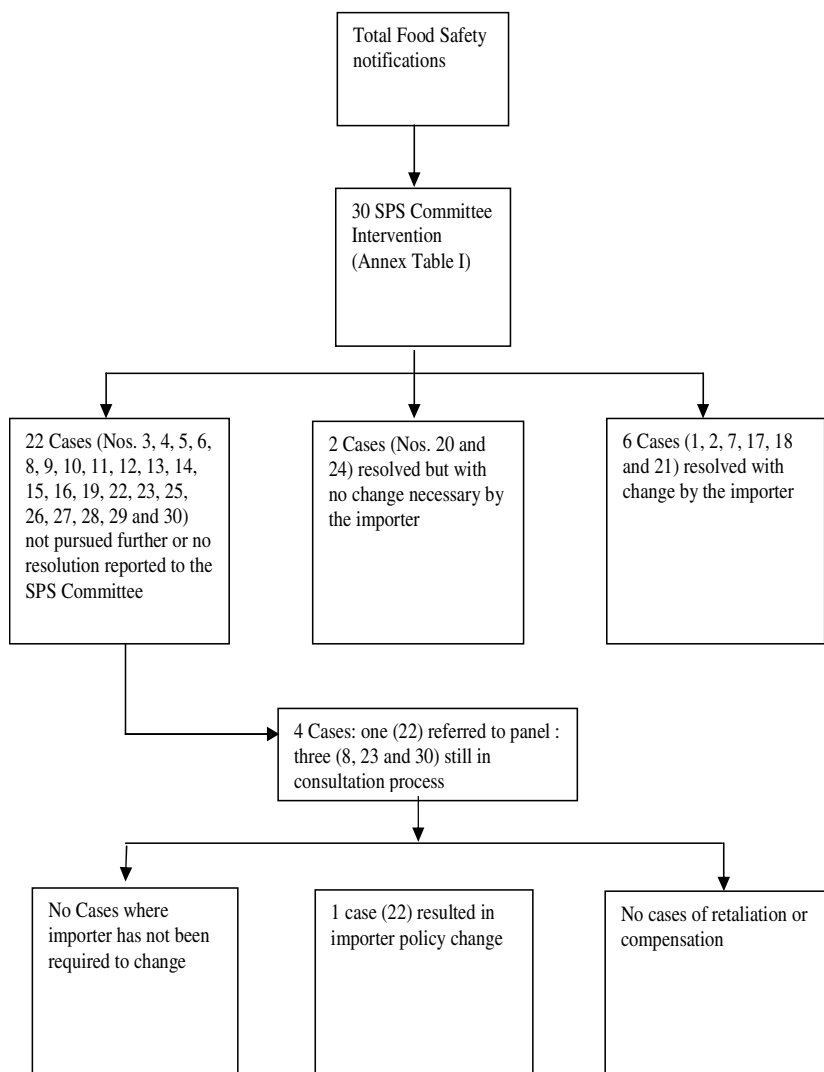
Issues that prompt the establishment of a panel also can be desegregated into three outcomes: a report in favour of the importer (defendant) implying no necessity to change policy to bring it into compliance; a report in favour of the complainant that results in a change in the practices of the importer; and a

finding against the importer that is not implemented and thus results in sanctions or compensation. These last two outcomes also need to be quantified as implying trade effects of the operation of the Agreement. If the importer changes policy instruments then the situation is as if this change had been made at the time of the Committee intervention. If the importer does not change policy then the impact of the Agreement is dependent on the retaliatory or compensatory measures taken.

For the purposes of illustration, only a subset of the total notifications and challenges are considered here. Thirty cases are identified that have been reported in the SPS Committee as being in the area of food safety.²¹ The details of these cases are shown in the Annex I. Of these 30 cases, 22 were not pursued further or not resolved (four went to the next stage of formal request for consultations with one case being remitted to a panel), two were resolved but the importer did not have to change policies, and six cases were resolved with the importer making changes to the relevant import protocol. The distribution of these cases is shown in Figure 5.4.

In the light of the discussion in earlier sections it is possible to identify more precisely what can be measured as the trade effect of the SPS Agreement. There is little to be gained by attempting to measure trade changes in cases where there has either been no resolution or when the outcome resulted in no change in policy in the importing country. This leaves seven cases where importer policy changed, six of these as a result of consultations inspired by the SPS Committee procedure and one that went to a panel. Five of these cases are discussed below to illustrate the use of data and analysis to isolate trade impacts.²²

Figure 5.4. Current status of 30 food safety cases with SPS Committee intervention*



* Case numbers in parenthesis refer to Annex I.

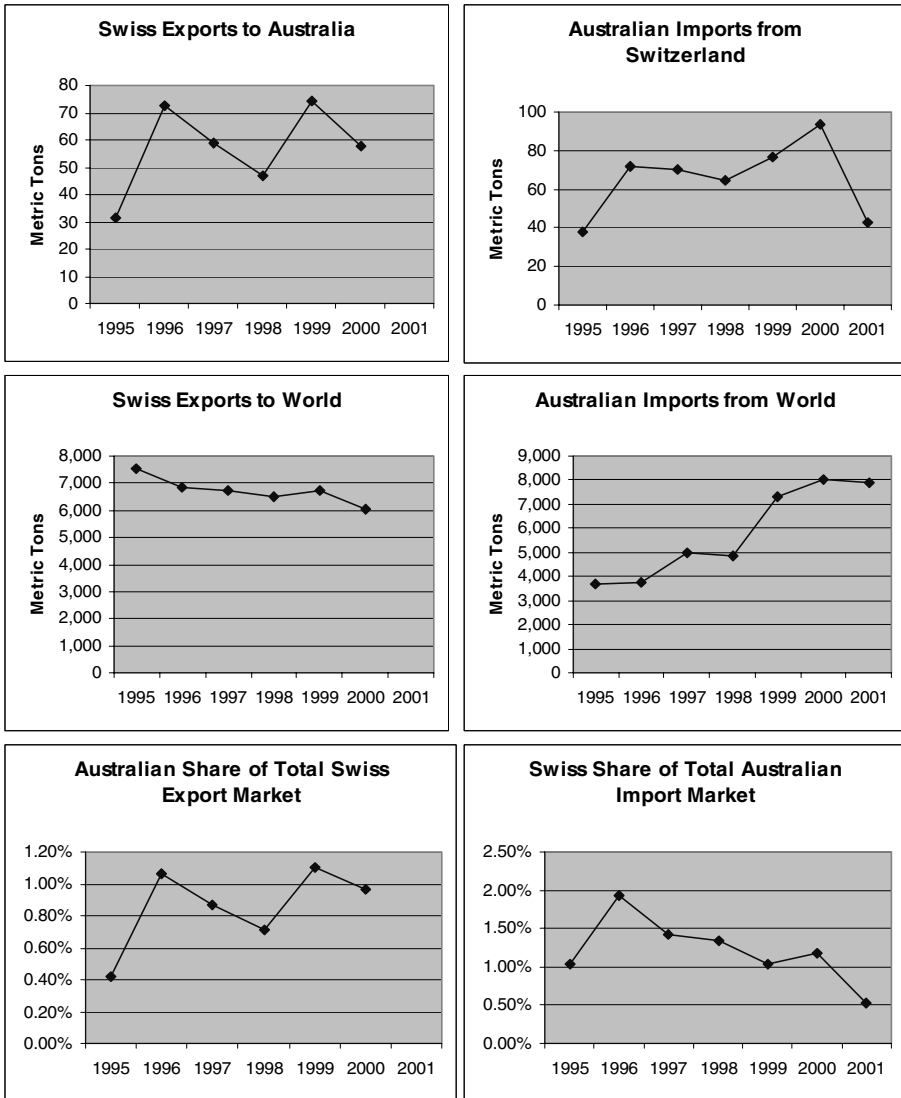
Example 1. Import restrictions on cheese from the EU and Switzerland into Australia and New Zealand

In June 1998, Switzerland notified the SPS Committee that Australia and New Zealand had stopped imports of hard cheese made from unpasteurised milk, on the grounds that they represented a health hazard (the possible presence of E-coli) to consumers.²³ Although the measure had been in place before the SPS Committee had been established, the compliance with the regulations had recently (in mid-1997) been enforced. The case was deemed to be settled in November 2000 when Switzerland reported that a mutually-satisfactory solution had been found.

The influence of the SPS Agreement is relatively clear-cut in this case. A risk assessment was conducted (a shift from A to B, in the nomenclature of Table 5.2) and the import protocol was modified. In effect, the Swiss production methods were deemed by the Australian authorities to be equivalent to the heat treatment of raw milk. Trade was, in principle, free to start again. This is a case where quantification of the impact should be possible. The trade data for the relevant period for the export of processed and other cheese from Switzerland to Australia is shown in Figure 5.5. The effect of the ban from the strict enforcement of the regulations in 1997 through the dispute period is evident in the decline of Swiss sales of cheese to Australia from 1996 to 1998 (though the recorded imports of Swiss cheese by Australia over those two years does not show such a significant fall). Swiss exports to the world were declining over those years, but the share of such exports going to Australia also declined indicating that the trade impact was likely to have been a result of the import restriction.

In 1999 there was a sharp rise in exports of cheese from Switzerland to Australia, supporting the notion that the resolution of the dispute had restored trade, and the increase in trade restored the share of the Swiss market destined for Australia. However, the volume of Swiss cheese imported into Australia dropped again in 2000 and 2001, and there is evidence of a continuing decline in the share of the Australian market filled by Swiss cheese. The steady rise of the volume of cheese imported into Australia since 1998 suggests that the import ban was not part of a general restriction on imports of cheese in response to protectionist pressures, and the reduction in Swiss exports to all countries suggests that there could be supply constraints as well.

Figure 5.5. Trade in cheese between Switzerland and Australia



Source: *UNSD Comtrade Database, 2001/2002*

This simple test of the apparent resumption of trade in Swiss cheese in 1999 does not imply that there are no protectionist motives in the import regulations. New Zealand, which claimed that it would abide by the Australian decision (the relevant standard would be implemented by the Australia New Zealand Food Authority, ANZFA, and hence apply in both countries), had no history of importing Swiss cheeses from unpasteurised milk. Trade data

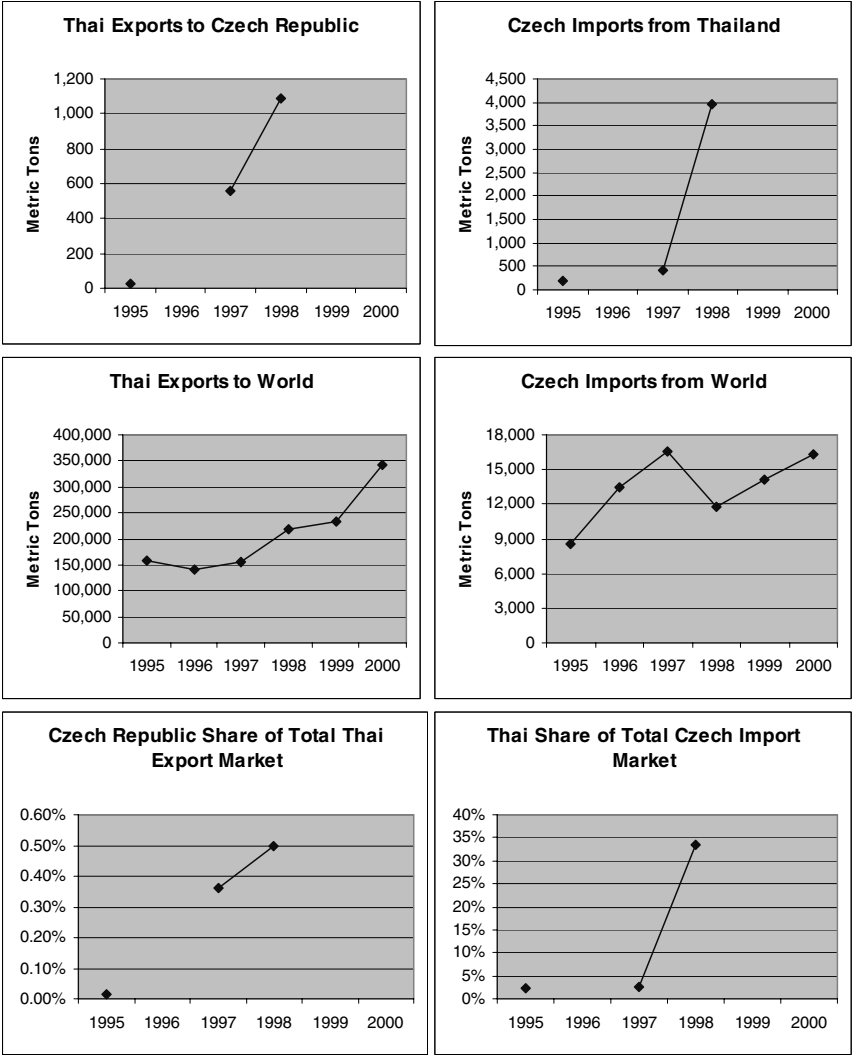
shows no evidence of trade commencing after the change in policy, though lack of any such trade could be due to taste or market conditions. Moreover, there were other conflicts that revolved around cheese imports from Europe. The EU challenged the import rules in the case of the export of Roquefort cheese from France to Australia. No equivalence agreement was negotiated, despite evaluation of data from the manufacturers. No trade effect would therefore be measurable, as no policy was changed. The EU might still consider that the import regulation was unnecessary, but apparently did not have the confidence (or commercial interest) in its own case to pursue the matter to a panel.

Example 2. Prohibition of poultry meat imports from Thailand to the Czech Republic

Trade in poultry meat is rife with accusations of unsubstantiated sanitary barriers to imports. One specific case falls in the category of those where the SPS Agreement has apparently led to a change in importer policy. In September 1998, Thailand raised in the SPS Committee the introduction of a ban by the Czech Republic on poultry meat from Thailand on the grounds of unacceptable levels of arsenic acid. The Czech government was asked to supply the scientific justification, as mandated by the SPS Agreement. After consultations at a technical level and a visit to Thailand by Czech experts in September 1999, the Czech Republic notified the SPS Committee that the ban had been lifted. The significance of the ban is suggested by the trade flows shown in Figure 5.6.

Thai exports of chicken had been rising since 1996, and had begun to capture a substantial share of the Czech market for poultry. Imports from Thailand seem to have increased dramatically in 1998 even though total Czech imports were down. Though the Czech Republic was not a major destination for Thai poultry, the prospect of losing such a rapidly growing market may have prompted the Thai concern over the import regulation. Unfortunately, data for the following two years are not available, but both Czech imports and Thai exports continued to climb. Bilateral trade figures when available will show whether there was any trade impact from the lifting of the ban.

Figure 5.6. Trade in poultry between Thailand and the Czech Republic



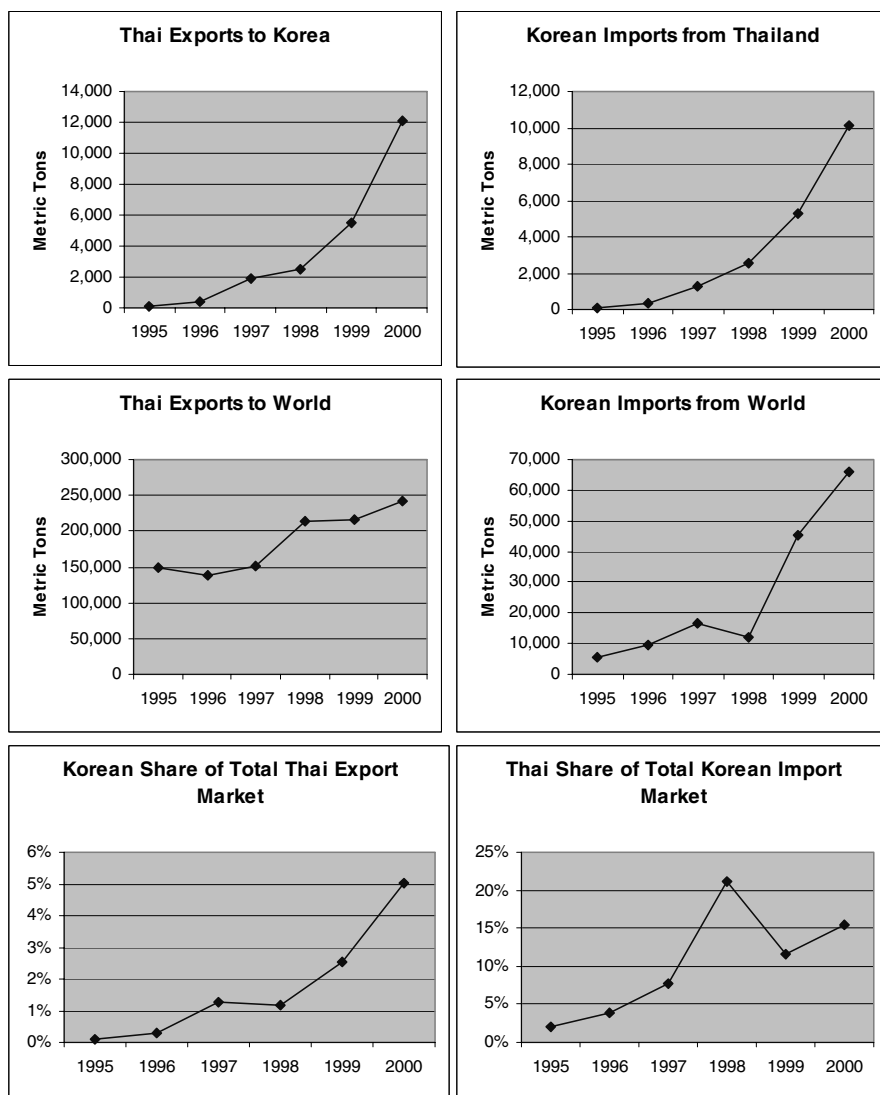
Source: *UNSD Comtrade Database, 2001/2002*

Example 3. Import ban on frozen poultry from Thailand to Korea

Exports of chicken from Thailand to Korea were the subject of another Committee intervention in the SPS Committee that had raised the issue of health regulations. In October 1997, Thailand questioned a ban on poultry imports that the Korean authorities had introduced to prevent the risk of listeriosis. Thailand claimed that this ban had breached Article 7 of the SPS Agreement (that ensures transparency) as the justification of the ban had not been given and the incidence of listeria in Asia was in any case very low. The Korean government responded that the regulation was temporary until the entry into effect of the new Korean Food Code, and this would then harmonise standards to international norms. The new Code exempted frozen chicken destined for further processing and cooking from the zero-tolerance test for listeria. Thailand was satisfied with the explanation, and the problem was resolved.

The data shown in Figure 5.7 confirm the reduction in the upward trend in Thai exports of chicken to Korea that occurred in 1998 (though Korean import data show the trend continuing in that year). The share of Thai chicken exports accounted for by the Korean market fell slightly at the time of the trade conflict. The resumption of the upward trend suggests that the intervention in the SPS Committee may have helped to solve the problem. Indeed, in 1998 Thailand increased its share of the Korean market noticeably at a time when imports were generally lower, though this share fell back to the trend level the next year. The Korean market represents only a small share of Thai chicken exports, but that share has risen sharply since the resolution of the dispute.

Figure 5.7. Trade in poultry between Thailand and Korea



Source: UNSD Comtrade Database, 2001/2002

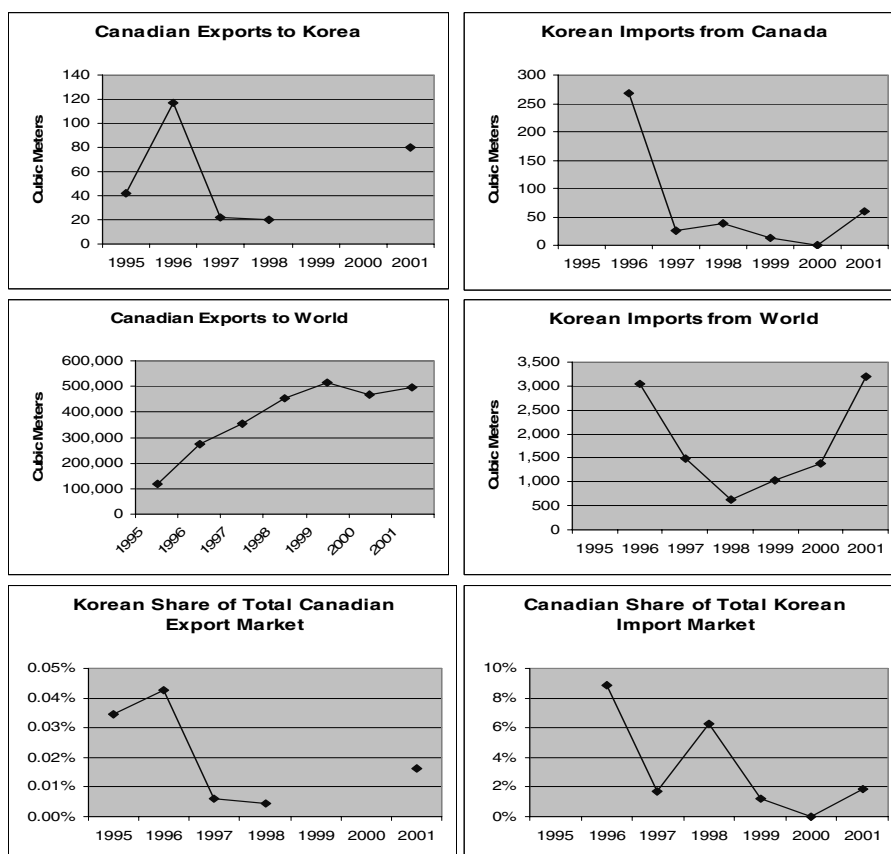
Example 4. Korean shelf-life requirements on bottled water from Canada

Food safety regulations also operate at the wholesale and retail level, and can give domestic products undue advantages over imported goods. One such example has been discussed in the SPS Committee, that of the regulations on shelf-life for imported products in Korea. The concern of a number of countries over the shelf-life requirements laid down by the Korean government predated

the formation of the SPS Committee, and the Committee was notified of the apparent resolution of the disputes in the cases brought by the US and Canada (W/DS5 and W/DS20, respectively). However, some products fell outside the settlement and the conflict continued to be discussed in the SPS Committee.

The particular product of concern to Canada was bottled water, where the government-mandated shelf-life was deemed to be unduly short. No bilateral resolution of this conflict has been reported to the SPS Committee. The trade data shown in Figure 5.8, below, shows a sharp fall in the exports of water to Korea from Canada over the period of the SPS consideration of the dispute. Canadian exports of bottled water were steadily climbing over this period, but the (very small) market share accounted for by sales to Korea was shrinking.

Figure 5.8. Trade in bottled water between Canada and Korea



Source: *UNSD Comtrade Database, 2001/2002*

The decline in bottled water imports into Korea was not however confined to imports from Canada. Until 1998 there was a steady decline in imports from all countries. The Canadian share of the Korean market has continued to drop (except in 1998) indicating that the conflict has not been resolved in spite of the introduction of the new food regulations in Korea. It appears that the drop in trade in bottled water from Canada to Korea could be said to represent a failure of the Agreement to settle this issue in a way that gave satisfaction to the exporter, though admittedly the amount of trade involved is small.

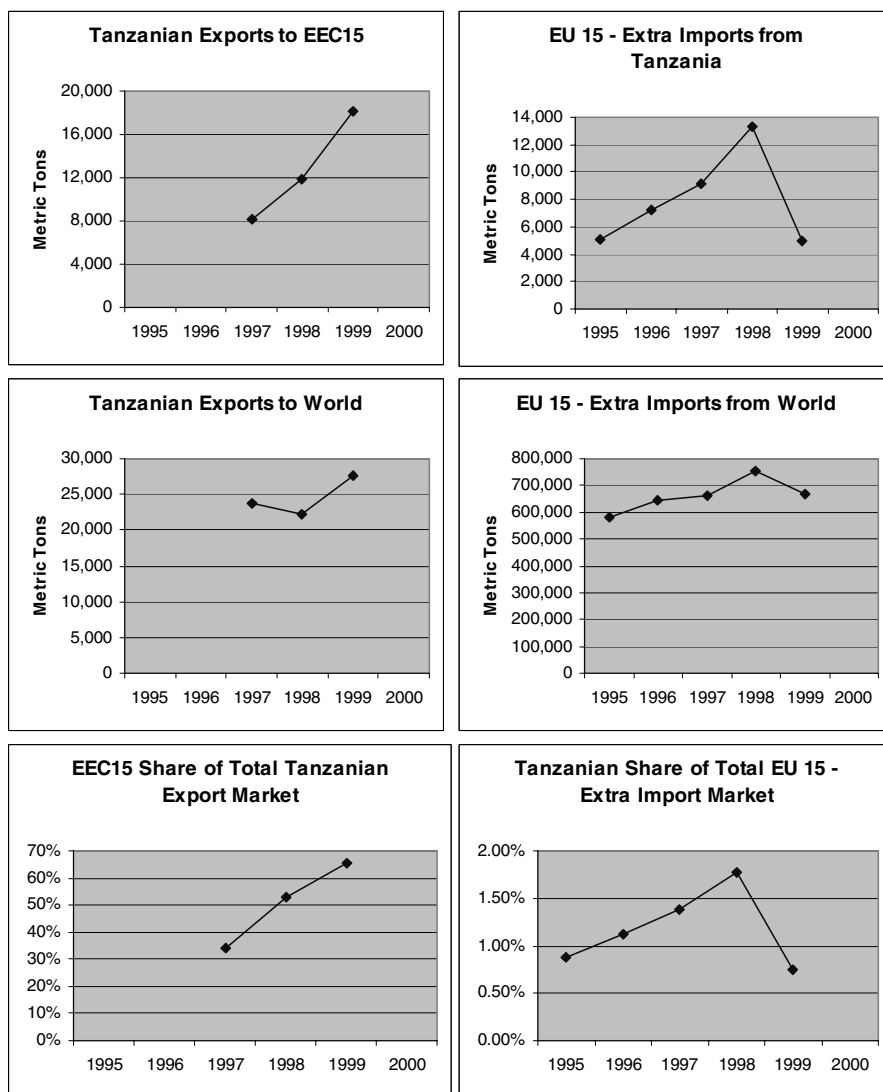
Example 5. Trade restrictions on the import of fish from Tanzania, Kenya and Uganda into the European Union in response to cholera outbreak in East Africa

One set of health-related trade conflicts has involved African countries selling food products into Europe. In March 1998, the EU informed the SPS Committee that it had restricted imports of a range of fruit, vegetable and fish products from Tanzania, Kenya, Uganda and Mozambique as a result of an outbreak of cholera in those countries. The EU undertook to develop a policy on imports from countries with cholera outbreaks, based on a risk assessment. In this instance, international scientific evidence was used to bridge the gap between the parties. The World Health Organization (WHO) has guidelines on the control of cholera, and these indicate that the risk of transmission of cholera through food imports is very low and suggest means of control other than import bans. Fish products, in particular, as they are not generally consumed in raw form in Europe, are deemed by the WHO to pose no significant risk. Initially, the EU argued that the WHO was not the appropriate body to suggest standards in this case and denied that its ban violated Article 2.2 (not being based on scientific principles) or Article 5.7 (that allows temporary measures while evidence is collected) of the SPS Agreement. The EU also pointed out that it was attempting to help Tanzania and the other affected exporting countries to introduce stricter controls before export. But eventually the European authorities declared that they were satisfied with these procedures and lifted the ban.

In this case the impact of lifting the ban seems to have a positive impact on at least some African food exports to the EU. Figure 5.9 (a), below, shows the sales of fish fillets from Tanzania to the EU. Tanzanian exports have increased sharply since 1997, mostly going to the EU market.²⁴ The EU import market for such fillets was rising from 1995-98, and the Tanzanian share of that market was increasing. This would appear to indicate that the cholera-linked ban on fish imports from Tanzania was of short duration. Consultation in the SPS Committee can be assumed to have assisted in the resolution of that dispute. But the imports of fish from the region dropped sharply in 1999. Though the

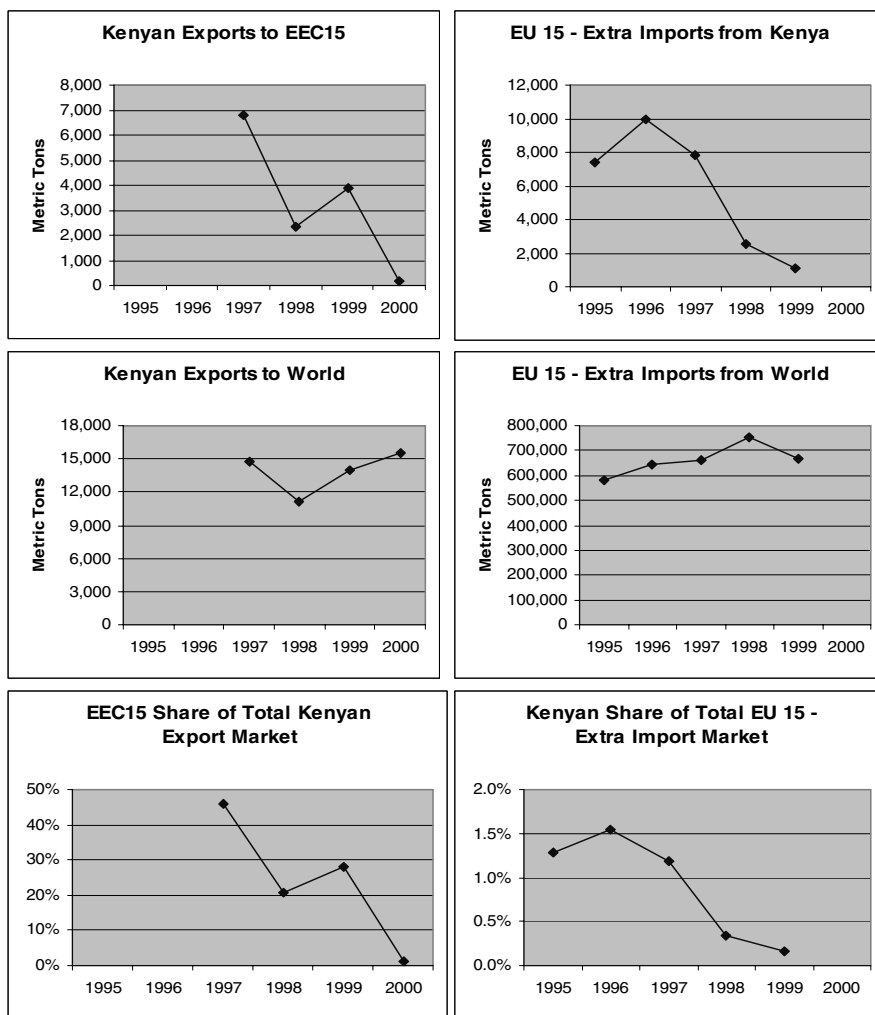
cholera-related restrictions were lifted, problems with high pesticide residues led to the imposition of import restrictions on fish from the region.²⁵

Figure 5.9(a). Trade in fish fillets between Tanzania and EU 15



Source: *UNSD Comtrade Database, 2001*

Figure 5.9 (b). Trade in fish fillets between Kenya and EU 15



Source: *UNSD Comtrade Database, 2001*

The situation is somewhat different in the case of exports of fish fillets from Kenya to the EU, as shown in Figure 5.9 (b). Export sales from Kenya have continued to slide even after the resolution of the cholera problem.²⁶ By the year 2000 the market for Kenyan fish fillets in the EU had virtually disappeared.

The lesson from the comparison between Kenya and Tanzania from this experience may be that the raising of an issue in the SPS Committee may indeed help to get a trade conflict resolved. But the resumption of trade cannot

be assumed. Other factors, including the speed at which the food regulatory authorities in both the importing and the exporting countries can respond to the changing regulations, can make a difference to the extent to which trade can recover after a period of restriction. As with all these cases, there are other factors at play in any particular year that will help to explain trade flows and trade shares.

5.4 Summary observations

Estimating the trade impact of the SPS Agreement involves several steps. First it is necessary to specify what changes the SPS Agreement could have made to the import regulations of the members of the WTO that would in turn have influenced trade. The changes identified in this paper include the increased transparency of regulations, the requirement that they be based on a risk-assessment, the obligation to seek harmonisation with international standards where available, the obligation to be able to justify stricter regulations by scientific evidence, the availability of procedures for settling disputes, ranging from intervention in the SPS Committee to using the WTO dispute settlement machinery, and the provision of technical assistance to developing countries.

Each of these SPS Agreement provisions can influence trade. In practice, it is likely to be impossible to calculate the trade impact of greater transparency, or of the threat of dispute settlement through a panel. In those cases where domestic policies have changed as a result of a challenge to their scientific justification, been brought into line with an international standard, or been modified following a request to demonstrate that a risk assessment was carried out, some estimate of the trade impact may be possible. The case studies in this report focus on the impacts of the procedures within the SPS Committee that allow WTO members to bring before the Committee evidence of possible violations of the Agreement. Thus, the case studies provide only partial evidence of the *observable* trade impacts of the agreement.

The most difficult analytical issue facing the estimation of the trade impacts of the SPS Agreement has to do with the appropriate counterfactual, *i.e.* to specify what would have happened if the Agreement had not been in place. Rather than a full analysis of the situation in the absence of any SPS measure, the more feasible approach may be to examine changes in policy from those that existed unconstrained by the SPS Agreement to those that are compatible with the Agreement.

Collection and analysis of the data necessary for this task itself poses problems. Self-reporting of trade losses due to improper use of SPS measures would seem to be a reasonable way of gauging the range of commercial and

diplomatic concerns but is not an unbiased measure of the actual impact of the Agreement. Ideally a full model with all such measures included in a quantified way could be used to estimate trade effects, but such models are still under development.

The preceding illustrations showed that there is a wide range of evidence from trade flows, from the apparent resumption of trade following the removal of a ban to a steady decline in trade that seems to be unaffected by the resolution of the conflict. One explanation might be that, while the raising of an issue in the SPS Committee may indeed help to get a trade conflict resolved, other factors such as the speed at which the food regulatory authorities in both the importing and the exporting countries can respond to the changing regulations, can make a difference in the extent to which trade can recover after a period of restriction. However, it is not possible to generalise about the trade effects of the SPS Agreement from such limited analysis, and other exogenous factors (*e.g.* exchange rate movements) can complicate the analysis.

NOTES

1. Chapter 5 was prepared by Timothy E. Josling (Stanford University). This material is also available as an OECD consultant's report, *Measuring the Trade Effects of the SPS Agreement*.
2. Ultimately any policy has to be judged against the counterfactual of no policy. But two ways of achieving a particular goal can be compared without having the knowledge of their absolute effect if the relative impact can be established. In practice we assume that the internal regulatory authorities can choose between similarly-effective ways of reducing risk: the SPS Agreement is imposing the obligation that the scientifically-based measure with the least trade distortion.
3. This could happen if the transparency provision leads to an internal review of measures by the importing country that can then be influenced by interests that argue for stricter regulations. However, one may have difficulty identifying such cases in practice, as the "non-transparent" counterfactual is unlikely to be clearly observable. For example, the non-transparent measure may have been applied in an *ad hoc* way by customs agents or domestic sanitary authorities.
4. Equivalence, regionalisation and mutual recognition do of course increase the disparity between the exporters that are involved in such agreements and those that are not. This form of "trade diversion" can best be offset by expanding these agreements rather than discouraging them. Regionalisation does not reduce transactions (and may increase such costs) but will also tend to increase market access by reducing the areas from which goods cannot be exported.
5. International standards may be inappropriate for certain importing countries, though the advantages of using them may outweigh the costs of the lack of country-specificity.
6. Committee interventions are reported in various parts of the minutes of the SPS Committee meetings, including "Information from members", "Special trade concerns" and "Other business." Committee interventions are used by members to raise objections to measures or to request further information about measures.

7. Prior to the Uruguay Round the disputes under the various Codes, such as the Standards Code that preceded the SPS and TBT Agreements, were subject to different settlement processes from that of the GATT.
8. A number of products, those generally regarded as safe (GRAS), are traded without being subject to inspection and testing. Presumably these instances would not elicit challenge under the SPS Agreement and hence not be relevant for this discussion.
9. One could define an additional policy (Policy C*) that represented a domestic policy that is in line with an ideal standard that both accords with scientific evidence and takes into account the desirable development of the trade system. This concept is discussed in Josling, Roberts and Orden (IIE, 2002). Thus one could also estimate the trade impact of an improvement (Policy C to C*) of the multilateral standards to take into account individual country circumstances and to improve the functioning of the trade system. This is not pursued here as it is outside the scope of the estimation of the trade impact of the SPS Agreement.
10. Roberts *et al.*, (1999) and Beghin and Bureau (2001) discuss the literature in this area.
11. In effect one is commonly caught in a “Baptist-bootlegger” policy problem: those who gain economically from a regulation are likely to support it even if their motives are not coincident with the primary purpose of the regulation. Economic benefits can often stem from justified scientific decisions. The same is true in reverse. Environmental and social benefits can come from economic protection, and in fact may offset some of the costs of that protection. Such spill-over effects do not in themselves justify the SPS measure, but they should be taken into account in the calculation. Cost-benefit analysis can accommodate these factors.
12. An analogy might clarify this distinction. One can estimate the effects of a speed limit in reducing traffic accidents even though it is clear that without an effective system of enforcement the rules would not have much impact. The quantitative impacts of the SPS Agreement rely on the qualitative effects for their impact. Alternatively one can assign all the quantifiable effects to the threat of the dispute settlement mechanism, but this seems a little obscure.
13. Examples of this are given in section 5.3 below.
14. There is the risk of overstating the impact of the SPS Agreement as some of the “liberalisation” moves may have taken place in any case. The set of policy changes discussed below essentially precludes that by focusing on discussions within the WTO. What is not covered is any change that comes

- about through bilateral pressure outside the context of the WTO process but which may be influenced by SPS Agreement disciplines.
15. The graph is a summary of a conceptual model based on the insights in Snape and Orden, in Anderson, *et al* (2000). It is further developed in Josling, Roberts and Orden (2002).
 16. There may be cases where the domestic risks exceed trade gains from the first unit of imports, and others where free trade has no risk to domestic health. The case illustrated here are the more interesting ones where a trade-off is involved and where there can be tension between a “pure” trade (free trade) and a “pure” domestic (no trade) solution.
 17. Of course, even the simplest quantitative analysis must be based on some implicit model and a set of assumptions about what would be the situation in the absence of the policy in question. A “before-and-after” trade test assumes that the change in policy in question is the main shock to the trade in that commodity at that time and that no other changes in policy have occurred at the same time. In practice, other factors shift trade flows and affect market shares.
 18. If the import in question was banned and the trade data referred only to that product, the first section of the line would be on the horizontal axis. In practice, the trade category may also contain some products that are not banned.
 19. At the time of this study, the latest consolidated report that has been derestricted is G/SPS/GEN/204/Rev.1.
 20. Earlier, the distinction was made between “qualitative” effects of the SPS Agreement, such as the fact that the Dispute Settlement Understanding affords a more compelling reason to bring domestic measures into compliance than the Standards Code procedures for settling disputes, along with the real but un-quantifiable advantages of transparency, and the “quantitative” impacts of a move from one import protocol to another. Among the qualitative effects is the fact that countries may have changed their policies to bring them into compliance in the absence of any challenge in the SPS Committee. These cases could be uncovered only by detailed analysis of the decision-making process in each country and is unlikely to be reported comprehensively or accurately to the Committee.
 21. The total number of notifications is much larger. Existing policies did not have to be notified, but substantive changes in policy, or the introduction of restrictions where none were in use previously, did have to be reported. The WTO classification into food safety, animal health and plant health leaves

open the issues of zoonotic diseases that affect both animals and humans. With the outbreak of BSE in the UK and other countries and the associated concerns about TSEs more generally, cattle diseases now have a human health component. These are not included in the category of food safety issues considered here. Another issue that is not reflected in the table presented here is the dispute between the US and Canada and the EU over the use of hormones in beef production. This dispute went directly to the dispute settlement level rather than being discussed in the Committee.

22. The other two cases that reached a conclusion covered a range of commodities and were therefore less amenable to an illustrative exercise in quantification.
23. In addition, the import restrictions were supposed to have a rationale in guarding animal health. This aspect seems to have been less contentious and was settled quickly.
24. EU import statistics exclude intra-EU trade (and are labelled in the table as EU-15 extra imports).
25. This latter problem was not, apparently, raised in the SPS Committee.
26. There was apparently a slight increase in fish fillet exports to the EU from Kenya in 1999, though the EU import statistics show a decline in 1999 in imports of fish fillets from Kenya in that year. The decline of imports from Kenya could also reflect the pesticide problem referred to above.

Annex 1.

Summary of WTO Committee Interventions and Disputes in the Area of Health and Safety

No.	WTO Symbol	Respondent	Issue	Raised by / supported by	Actions / Results	International standard
1	G/SPS/GEN/106, G/SPS/13, G/SPS/GEN/137, G/SPS/W/107/Rev.1; raised in G/SPS/R/12, G/SPS/R/13, G/SPS/R/15, G/SPS/R/19	Australia	Restrictions on imports of sauces containing benzoic acid	Philippines / Malaysia	Bilateral consultations / Australian tolerance level modified June 2000	No
2	G/SPS/N/AUS/80, G/SPS/N/AUS/107, G/SPS/N/NZL/48; raised in G/SPS/R/11 and Corr.1, G/SPS/R/13, G/SPS/R/14, G/SPS/R/20	Australia and New Zealand	Import restrictions on cheese	European Communities, Switzerland	ANZFA conducted a risk assessment / Switzerland reported that a mutually satisfactory solution had been found	No
3	Raised orally in G/SPS/R/17	Belgium	Measures regarding canned tuna in oil	Philippines	EU offered bilateral consultations / No solution reported	—
4	G/SPS/N/BRA/13/Rev.1; raised in G/SPS/R/5, G/SPS/R/7	Brazil	Import requirements for wine	European Communities	Brazil offered bilateral consultations / No solution reported	No
5	G/SPS/N/CAN/8; raised in G/SPS/R/5	Canada	Importation of cheese	European Communities / Switzerland	Canada promised supporting scientific documentation and appointed an expert advisory committee / No solution reported	No
6	G/SPS/GEN/3, G/SPS/N/CZE/8; raised in G/SPS/R/6, G/SPS/R/7	Chile, Czech Republic, El Salvador, Honduras, Slovak Republic	Zero-tolerance for <i>Salmonella</i> in imported poultry products	United States	No solution reported	

No.	WTO Symbol	Respondent	Issue	Raised by / supported by	Actions / Results	International standard
7	G/SPS/N/CZE/16; raised in G/SPS/R/12, G/SPS/R/13, G/SPS/R/14, G/SPS/R/15, G/SPS/R/17	Czech Republic	Prohibition of poultry meat imports from Thailand	Thailand	Bilateral consultations. Czech measure lifted in October 1999	
8	G/SPS/GEN/203; raised in G/SPS/R/19	Egypt	Restrictions on canned tuna	Thailand	Egypt agreed to report back to the Committee in due course. Formal consultations requested by Thailand	
9	G/TBT/N/EEC/6, G/TBT/N/EEC/7; raised in G/SPS/R/25	European Communities	Regulations on genetically modified food and feed	United States / Argentina, Canada	No solution reported	
10	Raised orally G/SPS/R/22	European Communities	Directive 2000/42 on pesticide residues	Ivory Coast	No solution reported	
11	Raised orally G/SPS/R/22	European Communities	Legislation on the fungicide thiabendazole (TBZ)	Israel	No solution reported	
12	G/SPS/N/EEC/100; raised in G/SPS/R/21, G/SPS/R/22, G/SPS/R/25	European Communities	Import restrictions on soy sauce	Thailand on behalf of ASEAN Korea	No solution reported	
13	G/SPS/GEN/123 and Add. 1-4; raised in G/SPS/R/15, G/SPS/R/18, G/SPS/R/19	European Communities	Information on dioxin	None, information provided by the European Communities	No solution reported	
14	G/SPS/N/EEC/61; raised in G/SPS/R/12	European Communities	Measures on food treated with ionising radiation	United States	No solution reported	Codex General Standard for irradiated foods CAC/VOL XV Ed. 1 (CODEX STAN 106-1983)

No.	WTO Symbol	Respondent	Issue	Raised by / supported by	Actions / Results	International standard
15	G/SPS/N/EEC/62; raised in G/SPS/R/12	European Communities	Notification G/SPS/N/EEC/62 of emergency measures on citrus pulp	Brazil	Bilateral consultations. No solution reported	nO
16	G/SPS/N/EEC/58, G/SPS/GEN/88; raised in G/SPS/R/11, G/SPS/R/12	European Communities	Measure on establishments operating in the animal feed sector	United States / Argentina	No solution reported	
17	G/SPS/N/EEC/51, G/SPS/GEN/50, G/SPS/GEN/52, G/SPS/GEN/54, G/SPS/GEN/55, G/SPS/GEN/56, G/SPS/GEN/57, G/SPS/GEN/58, G/SPS/GEN/61, G/SPS/GEN/62, G/SPS/GEN/63, G/SPS/GEN/93; raised in G/SPS/R/10, G/SPS/R/11, G/SPS/R/12, G/SPS/R/13, G/SPS/R/14	European Communities	Maximum levels for certain contaminants (aflatoxins) in foodstuffs	Argentina, Australia, Bolivia, Brazil, The Gambia, India, Indonesia, Malaysia, Philippines, Senegal, Thailand, Canada, Colombia, Mexico, Pakistan, Paraguay, Peru, Philippines (ASEAN), South Africa, Turkey, United States, Uruguay	Bilateral consultations. Technical consultations. Maximum levels for some products and sampling procedures revised	No
18	G/SPS/N/EEC/4, raised in G/SPS/R/10, G/SPS/R/11	European Communities	Trade restrictions in response to cholera	Tanzania	WHO observer opposed the ban / Measures revised	Lists A and B of the OIE
19	Raised orally in G/SPS/R/15	European Communities	Ban on antibiotics in feed	United States, Australia, Canada	Raised orally but not modified because it did not have any effect on trade	

No.	WTO Symbol	Respondent	Issue	Raised by / supported by	Actions / Results	International standard
20	G/SPS/N/ISL/1; raised in G/SPS/R/18	Iceland	Iceland's notification on meat and meat products	Argentina	Iceland confirmed that meat could be imported without heat treatment, provided all necessary certificates and documents were submitted. / No solution	
21	G/SPS/N/KOR/44; raised in G/SPS/R/9/Rev.1, G/SPS/R/10, G/SPS/R/11, G/SPS/R/12	Korea	Import ban on frozen poultry	Thailand	Thailand's comments taken into account – measure amended	
22	W/DS5, W/DS20, G/SPS/N/KOR/9, G/SPS/W/27, G/SPS/W/41, G/SPS/W/43, G/SPS/GEN/40; raised in G/SPS/R/2, G/SPS/R/3, G/SPS/R/5, G/SPS/R/7, G/SPS/R/8, G/SPS/R/9/Rev.1	Korea	Shelf-life requirements	Australia, Canada, United States / Argentina, European Communities	Formal dispute settlement: US, Korea and Canada-Korea. US-Korea mutually agreed solution notified in July 1995. Canada-Korea notified a mutually satisfactory solution in April 1996.70	
23	WT/DS3, WT/DS41, G/SPS/W/64, G/SPS/W/66, G/SPS/GN/6; raised in G/SPS/R/2, G/SPS/R/5, G/SPS/R/6, G/SPS/R/7, G/SPS/R/8, G/SPS/R/9/Rev.1	Korea	Import clearance measures and practices	United States, Several delegations	Consultations under Dispute Settlement initiated	
24	G/SPS/N/MYS/6, G/SPS/N/SGP/7; raised in G/SPS/R/15	Malaysia and Singapore	Notifications related to dioxin	Switzerland	Problems with Malaysia resolved, reported to be close to solution with Singapore in July 1999	
25	G/SPS/GEN/220; raised in G/SPS/R/201	Panama	Restrictions on milk powder imports	European Communities	Panama offers bilateral consultations. No solution reported	
26	G/SPS/N/POL/14; raised in G/SPS/R/13	Poland	Requirements for imports of milk and milk products	European Communities	EC offered bilateral consultations. No solution reported	WHO recommendation on maximum weekly intakes of metal

No.	WTO Symbol	Respondent	Issue	Raised by / supported by	Actions / Results	International standard
27	Raised orally in G/SPS/R/6, G/SPS/R/7	Spain	Restriction on levels of copper and cadmium in imported squid	United States, Argentina	No solution reported	
28	G/SPS/N/CHE/14 and Corr.1, G/SPS/N/CHE/15, G/SPS/N/CHE/16; raised in G/SPS/R/12, G/SPS/R/13	Switzerland	Notifications regarding import requirements on meat and eggs	United States, Australia, Brazil, Canada, Chile, Hungary, India, Israel, New Zealand	No solution reported	No
29	G/SPS/N/USA/133; raised in G/SPS/R/13	United States	Notification G/SPS/N/USA/133 on refrigeration and labelling requirements for shell eggs	European Communities	Discussion on risk assessment. No solution reported	No
30	WT/DS100	United States	Measures Affecting Imports of Poultry Products	European Communities		

Issues in bold are those for which trade data is discussed above.

Data Source: WTO SPS Committee Reports and Notifications.

Annex 2.

Overview of the TBT and SPS Agreements¹

The TBT and SPS Agreements entered into force with the establishment of the World Trade Organization on 1 January 1995. They concern the application of technical measures, food safety and animal and plant health regulations. The following description of the TBT and SPS Agreements is intended as background information for the analysis in subsequent sections and is based on publicly available WTO information (WTO, 1998).

2.1 The Agreement on Technical Barriers to Trade (TBT)

In recent years, the number of technical regulations and standards adopted by countries has grown significantly. Increased regulatory policy can be seen as the result of higher standards of living worldwide, which have boosted consumers' demand for safe and high-quality products, and of growing problems of water, air and soil pollution which have encouraged modern societies to explore environmentally-friendly products.

Although it is difficult to give a precise estimate of the impact on international trade of the need to comply with different foreign technical regulations and standards, it certainly involves significant costs for producers and exporters. In general, these costs arise from the translation of foreign regulations, hiring of technical experts to explain foreign regulations, and adjustment of production facilities to comply with the requirements. In addition, there is the need to prove that the exported product meets the foreign regulations. The high costs involved may discourage manufacturers from trying to sell abroad. In the absence of international disciplines, a risk exists that technical regulations and standards could be adopted and applied solely to protect domestic industries.

The provisions of the GATT 1947 contained only a general reference to technical regulations and standards in Articles III, XI and XX. A GATT working group, set up to evaluate the impact of non-tariff barriers in international trade, concluded that technical barriers were the largest category of non-tariff measures faced by exporters. After years of negotiations at the end of

1. The material in this Annex was taken from the official WTO website: http://www.wto.org/english/thewto_e/whatis_e/eol/e/wto03/wto3_1.htm

the Tokyo Round in 1979, 32 GATT Contracting Parties signed the plurilateral Agreement on Technical Barriers to Trade (TBT). The Standards Code, as the Agreement was called, laid down the rules for preparation, adoption and application of technical regulations, standards and conformity assessment procedures. The new WTO Agreement on Technical Barriers to Trade, or TBT Agreement, has strengthened and clarified the provisions of the Tokyo Round Standards Code. The TBT Agreement, negotiated during the Uruguay Round is an integral part of the WTO Agreement. Before examining the Agreement in detail, it is necessary to define the meaning of "technical regulations", "standards" and "conformity assessment procedures".

2.1.1 Definitions

Technical regulations and standards set out specific characteristics of a product — such as its size, shape, design, functions and performance, or the way it is labelled or packaged before it is put on sale. In certain cases, the way a product is produced can affect these characteristics, and it may then prove more appropriate to draft technical regulations and standards in terms of a product's process and production methods rather than its characteristics *per se*. The TBT Agreement makes allowance for both approaches in the way it defines technical regulations and standards (Annex 1).

The difference between a standard and a technical regulation lies in compliance. While conformity with standards is voluntary, technical regulations are by nature mandatory. They have different implications for international trade. If an imported product does not fulfil the requirements of a technical regulation, it will not be allowed to be put on sale. In the case of standards, non-complying imported products will be allowed on the market, but then their market share may be affected if consumers prefer products that meet local standards such as quality or colour standards for textiles and clothing.

Conformity assessment procedures are technical procedures — such as testing, verification, inspection and certification — which confirm that products fulfil the requirements laid down in regulations and standards. Generally, exporters bear the cost, if any, of these procedures. Non-transparent and discriminatory conformity assessment procedures can become effective protectionist tools.

2.1.2 Objectives

The largest number of technical regulations and standards are adopted to aim at protecting human safety or health. Numerous examples can be given. National regulations that require that motor vehicles be equipped with seat belts

to minimise injury in the event of road accidents, or that sockets be manufactured in a way to protect users from electric shocks, fall under the first category. A common example of regulations whose objective is the protection of human health is labelling of cigarettes to indicate that they are harmful to health.

Regulations that protect animal and plant life or health are very common. They include regulations intended to ensure that animal or plant species endangered by water, air and soil pollution do not become extinct. Some countries, for example require that endangered species of fish reach a certain length before they can be caught.

Increased environmental concerns among consumers, due to rising levels of air, water and soil pollution, have led many governments to adopt regulations aimed at protecting the environment. Regulations of this type cover, for example, the re-cycling of paper and plastic products, and levels of motor vehicle emissions.

Many regulations aim to protect consumers through information, mainly in the form of labelling requirements. Other regulations include classification and definition, packaging requirements, and measurements (size, weight, etc.), so as to avoid deceptive practices.

Other objectives of regulations are quality, technical harmonization, or simply trade facilitation. Quality regulations — *e.g.* those requiring that vegetables and fruits reach a certain size to be marketable — are very common in certain developed countries. Regulations aimed at harmonizing certain sectors, for example that of telecommunications and terminal equipment, are widespread in economically integrated areas such as the European Union and EFTA.

2.1.3 *Divergent regulations - costs for exporters*

If a firm must adjust its production facilities to comply with diverse technical requirements in individual markets, production costs per unit are likely to increase. This imposes a handicap particularly on small and medium enterprises.

Compliance with technical regulations generally needs to be confirmed. This may be done through testing, certification or inspection by laboratories or certification bodies, usually at the company's expense.

Information costs include the costs of evaluating the technical impact of foreign regulations, translating and disseminating product information, training of experts, etc. Moreover, exporters are normally at a disadvantage vis-à-vis domestic firms, in terms of adjustments costs, if confronted with new regulations.

2.1.4 *Avoidance of unnecessary obstacles to trade*

Technical barriers to trade generally result from the preparation, adoption and application of different technical regulations and conformity assessment procedures. If a producer in country A wants to export to country B, he will be obliged to satisfy the technical requirements that apply in country B, with all the financial consequences this entails. Differences between one country and another in their technical regulations and conformity assessment procedures may have legitimate origins such as differences in local tastes or levels of income, as well as geographical or other factors. For example, countries with areas prone to earthquakes might have stricter requirements for building products; others, facing serious air-pollution problems might want to impose lower tolerable levels of automobile emissions. High levels of per capita income in relatively rich countries result in higher demand for high-quality and safe products.

The TBT Agreement takes into account the existence of legitimate divergences of taste, income, geographical and other factors between countries. For these reasons, the Agreement accords to Members a high degree of flexibility in the preparation, adoption and application of their national technical regulations. The Preamble to the Agreement states that "no country should be prevented from taking measures necessary to ensure the quality of its exports, or for the protection of human, animal, and plant life or health, of the environment, or for the prevention of deceptive practices, at the levels it considers appropriate". However, Members' regulatory flexibility is limited by the requirement that technical regulations "are not prepared, adopted or applied with a view to, or with the effect of, creating unnecessary obstacles to trade". (Article 2.2).

For a government, avoiding unnecessary obstacles to trade means that when it is preparing a technical regulation to achieve a certain policy objective — whether protection of human health, safety, the environment, etc — the negotiations shall not be more trade-restrictive than necessary to fulfil the legitimate objective. According to the TBT Agreement, specifying, whenever appropriate, product regulations in terms of performance rather than design or descriptive characteristics will also help in avoiding unnecessary obstacles to international trade (Article 2.8). For example, a technical regulation on fire-

resistant doors should require that the door passes successfully all the necessary tests on fire resistance. Thus it could specify that "the door must be fire resistant with a 30-minute burn through time"; it should not specify how the product must be made, *e.g.* that "the door must be made of steel, one inch thick". Avoidance of trade obstacles means also that if the circumstances that led a country to adopt technical regulations no longer exist or have changed, or the policy objective pursued can be achieved by an alternative less trade-restrictive measure, they should not be maintained.

Unnecessary obstacles to trade can result when (i) a regulation is more restrictive than necessary to achieve a given policy objective, or (ii) when it does not fulfil a legitimate objective. A regulation is more restrictive than necessary when the objective pursued can be achieved through alternative measures which have less trade-restricting effects, taking account of the risks non-fulfilment of the objective would create. Elements that members can use for risk assessment are available technical and scientific information, technology or end-uses of the products. Article 2.2 of the Agreement specifies that legitimate objectives include *inter alia*: national security requirements, prevention of deceptive practices, protection of human health or safety, protection of animal and plant life or health or the environment.

The obligation to avoid unnecessary obstacles to trade applies also to conformity assessment procedures. An unnecessary obstacle to trade could result from stricter or more time-consuming procedures than are necessary to assess that a product complies with the domestic laws and regulations of the importing country. For instance, information requirements should be no greater than needed, and the siting of facilities to carry out conformity assessment, and the selection of samples should not create unnecessary inconvenience to the agents (Articles 5.2.3 and 5.2.6).

2.1.5 *Non-discrimination and national treatment*

Like many other WTO Agreements, the TBT Agreement includes the GATT's Most Favoured Nation (MFN) and national treatment obligations. Article 2.1 of the Agreement states that "in respect of their technical regulations, products imported from the territory of any Member be accorded treatment no less favourable than that accorded to like products of national origin and to like products originating in any other country".

The MFN and national treatment provisions also apply to conformity assessment procedures. Procedures for conformity assessment shall be applied to products imported from other WTO Members "in a manner no less favourable than that accorded to like products of national origin and to like

products originating in any other country" (Article 5.1.1). This means that imported products must be treated equally with respect to any fees charged to assess their conformity with regulations. Similarly, Members must respect the confidentiality of information about the results of conformity assessment procedures for imported products in the same way as for domestic products so that commercial interests are protected (Articles 5.2.4 and 5.2.5).

2.1.6 Harmonization

The arguments for harmonization of technical regulations are well-known. Harmonization is necessary for the connection and compatibility of parts of products, *i.e.* telecommunications equipment or car parts. Lack of technical compatibility might otherwise generate barriers to international trade. For example, television sets suitable for the US market would be unsaleable in Europe due to divergences in colour broadcasting formats (NTSC vs PAL or SECAM). Similarly, in order to be marketable in the United Kingdom, French or German motor vehicles need to be adjusted to right-hand drive. The costs of designing, manufacturing, and delivering the same product in various configurations may be high.

Technical harmonization may increase consumer welfare. Within a harmonized regulatory environment, competition ensures that consumers have a wide and economically attractive choice of products. This presupposes, however, that harmonized standards do not go beyond fulfilling their legitimate regulatory objective, *i.e.* that they do not stifle innovation or otherwise discourage producers from introducing new products or product variants.

For many years, technical experts have worked towards the international harmonization of standards. An important role in these efforts is played by the International Standardization Organization (ISO), the International Electrotechnical Commission (IEC) and the International Telecommunication Union (ITU). Their activities have had major impact on trade, especially in industrial products. For example, ISO has developed more than 9,600 international standards covering almost all technical fields.

The Agreement encourages Members to use existing international standards for their national regulations, or for parts of them, unless "their use would be ineffective or inappropriate" to fulfil a given policy objective. This may be the case, for example, "because of fundamental climatic and geographical factors or fundamental technological problems" (Article 2.4). As explained previously, technical regulations in accordance with relevant international standards are refutably presumed "not to create an unnecessary obstacle to international trade". Similar provisions apply to conformity

assessment procedures: international guides or recommendations issued by international standardizing bodies, or the relevant parts of them, are to be used for national procedures for conformity assessment unless they are "inappropriate for the Members concerned for, *inter alia*, such reasons as national security requirements, prevention of deceptive practices, protection of human health or safety, animal or plant life or health, or protection of the environment; fundamental climatic or other geographical factors; fundamental technological or infrastructural problems" (Article 5.4).

Widespread participation in international standardizing bodies can ensure that international standards reflect country-specific production and trade interests. The TBT Agreement encourages Members to participate, within the limits of their resources, in the work of international bodies for the preparation of standards (Article 2.6) and guides or recommendations for conformity assessment procedures (Article 5.5).

Implementing and enforcing international standards may require technical and financial resources beyond the capabilities of developing countries. The TBT Agreement eases the impact of certain provisions whose full application would not be compatible with developing country Members' development, financial and trade needs. Moreover, in view of their particular technological and socio-economic conditions, developing country Members may adopt technical regulations, standards or test methods aimed at preserving indigenous technologies and production methods and processes compatible with their development needs (Article 12.4). Finally, developing country Members may request international standardizing bodies to examine the possibility of, and if practicable, prepare international standards for products of special trade interest to them.

2.1.7 *Equivalence*

The process leading to the preparation of an international standard can be lengthy and costly. Reaching consensus on technical details can take several years. The time gap between the adoption of an international standard and its implementation by national regulators can also be significant. For these reasons, negotiators introduced in the TBT Agreement a complementary approach to technical harmonization, known as equivalence. Technical barriers to international trade could be eliminated if Members accept that technical regulations different from their own fulfil the same policy objectives even if through different means. This approach, based on the European Community's 1985 "new approach" to standardization, is contained in Article 2.7 of the TBT Agreement.

Let us assume that country A, wishing to protect its environment from high auto emission levels, requires that cars be equipped with a catalytic converter. In country B, the same objective is achieved through the use of diesel engines in motor vehicles. Since environmental concerns are identical in the two countries — to reduce the levels of pollutants in the air — A and B can agree that their technical regulations are essentially equivalent. Thus, if car manufacturers in country A want to export to B, they will not be obliged to satisfy country B's requirement to fit diesel engines, and vice versa. This will eliminate the costs of adjusting production facilities to fulfil foreign regulations.

2.1.8 *Mutual recognition*

As explained in the previous section, demonstrating compliance with technical regulations may impede international trade. In particular, if products are to be exported to multiple markets, multiple testing may be required. Manufacturers can have difficulties in securing approval for their products on foreign markets, for instance because testing experts disagree on optimal testing procedures, from bureaucratic inertia, or even from manipulation of the testing process by protectionist groups. Whatever the reason might be, such diversity of procedures and methods significantly increases the costs of producers who sell in multiple markets.

One of the main difficulties exporters face is costly multiple testing or certification of products. These costs would be drastically reduced if a product could be tested once and the testing results be accepted in all markets. In practice, countries would agree to accept the results of one another's conformity assessment procedures, although these procedures might be different.

Article 6.3 of the TBT Agreement strongly encourages WTO Members to enter into negotiations with other Members for the mutual acceptance of conformity assessment results. The presence of a high degree of confidence in testing and certification bodies is, in fact, a prerequisite for the good functioning of an MRA. For this reason, Article 6.1 of the TBT Agreement recognizes that prior consultations may be necessary to arrive at a mutually satisfactory understanding regarding the competence of the conformity assessment bodies. It also points out that compliance by conformity assessment bodies with relevant guides or recommendations issued by international standardizing bodies can be regarded as an indication of adequate technical competence.

2.1.9 *Transparency*

Members must notify when two conditions apply: (1) whenever a relevant international standard or guide or recommendation does not exist, or the

technical content of a proposed or adopted technical regulation or procedure is not in accordance with the technical content of relevant international standards or guides of recommendations; and (2) if the technical regulation or conformity assessment procedure may have a significant effect on the trade of other Members (Articles 2.9 and 5.6). Draft regulations should be notified to the WTO Secretariat, if possible sixty days prior to their formal adoption so as to allow time for other Members to make comments. Regulations can also be notified ex-post whenever urgent problems of safety, health, environment protection arise (Articles 2.10 and 5.7). Local Governments at the level directly below central government are required to notify technical regulations and conformity assessment procedures which have not been previously notified by their central government authorities (Article 3.2 and 7.2).

Each WTO Member must, promptly after the Agreement enters into force for it, notify Members of the measures in existence or taken to ensure the implementation and administration of the Agreement and of any subsequent changes to them (Article 15.2). This written statement has to include, *inter alia*, all relevant laws, regulations, administrative orders, etc., to ensure that the provisions of the Agreement are applied; the names of the publications where draft and final technical regulations, standards and conformity assessment procedures are published; the expected length of time for the presentation of written comments on technical regulations, standards or conformity assessment procedures; and the name and address of the enquiry points established under Article 10.

Under Article 10.7, a Member who has reached an agreement with any other country or countries on issues related to technical regulations, standards or conformity assessment procedures which may have a significant effect on trade must notify other Members through the WTO Secretariat of the products to be covered by the agreement, and provide a brief description of the agreement.

The Code of Good Practice for the Preparation, Adoption and Application of Standards lays down disciplines in respect of central government, local government, non-governmental and regional standardizing bodies developing voluntary standards. The Code is open for acceptance by any of these standardizing bodies. Central government standardizing bodies must accept and comply with the provisions of the Code. A standardizing body wishing to adhere to, or withdraw from, the Code has to notify its acceptance of, or withdrawal from, the Code using the appropriate notification format (paragraph C of the Code). Standardizing bodies which have accepted the Code must notify at least twice a year the existence of their work programme, and where details of this programme can be obtained (paragraph J). Notifications have to be sent either directly to the ISO/IEC Information Centre in Geneva, or to the national

member of ISO/IEC or, preferably, to the relevant national member or international affiliate of ISONET.

As a complement to the obligation to notify, each WTO Member must set up a national enquiry point. This acts as a focal point where other WTO Members can request and obtain information and documentation on a Member's technical regulations, standards and test procedures, whether impending or adopted, as well as on participation in bilateral or plurilateral standard-related agreements, regional standardizing bodies and conformity assessment systems (Article 10). Enquiry points are generally governmental agencies, but the relevant functions can also be assigned to private agencies. The obligation to set up enquiry points is particularly important for developing countries. On the one hand, it is the first step by a developing country Member towards implementation of the TBT Agreement. On the other, developing countries can acquire information from other Members' enquiry points on foreign regulations and standards affecting products in which they have a trade interest.

Finally, transparency is also ensured through the existence of a TBT Committee. This allows WTO Members the possibility of consulting on any matters relating to the operation of the Agreement or the furtherance of its objectives. The Committee holds on average two to three meetings a year and, if necessary, can establish working parties to carry out specific functions.

2.1.10 The Code of Good Practice

Product standards can be prepared by governmental or non-governmental standardizing bodies. Over the years there has been a proliferation of private standardizing bodies. The Code of Good Practice, contained in Annex 3 of the WTO TBT Agreement provides disciplines, including those related to transparency, for the preparation, adoption and application of standards by all central governmental, local government, non-governmental and regional standardizing bodies.

The Code is open for acceptance to any standardizing bodies, whether central government, local government or non-governmental and regional standardizing bodies. The Code of Good Practice contained in Annex 3 of the WTO TBT Agreement seeks to bring all standards within its purview and provides for [and gives] transparency in the preparation, adoption and application of standards.

Members of the TBT Agreement are responsible for the acceptance and compliance with the Code of Good Practice by their central government standardizing bodies. Furthermore, they are required to take such reasonable

measures as may be available to them to ensure also that local government and non-governmental standardizing bodies within their territories, and regional standardizing bodies of which they are members, accept and comply with the Code.

2.1.11 *Technical assistance*

Any Member, and especially developing country Members, can request technical assistance from other Members or from the WTO Secretariat, on terms and conditions to be agreed by the Members concerned (Article 11). Requests for technical assistance received from least-developed Members have priority.

The coverage of technical assistance ranges from the preparation of technical regulations and the establishment of national standardizing bodies to the participation in international standardizing bodies and the steps to be taken by developing country Members to gain access to regional international conformity assessment systems. Technical assistance can help firms in developing country Members to manufacture products in accordance with the technical requirements existing in an importing country, thus ensuring that the products are accepted on the importing Member's market.

The WTO Secretariat's assistance to developing and least-developing countries on TBT matters often takes the form of regional or sub-regional seminars. Recently, technical assistance seminars have been organized jointly with other international and regional organizations.

2.2 The Agreement on the Application of Sanitary and Phytosanitary Measures (SPS)

During the Uruguay Round, agricultural negotiations strove to lower barriers that countries used to protect their domestic markets. Some countries feared, however, that the elimination of agriculture-specific non-tariff measures and the tariff reductions would be circumvented by disguised protectionist measures in the form of sanitary or phytosanitary regulations. This concern provided a major driving force which led negotiators to create a separate Agreement on the Application of Sanitary and Phytosanitary Measures (the "SPS Agreement"), in parallel with the major agricultural trade negotiations. The SPS and Agriculture Agreements are complementary. Both are in fact serviced by the same Division within the WTO Secretariat, *i.e.* the Agriculture and Commodities Division. Although the two Agreements are complementary, they differ in their design. The Agreement on Agriculture contains not only rule-based commitments, but also detailed, specific quantitative commitments to reduce protection and support over a well-defined implementation period.

The SPS Agreement does not impose any quantitative and legally-binding schedules of concessions. It is a set of rules, principles and benchmarks for WTO Members to ensure, among other things, that sanitary and phytosanitary trade measures are justified and do not constitute disguised restrictions on international trade.

Prior to the negotiation of the SPS Agreement, many food safety, animal and plant health regulations fell within the scope of the plurilateral 1979 Agreement on Technical Barriers to Trade (TBT). The "TBT Agreement", also called the "Standards Code", resulted from the Tokyo Round of multilateral negotiations. This Code permitted its limited number of signatories to introduce potentially trade-restrictive technical or sanitary and phytosanitary regulations in the pursuit of a "legitimate" objective, by invoking for example the protection of human, animal or plant health, the protection of the environment, animal welfare, religious considerations, and national security motives. In light of the reforms resulting from the agricultural trade negotiations, it was felt that the relationship between health protection and trade measures required more specific and in-depth coverage than the Standards Code provided.

Another potential loophole existed in the GATT 1947, under Article XX, General Exceptions, point (b). Under this clause, a measure could be exempt from other GATT provisions if it was "necessary to protect human, animal or plant life or health". There was some concern that in the absence of clearer and more detailed rules on the scope of measures permitted in this regard governments would be pressured to resort to sanitary barriers as a device to shield domestic industries from competition and to frustrate measures to liberalize trade in agriculture. This added further weight to the view that a self-contained agreement was needed in order to provide an expanded and clearer set of rules and principles regulating the application of sanitary and phytosanitary measures.

The SPS Agreement explicitly recognizes Members' sovereign rights to take measures which may restrict trade in order to implement national laws protecting human, animal or plant life or health. In line with the national treatment and m.f.n. principles of the GATT, such measures should apply to domestically-produced food or to local animal and plant diseases requirements, as well as to products coming from other countries, without unjustified discrimination among foreign sources of supply. The SPS Agreement recognizes, however, that the animal and plant disease status may differ among supplying countries, and this must be taken into consideration in the trade measures applied.

A major purpose of this Agreement is to reduce the possible arbitrariness of governments' decisions in the field of sanitary and phytosanitary measures by clarifying which factors should be taken into account when imposing health protection measures. In particular, measures taken to ensure food safety and animal and plant health should be based on the analysis and assessment of objective and accurate scientific data. At the same time, the SPS Agreement encourages consistent and transparent decision-making in determining an appropriate level of health protection. It requires that potentially trade-restrictive measures be applied for no other purpose than that of ensuring food safety and animal and plant health, and do not result in unjustified barriers to trade.

The Agreement defines its scope as a function of the objective of the measure, *i.e.* food safety and animal and plant health protection, as opposed to the type of measure. Consequently, products, processes and production methods are equally covered by its provisions. For example, slaughterhouses must comply with strict sanitary standards if the end-users are to receive safe meat products. Sanitary and phytosanitary measures apply to domestically-produced food or to local animal and plant diseases, as well as to products coming from other countries. Any discrimination among foreign suppliers must be justified on the basis of their animal and plant health conditions.

2.2.1 *Definition of SPS measures*

Sanitary measures are those related to human or animal health, and phytosanitary measures deal with plant health. The protection of fish and wild fauna, forests and wild flora are included in this definition while the protection, for example of the environment *per se* and animal welfare are excluded. The SPS Agreement further narrows this broad definition to a limited range of situations.

Protection of human or animal life or health from risks arising from additives, contaminants, toxins or disease-causing organisms in their food. Other human health risks, such as nutrition concerns, medical treatments, or car safety risks, do not fall within this category. Restrictions on imports of oranges containing a certain level of pesticide residues, or regulations applied to imports of poultry products containing salmonella, are examples of typical SPS measures. Veterinary drugs given to farm animals are also covered in so far as they may pose a threat to humans later consuming the meat.

- *Protection of human life from plant- or animal-carried diseases.* The threat of plant- or animal-carried diseases can be illustrated by measures taken to prevent, for example the spread of rabies or the

banning of imports of meat and meat products originating from foot-and-mouth disease regions.

- *Protection of animal or plant life from the introduction of pests, diseases or disease-causing organisms.* An import ban on live cattle originating from herds infected by Bovine tuberculosis would be one example of an SPS measure taken with the objective of avoiding the introduction and spread of the disease to domestic cattle. Another example might be restrictions on certain fruit from areas plagued by the fruit fly.
- *Protection of a country from damage caused by the entry, establishment or spread of pests.* The undesired importation of certain weeds can cause major damage in terms of crowding out domestic animal and plant species without necessarily causing a disease. A measure taken to protect a country from damage caused by the spread of such weeds would fall under this fourth category.

The SPS Agreement applies to any kind of measure which has one of the objectives identified above. Sanitary measures can take many forms, such as imposing specific product or process criteria, requiring products to come from disease-free areas, quarantine regulations, certification or inspection procedures, sampling and testing requirements, health-related labelling measures, setting of permissible maximum levels of pesticide residues, or permitted use of only certain additives in food. Some of these measures, like processing requirements or certification, may take place in the exporting country and not upon arrival in the importing country. However, although the measure may be imposed outside the territory of the importing country, its purpose must be to protect health within the territory of the importing country.

The SPS Agreement aims to overcome health-related impediments to market access by encouraging the "establishment, recognition and application of common sanitary and phytosanitary measures by different Members". The establishment of national sanitary and phytosanitary regulations that are consistent with international standards, guidelines and recommendations is referred to as "harmonization". The primary incentive for the use of common international norms is that these provide the necessary health protection based on scientific evidence and improve trade flows at the same time.

2.2.2 Harmonisation

International standard-setting organizations offer ready-made benchmarks for WTO Members to use in developing their regulations. Most WTO Members

are actively involved in those fora. Together with scientists and health experts, they participate in the development of internationally-agreed standards.

The SPS Agreement explicitly refers to three standard-setting international organizations whose activities are considered to be particularly relevant to its objectives: the FAO/WHO Codex Alimentarius Commission, the Office International des Epizooties, and the international and regional organizations operating within the framework of the FAO International Plant Protection Convention (IPPC). These organizations are often referred to as the "Three Sisters". They are observers and important contributors to SPS Committee meetings. They can also be called in as experts to give advice to WTO dispute settlement panels.

The Codex Alimentarius Commission, based in Rome, is a subsidiary organ of the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO). The SPS Agreement designates Codex as the authority for all matters related to international food safety evaluation and harmonization. Several Codex activities relate to the evaluation of food-borne hazards, although Codex also develops non-health related technical food standards, like nutrition, composition, and quality standards. Codex develops scientific methodologies, concepts and standards to be used worldwide for food additives, microbiological contaminants, veterinary drug and pesticide residues to be used worldwide. It has also developed useful references like the "General Principles on Food Hygiene" and the "General Principles on Meat Hygiene".

The Office International des Epizooties (OIE) is the world animal health organization, based in Paris. The OIE's "International Animal Health Code" and "Aquatic Animal Health Code" offer international animal health standards and procedures that are periodically amended to take into account the latest scientific research. The OIE develops manuals on: animal diseases; standards for diagnosis, vaccination, epidemiological surveillance, disease control and eradication; procedures such as disinfection and certification; and laboratory equipment. It shares scientific information with its member countries and identifies countries that are free of a particular disease.

The International Plant Protection Convention (IPPC), based in Rome, is a subsidiary body of the FAO. Its main objectives are to take specific actions to prevent the introduction and spread of plant pests, and to promote measures for pest control, including information exchange. It has developed region-specific lists of plant pests. The IPPC develops international plant import health standards, principally on quarantine pests, a "Glossary of Phytosanitary Terms", basic principles governing phytosanitary laws and regulations, and harmonized

plant quarantine procedures. The IPPC guidelines for pest risk assessment provide a scientific means for evaluating risks before governments determine the appropriate level of plant protection.

Before the entry into force of the WTO, international standards, guidelines, recommendations and other advisory texts could be adopted by governments on a voluntary basis. Although these norms remain voluntary, a new status has in effect been conferred on them by the SPS Agreement. A WTO Member adopting such norms is presumed to be in full compliance with the SPS Agreement. A Member may decide to establish protection levels that exceed international standards if there is a scientific justification or if it determines that the standard does not meet its acceptable level of protection. When a Member decides not to use an international standard, however, its measure must be based on a proper risk assessment and is subject to a range of other conditions set out in detail in Article 5 of the SPS Agreement.

2.2.3 *Equivalence*

The SPS Agreement recognizes that there may be varied ways of ensuring food safety or animal and plant health protection in different countries, but provides that WTO Members should accept each other's regulations as equivalent whenever the same level of human, animal or plant health protection is achieved. Thus, mutual recognition agreements acknowledging the equivalence of health protection measures enforced by different approaches are negotiated on a bilateral or regional basis, and can help, for example, overcome any lack of international standards.

In the negotiation of such mutual recognition agreements, the exporting country has the burden of demonstrating that its domestic sanitary requirements are at least as good as those of the importing country in that they achieve the same level of health protection. In doing so, the exporter must supply relevant information that the importer may need to form its judgement, including access to its health authorities, facilities, equipment and procedures. If the exporter's measures are found to provide the same level of health protection, they should be accepted as equivalent by its trading partners.

The concept of equivalence requires countries to develop confidence in their trading partners' health and safety standards without compromising their own health objectives. Bilateral consultations and the sharing of information are essential to the successful negotiation of equivalence agreements. For example, if Country A is concerned with foot-and-mouth disease in Country B, the latter must cooperate by letting experts from Country A visit its farm operations and inspect its meat processing facilities.

2.2.4 *Risk assessment*

Members must establish SPS measures on the basis of an evaluation of the actual risks involved. The parameters used in such risk analyses commonly include substantial safety margins as a precautionary measure. If a country is concerned about the residues from a pesticide on imported fruit, it has two alternatives: either use an existing international standard to justify its decision, or conduct its own risk assessment in order to evaluate the food-borne risks and their possible consequences. The SPS Agreement encourages the use of a systematic approach to risk assessment. All factors considered, as well as the procedures and decisions used by a Member in evaluating the food-borne risks or threats to animal or plant health, must be made available to other Members upon request. Risk assessments may be qualitative or quantitative. Quantitative risk assessment in particular can be a costly process requiring expertise, and an adequate sanitary infrastructure, and this may not always be within the reach of countries with budget constraints and scarce resources. This implies that there are significant advantages in adopting established international standards.

WTO Members have the right to determine what they consider to be an appropriate level of health protection. However, this level should be a reflection of health protection, not a means to protect domestic producers from competition. In particular, where the health risks are similar, the acceptable level of protection should normally be similar, if any distinction would result in discrimination or a disguised restriction on international trade.

An acceptable level of risk can often be ensured in alternative ways. Once the government has determined its appropriate level of sanitary and phytosanitary protection, it should not choose a measure that is more stringent and trade-restrictive than necessary. A complete ban on imports of wheat may be one way to limit pesticide residue levels causing certain health risks to consumers. However, the importing country's obligation under the SPS Agreement is to consider alternative measures to the ban, bearing in mind not only its health protection objectives but the potential trade effects of the measures as well. Random testing for maximum residue levels at the port of entry may be a less trade-restrictive measure than a complete ban of wheat imports, and wheat complying with the relevant residue requirements could safely be distributed on the domestic market.

The SPS Agreement allows Members to take precautionary measures in cases of emergency and when sufficient scientific evidence does not yet exist to support definitive measures. For example, following the BSE scare in 1996, and in the absence of sufficient scientific evidence, several emergency bans were immediately introduced. However, these emergency measures should only be

provisional. Within a reasonable period of time, governments must seek the additional information needed to carry out a more objective assessment of the risks involved, and review their measures accordingly.

2.2.5 *Disease free areas*

Governments should recognize disease- or pest-free areas which may not correspond to political boundaries, that is, areas which might be only part of a country or might cover parts of several countries. Product requirements should be adapted to suit those regions. For example, animal diseases such as foot-and-mouth disease may be limited only to a geographical area in a country. In the past, importing countries often required the whole exporting country to be free from a disease before it could be granted access. Today, products coming from disease-free areas within a given country should be considered on the basis of their disease status, not that of the rest of the country.

The burden rests on the exporting Member (as with the principle of equivalence above) to demonstrate that given areas within an exporting country are free from a disease. The exporting country must allow experts from the importing country to inspect the area concerned and the controls in place to check the disease from spreading. Recently, the Office International des Epizooties, the competent organization for animal health concerns, has developed a procedure to declare a country, or a region, as free from certain diseases.

2.2.6 *Transparency*

Each WTO Member must designate a national central government authority as responsible for the implementation of the notification procedures. Whenever a government intends to put into effect a new sanitary or phytosanitary regulation, or modify an existing law that may restrict trade and differs from an international standard, it must notify the WTO Secretariat. A list of national notification authorities and their addresses is regularly circulated by the WTO Secretariat.

Governments must also set up offices, called "enquiry points", whose task is to provide to their trading partners any information requested on the application of food safety and animal and plant health regulations, the existence of equivalence agreements, or information on risk assessment procedures and decisions. The enquiry point should be able to answer any reasonable question regarding SPS measures, and should be able to provide the texts of the new or modified regulations that were notified to the WTO, as well as other relevant documents.

Members must inform their trading partners, through the WTO Secretariat, about new or modified national sanitary and phytosanitary regulations which could affect trade and which differ from international standards. Upon receipt of the notification, the Secretariat distributes it to all WTO Members within the shortest possible time. Interested Members can obtain the complete text of the corresponding (proposed) regulation directly from the designated enquiry point or any other agency responsible for distribution, as specified in the notification document. In line with the recommendations of the SPS Committee, notifications should be sent to the WTO Secretariat in advance of the date of entry into force of the regulation, in order to give other Members at least 60 days to submit their comments to the country issuing the regulation. The notifying Member may, if necessary, extend deadlines so that more inputs can be considered during this process and the regulation amended, if necessary, in light of the comments received. During the first three years of operation of the Agreement, approximately 800 notifications were submitted.

There are standardized formats for notifying sanitary and phytosanitary regulations. The notification must specify the competent authorities and the agency responsible for promulgating the regulation. The products covered must be clearly identified. The official title together with a brief abstract of the regulation must be provided, as well as an indication of the language in which the document is available. The objective of the measure determines whether a given measure is subject to the SPS Agreement or another WTO Agreement. Members must indicate whether an international standard exists, whether a measure is based on such a standard, and if not, how it deviates from it. For transparency purposes, full reference details concerning the publication where notice will appear must be indicated, as well as the agency responsible for handling comments, if this is different from the designated national enquiry point.

Sometimes a single regulation addresses two different objectives: a technical (*e.g.* quality or labelling) and a sanitary or phytosanitary objective. In those circumstances, the regulation is notified twice, using the appropriate formats of the Committee on Technical Barriers to Trade and the Committee on Sanitary and Phytosanitary Measures, respectively. For cross-reference purposes, the elements belonging to each category are clearly differentiated in the description of the regulation. In general, measures related to human disease control, nutritional claims, food packaging and food quality aspects are subject to the TBT Agreement, unless they concern diseases which are food-borne or carried by plants or animals.

Unexpected disease outbreaks may lead to situations in which governments take emergency measures. In this circumstance, a notification must be made

upon implementation, using the special format developed for this purpose. Under this format, the nature of the urgent problem must be clearly stated, and a period for its application must be identified. Comments may still be received from WTO Members concerned. Eventually, an emergency measure must be supported by an appropriate risk assessment and the government must stand ready to provide a scientific justification for maintaining the measure.

2.2.7 *Developing countries*

Developing country Members have the "right to delay application of the Agreement with regard to measures affecting imports". Compliance with SPS rules and principles was delayed for five years following the entry into force of the Agreement for least-developed countries (until 2000), and two years for other developing countries (until 1997). This delay was intended to give developing countries the time necessary to adopt international standards or otherwise develop their national sanitary and phytosanitary regulatory framework on the basis of scientific principles. During this grace period, their sanitary and phytosanitary measures directly or indirectly affecting trade flows cannot (or, for Members whose grace period has expired, could not) be challenged under WTO rules. The SPS Committee may grant longer time-frames for compliance with some or all of the obligations upon special request.

The Agreement calls for assistance to developing country Members to enable them to strengthen their food safety and animal and plant health protection. These countries may ask for technical assistance during SPS Committee meetings. Members are encouraged to provide technical assistance on a bilateral basis or through other international organizations. Such assistance can be in the area of processing technology, research or infrastructure development, and may take the form of technical advice, expertise, financial assistance or procurement of adequate equipment. OIE technical assistance activities include development of animal health and epidemiology networks, programmes for eradication of foot-and-mouth disease, and information exchange. Several FAO programmes focus on food safety and Codex standards, as well as the assessment of food control systems. Other FAO programmes address needs in establishing plant protection structures. Technical assistance is also provided at an informal level when governments seek additional information or legal advice directly from the WTO Secretariat. The Secretariat regularly assists Members in developing an effective understanding of SPS provisions, including the notification procedures, and helps them to appreciate their roles, responsibilities, rights and obligations in the context of this Agreement.

A number of regional seminars in Asia, Latin America, Africa, Eastern Europe and the Middle East have been carried out by the WTO Secretariat in cooperation with Codex, OIE and IPPC. At the invitation of national governments or private associations, the Secretariat also participated in various workshops and seminars related to the SPS Agreement. The SPS Agreement also features regularly on the agenda of the WTO Training Courses. Codex is involved with several cooperation projects worldwide and has carried out numerous workshops related to the implementation of the SPS Agreement and Codex standards. As part of its training strategy, the OIE addresses activities such as harmonization of the registration of veterinary drugs, training in epidemiology and control of vaccination, disease information and control, surveillance systems, and risk assessment methods. The FAO provides considerable training in the development of plant protection systems.

2.2.8 *Dispute settlement*

The SPS Agreement is subject to the unified WTO dispute settlement procedures. A specific food safety or animal or plant health requirement may be challenged, for example, if it restricts trade and if the scientific evidence does not appear to support its implementation. Bilateral consultations are encouraged so that countries have a chance to solve their disagreement through discussions and find a mutually acceptable solution. However, if no satisfactory solution results, the complainant(s) may request, following a 60-day formal consultation period, the establishment of a panel.

During the course of the deliberations over a sanitary or phytosanitary trade measure, the panel may seek advice on scientific or technical issues, as it sees appropriate. Such advice can be sought from individual experts, a group of technical experts, or a relevant international organization. The first three panels considering disputes under the SPS Agreement have sought advice from several individual experts as well as the relevant standard-setting body.

Some of the international standard-setting organizations in the SPS area, such as the IPPC, have their own procedures through which countries can settle their differences. The SPS Agreement does not limit the right of governments to use these dispute settlement procedures rather than those of the WTO. Similarly, Members of a regional organization, such as NAFTA, could choose to take SPS-related matters to that organization's dispute settlement mechanisms, or alternatively, to bring them to the WTO dispute settlement system.

Since 1 January 1995, several complaints involving sanitary and phytosanitary measures have been formally raised in the WTO. These include:

inspection procedures for fresh fruits; shelf-life regulations for processed meat products; bottled water requirements; a ban on imported salmon; a ban on the use of growth-enhancing hormones in meat production; and restrictions on poultry processing methods.

2.2.9 *SPS Committee*

The SPS Committee is the forum for discussion, information exchange and, where appropriate, resolution of sanitary and phytosanitary issues. It is open to all WTO Members, who often send capital-based food safety and animal and plant health experts to attend the meeting. Observer status has been granted not only to the Office International des Epizooties (OIE), the joint FAO/WHO Codex Alimentarius Commission (Codex), and the International Plant Protection Convention (IPPC), but also to other intergovernmental organizations active in this area, including World Health Organization (WHO), Food and Agriculture Organization of the United Nations (FAO), United Nations Conference on Trade and Development (UNCTAD), International Trade Centre (ITC) and the International Standards Organization (ISO).

The Committee reviews the implementation of the SPS Agreement. It periodically receives updates on new or proposed sanitary and phytosanitary regulations and procedures that explicitly address Members' obligations stemming from the SPS Agreement. It considers information provided by governments regarding their national regulatory procedures and their institutional infrastructures. The Committee is also being informed of the initiatives undertaken by Members to negotiate equivalency agreements on sanitary and phytosanitary matters with their trading partners.

Members are encouraged to bring specific trade concerns to the attention of the Committee. These concerns may be related to specific notifications or trade measures and sometimes serve as warning signals to potential disputes. The SPS Committee also considers issues of a more general concern. It provides a forum for multilateral consultation. Issues raised during past meetings include regulations restricting imports of cheese made of unpasteurized milk; regulations imposing government-mandated shelf-life period for heat-treated milk; restrictions on levels of copper and cadmium in imported squid; and zero-tolerance levels for salmonella in imported poultry products. Considerable discussion has focused on bovine spongiform encephalopathy (BSE or "mad cow disease") and related trade measures. The Committee has also discussed the information exchange procedures of Members, and procedures commonly followed in the establishment of maximum residue levels.

The SPS Committee is specifically mandated to develop a procedure to monitor the use of international standards, guidelines and recommendations. In October 1997, the Committee agreed, on a provisional basis, to examine those international norms which Members identify as of particular importance. The Committee may subsequently bring any identified problems to the attention of the relevant standard-setting body.

The SPS Agreement specifically seeks to reduce arbitrariness in decision-making processes so that the level of acceptable risk is determined in the most objective manner, and sanitary and phytosanitary measures are not used for trade protectionism. In this respect, the Committee is developing guidelines to further the practical implementation of a provision related to the objective of achieving consistency in the application of the concept of the appropriate level of protection for human, animal or plant health.

The effective implementation of the SPS Agreement requires close contact and coordination with technical international organizations in the field of sanitary and phytosanitary protection, and in particular with the "Three Sisters". International organizations play an important role in the implementation of the objectives of the Agreement. They are active participants and contributors to the work of the Committee.

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