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A First Step in Understanding Technical Barriers to Agricultural Trade

INTRODUCTION

It is widely recognized that technical barriers to trade create many obstacles to the international exchange of agricultural goods. Such barriers exist in most industries, but are particularly important in the trade of primary and processed agricultural products. Agricultural exporters are often required to demonstrate that native species or human health are not endangered by their products, while simultaneously satisfying the nutrition, packaging and labelling standards of the importing country. Policy makers acknowledge that the recent prominence of technical barriers is due in part to growing demands in the developed world for enhanced food safety and for protection of the earth's resources. However, they also recognize that the disingenuous use of technical measures can be a non-transparent means of providing protection for domestic producers.

The proliferation of such measures in recent years was a catalyst for the negotiation of new disciplines on their use in the Uruguay Round Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) and the Agreement on Technical Barriers to Trade (TBT Agreement). Both stipulate that technical measures should not constitute a disguised restriction on international trade, or be applied in an arbitrary or discriminatory manner. Additionally, a country should not enforce an SPS measure (related to protection of plant, animal and public health) without sufficient scientific evidence about the risks posed by an imported product and how the measure mitigates that identified risk (GATT Secretariat, 1994).

While having the new discipline on technical barriers in place is potentially constructive, their formal existence does not guarantee that greater discipline will be imposed on international use of technical trade barriers. When importing countries resist unilaterally bringing their measures into conformity with the SPS and TBT Agreements, legal scholars conclude that a strategy to encourage compliance may be to 'expose them to the light of day, on the premise that transparency and the attendant publicity will increase the costs of self-serving or scientifically dubious decision making and thus discourage it' (Sykes, 1995, p. 86).

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In this context, further study of technical barriers can clearly contribute to strengthening the disciplining role of the recent Uruguay Round agreements. Economic analysis can advance understanding on a wide breadth of issues including the net costs of technical trade barriers; sources of international regulatory heterogeneity; the benefits of harmonization of standards; least-trade restrictive measures; and distinctions between justifiable and unjustifiable technical barriers. However, this analysis has been slow to develop (Sumner and Lee, ch. 15 in Orden and Roberts, 1997).

One reason for the dearth of literature is that confusion over the basic definition of the term 'technical barrier to trade' has thwarted advancement towards the basic goal of identifying the characteristics that distinguish these measures from other non-tariff barriers. This absence of a *lingua franca* for technical barriers has been an important impediment to analysis, hampering development of conceptual foundations upon which further economic analysis can build. Furthermore, efforts to expand knowledge about technical barriers by means of empirical studies have been stymied by the lack of systematically collected data on the incidence of these measures (Ndayisenga and Kinsey, 1994). Therefore most of the empirical literature on technical barriers consists of case studies that together provide only fragmentary evidence of the costs to the international economy.

This paper represents a first step in advancing understanding of technical barriers as a distinct class of trade-restricting measures. It proposes an explicit definition of technical barriers followed by discussion of measures that would consequently be included or excluded from this sub-set of non-tariff barriers. Next the paper features a presentation and discussion of the results from a 1996 US Department of Agriculture (USDA) survey of technical barriers to US agricultural exports, one of the few institutional efforts to systematically collect information on the incidence and impact of these barriers. The final section proposes a general framework for taking the next steps in analysing technical barriers.

WHAT ARE TECHNICAL BARRIERS?

There are differing views on what constitutes a technical barrier. Earlier literature recognized sanitary and phytosanitary (SPS) measures, standards and an amorphous array of measures that delayed entry of products at the border, as technical barriers; more recently, technical barriers have been viewed as a subset of environmental regulations (Baldwin, 1970; Hillman, ch. 1 in Orden and Roberts, 1997). For this paper, technical barriers are defined as legally binding regulations and standards governing the sale of products in national markets, where the prima facie objective is the correction of market inefficiencies stemming from externalities associated with the production, distribution and consumption of the relevant products. This definition comprises regulations that have as their apparent primary objective the correction of information asymmetries (which includes standards of identity, standards of measurement and attribute or quality identification), or those aimed at correction of production externalities (which includes SPS measures and global commons measures),

or ones aimed at correction of consumption externalities (which includes packaging measures). The words 'prima facie' in the definition acknowledge the existence of regulatory capture, which occurs when domestic groups with a vested interest in limiting competition successfully lobby for measures that potentially represent a net cost to society.

This view of technical barriers is both broader and narrower than others found in the literature. The above definition excludes incentive measures such as subsidies and taxes, even though they may have been established to address environmental externalities (Figure 1). It is broader than other definitions of technical barriers in two respects. Technical barriers (especially in recent years) have been regarded as nearly synonymous with SPS measures; the above definition includes attributes such as organic production standards or shelf-life restrictions designed to ensure product freshness. Secondly, the definition comprises more than just a small set of border measures, such as import bans, which often dominate discussion of agricultural technical barriers; it also includes measures that range from input standards to information remedies (Roberts *et al.*, forthcoming).

The previous discussion implicitly notes two features of technical barriers that distinguish them from other trade policy instruments. Unlike conventional

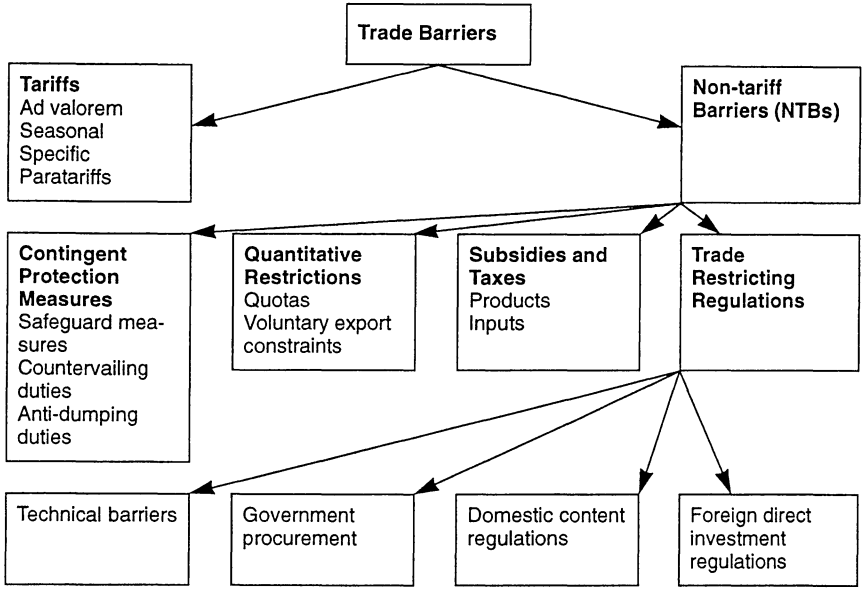

FIGURE 1 *Tariff and non-tariff barriers to trade*

trade measures, such as tariffs and quotas, the public goods dimension of technical barriers implies that these measures can sometimes be economically efficient. Also a large class of technical barriers, sanitary and phytosanitary regulations, are not most-favoured-nation policy instruments: that is, the conditions for entering the importing country's market are not identical for all trading partners. The bilateral nature of these measures can beget product differentiation and create market power in trading arrangements.

DATA SOURCES

USDA recognized the need for an assessment of technical barriers faced by US agricultural exporters as these barriers began to appear with increasing frequency at the centre of international commercial disputes. In lieu of a formal statistical survey, such as that used by the European Communities (Sykes, 1995), USDA began its assessment of technical barriers with a survey of experts from six economic and regulatory agencies within the Department, supplemented by a survey of representatives from selected producer groups. This assessment capitalized on the internal multidisciplinary expertise of the Department, and focused on foreign technical measures for which remedies were potentially available under the new Uruguay Round agreements (Roberts and DeRemer, 1997).

Field personnel from USDA's Foreign Agricultural Service (FAS), who collectively cover 132 countries representing 98 per cent of the 1996 US agricultural export market, as well as representatives from producer groups which cosponsor overseas market development activities with FAS, were asked to identify foreign technical barriers to US exports. They were also asked to provide estimates of annual US export revenue losses caused by each identified measure (estimated trade impact). This information was reviewed by USDA's four regulatory agencies: the Animal and Plant Health Inspection Service (APHIS), the Food Safety and Inspection Service (FSIS), the Agricultural Marketing Service (AMS) and the Grain Inspection, Packers and Stockyards Administration (GIPSA). Scientists and regulatory officials in these agencies deleted measures that were judged to have potential scientific justification (for SPS measures) or that were otherwise in conformity with the new trade agreement disciplines (for other technical measures).

The survey results therefore represent a cross-section of *questionable* technical barriers that were recently proposed or enforced in June 1996 which decrease, or potentially decrease, US agricultural exports to the specified market. The barriers are considered questionable because they appear to violate one or more principles of the new GATT trade agreements. This survey design permitted sharp focus on foreign measures that affected US commercial agricultural interests and for which provisions of recent trade agreements potentially offered some prospect of resolution in favour of greater access to foreign markets.

SURVEY RESULTS

The 1996 USDA survey identifies 303 questionable technical barriers to US agricultural exports with a total estimated trade impact of $4907.89 million. Trade impact is estimated as the loss in producer revenue resulting from a restricted quantity at a fixed world price. The average estimated trade impact per barrier is $16.20 million. Table 1 shows a distribution of barriers by their estimated impact on trade. The survey identified very few individual barriers with large estimated trade impacts. There are only 18 barriers (6 per cent) with effects of at least $50 million per barrier. The majority of barriers have small estimated trade impacts. More than 38 per cent of them have an impact between $5 million and $49.99 million and 55 per cent have estimated effects of less than $5 million per barrier.

TABLE 1 *Estimated trade impact of barriers in the 1996 USDA survey*

Estimated trade impact per barrier	Number of barriers
at least $50 million	18
$25–$49.99 million	19
$10–$24.99 million	51
$5–$9.99 million	48
$1–$4.99 million	97
$0.5–$0.99 million	22
$0.1–$0.49 million	29
less than $0.1 million	19
Total	303

Over 85 per cent of the barriers identified by the survey are questionable SPS measures. Other technical barriers, disciplined under the TBT Agreement, were small in both number and average trade impact. The average trade impact per barrier is $17.02 and $9.00 million for SPS and TBT barriers, respectively (Table 2). The average trade impact of barriers in the Multiple or Other Provisions of GATT 1994, which, for example, includes some grading and standards issues that are disciplined by Article XI of the GATT Agreement, is $15.01 million.

Technical barriers are categorized by the type of market restriction being imposed (Table 3). Market access barriers are import bans denying any exports of a US product to a country. The estimated trade impact is the potential value of US exports that could be sold if the ban was rescinded and the product gained access. Market expansion barriers are measures that limit, but do not preclude, US exports of a certain product to a country. The estimated effect is again the value of increased trade that might result from their removal. Market retention barriers are those measures under consideration by a foreign government that may adversely affect US exports if enacted. The estimated trade

TABLE 2 *WTO legal classification and regulatory goals for barriers identified in the 1996 USDA survey*

WTO classification Regulatory goal	Number of barriers	Estimated trade impact ($ million)	Average trade impact per barrier ($ million)
SPS Agreement*	260	4 424.73	17.02
Plant health		2 516.79	
Animal health		868.82	
Food safety		2 288.00	
Natural environment		0.51	
TBT Agreement*	27	243.06	9.00
Quality		202.72	
Compatibility		41.04	
Multiple or Other Provisions of GATT 1994	16	240.09	15.01
Totals	303	4 907.88	16.20

Note: *the sum of the estimated trade impact for the regulatory goals is greater than the estimated trade impact for the agreement because an issue may have multiple regulatory goals.

impact is the value of current export revenue that they threaten and could potentially be lost.

Of the 19 barriers with the largest impact, 12 are classified as market access or expansion barriers, while seven are classified as market retention barriers. The average trade impact per barrier in the 19 cases is approximately ten times larger than the average impact for all barriers in the survey. The 12 market access and expansion barriers, with effects of at least $50 million, account for 60 per cent of the $3732.21 million in estimated total impacts attributed to all barriers (calculated by summing rows 1 and 2 in Table 3). If these 12 barriers alone were absent, US agricultural exports might increase by 3.2 per cent from the 1996 level. The seven largest market retention barriers account for 70 per cent of the $1175.67 million in total impact attributed to all market retention barriers in the survey. If the seven largest market retention barriers are not resolved and the restrictions take effect, US exports could decrease by 1.2 per cent from 1996 levels.

Over half of the barriers with estimated trade impacts between $5 and $49.99 million and less than $5 million are classified as restricting market expansion. Barriers with $5–$49.99 million in estimated impact account for 33 per cent, while the smallest 174 barriers account for less than 3 per cent, of the total for all barriers in the survey.

When the individual countries identified as applying questionable barriers are divided into six geographic regions, by far the largest number of barriers (92) is identified in the Americas (Table 4). The largest estimated trade impact

TABLE 3 *Type of market restriction from barriers identified in the 1996 USDA survey*

Type of market restriction	Barriers with at least $50 million in estimated trade impact		Barriers with $5–$49.99 million in estimated trade impact		Barriers with less than $5 million in estimated trade impact	
	No.	Estimated trade impact ($ million)	No.	Estimated trade impact ($ million)	No.	Estimated trade impact ($ million)
Access	2	200.00	40	449.50	66	73.15
Expansion	10	2 049.60	64	848.13	90	111.83
Retention	7	828.61	17	316.39	18	30.67
Totals	19	3 078.21	121	1 614.02	174	215.65

Note: *the sum of the number of barriers is greater than the sum reported above as some barriers may impose more than one type of market restriction.

($2325.3 million) and average trade impact per barrier ($29.81 million) is found in the countries of East Asia. The Middle Eastern countries impose the smallest number of barriers (11) with the lowest total estimated trade impact ($39.6 million).

Of the 18 barriers with the largest estimated trade impact, eight are imposed by countries in East Asia, six are European, and four are imposed by countries in the Americas. There are no barriers in this category for Africa, Oceania or the Middle East. Barriers with the estimated trade impacts less than $50 million are found in all six of the regions. A similar number of barriers with estimated trade impacts from $5 million to $49.99 million are imposed by the countries of the Americas (32 barriers) and East Asia (34 barriers), but the questionable barriers in East Asia account for a higher proportion of the total estimated trade impact. Of the 167 barriers with estimated trade impacts less than $5 million, 34 per cent stem from the Americas, 23 per cent are European, while countries in East Asia account for a smaller proportion of the total impact.

When specific products are considered, six of the 18 barriers with the largest effect apply to broadly defined product categories: further processed foods (four barriers), all agricultural, fish and forestry products (one barrier), and all animal products (one barrier). In addition, five of the 18 barriers are applied to grains with three specifically focused on wheat. The most prevalent product categories facing questionable barriers with $5–$49.99 million in estimated trade impact are fruit (20 barriers), grains (19 barriers) and further processed foods (12 barriers). Of the 167 barriers where the effect is less than $5 million, many tend to be applied to very specific commodities, such as live crayfish or exotic meat. When grouped together by product category, the largest number of barriers in this group is applied to fruit (35 barriers), followed by further processed foods (22 barriers), vegetables (17 barriers) and poultry (14 barriers).

Table 5 shows a regional product cross-tabulation for those cases where more than 10 barriers or $50 million in estimated trade impact is identified within one of the regions. This will highlight examples where there are a smaller number of questionable barriers with larger estimated trade impacts and cases where there are many questionable barriers of little overall significance. The results show that the pattern of questionable trade barriers follows the broad pattern of trade flows for US agricultural products. Barriers in the grains group are distributed across all geographic regions. Those affecting fruit and vegetable groups are concentrated mainly in East Asia. Barriers against animal products are mainly among the European countries and barriers in seed products are concentrated in the Americas.

THE NEXT STEPS IN ANALYSIS OF TECHNICAL BARRIERS

The 1996 USDA survey provides the first step in an organized accounting of technical restrictions that constrain world agricultural trade. Identification of the 303 barriers confirms their wide scope across regions and products in international markets. The estimates which are provided for actual or potential

TABLE 4 *Regions imposing barriers identified in the 1996 USDA survey*

Region	Barriers with at least $50 million in estimated trade impact		Barriers with $5–$49.99 million in estimated trade impact		Barriers with less than $5 million in estimated trade impact	
	No.	Estimated trade impact ($ million)	No.	Estimated trade impact ($ million)	No.	Estimated trade impact ($ million)
Africa			9	166.40	10	13.30
Americas	4	761.00	32	398.26	56	74.55
East Asia	8	1 771.40	34	512.73	36	41.17
Europe	6	555.81	23	307.73	38	36.01
Middle East			3	30.00	8	9.60
Oceania			17	204.50	19	25.42
Totals	18	3 088.21	118	1 619.62	167	200.05

TABLE 5 *Barriers identified in the 1996 USDA survey, by product category and region*

Product	Region*			
	Africa	Americas	East Asia	Europe
	Estimated trade impact ($ million (number of barriers))			
All products	—	—	500.00 (1)	—
Fruits and vegetables				
Fruit	—	75.62 (26)	302.29 (24)	—
Vegetables	—	22.46 (11)	68.40 (14)	—
Citrus	—	—	87.50 (7)	—
Grains and feed				
Grains	62.00 (4)	705.00 (9)	140.00 (3)	108.81 (7)
Animal products				
Beef	—	58.00 (5)	—	157.80 (7)
Pork	—	—	—	68.50 (5)
Beef and pork	—	—	—	50.00 (1)
All animal products	—	—	—	201.00 (2)
Other products				
Further processed foods	—	—	1 059.06 (7)	112.91 (13)
Seed	—	162.75 (12)	—	—
Forestry	—	—	—	76.00 (4)
Fish	—	—	50.00 (1)	—
Totals	62.00 (4)	1 023.83 (63)	2 207.25 (57)	775.02 (39)

Note: *there are no product categories in the Oceania or Middle East regions with more than 10 barriers or $50 million in estimated trade impact identified; — less than 10 barriers or $50 million in estimated trade impact identified in the USDA survey.

US trade losses contribute to a greater understanding of the importance of questionable practices.

The design of the USDA survey limits the inferences that can be drawn directly from these preliminary results. The survey obviously does not provide a global assessment of the incidence and impact of technical barriers since only those affecting US exports are included. Although the estimated trade impacts can be viewed as an order-of-magnitude indication of the significance of the measures for US exporters, these values are consensus estimates supplied by FAS economists, not results derived from formal empirical trade models. The estimates reflect only the trade impact of the barriers, not associated welfare changes. Finally, the survey results provide very limited evidence about potential gains that could be realized from the much broader issue of regulatory reform. Sizeable trade and welfare gains would likely be realized by further alignment, unilateral modification, or even elimination of some measures that are viewed as legitimate under the provisions of the Uruguay Round Agreements.

Acknowledging these limitations, further investigation is still likely to yield useful insights. Simple categorization and cross-tabulation of the data represents the beginning of a systematic look at technical barriers that has not been possible previously. It is evident that there are many types of impediment faced by US agricultural exports, though the 18 largest barriers account for over 60 per cent of the total estimated trade impact. One approach to further analysis is to identify differences between the largest and smallest barriers under the hypothesis that there are certain characteristics that identify barriers where the estimated trade impact will be large. For example, there were only two large barriers identified where market access was restricted. There was a higher proportion of barriers with large estimated trade impacts when market retention was threatened, suggesting that the stakes tend to be higher where there is a possibility of removing or restricting access to a market that is already established.

Economists have used political economy models to explain the incidence of traditional tariff barriers and the approach can be extended to cover technical barriers. Theoretical and empirical models can be developed using an equilibrium framework where barriers result from a combination of market and political forces. One hypothesis is that certain kinds of restriction have characteristics that lend themselves to active public or government intervention in the policy determination process. Another is that the level of technical barriers simply reflects commodity trade levels between regions. A third hypothesis is that technical barriers are substitutes for (or complements to) other forms of trade protection. These, and many similar hypotheses, can be tested once an empirical model of the incidence and impact of technical barriers has been constructed.

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