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QUANTIFICATION OF NON-TARIFF MEASURES

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ABSTRACT

The increase in the relative importance of non-tariff measures has increased awareness of the various deficiencies in existing NTM data collections. This paper reviews various approaches to measure and quantify NTMs within the context of the existing data collections. It provides a landscape of NTM incidence for selected countries and for selected product categories.

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I. INTRODUCTION

This paper is concerned with the measurement of non-tariff measures (NTMs) for use in the formulation of trade policy. First, NTMs are defined and classified. Second, we look at the effects of NTMs and how to compute those effects. This includes a review of the inventory approach, under which NTMs are catalogued, modelling approaches, tariff equivalents, subsidy equivalents, the Trade Restrictiveness Index (TRI) and effective protection. Third, there is a brief discussion on sources of data on NTMs, which is followed by some results on the landscape of NTMs in the Asia-Pacific region. The paper concludes with a discussion on how to proceed with the issue of enhancing the collection and measurement of NTM data.

This is a brief introduction to the subject and is not meant to be a comprehensive literature survey; however, the reference list should be of assistance to those who wish to delve further into the science (or art!) of commercial policy measurement. To steer readers, the most useful starting place would be Baldwin (1970a) and Corden (1971). Other useful studies are Laird and Yeats (1990), Feenstra (1988a), Vousden (1990) and Helpman and Krugman (1989). Agriculture has an NTM measurement industry of its own: starting places are Krueger, Schiff and Valdes (1988), Goldin and Knudsen (1990), OECD (1994), and Webb, Lopez and Penn (1990). A new body of literature, in the nascent stage, concerns the Trade Restrictiveness Index, developed by Anderson and Neary (1994a), mainly designed to measure changes in welfare resulting from policy changes over time.

II.   NON-TARIFF MEASURES

The term "non-tariff measures" is defined to include export restraints and production and export subsidies, or measures with similar effect, not just import restraints. This is the term most widely used in GATT and UNCTAD, although textbooks generally prefer the terms "barriers" or "distortions".[1] Perhaps the most theoretically satisfying definition is that of Baldwin (1970a), who defines "non-tariff distortion" as "any measure (public or private) that causes internationally traded goods and services, or resources devoted to the production of these goods and services, to be allocated in such a way as to reduce potential real world income". Practically, the introduction of the concept of potential real world income means that very often it is difficult to be sure what is a distortion without undertaking complex, even impossible, calculations. However, it sets the correct framework in which to judge the relative importance of NTMs.

There are a wide variety of non-tariff measures. UNCTAD (1994) uses a classification of over 100 trade measures, including tariffs with a discretionary or variable component. It is reproduced in annex I. This classification does not include any measures applied to production or to exports.

Following Laird and Vossenaar (1991), NTMs may be broadly classified according to the intent or immediate impact of the measures (c.f. the motives or objectives – see below). They identify five such categories, of which (iv) has been adapted to cover restrictions as well as subsidies:

(i)   **Measures to control the volume of imports.** These include prohibitions and quantitative restrictions (QRs) on imports as well as export restraint agreements (ERAs). Licences are often used to administer QRs. ERAs consist of voluntary export restraints (VERs) (covering, *inter alia*, measures employed for the administration of bilateral agreements under the Multi-Fibre Arrangement (MFA) and, now, the WTO Agreement on Textiles and Clothing) and Orderly Marketing Agreements (OMAs).

(ii)   **Measures to control the price of imported goods.** These include the use of reference or trigger price mechanisms, variable levies, anti-dumping duties and countervailing measures. Tariff-type measures such as tariff quotas and seasonal tariffs also are usually intended to increase import prices under given circumstances. Voluntary export price restraints fall under this broad category of intent.

(iii)   **Monitoring measures, for example price and volume investigations and surveillance.** Such practices are often associated with charges by domestic interests of unfair trading practices by exporters, e.g. dumping and subsidization. Licences are sometimes used as a monitoring instrument. Monitoring measures may be a prelude to other actions, and, if seen as such, may lead to export restraints. They may have a harassment effect.

(iv)   **Production and export measures.** Subsidies may be directly applied to output or value added, or they may be indirectly applied, i.e. paid to material or other inputs into the production

process. They may arise from payments or the non-collection of taxes that would otherwise be due. Restrictions by mean of taxes or prohibitions may also be imposed on production or exports.

(v) **Technical barriers.** Imposed at the frontier, these are used to apply various standards for health and safety reasons to imported products to ensure that imported products conform to the same standards as those required by law for domestically produced goods. They may lead to the prohibition of non-complying imports or necessitate cost-increasing production improvements.

It is inevitable that there is a certain arbitrariness in such a classification. For example, most measures, including technical barriers, have price and quantity effects, as discussed in the next section. A glossary of individual non-tariff measures, derived from Laird and Yeats (1990), and based on the above five broad categories of NTMs, is to be found in annex II.

OECD (1994), dealing only with agriculture, lists some 150 measures or bodies administering country-specific schemes. In the UNCTAD classification these would fall within the more limited, but more general, list of individual measures, since many are simply national descriptions for a widely used basic measure.

Typically, the objectives or motives for using NTMs range from the long-term desire to promote certain social and economic objectives, including broad economic, industrial or regional development, to shorter-term purposes such as balance of payments (BOP) support or action to protect a specific sector from import surges or from dumped or subsidized imports. Price or volume control measures or subsidies have been used extensively in the past for industrial development reasons by developed and developing countries.

In any type of liberalization simulation, it may be important to look realistically at the likelihood of such measures being removed. It is unlikely that Governments will remove permanent controls on technical barriers to trade or on trade in arms, drugs, pornography and so forth, although technical barriers may become more harmonized. However, support for industrial development can be achieved in more open economies supported by improved macroeconomic management and realistic exchange rates. Furthermore, Governments seem attached to support for specific sectors (sometimes in key political constituencies) by means of hidden subsidies through government procurement and technology development (e.g. aircraft), but so far international disciplines on the use of such measures remain relatively weak. As a consequence, even after the Uruguay Round, there are still important peaks in sectoral protection in most countries, sometimes in the same sector, for example textiles and clothing.

It is important to realize that GATT (including GATT 1994, negotiated in the Uruguay Round) does not ban the use of all NTMs. Laird and Vossenaar (1991) argue that after the Preamble and the first three articles of the GATT, which deal with the overall objectives of GATT, most-favoured-nation (MFN) treatment, tariff reductions and national treatment, one enters the realm of exceptions and sets of rules which deal at least as much with how and when protection may be imposed, especially by means of non-tariff measures, as they do with liberalization. The Tokyo Round and Uruguay Round Agreements are a further extension of this idea, although the Uruguay Round results should see a reduction in the use of some important NTMs – for example, ERAs, the MFA, export subsidies and farm production support.

III. QUANTIFYING THE EFFECTS OF NON-TARIFF MEASURES

The main focus of this section is on the identification of the effects of non-tariff measures and the question of how these effects can be measured. There is an extensive literature in that field.[2] Three recent studies focusing specifically on NTMs are Deardorff and Stern (1998), the UNESCAP (2000) and PECC (2001). Here, we concentrate on some of the key effects, with a view to identifying some of the political and economic factors regarding the use of trade measures, and then go on to examine the measurement question only in relation to these effects.

A. Some complications

It should be noted that analysing NTMs is not quite the same as analysing tariffs (Bhagwati, 1965). For example, with identical goods a domestic monopolist will behave as a perfect competitor under a non-prohibitive tariff, albeit at a higher price. However, a quota allows the domestic firm to act as a monopolist within the limits of the quota. It can also be shown that a quota which restricts imports by the same amount as a tariff will raise the domestic price by more than the tariff.

Another difficulty is to distinguish the effects of tariffs from those of NTMs. A tariff and an NTM affecting the same product may or may not be additive. Typically, price NTMs work very much like an additional tariff and can simply be added to the tariff to obtain the total price effect associated with trade intervention. However, as noted later, if both a tariff and a quota are applied to the same product, the size of the price effect depends on whether the tariff or the quota is the binding constraint. Thus, if a quota is very large, only the tariff will matter. (An implication is that a quota can be expanded gradually until the tariff becomes the binding constraint, at which point the quota can be eliminated without any further effects.)

Most NTMs are discriminatory, having differential effects as between foreign trading partners. Examples of these include the MFA, VERs, quotas, minimum prices, anti-dumping duties and countervailing duty measures. This means that there may be a considerable variation in the effects of NTMs on different overseas suppliers. To identify these effects, it is necessary to look beyond the effects in the importing market alone (the main focus of many NTM studies).

In respect of the MFA, computations are also complicated by the fact that not all MFA quotas are filled. For example, Erzan and Holmes (1990) show that in the period 1986–1988 the utilization rates of United States quotas for major exporters such as Hong Kong was above 90 per cent, while quota utilization was much lower for Latin American and Caribbean countries, albeit with wide variations between countries and sectors. Thus, while MFA quotas may constitute the binding constraint for major exports to the United States, it is the tariff that matters more for smaller exporters, although they undoubtedly benefit to some extent from trade diversion away from the major exporters.

Beyond the impact of NTMs on products directly affected, there is now, as indicated earlier, clear evidence from a number of studies (Messerlin, 1988; Dinopoulos and Kreinin, 1988) that the "chilling" or harassment effect of VERs and anti-dumping duties goes far beyond the products and countries immediately affected. Thus, Dinopoulos and

Kreinin show that European automobile exporters adjusted the prices for the United States market in the wake of the introduction of the Japanese automobile VER; that is, they (genuinely) voluntarily restrained trade in order to capture the higher rent available in the United States market. Messerlin shows the dramatic reduction of imports under anti-dumping investigations, with further reductions in the event of positive findings.

As for tariffs, an issue which may be relevant is the appropriate weighting of estimates of tariffs or tariff equivalents of NTMs for individual products to compute economy-wide or sector-wide statistics. As indicated previously, import weighting can lead to seriously downward-biased results, while simple averages are subject to vagaries in the original statistical classification. Domestic output or value added weights may be more appropriate.

Finally, exchange rates matter – since they operate like a tariff cum export subsidy – and real exchange rates matter more. In many cases, fluctuations in exchange rates have by far exceeded tariff levels (and hence constitute one of the main arguments used by countries in the region concerned about potentially disruptive effects of trade flows responding to the changed import price levels). Real exchange rates (RERs), of course, take account of relative price movements between pairs of countries as well as the nominal rates. Their relationship with trade flows is endogenous and complex, because they are also partly determined by financial flows that may at times be strongly linked to interest rate differentials. In some countries (Argentina, Brazil, Chile etc.) the linkage between RERs and trade is very strong, while in other cases (e.g., the United States) the linkage is more tenuous. As a footnote, in two countries with uniform tariffs of different levels, export subsidies with levels equivalent to their tariffs and market-set exchange rates, the level of access for imports is to all intents and purposes the same.

For a discussion of multiple exchange rates, which have become much less common in recent years, see Corden (1971).

In addition to the effects of import restrictions on market access, it is possible to analyse the effects of NTMs in terms of what has been the World Bank's main concern in trade policy lending over the years, namely the effects on domestic resource allocation. In essence, protection for one sector is a tax on all other sectors, and the net effect of this is to introduce inefficiencies which reduce overall economic welfare. This is one of the reasons for focusing on calculations of effective rates of protection (see below) and of the domestic resource costs of NTMs.

B. Measurement

There are different methodologies for identifying the importance of trade measures or computing their effects. We look first at the inventory approach for summarizing information on the presence of NTMs, including quasi-NTMs. This is followed by a brief discussion of the modelling approaches. Their importance is that they provide a more rigorous analytical framework for analysis of welfare, price, production and trade effects. Most modelling work today focuses on complex simulation models, such as those discussed elsewhere in other chapters, which require prior information about elasticities and price effects. For this reason, following Deardorff and Stern (1985) and Baldwin (1989), we concentrate on four measures of price effects: tariff equivalents, subsidy equivalent, the Trade Restrictiveness Index and effective protection.

1. The inventory approach

Considerable efforts have been made in developing the inventory approach to NTMs,[3] which allows estimates of the extent of trade covered by NTMs or their frequency of application in specific sectors or against

individual countries or groups of countries. This has been based on the UNCTAD Database on Trade Control Measures (which has undergone several name changes, including as a result of merging different databases within UNCTAD), now available on CD-ROM (see below). In this database, data are collected by tariff item on the application of a range of NTMs against imports. Other information includes the country or countries affected and the dates of entry into force and termination of each measure. As indicated previously, information is stored on NTMs under more than 100 different categories. However, data are not collected on domestic support measures or export-related measures. The main source of the information on NTMs in the database is GATT notifications and government publications, such as customs tariffs, laws and regulations.

The database has its usefulness as an inventory of import measures used by importing countries, including changes in their use and in countries affected. In the context of the present paper they have certain limitations, but there are some possibilities using the trade coverage and frequency coverage ratios. However, the inventory itself can be used in the computation of the Trade Restrictiveness Index.

The percentage of trade subject to NTMs for an exporting country j at a desired level of product aggregation is given by the trade coverage ratio:

$$C_{jt} = \left[\frac{\sum (D_{it} \cdot V_{iT})}{(\sum V_{iT})} \right] \cdot 100$$

where, if an NTM is applied to the tariff line item i, the dummy variable D_i takes the value of one and zero if there is no NTM; V_i is the value of imports in item i; t is the year of measurement of the NTM; and T is the year of the import weights.[4] A problem for interpretation of this measure arises from the endogeneity of the import value weights. At the extreme, if an NTM is so restrictive that it precludes all imports of item i from country j, the weight V will be zero and, in consequence, the trade coverage ratio will be downward-biased. Similarly, the coverage ratios will not indicate the extent to which NTMs have reduced the value of the affected import items, and so they will reduce the weight of restricted items in the total value of a country's imports. It would be a refinement to use import weights from the world as a whole, as a proxy for free trade weights, but, as noted in the discussion on tariff-weighting, many important items in trade are subject to import restrictions in a wide range of countries.

Another procedure, which avoids the problem of endogeneity of the weights, is the frequency or transaction index. This approach accounts only for the presence or absence of an NTM, without indicating the value of imports covered. Thus, it is not affected by the restraining effect of NTMs (as long as they do not completely preclude imports from an exporting country).[5] The frequency index shows the percentage of import transactions covered by a selected group of NTMs for an exporting country. It is calculated as:

$$F_{jt} = \left[\frac{\sum (D_{it} \cdot M_{iT})}{(\sum M_{iT})} \right] \cdot 100$$

where D_i once again reflects the presence of an NTM on the tariff line item, M_i indicates whether there are imports from the exporting country j of good i (also a dummy variable) and t is the year of measurement of the NTM.

Unlike the coverage index, however, the frequency index does not reflect the relative value of the affected products and thus cannot give any indication of the importance of the NTMs to an exporter overall, or, relatively, among export items.

Despite the weaknesses of the trade coverage and frequency ratios, it is possible that within some limits between zero and 100 per

cent coverage they do give an indication of trade restrictiveness. This opens up several possibilities for using trade coverage or frequency ratios in econometric studies of trade flows. For example, they could be used as explanatory variables in models explaining bilateral trade flows at an aggregate level or disaggregated to a desired level of sectors. However, in such work it is important to recall that NTMs are often imposed in response to sudden changes in trade flows, which in turn respond to the inhibitory effect of the NTM, and the model has to take account of this endogeneity.

An example of an approach using NTMs as explanatory variables in cross-sectoral, cross-country analysis of OECD imports for a single year is Leamer (1990), in a research project partly financed by the World Bank and using the UNCTAD database.[6]

An approach which could prove promising is the use of trade or frequency coverage ratios in a gravity model.[7]

2.   Modelling approaches

A more comprehensive approach to quantifying the effects of trade barriers may lead to empirical measurement, sometimes on a single-industry partial equilibrium basis, look-ing at one country or the world – for example, recent studies on the effects of protection in motor vehicles, textiles and clothing, iron and steel, various agricultural products, and so forth. Such studies can be used to infer the price wedge, using information on observed changes in volumes together with relevant de-mand and supply elasticities. There have also been single-country computable general equi-librium (CGE) studies focusing on the effects of trade intervention in one industry, such as the textiles and clothing industry (de Melo and Tarr, 1992).

Models designed to capture the quantity effects of trade measures, and derive a price effect, may use cross-country or cross-

commodity regression techniques within a model designed to explain trade (Leamer and Stern, 1970). Thus, such models typically include some variation on the Hecksher-Ohlin comparative advantage framework. For example, Baldwin (1970b) ran cross-commodity regressions for the United States, while Leamer (1974) used cross-country analysis for each commodity. Tinbergen (1962) included trade resistance variables in a gravity model. Clearly, it is more useful to include NTMs explicitly in such models, even if only as dummy variables, rather than leaving NTMs as the reason for unexplained errors in the estimation, as is sometimes done in gravity models. Moreover, it is necessary to be mindful of the endogenous nature of NTMs: they may restrict imports, but they are also sometimes imposed as a response to political pressures which arise, in part, because of import competition.

Laird and Yeats (1990), Feenstra (1988a), Hufbauer and Schott (1992) and USITC (1989, 1990 and 1992a) contain surveys or collections of recent studies, including a variety of models to study the effects of non-tariff measures. Feenstra (1988a) includes several studies based on the testing of propositions from the non-competitive trade model, as well as the hypothesis that quality upgrading takes place under quota constraints. Helpman and Krugman (1989) discuss the problems of quantification in imperfect competition models, noting that there are relatively few such studies. One of the most important of those studies is that by Venables and Smith (1988), which looked at the effects of removal of obstacles to trade within Europe.

Two particularly useful surveys of United States import restraints, which include surveys of modelling work as well as estimates by staff of the United States International Trade Commission (USITC), are USITC (1989), covering manufacturing, and USITC (1990), covering agricultural products and natural resources.

Trade models such as these provide considerable insights into the operation of the sector or sectors being studied. However, they are also a valuable source of information on price wedges to be used as inputs into both partial and general equilibrium simulation models, such as are discussed elsewhere in this paper. These models, using price wedge information, attempt to explain the effects of the variations in trade measures, including complete trade liberalization. Examples include Deardorff and Stern (1986) and Whalley (1985). There has also been extensive use of such modelling techniques in the context of the North American Free Trade Agreement (NAFTA),[8] and the Uruguay Round, both in general[9] and focusing on agriculture.[10] However, modelling also requires information about various price elasticities, as well as the making of certain assumptions about the behaviour of Governments.[11]

In addition to the modelling of trade barriers in specific sectors, less comprehensive approaches cast light on some of the key effects of NTMs and what might be expected if they were removed.

3. The tariff equivalent or price wedge

For simulation modelling, an important input is the price effect or "price wedge" associated with each NTM – often called the "tariff equivalent" of the NTM. This is the difference between the free world price of a product and the domestic price which is protected by an NTM.

If world prices are genuinely free – not influenced by widespread use of subsidies – they can be obtained from customs invoices or from commodity markets. These can then be compared directly with the domestic ex-factory or wholesale prices of identical products. Sometimes it is necessary to identify representative products and find comparable domestic products and imports. It may be necessary to compute an average over a selected group of products and over a period of time.

Sometimes wholesale prices or constructed ex-factory prices in different countries are compared, adjusting for transport costs to compute the price wedge between the country with the lowest wholesale price and the importing country under study.

The price wedge technique is used frequently by World Bank economists, and has also been used in published studies by Roningen and Yeats (1976), Baldwin (1975), and Bhagwati and Srinivasan (1975). Roningen and Yeats obtained access to the raw data stored by *Business International*, which publishes comparative information on the cost of living in major cities of the world. The most extensive set of computations of this nature was done in the tariffication of existing import restrictions on agricultural trade for the Uruguay Round.[12] However, in this case the work was done by each Government in respect of its own measures, according to a set of mutually agreed procedures, essentially comparing the cost, insurance and freight (c.i.f.) price of imports with the ex-factory price of identical locally produced goods.

The work of computing the price wedge is much easier for Governments than for academic economists. Governments have access to customs invoices and routinely compile information on prices overseas for use in verifying customs declarations. In some cases, they use the services of pre-shipment inspection agencies such as SGS or Veritas, which have widespread international networks collecting such information. Thus, provided that no breach of confidentiality is involved, this information can usually also be obtained for third country markets even when there are no direct imports into the market applying the NTM. However, it would then be necessary to compute the cost of delivery to that market – information which can be obtained from shipping companies or invoices for similar goods. Price comparisons were made by Eurostat for use by the Commission of the European Communities (1988) in estimating the effects of removing barriers between member States of the European Union in 1992.

Observation of the price wedge is relatively straightforward when imports and domestically produced goods are perfect substitutes. However, calculations are often complex for manufactured goods because of the great range and heterogeneity of products. Obviously, the idea is to match items as closely as possible, but it is possible using econometric techniques to normalize differences in the characteristics and qualities of differentiated products. In this respect, a considerable amount of work has been based on the use of hedonic price indices, a technique developed by Griliches (1970).[13] However, this has principally been used in work on consumer price indices as well as demand analysis. A recent application is the analysis of protection of differentiated products by Feenstra (1988b) in respect of the United States market for United States-made and Japanese-made compact trucks.

The price wedge can sometimes be obtained directly if an auctioning system is used for allocation of import quotas, as has been done at times in Australia (Takacs, 1988)[14] or for the allocation of export quotas, as was done in Hong Kong for textiles and clothing exports (Hamilton, 1986). Hamilton also constructs export licence prices from the marginal costs of exporters using relative wage data adjusted for labour productivity. In the Hamilton study there was little difference between the constructed "price" data and the available information on licence prices, while Krishna, Martin and Tan (1992) find substantial differences in the case of Indonesia.

As noted earlier, it might also be possible to use an econometric model of an industry to compute the price wedge on the basis of observed changes in the volume of production and trade together with relevant supply and demand elasticities.

Even if we can calculate the price wedge between domestic and "world" prices associated with an NTM in one market, this does not necessarily give us the basis for computing how any one trading partner will be affected by the removal of certain NTMs. This is because of the discriminatory effects of a number of the NTMs, as noted earlier. Thus, exporting countries, attempting to assess what they will gain from the elimination of other countries' NTMs, need to take bilateral price differentials into account (not to mention the substitutability between their own and competitors' exports in the importing market).

Another factor to take into account is the variability of prices, particularly commodity prices, in international markets. With variable levies and reference prices the domestic price of the import remains fixed even when there are fluctuations in world prices. Thus, in markets using such devices the price wedge itself is constantly varying for a number of products.

For a number of products, particularly commodities, government intervention is so widespread that the "world price" cannot be observed from transaction values. In these circumstances, there is little alternative to developing a model to attempt to isolate "free world prices" from prices influenced by production and export subsidies (or, indeed, export taxes), as well as import barriers such as variable levies and quotas. One of the problems is estimating the supply response to changes in world prices by countries which are currently food importers. Fortunately, much work has been done in the area of commodities, as we shall see in the following section.

A further complication is that exporters have been observed to change the quality mix of their product when subject to import restraints expressed in volume terms. Correcting for these changes is discussed in Feenstra (1988b).

4. Subsidy equivalents

The concept of the producer subsidy equivalent (PSE) has come to be used extensively in recent years, following extensive work by the Organisation for Economic Co-operation and Development (OECD).[15] It is a

concise way of measuring the transfers, as a result of government policies, to producers. It can be measured: (i) by tracing the direct and indirect government expenditures to producers; or (ii) by imputing the effects of policies by calculating the difference between actual domestic prices and what they would have been in the absence of trade interventions. Its advantage over nominal protection, such as is given by the price wedge discussed above, is that it captures both the transfers from government expenditures and the transfers from price distortions.

PSEs can be expressed in different ways. The total PSE is simply the value of transfers to producers:

$$PSE = Q(P_d - P_w \cdot X) + D + 1$$

where:

Q   –   quantity produced
P_d –   the producer price in domestic currency units
P_w –   world price in world currency units
X   –   exchange conversion factor
D   –   direct government payments, net of any levies on production
I   –   indirect transfers through policies such as input subsidies, marketing assistance or exchange rate distortions.

The unit PSE is the total PSE per tonne or unit of production:

Unit PSE (PSE_u) = PSE/Q

The percentage PSE is the total PSE expressed as a percentage of the total value of production, valued at domestic prices, and adjusted for direct payments and levies:

$$\text{Percentage PSE} = \left[\frac{PSE}{(Q \cdot P_d + D)} \right] \cdot 100$$

Another way of expressing the PSE is the nominal assistance coefficient (NAC). The NAC for production is the ratio of the border price plus the unit PSE to the border price. In essence, it is the price wedge on the production side created by the agricultural policies in use.

$$NAC = \frac{(P_w \cdot X + PSE_u)}{P_w \cdot X}$$

It should be noted that changes in world prices, exchange rates or domestic production can change the PSE even when government policies remain unchanged. Also, since indirect transfers appear only in the numerator, the PSE can be altered by shifting transfers from indirect programmes to price support programmes or direct payments (Webb, Lopez and Penn, 1990). A negative PSE implies that the producer is being taxed as a result of the combination of policies operating in the sector, while a positive PSE implies the producer is being supported or assisted by the intervention.

The United States Department of Agriculture's Economic Research Service computes and regularly publishes PSEs as well as consumer subsidy equivalents (CSEs) for many agricultural commodities in a wide range of developed and developing countries; see, for example, Webb, Lopez and Penn (1990).

It is important to note these numbers can vary considerably from year to year for the reasons given. Also, the estimates take account only of exchange rate adjustments in the case of the developing countries, where they often dominate the calculations and can cause the PSE to swing wildly over time. There may also be quality differences which reduce the comparability of the data.

The CSE is the value of transfers, resulting from government intervention, from domestic consumers to producers and to

taxpayers (e.g. through tariff revenue paid on competing imports). It measures the net implicit tax imposed on consumers by agricultural support measures and any consumer subsidies. A negative CSE implies that consumers are being taxed by the policies operating in the sector. A NAC for consumption measures the extent to which consumers are paying more than they would in the absence of government intervention.

5. The trade restrictiveness index

The Trade Restrictiveness Index (TRI), developed by Anderson and Neary (1991), is defined as the "uniform tariff equivalent of the consumption and production distortions". It is a combination of the "consistent PSE" and "consistent CSE", which are defined as the uniform subsidy rates that are equivalent in trade restrictiveness (welfare loss) to the actual differentiated subsidy or tax structure. It is mainly used to measure change in the restrictiveness of trade policy over time for that economy or sector of the economy – that is, comparing two distorted situations rather than against the free trade benchmark.[16] Thus, it has important potential for the assessment of progress in the liberalization of an economy, for example under World Bank structural adjustment loans. However, it will be of less interest to modellers seeking to introduce the price wedge into large-scale simulation models. Indeed, in Anderson and Neary (1994b) it is used essentially as a weighting technique (using welfare loss as weights) for averaging licence prices for textile exports computed using the method established by Hamilton (1986). These show important differences from import-weighted averages, which are subject to downward biases, as noted earlier.

The most recent and comprehensive description is that by Anderson and Neary (1994a) and its most recent application is in Anderson and Neary (1994b). In general, the TRI is also more applicable to small variations, for example "short" time periods or in respect of "small" changes in quotas. Anderson and Neary (1994a) note that their alternative, hybrid

index, covering goods that are both tariff-constrained and quota-constrained, is difficult to interpret if one wishes to make comparisons across countries or time periods in which the mix of goods that are subject to tariffs and quotas differs. This can be avoided by using the tariff equivalents of quota-constrained goods, in which case the resulting index is "a uniform tariff and a tariff-equivalent surcharge factor". The choice between the two forms of the TRI depends essentially on the availability of data.

Anderson (1993) provides a manual for use of the TRI in an Excel spreadsheet. This uses actual tariff rates and trade for individual products within an economy or sector of an economy as well as other economy-wide data. NTMs can be introduced as dummy variables or, in the case of quota-constrained goods, as tariff equivalents of the quotas, as in the textile study by Anderson and Neary (1994b).

Anderson and Neary (1994a) list most of the applied studies carried out using the TRI methodology. These are now quite diverse. For example, one early partial equilibrium application was by Anderson and Bannister (1992) in respect of domestic price policies in Mexican agriculture. General equilibrium applications are discussed in Anderson, Neary and Safadi (1992).

6. Effective protection

Tariff equivalents and subsidy equivalents do not give a comprehensive view of the trade and production effects of the protective structure of a country. For example, an *ad valorem* tariff of, say, 20 per cent on automobiles does not give an idea of the extent to which protection generates changes in the value added in automotive assembly. For this it is necessary to look at the combined effect of tariffs (and any other restrictions or forms of assistance) on automobiles as well as the effect of such protection on the materials and parts used in the production process – steel, rubber, plastics, glass etc., as well as engines, gearboxes, brake assemblies, electrical

components etc. The combined effect of protection on inputs and outputs can be summed up in the concept of the effective rate of protection (ERP, normally referring to tariffs only) or the effective rate of assistance (ERA, intended to encompass all NTMs, including domestic supports).

The concept of the ERP was developed by Balassa (1965) and Corden (1966) to measure the increase in value added in an industry under protection relative to what value added would be under free trade. In other words, effective rates measure assistance to value added in an industry. Mathematically, the effective rate can be expressed in different ways, of which one such expression is:

$$g = \frac{(df - x \cdot dm)}{(1 - x)}$$

where:

g   –   effective rate of protection
df   –   nominal rate on finished good (output of a production process)
dm   –   nominal rate on inputs into a production process
x   –   free trade materials/output ratio.

As can be seen from the formula, the exact level of effective protection or assistance depends on the rate of protection on the output of a process (whether for final consumption or intermediate goods), the average rate of protection on the inputs of materials and parts, and the extent of value added in the industry at unassisted prices (the free trade material/output ratio or the technical coefficient). Protection may be defined to cover all forms of government intervention, including tariffs, other protection against imports and domestic subsidies, although sometimes only tariff protection is included.

If protection on the finished good is equal to the average protection on the inputs, the effective rate will be the same as that level of protection. However, if protection is higher on the finished good than on the inputs, the effective rate will be higher than the protection of the finished good, and value added will also be higher than when the rates were identical. On the other hand, if protection is lower on the finished good than on the inputs, the effective rate will be lower than that on the finished goods, and, correspondingly, value added will also be lower.

Effective rates can also be negative. For example, for a given rate of duty on outputs (df) which is lower than a given rate of duty on the inputs (dm), as the free trade material/output ratio (x) rises the effective rate declines and becomes negative, i.e. when df<(x.dm).[17] However, analysts more often take the average effective rate (the free trade value added weighted effective rates applicable to all sectors) as the main point of reference in discussions about resource allocation. If the effective rate for a sector is lower than average it means that sector is implicitly being taxed to support sectors with higher than average effective rates, and vice versa. This is because highly protected sectors (in terms of effective rates) are able to bid up wages, land and other inputs, thus affecting the costs of other sectors. This does not necessarily mean higher profits for the protected sector, since typically higher protection becomes factored into costs such as land and buildings or lost through economic inefficiency (X-inefficiency). Nor is it a prescription for increasing lower rates to the average, because a non-zero average still implies the implicit taxation of the non-traded sector.

It should also be noted that the level of the effective rate is highly sensitive to the materials/output ratio, increasing asymptotically to infinity as this ratio increases, i.e. as value added in the industry declines.

Despite their limitations, effective rates have become a standard tool of analysis since the late 1960s, being used by Governments to assess the implications of sectoral levels of protection for the efficiency of resource allocation within their own countries. The measure has become a standard analytical tool

of the World Bank in most studies associated with trade or structural adjustment lending. The World Bank has also developed standard specialized PC software, SINTIA-ER, using survey data, and SINTIA-IO, using input-output tables, for the purpose of making effective rate calculations, but these have not been published. The concept is currently under examination at OECD with a view to its introduction as a routine tool of analysis of OECD countries' economies, although initial work is focusing on more basic questions, such as trying to obtain up-to-date tariff information, including *ad valorem* equivalents of specific tariffs, while NTM work is at present following the inventory approach using UNCTAD data.

However, like many statistical tools, the effective rate has a number of shortcomings. It is a partial equilibrium rather than a general equilibrium measure. It assumes that there is no change in technology in shifting between actual and world prices. It assumes that there is perfect substitutability between domestic and foreign goods, whereas most modern trade models assume imperfect substitutability – the so-called Armington assumption.

There are also measurement problems, such as those we have been discussing, regarding how to measure NTMs – because this is a summary measure in which price wedges are used as an input, not an alternative technique. In the end, effective rates do not solve the question of measurement of NTMs, but they take more factors into account in assessing their effects.

The difference between the percentage PSE and the ERP/ERA relates to the forms of intervention and the value base or denominator in the computations. First, since PSE estimation has been focused on agriculture, PSEs do not comprehensively include the taxation or subsidy effect of intervention in relation to intermediate inputs produced in other sectors of the economy, whereas effective rates of assistance can be computed to take all forms of intervention into account. Second, PSEs relate assistance to the gross value of output (i.e. under existing intervention), whereas effective rates are based on free trade levels of value added (or the free trade input–output ratio as shown in the formula). Thus, the effective rate is a more comprehensive summary measure, albeit subject to the limiting, underlying assumptions.

The relationship between effective rates and the results of CGE models is not self-evident. Effective rates measure the value added under protection, while a CGE model can be used to compute changes in value added under a simulation of free trade – that is, in principle, they can do the same thing. However, in various studies, including by the authors, there are mixed results as to the pattern of protection, even using a rank correlation of industries according to the change in value added in moving to free trade. The issue is specifically addressed in Devarajan and Sussangkarn (1992), who examine the importance of the assumption of perfect substitutability between imported and domestic goods under the ERP and the assumption of imperfect substitutability under modern CGE models. In essence, they show that "the standard method for calculating ERPs can be seriously misleading if domestic and foreign goods are imperfect substitutes". For elasticity assumptions from around 10 to infinity the results of the two methods are similar, except in some cases where the import share in domestic supply is very small (which makes an important difference to the CGE results while having no importance for the standard ERP computations).

7. *Possible ways to move forward on NTMs*

As is obvious, there are both a number of complications and limitations with the measurement and collection of NTM data. These problems have been researched in depth in two recent studies by Alan Deardorff and Robert Stern (1998) and the United Nations Economic and Social Commission for Asia and the Pacific (2000). The former propose some guiding principles for measuring NTMs:

- Measures of NTMs should be constructed to reflect equivalence to tariffs in terms of their effects on the domestic prices of the traded goods.
- Only direct effects on domestic prices should be used to define tariff equivalence.
- There is no single method that can be relied upon to measure the sizes of NTMs that may be present in all sectors of the economy.
- There is no substitute for NTM-specific measures.
- Greatest reliance should be placed, where possible, on measures that derive their information from market outcomes in preference to measures that seek to construct estimates of the market outcomes from the quantitative data.
- There are many NTMs in practice for which high-quality measures are simply not available.
- Given the uncertainty that surrounds the measurement of NTMs, it would be best to construct approximate confidence intervals – upper and lower bounds that can be assumed to include the size of the NTM being measured.
- Estimates of NTMs should be done at the most disaggregated levels possible.

While these are sensible suggestions there is some question as to how practical they are to implement. Nevertheless, as pointed out by Deardorff and Stern (1998) and UNESCAP (2000) the existing data collections on NTM, while better than nothing, need to be improved.

IV. NTMs AND THE WORLD INTEGRATED TRADE SOLUTION

The most comprehensive collection of publicly available information on NTMs is the UNCTAD Database on Trade Control Measures, which is in the UNCTAD Trade Analysis and Information System (TRAINS) included in the World Integrated Trade Solution (WITS).

The NTM data incorporated in WITS are frequency data and are an incidence of NTMs, not an impact measure. The NTM incidence, shown in the panels for cross-market and cross-product analysis, indicates to what extent the national tariff lines within a Harmonized System 6-digit classification are affected by certain NTMs (known as "core" NTMs being relatively restrictive).

A core NTM includes the following three major categories of non-tariff measures:

- Quantity control measures, excluding tariff quotas and enterprise-specific restrictions;
- Finance measures, excluding regulations concerning terms of payment and transfer delays;
- Price control measures.

By way of illustration, consider the following hypothetical example to better understand the presentation of NTMs in WITS. For an imaginary HS089876, an import licence applies to oranges, apples and grapes, while an advance import deposit applies to grapes and melons (table 1).

In the above example, the NTM incidence is 100 per cent for the tariff line 08987601 as oranges are subject to licensing, 50 per cent as only apples are affected by licensing, 0 per cent for pineapples and 100 per cent for grapes and melons. Therefore, the percentage term reflects only the incidence and not the impact of the NTM. Furthermore, given the way the number is calculated it is important to note that it is dependent on the number of lines that are affected, not the number of measures.

In reality, however, many researchers would want to consider the incidence of NTMs at a higher level. In this case, the calculation at the level of an HS6 line is calculated by taking the simple average of the incidence for each national tariff line. In the above example, the NTM incidence for an HS 089876 is 62.5 per cent calculated as the sum of the percentage incidence (250) divided by the number of tariff lines (4).

It is also possible to calculate the trade coverage of NTMs, which is the value of trade subject to NTMs, or to a particular NTM. This

Table 1. An example of calculating NTM incidence

HS Code	Tariff line	Product description	NTM incidence
089876	08987601	Oranges	100
	08987602	Apples and bananas	50
	08987603	Pineapples	0
	08987604	Grapes and melons	100

is known as the import coverage ratio and like the frequency index explained above it should not be interpreted as an incidence or trade impact of an NTM.

Given that trade and tariff data are collected using the Harmonized System of classification, the level of detail at which data can be obtained is very fine. In reality, however, a researcher would be more inclined to want the data at an aggregated level. Consider a more practical example such as the landscape of NTMs in the Asia-Pacific region and selected other countries. In this case, an aggregate number that reflects the incidence of NTMs could be reasonably useful, but this would be just as extreme as an extremely detailed analysis. One option for balancing the issue of disaggregated versus aggregated analysis is to use an individual chapter from the HS system. In this case, the analysis would proceed as in table 2, except the level of aggregation would be at the HS two-digit level. A more popular approach is to use a classification that reflects industry categories according to a Standard International Trade Classification (SITC). In this case, four broad aggregates can be constructed: primary products, manufactures, other consumer goods and other products.

Table 2 contains the results of the calculations for the latest available year for selected countries. The procedure to calculate these numbers is as follows. First, a simple average is calculated at the HS level as in table 1. Then, then using a concordance table of HS classifications to the SITC aggregates, a second simple average is calculated. The end result is the numbers in table 2.

A number of conclusions can be drawn from table 2. First, the availability of data should always be verified. Cells with a zero may not necessarily reflect the absence of an NTM, but rather lack of data. For example, Papua New Guinea has a number of zeros, as do Hong Kong (China) and Singapore. Therefore, when interpreting the results a researcher should consider supplementing the

WITS data with data from other sources. Second, the sectors with the highest level of NTM incidence are textiles and clothing and iron and steel. Third, the country with the highest incidence is India, followed by Taiwan Province of China.

We have yet to discuss the issue of weighting NTMs. The above analysis was conducted using simple averages. This gives a good picture, but it also might introduce certain biases in the assessment of the protective effect of an NTM structure. For example, a country could have many tariff lines where imports are zero or negligible and where the tariff rate is also low. This would typically bias the assessment of protection downwards. Protection, after all, is implemented to reduce competition in a particular sector. In order to account for this, and bearing in mind that any weighting scheme introduces biases, a weighting vector can be applied to the vector of NTMs. This procedure is quite popular and can have an effect on the final assessment of a country's trade regime (Bacchetta and Bora, 2001). However, it is not recommended for the analysis of NTMs. The reasons for this are discussed in section II of the paper. Since the measures available in the UNCTAD database are frequency measures they are devoid of any assessment of their trade impact.

Two possible approaches can be adopted to account for some of the biases that exist in the context of simple averages. The first is to calculate an import coverage ratio – the value of imports in a tariff line that are covered by an NTM. In reality, of course, this may not be the case. A second approach is to reverse the analysis of table 2 and examine the pattern of NTMs (or protection for that matter) from the perspective of the exporter.

The results of the second approach are taken from Bacchetta and Bora (2001) and are reported in tables 3–7 for five groups of exporters: least developed countries, major developing country exporters, petroleum exporters, other developing countries and

Table 2. NTM coverage by product for selected countries: latest available year

Description	Australia	Brunei	Canada	Chile	China	China, Hong Kong	Thailand
Primary products (0–4, 68)	0.54	6.49	3.23	1.22	6.46	0.35	4.43
Agricultural products (0–2, 4)	0.63	7.61	3.52	1.43	7.30	0.41	3.35
Mining products (3, 68)	0.00	0.00	1.51	0.00	1.51	0.00	10.84
Manufactures (5-8 less 68)	0.31	2.43	20.89	0.17	8.00	0.49	1.07
Iron and steel (67)	0.24	0.00	83.33	0.00	44.85	0.44	1.87
Chemicals (5)	0.89	3.41	0.16	0.00	3.90	2.19	1.56
Other semi-manufactures (61-64, 66, 69)	0.49	6.72	1.47	0.00	1.36	0.00	1.22
Machinery and transport equipment (7)	0.07	2.90	0.11	0.73	14.02	0.00	1.92
Textile and clothing (65, 84)	0.06	0.00	81.26	0.00	2.85	0.00	0.00
Other consumer goods (81–83, 85, 87–89)	0.00	0.00	0.35	0.00	5.05	0.00	0.00
Other products (9)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALL PRODUCTS (0–9)	0.36	3.35	16.88	0.41	7.62	0.46	1.82

Description	Japan	Republic of Korea	Malaysia	Mexico	New Zealand	Papua New Guinea	Peru
Primary products (0–4, 68)	7.49	9.29	3.02	2.41	0.50	0.32	0.88
Agricultural products (0-2, 4)	7.69	10.76	3.53	2.54	0.59	0.37	1.03
Mining products (3, 68)	6.31	0.60	0.00	1.67	0.00	0.00	0.00
Manufactures (5–8 less 68)	5.08	0.37	2.41	0.80	0.37	0.01	0.03
Iron and steel (67)	0.48	0.00	7.97	0.00	0.00	0.00	0.00
Chemicals (5)	1.15	1.25	0.75	0.14	0.00	0.00	0.00
Other semi-manufactures (61–64, 66, 69)	0.64	0.16	0.90	0.08	0.73	0.08	0.00
Machinery and transport equipment (7)	0.05	0.00	4.29	2.25	0.21	0.00	0.07
Textile and clothing (65, 84)	23.06	0.38	0.30	0.00	0.00	0.00	0.06
Other consumer goods (81–83, 85, 87–89)	0.68	0.00	4.31	1.57	1.41	0.00	0.00
Other products (9)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ALL PRODUCTS (0–9)	5.61	2.37	2.54	1.16	0.40	0.08	0.22

Description	Philippines	Russian Federation	Singapore	China, Taiwan Province of	Thailand	United States	Viet Nam
Primary products (0–4, 68)	0.74	1.13	0.61	21.17	6.32	4.69	0.43
Agricultural products (0-2, 4)	0.76	0.66	0.72	22.79	6.67	4.56	0.41
Mining products (3, 68)	0.61	3.92	0.00	11.60	4.22	5.44	0.54
Manufactures (5-8 less 68)	1.92	0.73	0.13	7.48	3.30	5.23	1.23
Iron and steel (67)	0.00	0.00	0.00	8.21	0.00	42.44	21.74
Chemicals (5)	4.67	0.65	0.00	15.30	0.24	3.35	0.12
Other semi-manufactures (61-64, 66, 69)	0.60	1.22	0.00	0.76	1.47	4.59	0.41
Machinery and transport equipment (7)	1.92	0.00	0.56	8.28	1.39	5.18	0.00
Textile and clothing (65, 84)	0.00	0.00	0.00	0.00	13.50	1.13	0.00
Other consumer goods (81–83, 85, 87–89)	2.65	2.84	0.00	11.93	0.00	0.92	0.00
Other products (9)	8.33	50.00	0.00	33.33	0.00	0.00	0.00
ALL PRODUCTS (0–9)	1.68	0.90	0.24	10.59	3.97	5.08	1.03

Description	Brazil	Egypt	European Union	India	South Africa
Primary products (0–4, 68)	3.54	0.17	1.98	35.37	0.13
Agricultural products (0–2, 4)	3.76	0.19	2.30	42.24	0.13
Mining products (3, 68)	2.50	0.00	0.47	2.37	0.16
Manufactures (5-8 less 68)	3.91	4.97	10.77	27.18	1.99
Iron and steel (67)	0.49	0.00	51.94	0.00	2.91
Chemicals (5)	0.87	0.00	4.18	16.73	1.67
Other semi-manufactures (61-64, 66, 69)	2.20	0.31	0.86	28.18	1.77
Machinery and transport equipment (7)	8.14	0.10	2.41	28.11	0.52
Textile and clothing (65, 84)	5.36	65.68	87.21	80.58	10.30
Other consumer goods (81–83, 85, 87–89)	6.85	0.00	4.82	61.17	2.29
Other products (9)	0.00	0.00	0.00	50.00	0.00
ALL PRODUCTS (0–9)	3.88	2.13	5.79	34.66	1.12

developed countries. The next step was to define the markets for those exports. Ideally, one would like to have the markets selected using a process similar to the one used for products; that is, the markets should be the key markets for each exporter. However, given the diversity of export structures, a much simpler, yet still policy-friendly approach was used. The world was divided into markets according to the World Bank's geographical classification. They comprise South Asia, the Middle East and North Africa, Latin America and the Caribbean, Europe and Central Asia, South Asia and sub-saharan Africa, plus the developed countries and the Rest of the world.[18] It is important to point out that not all members of each one of those geographical regions report their import tariff and NTMs, therefore, this limited the scope of our analysis to those countries that actually provide this information.

Tables 3–7 indicate that for all the exporters in each of the markets agricultural products are the sector with the highest incidence of NTMs. This is followed by textiles and clothing. In terms of the geographical dispersion of the incidence of NTMs, very little can be said about the overall numbers in view of the dispersion across the product categories.

Table 3. Frequency of non-tariff measures facing LDC exports

Description	Developed countries	South Asia	Middle East and North Africa	Latin America and the Caribbean	Europe and Central Asia	East Asia and the Pacific	Sub-Saharan Africa	Quad
Agricultural and fishery products	**48.24**	**14.87**	**57.69**	**34.24**	**32.93**	**24.42**	**18.58**	**41.98**
Crustaceans (live)	58.64	8.33	75.00	30.98	43.56	22.22	20.00	50.00
Other fish	64.49	14.07	75.16	30.96	43.85	22.87	20.28	55.43
Edible fruit and nuts	53.95	19.21	54.61	37.09	32.36	24.21	28.20	54.67
Coffee and substitutes with coffee	32.25	17.86	44.64	28.10	20.63	26.19	18.18	21.43
Oil seeds and miscellaneous grain, seeds and fruits	53.93	14.20	68.55	40.75	38.49	28.71	25.12	37.41
Other agricultural and fishery products	43.50	11.11	52.08	35.28	28.59	32.87	17.80	27.50
Minerals and fuels	**6.72**	**3.29**	**5.73**	**6.64**	**6.72**	**4.52**	**0.16**	**6.53**
Ores, slag and ash	1.74	0.98	3.31	9.93	10.03	6.05	0.00	1.47
Crude and refined petroleum oil	26.88	22.73	28.13	14.53	38.01	17.75	4.55	12.19
Other minerals and fuels	4.55	0.00	0.00	18.33	0.00	11.11	0.00	0.00
Manufactures	**10.67**	**7.20**	**10.96**	**11.68**	**7.15**	**5.57**	**1.74**	**16.78**
Rubber, leather and footwear products	12.71	4.44	13.70	11.30	7.26	1.82	2.36	15.80
Wood and wood products	17.33	13.82	8.73	18.94	3.23	8.74	2.69	28.76
Cotton products	9.09	16.67	6.25	36.67	0.00	11.11	4.55	25.00
Knitted or crocheted articles	30.46	16.59	17.43	17.82	18.27	4.78	7.02	68.64
Non-knitted or crocheted articles	30.89	16.53	17.96	18.35	19.02	8.26	2.27	66.15
Diamonds	9.09	11.67	12.50	0.67	31.11	11.11	9.09	12.50
Other manufactured products	14.78	9.48	19.04	11.88	14.50	8.68	4.39	13.83
Other products not elsewhere specified	13.27	7.42	15.30	13.70	9.12	7.65	3.19	16.52

Source: Bacchetta and Bora (2001).

Table 4. Frequency of non-tariff measures facing major exporters of manufactures

Description	Developed countries	South Asia	Middle East and North Africa	Latin America and the Caribbean	Europe and Central Asia	East Asia and the Pacific	Sub-Saharan Africa	Quad
Agricultural and fishery products	**48.24**	**14.87**	**57.69**	**34.24**	**32.93**	**24.42**	**18.58**	**41.98**
Minerals and fuels	**6.72**	**3.29**	**5.73**	**6.64**	**6.72**	**4.52**	**0.16**	**6.53**
Crude petroleum oil	22.73	8.33	25.00	13.33	30.56	11.11	4.55	12.50
Refined petroleum oil	31.03	37.12	31.25	15.72	45.47	24.39	4.55	11.88
Other mineral and fuels	13.33	13.33	19.17	7.75	9.01	14.74	0.61	19.17
Manufactures	**10.67**	**7.20**	**10.96**	**11.68**	**7.15**	**5.57**	**1.74**	**16.78**
Plastics	1.38	3.36	2.76	5.75	3.76	2.49	0.35	2.08
Rubber and rubber products	5.67	2.11	3.17	4.59	1.34	2.37	1.12	7.44
Wood and wood products	17.33	13.82	8.73	18.94	3.23	8.74	2.69	28.76
Synthetic yarns and woven fabrics	13.06	9.33	11.38	17.81	5.47	1.44	0.14	35.72
Knitted or crocheted articles	30.46	16.59	17.43	17.82	18.27	4.78	7.02	68.64
Non-knitted or crocheted articles	30.89	16.53	17.96	18.35	19.02	8.26	2.27	66.15
Footwear	19.83	8.60	18.55	14.18	12.45	0.00	4.25	10.97
Precious stones and metals (including coins)	2.27	5.29	12.71	1.79	21.90	2.56	5.59	1.68
Iron and steel	12.95	0.27	1.26	2.51	2.68	9.60	0.00	35.42
Automatic data processing machines	14.94	4.17	8.04	6.90	13.69	0.21	0.00	8.93
Other office machines	10.61	1.39	0.00	2.96	0.46	0.00	0.00	4.17
Other mechanical parts	11.06	2.64	7.46	6.75	4.09	3.32	0.20	3.87
Reception apparatus	23.46	13.73	25.06	7.57	15.85	13.89	0.80	23.35
Electronic integrated circuits and microassemblies	15.50	0.00	10.23	2.10	0.00	0.00	0.00	6.26
Other electrical equipment	14.50	4.48	19.67	7.07	5.47	4.22	0.39	6.90
Motor vehicles for transporting persons	40.91	51.85	25.69	21.94	39.75	45.95	0.00	50.00
Other motor vehicle and parts	10.83	16.04	9.31	12.69	16.75	15.17	1.56	24.04
Ships, boats and floating structures	9.76	13.73	7.72	8.28	4.58	3.98	1.47	25.37
Furniture, bedding and lamps	2.01	10.59	8.07	5.92	7.16	0.30	4.30	4.05
Other manufactured articles	14.34	14.74	18.49	13.01	10.43	3.79	5.99	27.66
Other products	8.08	7.32	10.92	13.57	6.92	5.71	1.87	13.56

Source: Bacchetta and Bora (2001).

Table 5. Frequency of non-tariff measures facing major petroleum exporters

Description	Developed countries	South Asia	Middle East and North Africa	Latin America and the Caribbean	Europe and Central Asia	East Asia and the Pacific	Sub-Saharan Africa	Quad
Agricultural and fishery products	**48.24**	**14.87**	**57.69**	**34.24**	**32.93**	**24.42**	**18.58**	**41.98**
Crustaceans (live)	58.64	8.33	75.00	30.98	43.56	22.22	20.00	50.00
Other agricultural and fishery products	53.41	16.48	63.58	32.86	38.81	24.38	18.79	43.28
Minerals and fuels	**6.72**	**3.29**	**5.73**	**6.64**	**6.72**	**4.52**	**0.16**	**6.53**
Ores, slag and ash	1.74	0.98	3.31	9.93	10.03	6.05	0.00	1.47
Crude petroleum oil	22.73	8.33	25.00	13.33	30.56	11.11	4.55	12.50
Refined petroleum oil	31.03	37.12	31.25	15.72	45.47	24.39	4.55	11.88
Petroleum gases	24.03	16.67	16.07	11.85	18.25	13.49	0.00	28.57
Other minerals and fuels	14.23	7.89	9.21	7.11	11.19	10.76	0.48	15.13
Manufactures	**10.67**	**7.20**	**10.96**	**11.68**	**7.15**	**5.57**	**1.74**	**16.78**
Organic chemicals	11.32	10.79	17.43	25.16	10.56	17.76	1.95	8.87
Natural rubber	0.00	11.67	0.00	5.22	0.56	8.89	0.00	0.00
Plywood, panels and laminated wood	12.50	9.62	8.65	13.85	0.00	7.69	2.45	34.38
Other wood and wood articles	18.24	14.61	8.74	19.90	3.84	8.94	2.73	27.70
Non-knitted or crocheted articles and accessories	30.89	16.53	17.96	18.35	19.02	8.26	2.27	66.15
Iron and steel	12.95	0.27	1.26	2.51	2.68	9.60	0.00	35.42
Aluminium and aluminium products	0.64	2.63	2.03	4.36	2.07	5.44	0.00	0.66
Machinery and mechanical appliances	11.15	2.67	7.40	6.71	4.30	3.20	0.19	4.00
Other manufactured products	17.79	12.64	15.37	13.28	15.17	10.06	4.40	31.41
Other products, not elsewhere specified	15.59	8.49	19.03	15.23	11.12	7.35	4.79	19.68

Source: Bacchetta and Bora (2001).

Table 6. Frequency of non-tariff measures facing other developing countries' exports

Description	Developed countries	South Asia	Middle East and North Africa	Latin America and the Caribbean	Europe and Central Asia	East Asia and the Pacific	Sub-Saharan Africa	Quad
Agricultural and fishery products	**48.24**	**14.87**	**57.69**	**34.24**	**32.93**	**24.42**	**18.58**	**41.98**
Fish, crustaceans, molluscs and aquatic invertebrates	63.82	13.41	75.14	30.96	43.82	22.80	20.25	54.80
Edible fruit and nuts	53.95	19.21	54.61	37.09	32.36	24.21	28.20	54.67
Coffee and substitutes with coffee	32.25	17.86	44.64	28.10	20.63	26.19	18.18	21.43
Cereals	65.46	9.38	53.65	42.50	34.28	41.78	31.68	82.29
Other agricultural and fishery products	42.92	16.15	56.88	36.31	36.59	26.78	18.27	33.14
Minerals and fuels	**6.72**	**3.29**	**5.73**	**6.64**	**6.72**	**4.52**	**0.16**	**6.53**
Ores, slag and ash	1.74	0.98	3.31	9.93	10.03	6.05	0.00	1.47
Crude petroleum oil	22.73	8.33	25.00	13.33	30.56	11.11	4.55	12.50
Refined petroleum oil	31.03	37.12	31.25	15.72	45.47	24.39	4.55	11.88
Other fuel and oils	17.28	7.89	7.57	7.23	13.89	5.12	0.00	16.78
Other minerals and fuels	7.27	8.33	19.17	8.56	2.53	10.79	1.01	9.17
Manufactures	**10.67**	**7.20**	**10.96**	**11.68**	**7.15**	**5.57**	**1.74**	**16.78**
Wood and wood articles	17.33	13.82	8.73	18.94	3.23	8.74	2.69	28.76
Knitted or crocheted articles and accessories	30.46	16.59	17.43	17.82	18.27	4.78	7.02	68.64
Non-knitted or crocheted articles and accessories	30.89	16.53	17.96	18.35	19.02	8.26	2.27	66.15
Diamonds	9.09	11.67	12.50	0.67	31.11	11.11	9.09	12.50
Other precious stones	1.55	4.61	12.74	1.91	20.92	1.65	5.22	0.53
Iron and steel	12.95	0.27	1.26	2.51	2.68	9.60	0.00	35.42
Copper and copper products	0.75	1.09	1.87	4.50	0.62	2.91	0.00	1.72
Aluminium and aluminium products	0.64	2.63	2.03	4.36	2.07	5.44	0.00	0.66
Machinery and mechanical appliances	11.15	2.67	7.40	6.71	4.30	3.20	0.19	4.00
Electronic integrated circuits	15.50	0.00	10.23	2.10	0.00	0.00	0.00	6.26
Other electric, machinery and parts	14.99	4.98	19.96	7.10	6.03	4.74	0.41	7.80
Motor vehicles for transporting persons	40.91	51.85	25.69	21.94	39.75	45.95	0.00	50.00
Other motor vehicles and parts	10.83	16.04	9.31	12.69	16.75	15.17	1.56	24.04
Furniture, bedding and lamps	2.01	10.59	8.07	5.92	7.16	0.30	4.30	4.05
Other manufactured articles	12.35	8.24	16.87	16.13	11.94	6.37	5.16	16.36
Other products not elsewhere specified	13.58	8.58	17.21	16.28	9.96	7.92	3.95	17.92

Source: Bacchetta and Bora (2001).

Table 7. Frequency of non-tariff measures facing developed countries' exports

Description	Developed countries	South Asia	Middle East and North Africa	Latin America and the Caribbean	Europe and Central Asia	East Asia and the Pacific	Sub-Saharan Africa	Quad
Agricultural and fishery products	**48.24**	**14.87**	**57.69**	**34.24**	**32.93**	**24.42**	**18.58**	**41.98**
Minerals and fuels	**6.72**	**3.29**	**5.73**	**6.64**	**6.72**	**4.52**	**0.16**	**6.53**
Petroleum oil	26.88	22.73	28.13	14.53	38.01	17.75	4.55	12.19
Other minerals and oils	17.28	7.89	7.57	7.23	13.89	5.12	0.00	16.78
Other mineral and fuels	0.00	0.00	0.00	3.33	0.00	7.41	0.00	0.00
Manufactures	**10.67**	**7.20**	**10.96**	**11.68**	**7.15**	**5.57**	**1.74**	**16.78**
Medicaments	40.34	33.33	81.25	35.67	53.13	17.19	47.73	25.00
Paper and paperboard articles	0.61	5.06	8.05	6.43	0.38	3.37	0.06	0.11
Precious stones and metals	2.27	5.29	12.71	1.79	21.90	2.56	5.59	1.68
Automatic data processing machines	14.94	4.17	8.04	6.90	13.69	0.21	0.00	8.93
Other office parts	10.61	1.39	0.00	2.96	0.46	0.00	0.00	4.17
Other machinery and mechanical appliance	11.06	2.64	7.46	6.75	4.09	3.32	0.20	3.87
Electronic integrated circuits	15.50	0.00	10.23	2.10	0.00	0.00	0.00	6.26
Other electric machinery	14.99	4.98	19.96	7.10	6.03	4.74	0.41	7.80
Motor vehicles for transporting persons	40.91	51.85	25.69	21.94	39.75	45.95	0.00	50.00
Parts and accessories for motor vehicles	9.47	0.00	12.71	7.83	19.88	6.89	0.91	25.00
Aircraft	6.49	14.29	31.55	11.31	16.07	0.00	0.00	8.93
Furniture, bedding and lamps	2.01	10.59	8.07	5.92	7.16	0.30	4.30	4.05
Other manufactured articles	19.46	16.59	13.99	17.48	11.31	10.00	2.43	32.53
Other products not elsewhere specified	10.05	7.52	10.22	12.87	7.20	5.88	1.91	19.46

Source: Bacchetta and Bora (2001).

V.   CONCLUDING REMARKS

The rise in the relative importance of NTMs as an instrument of trade policy has increased the need to better understand their impact on trade flows. This paper has examined measurement issues regarding NTMs. For applied trade policy the most important issue discussed in this paper was the computation of the price wedge associated with the use of NTMs, despite its limitations. This is because partial and general equilibrium simulation models are driven by the price changes in international trade. However, as discussed, there are other rewarding approaches to NTM analysis. It is hoped that the discussion has been sufficiently general to allow the application of the approaches described to NTMs other than those specifically identified, because one important lesson from the study of NTMs is that the inventiveness of those seeking protection is unbounded.

NOTES

1. The reason why the Geneva agencies have adopted the term "measures" is to avoid some of the measurement and judgemental problems associated with the terms "distortions" and "barriers". As UNCTAD has explained it, "measures" encompasses all trade policy instruments, even though their restrictiveness or effects, if any, may vary between countries applying the measures or at different points of time in a specific country; for example, if the world price of a product rises above the domestic support price, a variable levy would not be applied, although the mechanism remains in force. A quota may be greater than import demand, implying no restrictiveness.

2. See, for example, Baldwin (1970a) for one of the earlier and most useful broad treatments of the subject, Bhagwati (1988) for a critique of some of the more recent developments, Laird and Yeats (1990) for a survey of recent studies of the effects of NTMs, and other studies cited in the reference list.

3. See various UNCTAD studies in the reference list, as well as Laird and Yeats (1990).

4. It is normal to use fixed year weights, so that movement in the ratio is related to changes in the application of measures against countries or products, rather than because of changes in the value of trade under different items. This procedure is similar to the construction of a fixed basket of groceries in computing price indices. If current weights are used, then in the formula t=T.

5. If imports from some countries are excluded, this ratio will also have a downward bias. In this case, the ratio could be computed only for tariff items.

6. There have been further studies by former students, using Leamer's database. While these make advances on Leamer's work, they are limited in that they do not take account of the endogeneity of NTMs in an inter-temporal context. See, for example, Harrigan (1993).

7. This is not the place to go into the debate on the gravity model. For those who wish to pursue the literature a useful starting place might be Bergstrand (1985).

8. See, again, USITC (1992a) and Francois and Shiels (1994).

9. Francois, McDonald and Nordström (1994), Goldin, Knudsen and van der Mehnsbrugghe (1993), OECD (1993), and Stoeckel, Pierce and Banks (1990).

10. Brandão and Martin (1993) and Goldin and Knudsen (1990).

11. The Software for Market Analysis and Restrictions on Trade (SMART) was developed to provide information on market conditions and to allow developing countries to make simulations of the direct trade effects of various scenarios in the Uruguay Round. The design of the system and training provided to developing countries by UNCTAD and the World Bank were supported by the United Nations Development Programme (UNDP). SMART uses a simple partial equilibrium model, and allows users to vary the parameters as well as the scenarios. It could have similar application in the context of a free trade agreement.

12. These are now available as a published schedule and on diskette in Lotus format from the WTO.

13. In the 1970s this technique was regularly used by the Australian Industries Assistance Commission to calculate price differences between foreign and domestically produced manufactures, such as domestic appliances and automobiles.

14   One of the first experiments in quota auction-
      ing in Australia – for automobiles in the mid-
      1970s – was quickly concluded as the Gov-
      ernment became embarrassed by the size of
      the quota rents.

15   See OECD (1987), the country studies pub-
      lished in the same year and OECD (1994).

16   In Anderson and Neary (1994b) it is also used
      to compare the restrictiveness of the United
      States MFA scheme with regard to different
      exports to the United States market.

17   The free trade materials/output ratio is com-
      puted by adjusting the materials/output ratio
      under protection for the effects of the existing
      protection structure. Thus, the unit values of
      the input and output are divided by (1+dm) and
      (1+df) respectively, i.e. x=x'*((1+df)/(1+dm)),
      where x' is the materials/output ratio under
      protection. Also, note that x can be greater
      than unity because of this adjustment, imply-
      ing that the denominator in the effective rate
      formula is negative and, hence, effective rates
      may also become negative. In addition, while
      tariffs must be positive, nominal protection on
      inputs or outputs can be negative if the net ef-
      fect of all forms of assistance and taxes is nega-
      tive. It should also be noted that in effective
      rate calculations no allowance is made for any
      shift between materials, or between materials
      and other factors of production, as a result of
      relative price variations in the free trade situa-
      tion vis-à-vis the protected situation.

18   The developed countries are also subdivided,
      generating another region, the Quad (EU,
      United States, Canada and Japan).

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Code	Description
1000	**TARIFF MEASURES**
1100	STATUTORY CUSTOMS DUTIES
1200	MFN DUTIES
1300	GATT CEILING DUTIES
1400	TARIFF QUOTA DUTIES
1410	Low duties
1420	High duties
1500	SEASONAL DUTIES
1510	Low duties
1520	High duties
1600	TEMPORARY REDUCED DUTIES
1700	TEMPORARY INCREASED DUTIES
1710	Retaliatory duties
1720	Urgency and safeguard duties
1900	PREFERENTIAL DUTIES UNDER TRADE AGREEMENTS
1910	Interregional agreements
1920	Regional and sub-regional agreements
1930	Bilateral agreements
2000	**PARA-TARIFF MEASURES**
2100	CUSTOMS SURCHARGES
2200	ADDITIONAL TAXES AND CHARGES
2210	Tax on foreign exchange transactions
2220	Stamp tax
2230	Import licence fee
2240	Consular invoice fee
2250	Statistical tax
2260	Tax on transport facilities
2270	Taxes and charges for sensitive product categories
2290	Additional charges n.e.s.
2300	INTERNAL TAXES AND CHARGES LEVIED ON IMPORTS
2310	General sales taxes
2320	Excise taxes
2370	Taxes and charges for sensitive product categories
2390	Internal taxes and charges levied on imports n.e.s.
2400	DECREED CUSTOMS VALUATION
2900	PARA-TARIFF MEASURES N.E.S.
3000	**PRICE CONTROL MEASURES**
3100	ADMINISTRATIVE PRICING
3110	Minimum import prices
3190	Administrative pricing n.e.s.
3200	VOLUNTARY EXPORT PRICE RESTRAINT
3300	VARIABLE CHARGES
3310	Variable levies
3320	Variable components
3330	Compensatory elements

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Code	Description
3340	Flexible import fees
3390	Variable charges n.e.s
3400	ANTI-DUMPING MEASURES
3410	Anti-dumping investigations
3420	Anti-dumping duties
3430	Price undertakings
3500	COUNTERVAILING MEASURES
3510	Countervailing investigations
3520	Countervailing duties
3530	Price undertakings
3900	PRICE CONTROL MEASURES N.E.S.
4000	**FINANCE MEASURES**
4100	ADVANCE PAYMENT REQUIREMENTS
4110	Advance import deposit
4120	Cash margin requirement
4130	Advance payment of customs duties
4170	Refundable deposits for sensitive product categories
4190	Advance payment requirements n.e.s.
4200	MULTIPLE EXCHANGE RATES
4300	RESTRICTIVE OFFICIAL FOREIGN EXCHANGE ALLOCATION
4310	Prohibition of foreign exchange allocation
4320	Bank authorization
4390	Restrictive official foreign exchange allocation n.e.s.
4500	REGULATIONS CONCERNING TERMS OF PAYMENT FOR IMPORTS
4600	TRANSFER DELAYS, QUEUING
4900	FINANCE MEASURES N.E.S.
5000	**AUTOMATIC LICENSING MEASURES**
5100	AUTOMATIC LICENCE
5200	IMPORT MONITORING
5210	Retrospective surveillance
5220	Prior surveillance
5270	Prior surveillance for sensitive product categories
5700	SURRENDER REQUIREMENT
5900	AUTOMATIC LICENSING MEASURES N.E.S.
6000	**QUANTITY CONTROL MEASURES**
6100	NON-AUTOMATIC LICENSING
6110	Licence with no specific ex-ante criteria
6120	Licence for selected purchasers
6130	Licence for specified use
6131	Linked with export trade
6132	For purposes other than exports
6140	Licence linked with local production
6141	Purchase of local goods
6142	Local content requirement
6143	Barter or counter trade
6150	Licence linked with non-official foreign exchange
6151	External foreign exchange
6152	Importers own foreign exchange
6160	Licence combined with or replaced by special import authorization
6170	Prior authorization for sensitive product categories
6190	Non-automatic licensing n.e.s.
6200	QUOTAS
6210	Global quotas
6211	Unallocated

/...

Code	Description
6212	Allocated to exporting countries
6220	Bilateral quotas
6230	Seasonal quotas
6240	Quotas linked with export performance
6250	Quotas linked with purchase of local goods
6270	Quotas for sensitive product categories
6290	Quotas n.e.s.
6300	PROHIBITIONS
6310	Total prohibition
6320	Suspension of issuance of licences
6330	Seasonal prohibition
6340	Temporary prohibition
6350	Import diversification
6360	Prohibition on the basis of origin (embargo)
6370	Prohibition for sensitive product categories
6390	Prohibitions n.e.s.
6600	EXPORT RESTRAINT ARRANGEMENTS
6610	Voluntary export restraint arrangements
6620	Orderly marketing arrangements
6630	Multi-fibre arrangement (MFA)
6631	Quota agreement
6632	Consultation agreement
6633	Administrative co-operation agreement
6640	Export restraint arrangements on textiles outside MFA
6641	Quota agreement
6642	Consultation agreement
6643	Administrative co-operation agreement
6690	Export restraint arrangements n.e.s.
6700	ENTERPRISE-SPECIFIC RESTRICTIONS
6710	Selective approval of importers
6720	Enterprise-specific quota
6790	Enterprise-specific restrictions n.e.s.
6900	QUANTITY CONTROL MEASURES N.E.S.
7000	**MONOPOLISTIC MEASURES**
7100	SINGLE CHANNEL FOR IMPORTS
7110	State trading administration
7120	Sole importing agency
7200	COMPULSORY NATIONAL SERVICES
7210	Compulsory national insurance
7220	Compulsory national transport
7900	MONOPOLISTIC MEASURES N.E.S.
8000	**TECHNICAL MEASURES**
8100	TECHNICAL REGULATIONS
8110	Product characteristics requirements
8120	Marking requirements
8130	Labelling requirements
8140	Packaging requirements
8150	Testing, inspection and quarantine requirements
8190	Technical regulations n.e.s.
8200	PRE-SHIPMENT INSPECTION
8300	SPECIAL CUSTOMS FORMALITIES
8900	TECHNICAL MEASURES N.E.S.

Source: UNCTAD (1994), which contains notes on certain measures as well as a set of working definitions for trade control measures.

The following list of the main types of non-tariff measures is adapted from Laird and Yeats (1990) to fit in with the broad classification according to intent by Laird and Vossenaar (1991), given in section III of this paper. It has been extended to cover measures affecting exports.

A. Measures to control the volume of imports

A wide range of measures are used to control the volume of imports. These include prohibitions, various types of quotas or quantitative restrictions (QRs), non-automatic licensing, import authorizations, voluntary export restraints, including under the Multi-Fibre Arrangement (MFA), orderly marketing arrangements, and State trading or sole import monopolies.

Prohibitions can apply in general or under special circumstances, for example conditional prohibitions. Typically, prohibitions apply to arms and munitions as well as other military equipment (unless imported by the armed forces), drugs (except where imported by health authorities or for scientific purposes), pornographic materials, and certain plants or animals (including endangered species, under international conventions). If certain standards or other technical regulations are not complied with, imports may be prohibited (technical barriers – see below).

Quotas are restrictions on the quantity or value of imports of specific products. They are determined for a specific period of time, and modified periodically. They may be imposed for a limited period of time as a trade remedy or safeguard action against a surge in imports, for example under Article XIX of the GATT. They are sometimes set on a first-come-

first-served basis, but more often they are allocated in respect of existing trading partners in proportion to their historic market share. They may be allocated to importing companies, again in relation to historic share in imports, or to foreign Governments or companies. If foreign Governments receive the quotas, they may allocate them to companies in their country on the basis of historic market share or sell the quotas, including by auction.

Quotas may be applied globally (to all countries), plurilaterally (to a group of countries) or bilaterally (to a single trading partner). They may also be applied at certain times of the year (seasonal quotas), usually during the growing season for protected agricultural products.

Non-automatic licensing is usually the means for administering a quota or a conditional prohibition, and in such cases is a condition for import. However, sometimes quotas are not determined in advance; in these cases, the non-automatic licence may be a means of rationing foreign exchange, or of determining whether certain conditions for import have been met, for example export performance requirements. Non-automatic licensing may be relatively restrictive or discretionary or it may be relatively liberal, often depending on the economic circumstances in the importing country. Import authorizations, usually for a ministry, government agency and so forth, are a form of non-automatic import licensing, typically used to administer conditional prohibitions.

Voluntary export restraints (VERs) are usually informal export restraint arrangements (ERAs) between an exporter and an importer whereby the former agrees to limit, for a certain period of time, the exports of certain goods to the market of the imports to avoid the imposition of import quotas. They are often

industry-to-industry arrangements, but Governments can be involved on a more or less formal basis. Where Governments are formally involved, these arrangements are sometimes categorized as organized marketing arrangements (OMAs), although the use of this term seems to have become less frequent.

Textiles and clothing imports by most industrial countries have operated under various restraints for more than 30 years. In its current form, the main instrument is the Multi-Fibre Arrangement (MFA), which is scheduled to be phased out over 10 years as part of the Uruguay Round agreement. Essentially, it is a series of bilateral VERs applying to some 100 or so textile and clothing sectors; the sectors need not be comprehensive, being specified for each affected trading partner. Textile and clothing exporters which are not members of the MFA, for example Eastern European countries and China, are covered by similar restrictions – textile restraint agreements.

State trading and import monopolies are procedures whereby a government agency has the exclusive right to trade or has granted this right to a private monopolist. Only that agency or company can determine the level of imports, although it may in practice operate strictly as an independent operator.

B.   Measures to control the price of imported goods

These can be subdivided into tariff-type or para-tariff measures and price NTMs.

(i)   Tariff-type measures

These include the following: tariff surcharges, seasonal tariffs, tariff quotas, additional charges, domestic charges levied on imports, variable levies, anti-dumping duties and countervailing duties.

Tariff quotas operate as a limit or a quota on the quantity or value of imports of specific products allowed, for a given time period, under the normal tariff, whereas higher rates are charges on imports which exceed the quota. These are sometimes called tariff rate quotas. They are to be applied extensively in the agricultural sector for a range of commodities for which existing restrictions on imports are to be "tariffied".

Local content plans can work like a tariff quota. In return for achieving a certain degree of local content, producers, such as automobile assemblers, are allowed to import a certain amount or quota of equivalent finished goods at lower or even duty-free prices. Imports above the quota attract the normal, higher rate. An important effect is protection of the domestic components industry, as discussed in the main text.

Variable levies are special charges imposed on imports of certain goods in order to raise their price to a domestic target price. No levy is imposed when the international price exceeds the domestic support price. They are widely applied to the agricultural sector by the European Union, but are to be eliminated under the Uruguay Round agreement. For an analysis, see Sampson and Yeats (1977).

Anti-dumping duties are levied on certain goods originating in a specific trading partner or specific trading partners to offset the effect of dumping. Such duties may be enterprise-specific or may be applied on a nation-wide basis. These have become one of the most widely used measures in recent years. For a discussion, see Finger (1993).

Countervailing measures are special charges on certain goods to offset the effect of any bounty or subsidy granted directly or indirectly on the manufacture, production or export of these goods.

(ii)   Other price NTMs

Other price measures include minimum prices, voluntary export price restraints,

government procurement procedures, and certain other procedures which increase the costs of imports.

Minimum prices set a decreed target or reference price for an imported good, like the domestic support price used for many agricultural products. Actual import prices below the minimum price may trigger action in the form of compensatory duties or price investigations. A duty which is set in order to equalize the import price and the minimum or target price is a variable levy. However, where the target price or reference price is a means of determining the value for duty (customs valuation) the "normal" rate is levied on the reference price, not the actual transaction value.

Voluntary export price restraints are an undertaking by an exporter, accepted by the authorities in the importing country, to undertake actions which neutralize price effects of subsidies and/or dumping in order to avoid the imposition of countervailing measures.

Government procurement procedures typically involve a price preference for domestic goods. The price preference is computed to determine the outcome of public tenders for the supply of goods or services to government agencies.

Other measures which increase the cost of imports include advance deposit requirements (without interest payments), special regulations on foreign exchange and the use of credit for imports. Similarly, special entry procedures, such as the requirement that a fixed share or all of trade be carried by the national fleet or that imports be effected through special ports, operate to increase costs.

C. Monitoring measures, including price and volume investigations

Monitoring measures include automatic licensing, import surveillance, price surveillance and investigations, and anti-

dumping and countervailing investigations. These are sometimes considered to have a harassing or "chilling" effect on imports. It has been shown by Messerlin (1988) that anti-dumping investigations themselves may cause a reduction in imports.

Automatic licensing and import surveillance are typically used together to track the level of imports. One reason for such action may be concerns about possible import surges, which could trigger safeguard actions.

In some countries, including the United States, there is a separation of two components of an anti-dumping or countervailing investigation. First, there is an investigation as to whether dumping or subsidization is taking place. Only if this is found to be the case is there an investigation as to whether or not there is injury to the domestic industry. Standards of injury are defined in the relevant GATT codes. Dumping investigations often involve the use of constructed prices and the methodology applied in some cases has been widely criticized (Finger, 1993).

D. Production and export measures

These consist of measures to assist or to control production or exports. The main measures are production and export subsidies and export prohibitions and taxes.

Subsidies, sometimes called bounties (although the latter term is often reserved for inputs), may be used to assist domestic production and are most common in the agricultural sector, but they have also been a widely used tool of industrial policy in developed and developing countries. For a general treatment, see Hufbauer and Erb (1984). There are many different schemes operating under a wide range of names – see, in particular, OECD (1994) for a catalogue of measures in the agricultural sector. Subsidies can be applied directly to production or, indirectly, to inputs into production. They can also be applied in

respect of services, such as finance or transport used in production or marketing. They are sometimes applied only in certain regions, to assist regional development. They may take the form of financial support or waivers of taxes or charges that would otherwise be due. In the Uruguay Round one of the important issues was the de-linking of subsidies from the level of production to a form of income support for farmers.

Subsidies may also be applied directly to exports. An Illustrative List of Export Subsidies is attached to the Uruguay Round Code on Subsidies and Countervailing Measures – see GATT (1994). Remission of import charges on imported inputs must be precisely computed to avoid being considered a subsidy. Various tax breaks applied only to exports are considered to be subsidies.

Export performance requirements are a means of linking certain import concessions (reduced tariffs) or investment tax breaks to the export of a fixed share of domestic production.

Exports may be prohibited, for example in support of United Nations resolutions, or because the products are deemed dangerous or constitute a security risk. However, they are often prohibited to provide materials such as raw or tanned hides, vegetable oil seeds or cake, or lumber to processors. The export restriction usually drives down the domestic price so that processors also obtain their inputs below world prices. Export prohibitions (and taxes) have more recently been invoked as necessary for conserving natural resources, such as rare tropical timbers, but if domestic access is not restrained the effect may be to encourage technically inefficient processing with little or no effect on conservation. Export taxes are also used to attempt to exploit market power by capturing the economic rents from a dominant supplier position. Such rents can attract expansion by competitors, resulting in their elimination and loss of market power.

E. Technical barriers

These comprise technical regulations and standards to be met by products for sale on the domestic market, applying, in principle, equally to domestic and imported goods. They include health, sanitary, phytosanitary and safety regulations, as well as marking and packaging requirements.

Such measures may be applied to individual items or to samples from shipments. Type approval may be granted for imports from certain suppliers, obviating the need for individual testing. Sometimes a certificate of compliance with international standards or national standards of the United States or member States of the European Union, issued by approved agencies, is acceptable to other countries.

Technical barriers may increase the price of imports or cause non-complying imports to be prohibited.

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