

Estimating Trade Restrictiveness Indices

The World Bank - DECRG-Trade

SUMMARY

The World Bank Development Economics Research Group -Trade - has developed indices of trade restrictiveness covering both developing and developed countries to be used by researchers, to inform policymakers and to enter as input into World Bank publications. The objectives of these indices are: first to build more comprehensive indicators of trade restrictiveness that include measures of both tariff and non-tariff measures; and second to explore differences in the level of trade protection vis-à-vis different groups of countries (low-income, middle-income, least-developed countries). This note summarizes the methodologies used to construct such indices.

Indices of trade restrictiveness.

The indices detailed in this note (OTRI, TRI and MA-OTRI) belong to the family of trade restrictiveness indices developed by Professors James Anderson (Boston College) and Peter Neary (University College Dublin) for the World Bank in the early 1990s.¹ Their, and our, approach addresses two of the classic problems in creating measures of trade protection that were until then only imperfectly solved.

The first problem is that trade policy can take many different forms: tariffs, quotas, non-automatic licensing, antidumping duties, countervailing duties, tariff-quotas, subsidies, etc. How can we find a single measure of the trade restrictiveness of a 10 percent tariff, a 1000 tons quota, and \$1 million subsidy? Often the literature relies on outcome measures, e.g., import shares. The rationale is that import shares summarize the impact of all these trade policy instruments. The problem is that they also measure differences in tastes, macroeconomic shocks, and other factors such as rainfall, which should not be attributed to trade policy. Another approach that is also often followed is to simply rely on tariff data and hope that all other instruments are (perfectly) correlated with tariffs. These are obviously unsatisfactory solutions. A more adequate approach to solve this first problem is to bring all types of trade policy instruments into a common metric. This is, for example, what the IMF's TRI (Trade Restrictiveness Index) does by implementing the following procedure. First, countries with an average tariff below a certain threshold are open and therefore score only 1 point, whereas countries with higher average tariffs score a higher number of points. Second, countries with a share of tariff lines affected by non-tariff measures below a certain threshold are open and score 1 point, and countries with higher shares score a higher number of points. So for example, an average tariff of 3 percent scores 1 point and when only 5 percent of tariff lines are affected by NTMs the country also scores 1 point, for a total of 2 point on the TRI. Different types of trade policy instruments have been brought to a common metric. The problem is that it is not clear why a 3 percent average tariff should be equivalent to a 5 percent NTM coverage. These are ad-hoc criteria with no economic basis.

The second problem is that trade policy is determined at the tariff line level and there are about 5000 tariff lines in the tariff schedule of developing and developed countries. How can one summarize all this information in one aggregate measure? Commonly used aggregation procedures include simple average, import-weighted averages and frequency ratios, none of which has a sound theoretical basis as an adequate measure of trade protection. For example, imports subject to high protection rates are likely to be small and therefore will be attributed

¹ See Anderson and Neary (1992, 1994, 1996, 2003, 2004). Their influential work on this subject is illustrated and summarized in a recent volume (Anderson and Neary, 2005). For other analytical derivations, see Professor Robert Feenstra's chapter in the Handbook of International Economics (Feenstra, 1995).

small weights in an import-weighted aggregation, which would underestimate the restrictiveness of those tariffs.² Goods subject to prohibitively high tariffs have the same weight in the index as goods subject to zero tariffs –zero. Similarly, when computing simple average tariffs, very low tariffs on economically meaningless goods would downward bias this measure of trade restrictiveness. For example, assume that there are two tariff lines for cement: one for finished cement, which is very costly to transport internationally and one for clinker which represents 80 percent of cement’s value added, but is cheap to transport. Finished cement has a 0 percent tariff and clinker a 100 percent tariff. The simple average tariff is 50 percent, whereas most of what is imported pays a 100 percent tariff.

Methodology

The methodology for estimating these indices has been fine tuned during the last few years. During this time the current methodology has been perfected, made more robust and up-to-date with the latest modeling and econometrics estimation. The approach to estimate these indices is now widely accepted and used as a valid method by researchers and academics. The papers illustrating this methodology are in the process to be published in first-ranking academic journals.

In summary, the methodology to measure trade restrictiveness solves the first problem by transforming all the information on non-tariff measures into a price equivalent, i.e., it answers the following question: what is the impact that these NTMs have on the domestic price of imported goods? This is called an Ad-Valorem Equivalent (AVE), and is directly comparable to a tariff.

It solves the second problem by using theoretically sound aggregation procedures that answer very specific questions. When interested in the trade distortions that the country imposes on itself, the aggregation procedure answers the following question: *What is the equivalent uniform tariff that would keep domestic welfare constant?* When interested in the trade distortions that a trading partner (e.g., OECD) is imposing on a country’s export bundle, the aggregation procedure answers the following question: *What is the equivalent uniform tariff of country M that would keep imports of country M from country X at their observed levels?*³ We labeled these trade restrictiveness indicators OTRI and MA-OTRI for Overall Trade Restrictiveness Indices and Market Access Overall Trade Restrictiveness Index depending on whether we take the perspective of the importer or the export. They are simply given by a weighted sum of tariffs and AVEs of NTMs at the tariff line level. Weights are an increasing function of import shares and elasticities of import demand at the tariff line level, which capture the importance that restrictions on these good would have on the overall restrictiveness. When domestic welfare is the relevant metric, then weights are also a function of aggregate levels of protection at the tariff line level. In other words, the higher the variance of the tariff schedule, the higher the OTRI. Note that the weights of the OTRI do not take the value of zero in the presence of prohibitive tariffs unless import demand is also infinitely inelastic, overcoming the problems of import-weighted averages mentioned above.

Thus, in order to compute the aggregate measure of trade restrictiveness, one needs information on tariffs, but more importantly AVEs of NTMs and elasticities of import demand at the tariff line level. These were estimated in two background papers.

Kee, Nicita and Olarreaga (2004, 2008a) provide estimates of import demand elasticities at the tariff line level for 117 countries. The methodology follows closely Kohli (1991) and Harrigan

² Note that if one were to use welfare as a metric, the welfare cost of a tariff increases with the square of the tariff and therefore higher weights should be attributed to high tariffs when computing a trade restrictiveness index.

³ Note that from the exporter’s perspective, as well as the importer’s political economy perspective, this is the relevant question. From the importer’s perspective, however, the relevant trade restrictiveness index would be the one that keeps welfare constant (see Anderson and Neary, 1994, 1996).

(1997), where imports are treated as inputs into domestic production, given exogenous world prices, productivity and endowments. In a world where a significant share of growth in world trade is explained by vertical specialization, the fact that imports are treated as inputs into the GDP function—rather than as final consumption goods as in most of the previous literature—seems an attractive feature of this approach. Note that most imported products—even consumption goods—have some domestic value added embedded (marketing cost, transport costs, etc.), which justifies the assumption that they are inputs into the GDP function. The main difference with Kohli (1991) and Harrigan (1997) is that their estimates are undertaken at the aggregate and industry level respectively, whereas we estimated import demand elasticities at the tariff line level.

Kee, Nicita and Olarreaga (2006, 2008b) provide estimates of AVEs of Core NTMs (price and quantity control measures, technical regulations, as well as monopolistic measures, such as single channel for imports) and agricultural domestic support at the tariff line level for 104 countries. This is done as follows. We first measure the impact of NTMs on imports following Leamer's (1990) comparative advantage approach (see also Harrigan, 1993 and Trefler, 1993). The logic of this approach is to predict imports using factor endowments and observe its deviations when NTMs are present. This is done for each HS six-digit tariff line in which at least one country has some type of NTM (around 4800 tariff lines). The impact of NTMs on imports varies by country (according to country specific factor endowments). We then convert the quantity impact of NTMs on imports into a price equivalent (or AVE) by simply moving along the import demand curve using import demand elasticities estimated earlier.

Data Sources

Import data comes from United Nations' Comtrade (available through WITS). We take the average between 2004 and 2006 to smooth any year specific shock. If data is missing for a particular country, then we also use data for 2003 to calculate the average.

Tariff data comes from different sources. The main source is the TRAINS database. Additional data was obtained from the WTO tariff database. Unilateral, bilateral and regional preferences mostly come from UNCTAD's Trains. AVEs of specific tariffs, which can be quite common in some countries, were estimated by UNCTAD.

Regarding NTMs, we obtained the entire UNCTAD TRAINS dataset through the World Bank's WITS system. This dataset contains detailed information on various types of NTMs (more than 30 different types of NTMs are identified). In UNCTAD's TRAINS classification terminology, we included in our measure of core NTMs: price control measures (excluding antidumping which are already included in the tariff dataset, quantity restrictions, monopolistic measures and technical regulations). The second type of NTM included is agricultural domestic support. This was obtained from WTO members' notifications during the period 1995-1998 (and constructed by Hoekman, Ng and Olarreaga, 2004). The NTM dataset was updated using WTO's Trade Policy Reports and in the case of the EU the "EU Standards Database" put together by Ben Shepherd and his colleagues at the Institute of Science Politiques, Paris.

In order to have a more comprehensive view of trade restriction around the world, DECRG-Trade continues to collaborate with the WTO and UNCTAD Secretariat to improve the country and time coverage of both tariff and NTM data.

Results

The output of this project includes two academic papers (Kee, Nicita and Olarreaga (2008a, 2008b) and three databases: a) import demand elasticities, b) AVEs of Core NTMs and agricultural domestic support, and c) trade restrictiveness indices.

Import demand elasticities

As expected, import demand elasticities tend to be larger for homogeneous goods (e.g., larger for metal than machinery). They also tend to be larger in large and poor countries. They tend to decline as we estimate them at more aggregate levels (industry level instead of tariff line level).

AVEs of NTMs

The average AVE of core NTMs and agricultural domestic support increases with GDP per capita. Similarly, their contribution to the overall level of protection is higher in rich countries. When they are present, they are generally more restrictive than tariffs on the same products. For example, in around 75 percent of tariff lines in which a core NTM is present, the AVE is higher than the tariff. Similarly, in 45 percent of tariff lines in which there is agricultural domestic support, the AVE is higher than the tariff. Finally, within countries, tariffs, AVEs of core NTMs, and AVEs of agricultural domestic support tend to reinforce each other, rather than substitute for each other.

Trade Restrictiveness Indices

We computed three types of trade restrictiveness index. First, the TRI captures the trade distortions that each country's trade policies impose on itself. Second, the OTRI captures the trade distortions it imposes on its import bundle. Finally, the MA-OTRI captures the trade distortions that the rest of the world trade policies impose on the export bundle of each country. We compute these indices for the broad aggregates of agriculture and manufacturing. Trade restrictiveness is generally higher in agriculture, and exporters of agriculture goods will face higher MA-OTRI.

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