

# Measuring WTO's Contributions to Global Economic Welfare

Edited by  
Kym Anderson



Critical Perspectives on the  
Global Trading System and the WTO

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CRITICAL PERSPECTIVES ON THE GLOBAL TRADING SYSTEM AND THE WTO

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# Measuring WTO's Contributions to Global Economic Welfare

# **Critical Perspectives on the Global Trading System and the WTO**

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# Introduction

Kym Anderson<sup>1</sup>

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The contributions to global economic welfare of the World Trade Organization (WTO) and its predecessor, the General Agreement on Tariffs and Trade (GATT), are many and varied and range over the WTO's five areas of competence, which are to:

- establish international trade rules and disciplines,
- negotiate reductions in policy-induced distortions to the free flow of goods and services between members (including when non-members seek to accede),
- settle trade-related disputes between members,
- monitor, record notifications and disseminate information on trade and trade-related policies of members, and
- coordinate with other international organizations on trade-related issues.

As Irwin (1995a,b) notes, there has also been the hope that the GATT/WTO would help avoid a repetition of the economic depression of the 1930s, and even of war (through promoting greater economic interdependence, which raises the opportunity cost of going to war).

Estimating empirically the worth of those contributions is a challenge that has barely begun to be addressed by economists. For present purposes the last two of the above-listed five roles of the WTO are ignored, partly because they did not apply to the GATT but also because we know of no quantitative assessments of those contributions.<sup>2</sup>

Nor are any assessments included of the value of the GATT/WTO core rules and disciplines. That area is covered qualitatively in a separate volume in this series (Anderson and Hoekman 2005), but again we know of no attempt to estimate their value empirically.

The economic welfare contributions of the WTO's Dispute Settlement Body also are difficult to assess, not least because the very existence of that Body increases the extent to which members comply with WTO rules, disciplines, and commitments.<sup>3</sup> Furthermore, more than half the disputes are resolved informally between the parties without the complainant having to request a Panel (Horn and Mavroidis 2011). Of the cases that do go through the Panel process, it is rare to see estimates of the economic consequences of the dispute (other than the value of trade involved), which anyway would be speculative if done *ex ante* because the exercise would involve comparing the WTO-inconsistent policy measure under dispute with not the absence of the measure but its replacement with an unknown WTO-consistent (but possibly no less protective) alternative policy measure (Anderson 2002).

Thus this volume focuses mostly on the value of the GATT/WTO's contribution in providing a forum for negotiating reductions in policy-induced distortions to trade flows, including through the process of accession by new members – of which there have been 31 in the WTO's first 19 years, bringing the total membership to 159 customs territories by late 2013, with a

further 25 governments still 'observing' while in various states of negotiating their accession protocol.

Even this narrowing of the field is insufficient, as the lowering of trade distortions generally (although not in every case) has contributed to global economic welfare through, for example, improved efficiency of resource use, lower consumer prices, often more employment, faster economic growth, more sustainable development, nearly always less global income inequality and poverty, and less conflict between and within nations. To make the present task more manageable, readers are referred to other volumes in this series of readings dealing with trade and employment (Brown and Stern 2007), the environment (Sampson and Whalley 2005), income inequality and poverty (Winters 2007), and conflict (Busch and Mansfield 2007).

This volume's focus is thereby confined mainly to the empirical literature aimed at estimating the *ex ante* or *ex post* national and global economic welfare impacts of producer and consumer responses in the marketplace to GATT/WTO-induced multilateral liberalization of price-distorting policies (past and also prospective). Smaller sections briefly focus on implementation of the Uruguay Round's TRIPS agreement on intellectual property rights, and on WTO accession and trade facilitation (more on which can be found in Maskus 2004, Primo Braga and Cattaneo 2010, and Maur and Wilson 2010, respectively). Welfare effects are estimated directly by some authors. Others have sought to estimate econometrically the impact of WTO on trade, presuming that trade growth resulting from a multilateral reform process will improve economic welfare (given the anti-trade bias in virtually every country's trade policy regime, and the low risk of trade diversion in multilateral as distinct from preferential policy reform).

The theory of trade policy and economic welfare blossomed in the two decades following the seminal contribution by Meade (1955). A synthesis appears in Bhagwati (1971), and a fuller treatment in Corden (1974, revised in 1997). That theory makes clear why trade taxes and other border measures are almost never first-best policy instruments for overcoming externalities or achieving the non-economic objectives of a small open economy. Even for large economies able to influence their terms of trade, there is value in international cooperation to desist from exploiting that power via trade taxes when retaliation is likely – or as a way to move from a sub-optimal equilibrium resulting from unilateral application of trade measures (a Nash equilibrium) to a negotiated solution that allows higher income levels for all countries. A rich theoretical literature around the economics of the multilateral trading system has been evolving over the past decade or so, with important contributions from Bagwell and Staiger (1999, 2002) and Horn and Mavroidis (2001). Saggi (2009) provides a recent enhancement involving a repeated game of tariff cooperation, in which multilateral free trade is shown to be easier to sustain under most-favoured-nation (MFN) rules than under discriminatory preferential ones. This conclusion holds even when tariff discrimination takes the form of bilateral trade agreements. Overall, his analysis shows that from the viewpoint of low-income countries, MFN and multilateral tariff cooperation are complementary in nature. A further important contribution shows how WTO tariff bindings are welfare improving even when bound tariffs are above applied rates, in a world of fluctuating prices (Francois and Martin 2004).

Despite the strong theoretical case in favor of free trade, most countries continue to impose trade-restrictive policies; and despite the compelling case for multilateral cooperation in reducing those barriers, national governments of the key large economies are often reluctant to champion the multilateral trade negotiation process. That reticence to reform – and the occasional trade subsidy – suggests there are political economy forces at work that favor trade-

distorting policies (see the readings in Ethier and Hillman 2008). That in turn suggests counter-forces are needed within national polities to provide the majority gainers with more influence over the minority that might lose from reducing those distortions. One counteracting force has emerged in recent years, as a result of past policy reforms plus technological advances that have fragmented production along the value chain. This rapidly developing phenomenon has increased incentives for countries to lower trade costs and has greatly reduced their incentives to protect domestic markets (Baldwin 2012). Another counteracting force that can alter the imbalance of intra-national political powers is more transparency on the extent and economic effects of price-distorting policies. This prospect has stimulated analysts to estimate the extent to which national policies have distorted prices and quantities traded, how markets would be altered under various actual or proposed partial multilateral trade agreements, and what the national and global trade and welfare consequences would be or have been of such reforms.

This set of readings is divided into seven parts: measuring the price-distorting effects of trade-related policies, estimating with global simulation models the welfare effects of reforms prior to the WTO's Doha round, estimating the net benefits and transfers associated with implementing the Uruguay Round agreement on trade-related intellectual property rights, estimating (again with global simulation models) the potential welfare effects of a Doha Round agreement, estimating econometrically past trade and related effects of the GATT/WTO, estimating the benefits of WTO accession, and estimating potential benefits from WTO-sponsored trade facilitation. The rest of this introduction provides a guide to the various readings in each of those parts of the volume, before offering some concluding comments.

An important caveat needs to be made at the outset though. Not only is it impossible to place even an approximate value on the contribution of the rules-based multilateral trading system to the world economy, but it is also very difficult to attribute policy changes specifically to GATT/WTO negotiations *per se*. Some commitments made in GATT agreements are no more than belated recognition of past unilateral policy changes (just as national laws are often just belated codification of changes in societal norms – see Cooter 1997). The challenge still before the economics profession is to better identify *how* the GATT/WTO has contributed to trade-related policy reforms, and then to use that knowledge to more-precisely estimate *how much* that contribution is worth in terms of national and global economic welfare.

## 1. Measuring Price Distortions due to Trade-Related Policies

The first step in any analysis of the market and welfare consequences of trade reform is quantification of the extent to which policies alter market prices. Such measures are essential inputs into sectoral or economywide models aimed at estimating economic welfare effects, but they are also useful as stand-alone indicators for monitoring national policy trends. They may also serve as an aid to trade negotiators and as a guide to compliance with WTO obligations.

Price distortions can be due to taxes or subsidies on imports or exports, or quantitative restrictions on trade volumes (including trade bans). Trade can be also distorted by interventions in foreign exchange markets. Myriad domestic policy interventions such as output, input, and factor taxes and subsidies, even on nontradables, can affect trade as well. Conditions of competition also affect domestic prices, especially in the case of impediments to services trade

and investment flows. In the case of a national economy too small to influence its international terms of trade, and without any externalities or market failures, such market interventions generally will reduce national economic welfare. And when many such small economies so intervene, international prices, and hence other countries' terms of trade, also are affected.

Over recent centuries the most common trade distortionary measure, and certainly the one most studied by international economists and most negotiated at the GATT and WTO, is the import tax known commonly as the tariff.<sup>4</sup> We discuss it first, then export taxes and subsidies, and then domestic subsidies – all of which are subject to varying extents to the rules and disciplines of the GATT and WTO. When the prices of some intermediate inputs are also distorted by policies, that affects the value added by an industry and hence its profitability depending on the importance of such intermediate inputs. To capture that effect the concept of effective protection was created to provide an indicator of how much policies may have reallocated resources within a sector. Allocation of resources between sectors is determined also by the assistance provided to producers in other tradable sectors, so a relative rate of assistance has been devised. These measures do not give policy makers and trade negotiators very reliable indicators of the overall sectoral or economywide trade and welfare effects of those distortionary policies, however. Hence another family of single indicators of the trade-distorting and welfare-reducing effects of price and trade policies has been developed, known as trade restrictiveness indexes. Finally in this section we discuss measures to capture the impediments to services trade and foreign investment.

### 1.1 Import Tariffs and Tariff Equivalents

To measure the extent of a country's aggregate tariff protection against import competition, attention focused initially on developing tariff level indexes. Early efforts include studies by Crawford (1934) and Carmody (1952) for Australia (infamous for having perhaps the highest manufacturing tariffs in the OECD in the twentieth century), plus Loveday (1929), Liepmann (1938), and the League of Nations (1927) more generally.

One of the problems with any aggregate measure, however, is that it cannot serve equally well all purposes simultaneously. Domestic uses for the index could be as an indication of the aggregate degree of resource reallocation towards protected industries and/or of taxation of consumption of importables, or of foregone welfare gains from trade. International uses such as by trading partners could be as an indication of the degree of restriction on import market access. Aggregation across products requires deciding on what to use as weights (actual imports? production? consumption?) and, if some tariffs are expressed per unit of volume or weight, they need to first be converted to an *ad valorem* basis (using what prices?). These and other measurement issues associated with aggregate tariff level indicators are discussed in Michaely (1977).

The second most important group of trade distortions are non-tariff restrictions on imports. The most common of those during the twentieth century were import quotas and licenses. These non-tariff barriers (NTBs) to trade are even more difficult to deal with than tariffs, but the most practical way for modelers to estimate their effects on trade and welfare is to express them as *ad valorem* tariff equivalents at a point in time. If that is greater than the rate of tariff that is also in place for a particular product, then generally the former is the appropriate measure of protection.

The science – and art – of so deriving an accurate measure of the extent of price distortions due to tariffs and NTBs can be complicated and tedious empirical work (Laird 1997; Maskus and Wilson 2001). But once the percentage by which the domestic price is raised by a tariff or more-protective NTB has been estimated, it is then able to be compared with similar estimates for other products. This rate has become known as the nominal rate of protection (NRP). If that product's domestic price is distorted only by those trade measures at the country border, the NRP will also be the consumer tax equivalent (CTE), since both the producer and consumer prices are raised by an import restriction. And if the domestic industry producing that product produces no other products and receives no other help or hindrance from government policies, the NRP will be the same as the nominal rate of assistance (NRA) to that industry.<sup>5</sup>

Generally NTBs are outlawed in the WTO (GATT Article XI). Those still on farm products were tariffed after 2004, following the signing at the end of the GATT's Uruguay Round of the Agreement on Agriculture (URAA). Even so, many farm tariffs were expressed in specific rather than *ad valorem* form, and for some agricultural products one tariff rate is applied to a specified volume of (so-called in-quota) imports while any additional (out-of-quota) imports are subject to a higher tariff.

### 1.2 Export Subsidies or Taxes

The NRP/NRA can equally be used to indicate the *ad valorem* rate of government assistance to an export industry enjoying help via an export subsidy. In the case of an export tax being imposed, the NRA would be negative. Again, if the subsidy or tax is specific and it is to be aggregated or compared with rates for other products, it needs to be converted to an *ad valorem* rate (at, for example, the average price of the exported product in the relevant period). And, as with import restrictions, any quantitative barrier to exports can likewise be converted to an *ad valorem* equivalent rate.

In the WTO, export subsidies are generally outlawed. However, an exception is still made for agricultural products (see GATT Article XVI(b)), where they are now subject to specific or *ad valorem* bindings following the URAA. Export taxes are not explicitly disciplined under GATT, which is an asymmetry in the rules that has yet to be resolved. More than that, an exception in Article XI permits quantitative export restrictions for food.

### 1.3 Domestic Subsidies

Subsidies that affect trade are generally discouraged under GATT Article XVI, but again an exception has been made for agriculture under the URAA. They are, like export subsidies, subject to ceiling bindings though. The rules and commitments are extremely complex and not very transparent, not least because many members are slow to notify the WTO of changes each year. A comprehensive empirical analysis of them for a selection of major subsidizing countries can be found in Orden, Blandford and Josling (2011).

### 1.4 Effective Protection and Assistance

Useful and necessary though they are for economic modelers, NRPs/NRAs have a number of weaknesses as stand-alone summary indicators of resource reallocation, trade restriction, and



welfare reduction. That fact has encouraged the development of additional indicators, two of which are the effective protection concept and trade restrictiveness indexes.

The distinction between nominal and effective protection is that the NRP can measure the extent to which the tariff or subsidy raises the domestic price of a producer's output whereas the effective rate of protection (ERP) indicates the extent to which the producer's value added is enhanced, taking into account any distortions to the prices of importable intermediate inputs and the share of the industry's value added in the value of final output. The origin of this indicator was a paper on Canada's protection by Barber (1955), from which Corden (1963) developed and applied it to Australia.

The ERP concept gained immediate recognition as a practical way of indicating more appropriately the level of industry protection against import competition not only in aggregate for a country but also – and more importantly – between industries within a country. Its first official use was by the Australian Government with the publication of the Vernon Report (Vernon et al. 1965), and the first major academic journal publication with cross-country estimates came out at the same time (Balassa 1965). The next few years saw an avalanche of both theoretical and empirical ERP papers and reports. In his seminal book, Corden (1971) brings together most of the key theoretical ideas, while his survey of empirical studies covers the first decade of quantitative applications of the concept (Corden 1975). The early empirical work includes numerous comparative studies of both industrial countries (Balassa et al. 1967) and developing countries (Little, Scitovsky and Scott 1970; Balassa et al. 1971), a testament to its widespread popularity. A striking feature of this literature is the genuine interaction between theory and empirical work, and between academic researchers and the policy community including the GATT. See, for example, the conference proceedings volume edited by Grubel and Johnson (1971). The state of the art at that time is summarized by Balassa (Chapter 1 of this volume).

These studies reveal four points in particular that are worth mentioning here. First, the estimated EPRs far exceed the NRPs, suggesting that the resource pulls, and hence costs of protection, may be greater than the NRPs on their own might suggest. Second, the differences between NRPs and ERPs are not constant across countries, so that ERPs might be preferred to NRPs for cross-country comparisons of the extent of industry or sectoral protection. Third, while the NRP and ERP rankings of industries within countries are not greatly different when the degree of aggregation is fairly high, the rank correlation falls as the degree of disaggregation increases. This means ERPs are also better than NRPs for comparisons across industries within a country, since the resource-pull cost of protection tends to increase with the range of ERPs, particularly within sub-sectors where substitution in production is high (Lloyd 1974). And fourth, the ERP estimates exposed a non-trivial number of industries where value added has been negative at international prices even though those activities were privately profitable because of the height of protection on the final product.

Since its first adoption officially in Australia, the NRP and EPR concepts have been broadened to the nominal and effective rate of assistance (NRA and ERA) to industries, so as to capture in principle all forms of governmental assistance to producers.<sup>6</sup> This broadening is helpful not only for those concerned with national resource allocation but also for trade negotiators, given the increasing tendency of negotiators to focus also on trade-related measures inside national borders, particularly when they are introduced or strengthened as border protection is lowered following trade negotiations.

### 1.5 *Relative Assistance to Tradable Sectors*

The Symmetry Theorem due to Lerner (1936) demonstrates that producer incentives in a tradable sector are affected not only directly via distortions to their output and input prices but also indirectly via government distortions to incentives in other tradable sectors of the national economy. The higher is the NRA to those other sectors, the more incentive producers there will have bid up the value of mobile resources that could otherwise have been employed in the sector of interest, other things equal.

For example, one of the most important negative effects on farmers in many (especially developing) countries has been protection from import competition for industrialists. To capture this indirect influence on farmer incentives as well as the standard direct effect, Anderson et al. (2008) define a Relative Rate of Assistance (RRA) that can be estimated annually with just the production-weighted average NRA for tradable agricultural industries and the comparable NRA for all non-agricultural tradable sectors.<sup>7</sup>

Simple though it is, this RRA measure has been proven to be useful as a single general equilibrium indicator for international comparisons over time of the extent to which a country's policy regime is biased in favor of or against a particular sector. In Chapter 2, Anderson illustrates how the policy bias towards farmers has changed since 1960 for developed versus developing countries, based on a sample of 75 countries that together account for all but one-tenth of global agriculture.

### 1.6 *Trade Restrictiveness Indexes*

Another single measure concept that has developed to improve on NRAs/CTEs with the aim of giving policy makers and trade negotiators a more reliable indication of the trade or welfare effects of price-distorting policies is the family of trade restrictiveness indexes (TRIs). Certainly partial and general equilibrium modeling can estimate such effects using NRAs and CTEs as inputs, as discussed in the next section. However, those models can require a great deal of other information and analytical effort that is often not readily available, particularly in low-income countries; and such models typically are calibrated only for a recent (or not-so-recent) year and so are incapable of providing estimates of trends over time. With that in mind, single indicators of the trade-distorting and welfare-reducing effects of price and trade policies were developed in the 1990s for the World Bank, by Anderson and Neary (1994). Their indicators require somewhat more computation than just the nominal rates, but they provide much better indications of price distortions as they affect trade and welfare than NRA/CTE (or PSE/CSE) estimates. The literature surrounding them has developed considerably over recent years, in terms of both theoretical advances (summarized in Anderson and Neary 2005) and partial equilibrium applications following the simplifications by Feenstra (1995).

The key contribution of this literature is that it addresses the problem that overall NRAs and CTEs are weighted averages for one or more sectors and thus hide the fact that distortions vary across products within an economy or even within a sector. This is especially problematic in cases where some product NRAs are negative, as when trade taxes apply also to exports or when dual exchange rates operate. In those cases the sectoral mean NRA may be close to zero even though the trade- and welfare-reducing effects of the sector's interventions could be substantial. Further, the sectoral mean NRA may be the same in two countries and yet, if the

variance of the NRA across industries within that sector is greater in one country, so too will be the welfare cost of its policies for that sector. This is because the welfare cost is proportional to the square of the tariff rate or NRA.

The growing literature on TRIs that has developed serves a key purpose: it overcomes aggregation problems (across different intervention measures and across industries) by using theoretically sound aggregation procedures to answer precise questions regarding the trade or welfare reductions imposed by each country's trade or other price-distorting policies. Specifically, it seeks to estimate the uniform trade tax rate which, if applied to all goods in the place of all actual border and behind-the-border price-distorting policies, would result in the same reduction in economic welfare (or in the volume of trade) as the actual mix of distortionary policies. Anderson and Neary call these the Trade Restrictiveness Index and the Mercantilist Trade Restrictiveness Index, respectively.

Notwithstanding these advances, few consistently estimated indexes have yet been generated across time, and even fewer across countries. A prominent exception is the work of Kee, Nicita and Olarreaga (Chapter 3), who follow the simplifying approach of Feenstra (1995) to estimate a series of Trade Restrictiveness Indexes for the import restrictions of many developing and developed countries. Those authors provide estimates for a snapshot in time, the mid-2000s. Another recent study provides a very long time series (103 years), but for just one country, the United States (Irwin 2010). Both of those empirical studies are based only on import barriers.

Another recent empirical study provides a 48-year time series of indexes for 75 countries (Lloyd, Croser and Anderson 2010). While the latter study is just for one sector, namely agriculture, it has two innovative features. One is to show that if one is willing to assume domestic price elasticities of supply are equal across farm commodities within a country, and likewise for elasticities of demand, the calculations simplify and the indexes can be generated with no more information than that needed to estimate the underlying NRAs and CTEs. With those assumptions the formula simplifies to a share-weighted function with shares of production and consumption as weights; and it can include all price-distorting policies, not just import restrictions. For agriculture the latter is very important because over the past half-century there have been also export restrictions (and occasionally import subsidies) applied by developing countries, export subsidies by high-income countries, and numerous domestic producer and consumer taxes and subsidies that have driven wedges between farmer and consumer prices. A summary of those estimates is provided in Chapter 2. That application also exposed the relative importance of the 'three pillars' that were included in commitments undertaken as part of the WTO's Uruguay Round Agreement on Agriculture: so-called market access (import tariffs once NTBs had been tariffied), domestic support (a limited set of domestic farm production subsidies), and export subsidies. Croser and Anderson (2011) show that export restrictions have been second only to import restrictions in their contribution to the TRI historically, and that import subsidies have been nearly as important as export subsidies.<sup>8</sup> The sudden increased use of export restrictions and import subsidies when international food prices spiked in 2008 underscored the asymmetry in WTO commitments, and in particular the limited role those commitments can play in making international food trade more stable and predictable.

A unifying feature of all these TRI studies is that they indicate a much higher degree of price distortions in markets for goods than do weighted average NRAs or CTEs. That has stimulated modelers to use the TRI logic to better estimate price distortions across products that have to be aggregated to make sectoral and especially economywide models tractable given the much



higher level of aggregation at which domestic input–output data are available relative to trade and protection data (see Laborde, Martin and van der Mensbrugghe 2011).

### 1.7 *Impediments to International Trade and Investment in Services*

Price comparisons of services across countries are generally inappropriate. This is not least because services involve a much greater use of local inputs that are nontradable, and the degree of product differentiation and heterogeneity is generally far greater than for commodities. As well, services trade barriers often take the form of government regulations, including limitations on the number of firms allowed to contest a market or on the nature of their operations, and even prohibitions on private provision. Two different alternative approaches have been taken in the recent literature (Francois and Hoekman 2010). The first involves collecting information on applied policies, converting these to coverage/frequency indicators and using the resulting indices as regressors to explain observed measures of prices or costs (with the price–cost margin often the focus of estimation). The second approach is to rely on indirect methods, such as calculating price–cost margins by sector across countries or gravity regressions to estimate what trade flows ‘should be’ and back out an estimate of the tariff equivalent of policies from the difference between estimated and observed flows. A well-known problem with indirect approaches is that it is not possible to attribute price–cost margins or differences in trade volumes to specific policies. Most of the literature has therefore pursued the first approach.

Warren and Findlay (Chapter 4), drawing on Findlay and Warren (2000), provide a survey of much of the early quantitative literature investigating the effects of services policies. They discuss many of the efforts to directly measure the extent of policy barriers on a sectoral and cross-country basis and the use of such measures – usually a policy index of some kind – to estimate the price or quantity effects of policies. They suggest that despite limited information, barriers to trade appear to be very substantial.<sup>9</sup>

### 1.8 *Have Indicators of Price Distortions Fallen under GATT/WTO?*

The only comprehensive historical benchmark indicators for the pre-GATT period are trade-weighted average tariffs on imports of manufactures (or in some cases just import duty collections as a percent of the total value of imports) and some NRAs for agriculture in high-income countries.

Table 1 reveals the relatively low rates of protection in 1875, during the first wave of globalization, the generally higher rates during the first four decades of the twentieth century with the key exception of the United States, and then falling rates, particularly in Europe and other high-income countries, after the GATT came into force in 1948 and a series of trade negotiating rounds were concluded. In developing countries, however, rates of manufacturing protection were still very high in the 1960s, and well above their rates in the six decades prior to World War II (shown in Table 2). Evidently the GATT had not been able to prevent that rise, even though some developing countries had become contracting parties to the GATT.

By contrast, rates of assistance to agricultural sectors of high-income countries without a strong agricultural comparative advantage had been rising from the late nineteenth century to the late 1930s (Table 3). After the war the GATT did not manage to discipline that rise, and it continued through to the early 1990s for high-income countries (upper rows of Table 4).