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The Doha Agenda and Agricultural Trade Reform: the Role of Economic Analysis

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Abstract

This paper shows that research on international agricultural trade reform can make much greater contributions to understanding than was feasible in earlier trade negotiations. Part of this is due to improvements in the basic data on production, consumption and trade associated with the development of the GTAP database and part due to the greater availability of disaggregated data on not only applied but also bound rates of protection. While current models typically estimate gains of less than one percent of GDP, new developments in theory and methodology provide the potential for quantitative analysis to be improved in at least six areas: measurement of protection for goods; incorporation of barriers to foreign trade and investment in services; representation of the counterfactual; disaggregation of products and regions; incorporation of new products; and inclusion of the productivity enhancement associated with trade reform. Urgent action is needed to avoid current measures becoming either irrelevant or counter-productive in the policy reform process.

JEL Codes: F13, F11, F12

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The Doha Agenda and Agricultural Trade Reform:

the Role of Economic Analysis

The negotiations under the WTO's Doha Development Agenda have followed a path reminiscent of the negotiations on non-agricultural trade during the GATT's Kennedy and Tokyo Rounds of the 1960s and 1970s: an ambitious formula approach to tariff reduction is agreed, and then the focus of negotiations turns to dealing with the exceptions. The approach to agricultural trade during the Uruguay Round was a little different in that the agreed approach to liberalization—an agreed average-cut in tariffs—was inherently flexible while maintaining consistency with the “formula”. In all of these cases, the consequences of reforms were heavily influenced by the details, that is, by what was actually done by policy makers with the flexibility available for specific products.

In the Uruguay Round, and before, the challenges posed by the availability of data on protection made it difficult for analysts to assess, *ex ante*, the consequences of choices about the details of the negotiations. Even in the Uruguay Round, information about the protective effects of agricultural trade barriers had to be generated (Hathaway and Ingco 1996), and information about the actual tariff cuts undertaken was available in electronic form only on a restricted basis even after the completion of the negotiations. Information about the structure of production, consumption and global trade needed to make assessments of the consequences of reform was also extremely difficult to obtain before

the Global Trade Analysis Project (GTAP) made these data widely available in 1992 (at www.gtap.org).

The contrast with the current negotiations is striking. The GTAP database makes available the needed information on production, consumption and trade as well as applied tariffs and agricultural subsidies. In addition, detailed information about the *ad valorem* equivalents of not only applied but also bound agricultural and non-agricultural tariffs is available at the six-digit level of the Harmonized System, thanks to the excellent work of CEPII in Paris and the ITC in Geneva (at www.cepii.org). These data are used to build up estimates of the effects of protection at the level of aggregation used in the GTAP database. Because of those developments, informed assessments of the consequences of particular formulas, and of agreed flexibilities relative to these formulas, can now be used to make *ex ante* assessments of the consequences of reform (see, for example, Anderson and Martin 2006). These impacts can even be traced through to the household level to assess the impacts for poverty (as in Hertel and Winters 2006). Evidently there is a significant audience for these results, as they are widely cited by policy makers and in the media.

There are, however, some important remaining challenges for quantitative analysts. Many critics have raised concerns about or offered lukewarm defenses of the quantitative estimates that economists provide of trade agreements (see, for example, Ackerman 2006 and Stiglitz and Charlton 2006, respectively). Liberal traders also worry that our greater capability to generate informed estimates of the costs of exceptions may create an

impression that there are no worthwhile benefits from a prospective agreement—
weakening the ability of negotiators to reach agreements that constitute feasible,
incremental and tangible (even if small) moves forward. In light of these concerns, it
seems timely to take stock of what it is that analysts currently do successfully, and what
we might be able to do better in the future.

What we can do

Today's global general equilibrium modelers are able to estimate the impact
of commitments to reduce bound trade barriers that are negotiated in the WTO on the
welfare or real income of the household or households represented in their model. These
welfare measures are conceptually well-grounded in the new welfare economics, and can
be shown to relate closely to the Harberger Triangles that appear in simple, graphical
treatments of the impacts of trade policy (Martin 1997 and Just, Hueth and Schmitz 2004,
Ch. 9). A global trade reform will affect welfare through changes in consumer surplus,
producer surplus, government revenues, and the terms-of-trade.

A key feature of these welfare estimates is that they are quite small as a share of GDP.
The 0.7 percent of global GDP that Anderson and Martin (2006) conclude would be the
average benefit from complete, global trade reform corresponds with roughly one
month's growth in China or India. Part of the reason for this is that trade liberalization
has already come a long way—average tariffs in developing countries have fallen from
roughly 30 percent in developing countries in the early 1980s to not much over 10

percent today, other trade barriers such as quantitative restrictions and exchange rate over-valuation have been dramatically pared back (World Bank 2001), and the accession of China to the WTO generated substantial global welfare gains (Bhattasali, Li and Martin 2004). However the small size of these gains is more deeply rooted in the static nature of the benefit measures used. Bernhofen and Brown (2005) conclude that the static gains from Japan's move from near-complete autarky to near-free trade were roughly 8 percent of GDP, or more than ten times what standard CGE models suggest.

The value of these welfare measures is also highly influenced by the values of parameters about which there is no consensus. A critical parameter is the Armington (1969) elasticity, which defines the extent to which domestic and imported goods are imperfect substitutes, and allows for the widely observed phenomenon of simultaneous imports and exports of the same commodity. Even amongst studies using the same database, there are sharp differences in the chosen values of these parameters, based on differences in the interpretation of the econometric literature, and of the experience of economic growth. Many, if not most, econometric estimates of these parameters are sufficiently low that they generate implausibly large, adverse terms-of-trade impacts when countries grow rapidly. Ruhl (2005) points out that the relevant values of these parameters should be much larger than those that match short-term quantity adjustments to price changes, but there is, as yet, no consensus on the correct values for analysis of trade reform.

Most of the latest widely-cited studies of agricultural trade reform (see, for example, Anderson, Martin and van der Mensbrugghe 2006; Bouët 2006; Hertel and Keeney 2006;

OECD 2006) focus on models using the simplest of assumptions: perfect competition; tariff revenues redistributed costlessly to households; and a constant level of employment. This is not because these assumptions are totally realistic, but rather because the data and theory for the analysis of trade reform under these circumstances are well-developed; and because alternative formulations are either not supported by consistent theory, data and parameters, or can generate estimated impacts that are heavily dependent on the particular assumptions made.¹

Standard CGE models can be extremely useful in answering a number of questions. One type of question involves the potential for reforms in particular regions or product markets to generate benefits. Another involves the sensitivity of the benefits of reforms to particular parameters of the negotiations, such as the share of products that are allowed more “flexible” treatment in the negotiations. The first type of question can be addressed using the basic data provided in an aggregate database of the type used for modeling, such as the GTAP database (www.gtap.org). The second type of question is much more demanding in its information requirements. It needs information about protection at a fine level of disaggregation, not just on applied protection, but also on the tariff bindings that are the actual legal policy instruments changed as a consequence of WTO negotiations.

One key result emerging from standard CGE models is the continuing importance of agricultural trade distortions. As is evident from Table 1, elimination of all agricultural

¹ Adding estimates of productivity gains from liberalization based on atheoretical models is one common alternative. Introducing a labor market in which consumer real wages are fixed and hence producer real wages fall and employment rises following trade reform tends to produce results in which the welfare effects are dominated by changes in employment (see, for example, Polaski 2006).

trade distortions is consistently found to generate around two-thirds of the global gains from abolition of all merchandise trade barriers. That these gains are so large from a sector that contributes only 6 or 7 percent of world trade and world GDP reflects the high levels and variability of protection in this sector both in industrial and in developing countries. This result is, however, not robust to alternative modeling specifications—models that include increasing returns to scale and a preference for variety in non-agricultural sectors or that lower producer real wages and expand employment following liberalization (for example Polaski 2006) tend to obtain larger gains from non-agricultural liberalization.

Another example of this type of insight arises when considering the different “pillars” of assistance within agriculture—domestic support; export competition; and market access. From the attention showered on the issue of domestic support in the negotiations, one might have thought that it was at least equal in importance to market access, a view partly supported by the OECD’s estimate that subsidies contributed 39 percent of total support to OECD agriculture (Anderson, Martin and Valenzuela 2006, Table 1). However, the GTAP database, and the results of models based upon it, give a completely different perspective. As is clear from Table 2, abolishing domestic subsidies is expected to generate only around 5 percent of the global gains from agricultural trade reform and 2 percent of the gains to developing countries. Further, careful investigation of the reasons underlying these results shows that the main cause of this result is the predominance of support provided through market access barriers (Anderson, Martin and Valenzuela 2006). Once the coverage of barriers is extended to include agricultural processing in the

OECD countries, and assistance to agriculture in non-OECD countries, market access is estimated to provide 75 percent of total support. Once allowance is made for the much greater variability of market access barriers relative to domestic support, and for the fact that export subsidies have a welfare-enhancing positive impact on trade, even a simple back-of-the-envelope calculation is able to replicate the model-based finding that domestic support contributes only a very small share of the total costs of agricultural support.

The availability of disaggregated information on applied and bound tariffs from the CEPII/ITC work on trade barriers (Bouet et al. 2004; Bchir, Jean and Laborde 2005) has allowed quantitative analysis to provide *ex ante* insights into the effects of specific tariff-cutting formulas on market access, and even to make informed assessments of the likely consequences of particular types of flexibility.

In the current negotiations, this has highlighted the extent of the gaps between bound and applied rates, and hence the need for much larger cuts in bound rates to achieve any given reduction in applied rates. It has also allowed analysis of the consequences of non-proportional cuts in tariffs, which must be based on information at the most disaggregated level available. Table 3 highlights the extent of the gaps between bound and applied rates, including the very large contribution of tariff preferences (unilateral and regional) to this overall gap in the industrial countries.

With this information, we can make assessments about the effects of non-proportional tariff-cutting formulas. In Anderson, Martin and van der Mensbrugghe (2006), we did this using a tiered formula with income-tax-style marginal rates of tax cutting increasing with the tariff rate to a peak of 75 percent. As shown in Table 4, these rates fitted within the range of tariff cuts under discussion up to the failed June 2006 Ministerial meeting. In addition, we considered the impact of several other key attributes of the proposals under discussion—sensitive products; special products; and a tariff cap.

Simulations of this type allow us to provide estimates of the consequences of trade reform that take account of the detailed features of these agreements. The first column of Figure 1 shows the impact of this the tiered formula in agriculture on overall economic welfare. In making this assessment presented in the first column, we applied the tiered formula on agricultural tariffs to all agricultural tariffs; abolished agricultural export subsidies; and made the modest cuts in applied agricultural subsidies implied by the proposed cuts in domestic support. In the second column, we consider the impact of allowing developed countries to subject 2 percent of their tariff lines to much smaller cuts (15 percent in our case), rather than the tiered formula. In the third column, we consider the impact of incorporating a tariff cap of 200 percent. In the fourth column, we return to the original tiered formula in agriculture, and add a modest agreement consisting of 50 percent cuts in bound tariffs on non-agricultural (NAMA) products. Finally, in the fifth column, we consider the impact of removing the special and differential treatment that allowed the developing countries to make smaller cuts (by a factor of roughly two-thirds) in their tariffs under the previous scenarios.

The results presented in Figure 1 provide important insights into the consequences of potential trade reforms. The first point to note is that the first scenario—the tiered formula in agriculture—generates a little over a quarter of the estimated total potential gains from trade reform, of \$287 billion per year or 0.7 percent of world GDP in 2015. This is a substantial share given that the cuts are in the middle of the range of possibilities being considered, and that they are based on bound rates in a situation where there is a large degree of binding overhang. The second point to notice is that a simple proportional cut² represented by the second pair of columns in Figure 1, which side-steps many of the problems associated with a complex tiered-formula, generates gains that are almost as large as the tiered formula. The third point to note is that allowing even 2 percent of products³ to be treated as sensitive and subject only to a 15 percent cut results in much smaller gains. The gains to developed countries fall by more than two-thirds, and the gains to developing countries disappear. When a tariff cap of 200 percent is introduced on all products, the gains to the high-income countries rebound substantially, reflecting the fact that these are the countries with mega-peak tariffs. Japan and the Republic of Korea benefit particularly strongly because this cap requires them to reduce their extremely costly tariffs on products such as rice.

The fifth pair of bars in Figure 1 shows the benefits when 50 percent cuts in non-agricultural tariff bindings are combined with the tiered formula for agriculture shown in the first pair of bars. The final pair of bars shows the effects if developing countries were

² Calibrated to produce the same reduction in average bound tariffs in industrial and developing countries.

³ Developing countries were allowed to treat an additional 2 percent of tariffs as “special” and to subject them to the same (lack of) disciplines.

to forgo the traditional type of special and differential treatment under which they make smaller cuts in their tariff bindings than the industrial countries. This, unsurprisingly, shows that the benefits to developing countries would increase if they made larger reductions in their own protection.

All of these simulations highlight important features of the menu of choices faced by trade negotiators and hence are potentially very useful. Note that it is the differences between the scenarios that provide the insights into the effects of the different alternatives—as noted above, the levels of the gains are extremely small in all cases.

Fortunately, there is a number of areas in which new research is creating the potential for us to obtain better measures of the welfare benefits of reform, or at least pointing out the scope and approximate depth of our ignorance. It is in these areas that further work may allow us to make estimates of the effects of policies that are even more accurate and more useful in providing guidance for policy makers.

What we still need to do

While, as we have seen, there has been an enormous expansion in the contribution that quantitative economic analysis can make to trade policy debates, there is scope to improve on this in at least six areas: (i) the quality of our protection measures; (ii) the omission of trade reform in services; (iii) the aggregation of our information on trade barriers; (iv) the nature of the counterfactual; (v) the emergence of new products; and (vi) the potential productivity-enhancing impacts of trade reform.

Quality of protection measures

While we have detailed information on **tariffs**, this is insufficient. In agriculture, there is a particular problem in that the support provided to producers may differ considerably from the nominal tariffs. If, for instance, the commodity is an exportable, then tariffs are unlikely to provide significant support to producers. The OECD measures of agricultural protection provide measures based on price comparisons that deal with both of these problems for OECD members and a few select non-members, and research led by Kym Anderson at the World Bank is in the process of generating comparable measures for more than 50 developing countries.

Our information base on **non-tariff measures** is extremely limited, even though research by Kee, Nicita and Olarreaga (2006) suggests that the trade-restricting impact of these measures remains very substantial. This is particularly the case in agriculture, where measures such as sanitary and phyto-sanitary barriers can easily function as disguised

instruments of protection—an issue discussed in more detail in the paper by Orden and Roberts in this session.

Trade Barriers and Reform in Services

A key concern is that we are continuing to analyze the less rapidly-growing part of global trade, and the part in which trade liberalization has been under way for the longest time—merchandise trade. For lack of good data and methods, however, the potential gains from trade liberalization in services are rarely considered. This is an extremely serious omission since there are indications that the costs of barriers to trade in services may be very substantial, and potentially larger than the barriers presented by conventional trade measures such as tariffs and subsidies (Dee, Hanslow and Pham Duc 2000; Department of Foreign Affairs and Trade 1999). This omission is increasingly important for agriculture in an environment where input markets are becoming more important in developing country agriculture, and where efficient marketing channels such as those through supermarkets will have profound implications for the performance of the agricultural sector and its access to export markets.

Konan and Maskus (2004) point out that the costs of services protection are likely to be larger than those on merchandise trade because they typically involve restrictions not only on cross-border trade (Mode 1 of GATS), but also on supply by establishing enterprises in the country or by the movement of service suppliers (Modes 3 and 4 of GATS). When barriers to trade in services are represented as reducing productivity in producing sectors, the measured benefits of reforming trade in services are even larger. Jensen, Rutherford and Tarr (2004) find that the benefits of reform in services trade

completely dominate as a source of benefits from likely reforms following Russia's accession to the WTO. A wide range of services, including financial services, transport and communication, as well as those involve in supply of agricultural inputs and agricultural marketing services impinge directly on the performance of the agricultural sector.

Aggregation of Protection

Trade barriers frequently vary enormously across commodities, and frequently also across suppliers. This variation in rates of protection increases the cost of any given 'average' level of protection, since the cost of protection increases with the square of the rate of protection. Unfortunately, some degree of aggregation is essential if only because the available information on the structure of production and consumption is at a higher level of aggregation than information on tariffs and trade. Further aggregation is typically employed for computational reasons. Further problems are introduced by the typical approach to aggregation of trade barriers—the use of averages weighted by external trade. As protection rates rise, the weights associated with these measures decline, so that a tariff that completely blocks trade has the same measured impact as a zero tariff.

The modern approach to tariff aggregation pioneered by Anderson and Neary (1992) provides an indication of a possible means of dealing with the aggregation problem. Anderson and Neary develop a single tariff aggregator that captures the welfare impacts of a non-uniform tariff. Building on this approach, Bach and Martin (2001) used a tariff aggregator to capture the impacts of changes in the tariff regime on the expenditure

required to achieve a given level of utility, and another to capture the impact on tariff revenues. Manole and Martin (2005) provide closed-form measures of these aggregators for the widely-used Constant-Elasticity-of-Substitution functional form. Applying these procedures to a sample of seven developing countries, they find that appropriate aggregation increases the estimated cost of protection on average twenty-fold relative to the cost estimated using a weighted average tariff.

The problems of aggregation are particularly intense in agriculture because of the enormous variation in rates of protection across countries and commodities, especially among the industrial countries. Simple solutions, such as the representative-weighting approach used in some versions of the MAcMAP database, deal with the weighting problem without addressing the aggregation bias problem associated with nonlinearity in the costs of individual tariffs. In a recent paper Anderson (2006) proposes a new aggregation method that deals with both the aggregation bias and weighting problems, and maintains global payment balances, allowing it to be applied in global models.

The Protection Counterfactual

The standard approach used in evaluating the consequences of WTO agreements is to compare the agreed tariff binding with the previously applied tariff rate, and to treat the post-agreement tariff rate as the lesser of the two rates. This essentially involves treating the current applied rate as a deterministic forecast of future protection rates in the absence of the agreement.

There are two potentially serious problems with this specification of the counterfactual. One is that the trend rate of protection responds systematically to underlying determinants that evolve over time. The second is that annual protection rates fluctuate substantially around that trend. Taking account of either or both of these counterfactuals can have very large impacts on the estimated benefits of international trade liberalization agreements.

Anderson and Hayami (1986) and Lindert (1991) provide insights into the likely evolution of agricultural trade policies in the absence of international agreements. Key findings include a strong tendency for agricultural protection to rise with economic development because of fundamental changes in the structure of the economy. In particular, there is a tendency for agricultural protection to be low or negative in very poor countries because the number of farmers is large and it is difficult for them to organize to apply pressure on governments. Because farmers are mainly subsisting at that stage, their real incomes are not greatly affected by increases in farm output prices. By contrast, the urban population in a poor country is far smaller and easier to organize, and food is an important part of consumer budgets.

As economies develop, however, all of these economic factors change in ways that shift the political-economy balance more towards agricultural protection. Farmers become fewer in number and easier to organize. They also become more commercial in orientation, so that their real incomes are more strongly influenced by agricultural output

prices. At the same time, the urban population becomes larger and hence harder to organize, and the importance of food in consumer budgets declines. The end result can be a very rapid increase in agricultural protection rates in high-growth economies, as is evident from Figure 2 showing the nominal rate of border protection provided to rice in Japan during the twentieth century. A standard *ex ante* welfare evaluation of a hypothetical 1955 agreement constraining protection on rice in Japan to no more than its 1955 level of 46 percent would have concluded that no liberalization was achieved by this agreement. And yet, it is clear that such an agreement would have had a profound liberalizing effect, obviating the descent into costly protectionism that was to unfold in the subsequent decades.

Also evident from Figure 2 is the large variation in rates of protection over time. Variation of this type is very common in agriculture because trade policies are frequently used also to stabilize domestic agricultural prices in the face of variations in world prices⁴. These variations in protection have important implications for the value of trade agreements. As Francois and Martin (2004) show, even tariff bindings that are set well above average rates of protection may greatly diminish the costs of protection. Such bindings rule out the highest—and most costly—incidents of protection. They estimate, for example, that the European tariff binding on wheat, at 82 percent, reduced the cost of protection to this commodity by almost a third, despite being substantially above the average rate of protection prevailing during the preceding 15 years for which data were available.

⁴ Tyers and Anderson (1992) point out that the variation in world prices is, in large measure, a consequence of these policies of insulating domestic markets.

The Emergence of New Products

Standard models used to assess the implications of trade reforms are based on the Armington (1969) assumption that expansion of exports following liberalization involves increasing the volume of the products initially being exported, but not of any other products. The Armington assumption also rules out expanding the markets to which goods are being supplied—if exports to a particular market are initially zero, they remain zero.

Recent research, however, highlights the key role of the “extensive” margin, where export expansion involves increases in the range of products exported (Hummels and Klenow 2005) and expansion in the range of markets supplied (Evenett and Venables 2002). Hummels and Klenow conclude that only about one-third of the export expansion associated with economic growth comes from the “intensive margin” where greater quantities of the same products are exported. Evenett and Venables found that about one-third of the expansion of exports from developing countries was obtained by exporting products to new markets.

In a world where importers exhibit a preference for variety in the goods they purchase, these observations on the importance of extensive-margin growth have important implications. Increasing the volumes of the same products, as under the Armington assumption, has the inevitable consequence of driving down the price of exports and

causing income losses to the exporter from deterioration in the terms of trade. Where exports are characterized by an expansion in the range of products supplied, the preference for variety exerts a counteracting force—helping to increase the demand for exports. In simulations introducing the Hummels-Klenow preference for variety in exports from China and India, Dimaranan, Ianchovichina and Martin (2006) found that the terms of trade for these exporters need not deteriorate significantly, despite very high projected rates of export growth.

Some traditional treatments of new varieties, such as those based on monopolistic competition and a love-of-variety inspired by Krugman (1980), are typically implemented with agriculture and services as perfectly competitive sectors and the rest of the economy characterized as monopolistically competitive. However, as Rodrik (2004) notes, the process of discovering efficient new exports is just as important and difficult in agriculture and services as in manufacturing. Models developed by Melitz (2003), with a fixed cost of entry into export markets, provide a basis for modeling the endogenous emergence of new products.

Productivity-Enhancing Impacts of Reform

Economists have long suspected that participation in international trade provides a bonus through improvements in productivity. Most of the investigation of these gains has been empirical, based loosely on Arrow's (1962) concept of learning-by-doing. Major contributions to this literature include Feder (1983), Dollar (1992) and Sachs and Warner

(1995), all of which find strong links between export performance and economic growth. Rodriguez and Rodrik (2001) raise concerns about the robustness of the estimated relationship between aggregate exports and productivity. During the same period, Clerides, Lach and Tybout (1998) questioned the learning-by-doing framework based on firm-level findings that exporting firms were more efficient before entering export markets, rather than because of learning-by-doing after entering these markets.

More recent research on the aggregate links between exports and productivity has more carefully examined the potential endogeneity of the relationship, and continues to find an aggregate relationship (Frankel and Romer 1999). A number of subsequent firm-level studies have re-examined the relationship between exporting and growth, and have found evidence of productivity growth associated with learning-by-doing after firms enter exporting. Blalock and Gertler (2005) find evidence of an increase in firm productivity of between 2 and 5 percent after Indonesian firms enter export markets. Fernandes and Isgut (2006) find evidence of an increase in productivity from learning-by-exporting when Colombian firms entered export markets. Van Biesebroek (2004) finds that African exporting firms had higher productivity before entering export markets, and that their productivity levels, and their subsequent rates of productivity growth, grew after entering export markets. Girma, Greenaway and Kneller (2004) find both higher initial levels of productivity and higher productivity growth rates after entry into exporting.

In addition to the improvements in process efficiency that have been the focus of the literature on exports and growth, the recent literature has pointed to potentially important

gains from improvements in the quality of exports. Hummels and Klenow (2005) suggest that these improvements in quality are sufficiently rapid that the prices received by countries for the products that they continue to export—as distinct from their new exports—actually rise by 0.09 percent for each increase of 1 percent in national income. This result is strikingly at variance with traditional Armington models, which generate a reduction in export prices when economies grow and exports expand.

Conclusions

A key piece of good news in this paper is that recent advances in data and techniques have greatly expanded our ability to make informed assessments of the consequences of trade reform. We can now provide insights into the areas in which trade policy reforms might generate the largest gains, and about the implications of the details in which the true battle is fought and the true benefits of trade reforms are gained or lost. The bad news is that we are left making interesting and insightful comments about reforms that might, possibly, garner estimated benefits of 0.7 percent of GDP—less than a month's growth for fast-growing economies such as China or India.

Fortunately, however, there is more good news about improvements in our ability to say useful things about the gains from trade reform. Our measures of tariff barriers have improved enormously, and now is the time for us to make corresponding improvements in our measures of nontariff barriers and barriers to trade and investment in services.⁵

⁵ Financial markets also could be integrated into CGE models, to capture the gains from liberalizing them also. On those markets' importance, see Rajan and Zingales (2004).

Once we have these measures—or even before we have them—we need to improve the approaches to aggregation that are currently not using an enormous amount of the information we currently have in our hands.

We also need to pay much more attention to the counterfactual against which to compare the liberalization measures scenarios. We currently treat the counterfactual as the applied rate prior to the reform, and yet we have strong evidence that the average applied rate varies systematically with the determinants of economic development, and that reform can reduce the costly annual variations in protection around these underlying trend rates. Further, we need to begin to take account of the fact that trade expansion takes place more by expanding the range of products exported, and their quality, than by increasing the volumes of traditional exports. Finally, we need to take advantage of new theoretical developments that are improving our ability to incorporate the implications of trade reform for productivity and that improves process efficiency and product quality.

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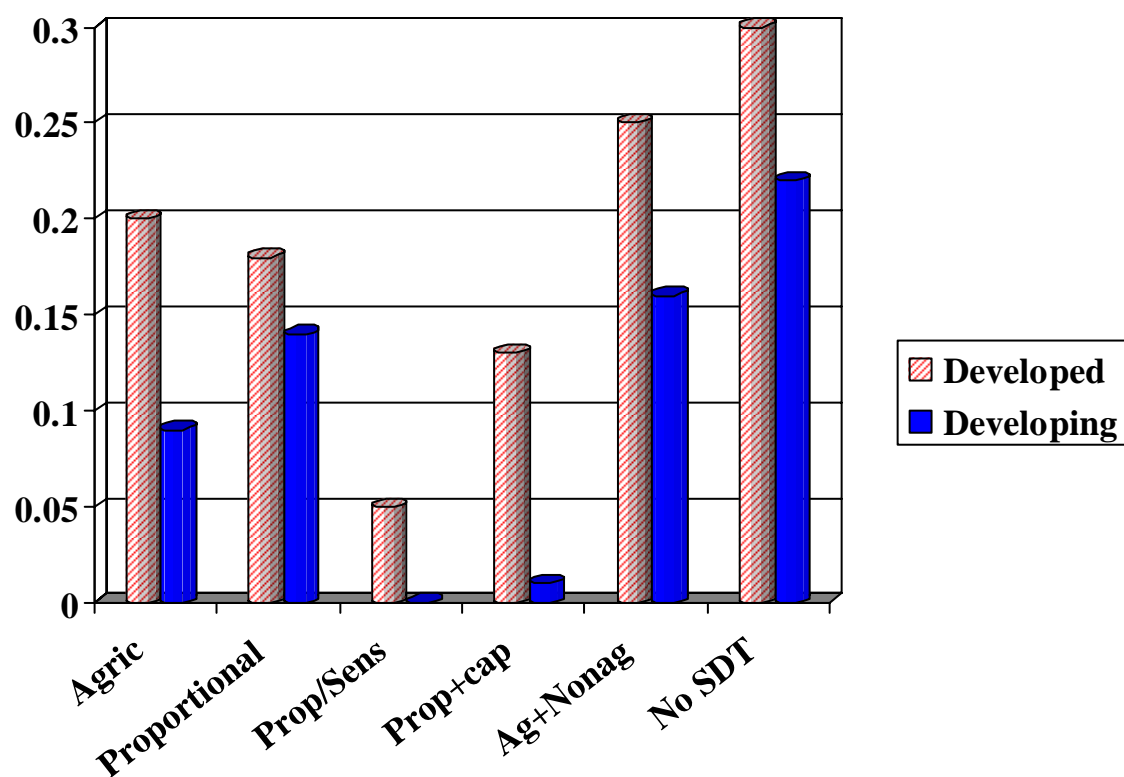
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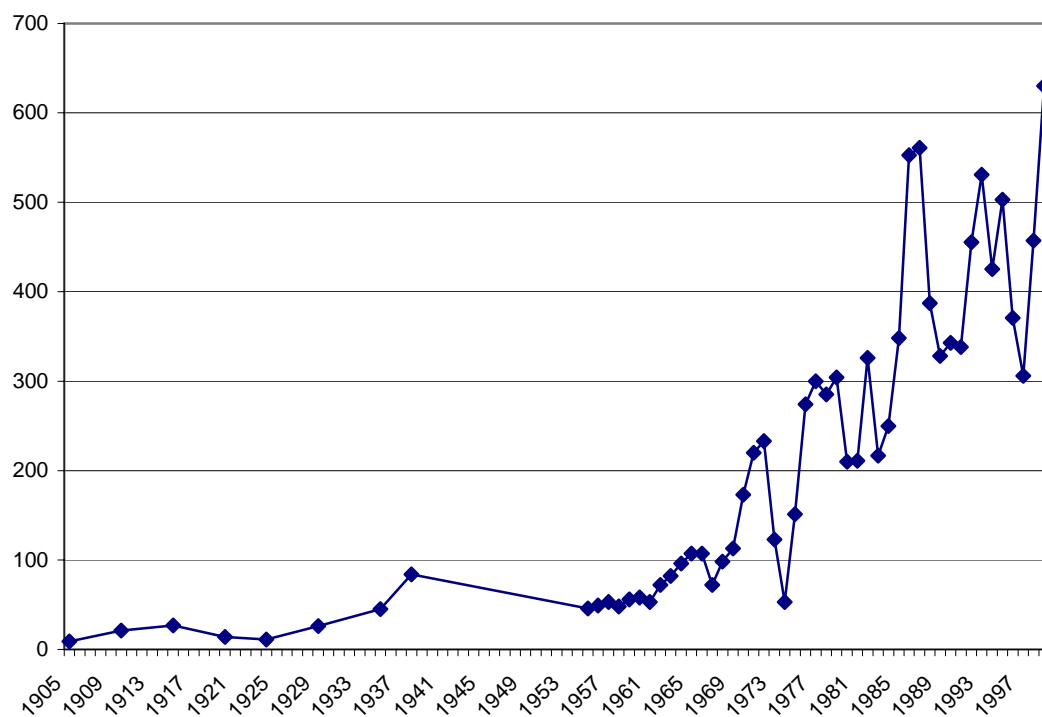
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Figure 1. Impacts of tariff scenarios on welfare in developed and developing countries



Source: Anderson and Martin (2006, Ch. 12).

Figure 2. Nominal rate of border protection provided to rice, Japan, %



Source: Anderson and Hayami (1986); Martin (2002)

Table 1. The share of estimated global gains from full goods trade liberalization that would come from agricultural policy reform, %

Anderson and Martin (2006)	63
OECD (2006)	59
Hertel and Keeney (2006)	67
Francois, van Meijl and van Tongeren (2005)	66

Table 2. Distribution of gains from full global agricultural trade liberalization due to each of the three agricultural pillars, %

<i>Welfare effects from: % for:</i>	Market access	Domestic support	Export subsidies	All agric policies
Developing countries	106	2	-8	100
High-income countries	89	6	5	100
World	93	5	2	100

Source: Hertel and Keeney (2006)

Table 3. Bound and applied agricultural tariff rates by region, %

	Bound	MFN	Applied
Developed	27	22	14
Developing (excl. LDCs)	48	27	21
LDCs	78	14	13
WORLD	37	24	17

Source: Jean, Laborde and Martin (2006)

Table 4. **Proposed cuts in protection and the scenarios examined**

	Top Tariff Cut, %	Sensitive Products %	EU/US AMS cut, %	Tariff Cap
US proposal	90	1	83/60	75
EU proposal	60	8	70/60	100
G-20 proposal	75		80/70	100
Authors' reform scenario	75	0-5	75/75	200
Sources : Jean, Laborde and Martin (2006)				