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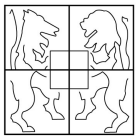

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# THE EU BANANA REGIME:
# AN ASSESSMENT OF THE SHIFT
# TO A TARIFF REGIME

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February 2005

# The EU Banana Regime:
# An Assessment Of The Shift To A Tariff Regime

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## EXECUTIVE SUMMARY
**February 2005**

This paper analyzes the December 2004 proposal tabled by the European Union (EU) for shifting from a tariff-quota to a tariff-only regime on imported bananas. It is organized in two Parts.

Part I focuses on WTO-related matters. Section 1 provides an overview of the WTO disciplines imposed on the tariffication process to be done by the EU, underlining the key condition of a shift "*at least maintaining total market access for MFN banana suppliers*." Section 2 presents the calculations done by the European Commission (without questioning at this stage the Commission's procedure). It shows the substantial revisions needed for full compliance to WTO disciplines, and calculates that an *ad valorem* tariff of at most 30 percent (corresponding to a specific tariff of 134 €/ton) would be consistent with WTO disciplines.

Section 3 estimates the impact of the tariff of 230 €/ton that the current EU proposal would impose on banana imports (instead of the 134 €/ton tariff calculated in section 2), except on imports from ACP suppliers who are given a preference margin equal to the full new specific tariff. This tariff differential has a dramatic effect on the supply of bananas to the EU. Non-ACP suppliers are forced out of the EU market, with a 27, 23 and 40 percent drop in exports to the EU from Ecuador, from Columbia, Costa Rica, Nicaragua, and Venezuela, and from other suppliers, respectively. In addition to cutting back on exports to the EU25 market, non-ACP suppliers are forced to cut prices. Ecuador, Columbia, Costa Rica, Nicaragua, and Venezuela, and other non-ACP suppliers would need to reduce their price by 6.4, 7.4 and 1,6 percent (respectively) percent (roughly 28, 32 and 7 €/ton). A key reason for all these

dramatic effects is the imposition of the old EU15 regime across the EU10 (the new Member States). In the non-preferential, low tariff regime existing until 2004, non-ACP producers had strong exports to the EU10. They are placed at a tremendous disadvantage under the new regime.

Part II shifts the focus to EU-related issues by underlining the unability of the current and future banana trade regimes to fulfill the proclaimed EU goals of "preferences" and "development." Section 4 shows that the current tariff-quota regime does not provide real "preferences" to the ACP countries, and that it would be the same for the new regime. Section 5 shows that the absence of effective preferences reveals the illusion of a "development" dimension in the new regime. As a result, section 6 provides recommendations for granting effective preferences and for introducing a real development dimension in the future EU banana policy.

The conclusion estimates the cost-benefit ratio of the tariff-only regime tabled by the EU proposal to approximately 4:1—in other words, there is approximately €4 in costs to the EU and third countries for every €1 in benefits to operators based in ACP countries. It also shows that two-thirds of the cost of the new regime are carried by the consumers in the new Members States. This last result underlines a key point from a purely European perspective. The new EU banana policy totally ignores the interests of the poorest European consumers (concentrated in the new Member States) and continues the regressive, anti-social policy of its previous and current forms.

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# INTRODUCTION

This paper analyzes the proposal of the European Union (EU) for shifting from a tariff-quota to a tariff-only regime on imported bananas. In December 2004, the Commission tabled calculations defining the unique tariff rate to be imposed on bananas imported from of the "most-favored nation" (MFN) WTO Members. All the ACP countries are expected to be exempted from such a tariff, and to benefit from free access to the EU markets. Consultations are ongoing between the Commission and the non-ACP countries that receive WTO "most-favored-nation" status.

Following the 1997 WTO ruling on the EU trade regime in bananas, and the WTO authorization granted to the U.S. (in April 1999) and to Ecuador (in May 2000) to impose retaliatory measures roughly worth US$ 393 million per year, key regulatory changes occurred in the EU banana policy. In December 2000, the EU amended its 1994 Regulation on banana imports in order to include a pledge to abandon, by December 31, 2005, its tariff-quota regime and to adopt a tariff-only trade regime coupled with a preferential tariff on imports from ACP countries. In April 2001, two crucial agreements were signed between the EU on the one hand, and the U.S. and Ecuador on the other hand. The EU has since made profound changes to the economic nature of its tariff-quota regime. This has important consequences for the effects of the tariff-only policy to be implemented.

The paper is organized in two Parts. Part I focuses on strictly WTO-related issues. Section 1 provides an overview of the disciplines that WTO texts impose on the tariffication process to be done by the EU. Section 2 presents the calculations done by the European Commission (without questioning at this stage the Commission's procedure) and the substantial revisions needed for full compliance to WTO disciplines. It then calculates the appropriate price wedge to be used for tariffication. Section 3 estimates the economic impact—in terms of exported quantities and price changes—of shifting from this price wedge to the specific tariff tabled by the Commission in December 2004.

Part II shifts the focus to EU-related issues by underlining the inability of the current and future trade regime to fulfill the proclaimed EU goals of "preferences" and "development" and by suggesting better alternative instruments to reach these goals. Section 4 shows that the post-April 2001 tariff-quota regime did not provide real "preferences" to the ACP countries, and that, in sharp contradiction with the goal proclaimed by the EU, the new regime is unlikely to do so either. Section 5 shows that the absence of effective preferences in the tariff-quota regime and in the new regime reveals the illusion of a "development" dimension in the new regime. As a result, section 6 provides recommendations for granting effective preferences and for introducing a real development dimension in the future EU banana policy.

The conclusion estimates the cost-benefit ratio of the tariff-only regime tabled by the EU proposal to approximately 4:1—in other words, there is approximately €4 in costs to the EU and third countries for every €1 in benefits to operators based in ACP countries. It also shows that two-thirds of the cost of the new regime are carried by the consumers in the new Members States. This last result underlines a key point from a purely European perspective. The new EU banana policy totally ignores the interests of the poorest European consumers (concentrated in the new Member States) and continues the regressive, anti-social policy of its previous and current forms.

# PART I. THE WTO CONTEXT

Part I develops three points which are all strictly related to the WTO context: the disciplines imposed by the Doha Ministerial on the shift to a tariff-only regime, the calculation of the new tariff, and the estimates of the impact of the 230 €/ton tariff currently tabled by the Commission.

## 1. Relevant WTO Disciplines

The EU tariffication does not occur in a legal vacuum. Rather, it is constrained by two WTO disciplines. The first one is not specific to the banana case. It consists of the rules to be followed by a WTO Member when it "tariffies" trade barriers which include non-tariff components. In the case of agricultural products, these rules are set in the attachment to Annex 5 of the Uruguay Round Agreement on Agriculture (URAA). The attachment defines the "external" and "internal" prices to be compared—preferably the actual average CIF unit value for the former and the "representative" wholesale price for the latter.

The second set of WTO disciplines to be considered is specific to the banana case and to the EU trade regime. During the November 2001 Doha Ministerial Conference, the EU requested a waiver from its WTO partners in order to be able to enforce the EU-ACP Partnership Agreement for the transitory period 2001-2007. The reason for such a waiver was that the preferences granted to the ACP countries by the EU under the Cotonou Agreement infringed both the most-favored nation clause (Article I of the GATT) and the WTO rules on quantitative restrictions (under Article XIII of the GATT)..

The waiver and the accompanying conditions were granted by two Decisions which were adopted by the Doha Ministerial. These Decisions have deeply changed the legal nature of the EU pledge to shift to a tariff-only regime. Until November 2001, this EU pledge was largely unilateral—contained in the text, adopted in December 2000, by the EU Council of Ministers revising the 1994 import regime. The Doha Ministerial has made the EU pledge a multilateral obligation.

The first Doha Decision [WTO, WT/MIN(01)/15] (hereafter the Doha Decision I) requires that the EU shift to a tariff-only regime be subject to the following condition: "*any re-binding of the EC tariff on bananas under the relevant GATT Article XXVIII procedures should result in at least maintaining total market access for MFN banana suppliers and its willingness to accept a multilateral control on the implementation of this commitment*" (own emphasis). The stress on existing market access implies that what is at stake is not merely market opportunities (potentialities) but effective access. In addition, the Doha Decision I makes clear that "*if the rebinding would not result in at least maintaining total market access for MFN suppliers, the EC shall rectify the matter*" and that "*if the EC failed to rectify the matter, this waiver shall cease to apply to bananas upon entry into force of the new EC tariff regime*."

The second Doha Decision [WTO, WT/MIN(01)/16] (hereafter the Doha Decision II) introduces a perspective, in one of its introductory recitals, which reads as follows: "*Recognizing the need to afford sufficient protection to the ACP banana supplying countries, including the most vulnerable, during a limited transitory period, to enable them to prepare for a tariff-only regime*" (own emphasis). That the main goal of the transitory period is to prepare ACP producers for a new regime has a clear consequence. It implies that the WTO partners of the EU are expecting the EU tariff-only regime to be *less* restrictive than the current tariff-quota regime. There is no reason to prepare for shifting from one trade regime to a regime which would be similar in terms of economic consequences. A less restrictive regime has two components: a lower rate of protection, and a more transparent instrument. The second condition can only be fulfilled by an *ad valorem* tariff (as emphasized by the current Doha negotiations).

## 2. The European Commission Calculations

This section examines the Commission's calculations in the light of WTO obligations, in particular the precise Doha Decision I condition *"at least maintaining total market access for MFN banana suppliers."* In this context, the section does not question the Commission's methodology. Rather, it takes it as given. Questions about the appropriateness of the approach used by the Commission in relation with the EU motives are raised in the following sections. As a result, the three left columns of Table 1 reproduce exactly the successive steps of the calculations taken by the Commission, and its results. The right column of Table 1 presents the revised figures that are then shown to fit WTO disciplines more accurately.

The calculation procedure starts with the EU duty-paid price for dollar green bananas in Hamburg (see line 1) which is defined as the average of the annual (average) prices recorded by the FAO. The period of reference adopted by the Commission is the years 2000-2002. The section takes these starting points as given, and does not look at alternative sources of price series (such as the World Bank series) nor at the consequences of taking Hamburg

**Table 1. Calculation of the tariff equivalent on bananas in the EC25**

| The successive steps of the Commission procedure | | Notes and remarks | Commission calculations | Revised calculations [FAO] |
|---|---|---|---|---|
| 1. Hamburg duty-paid price (euro/ton) | [a] | | **890** | **889** |
| year 2000 | | | 806.00 | 805.73 |
| year 2001 | | | 926.00 | 925.59 |
| year 2002 | | | 937.00 | 936.92 |
| 2. Ratio South/Central Am. bananas | [b] | see Table 2 | 0.998 | 0.904 |
| 3. Adjusted duty-paid price (euro/ton) | | calculated = (1x2) | 888 | 804 |
| 4. Ratio wholesale EU15/Germany | [c] | see Table 3 | 0.939 | 0.939 |
| 5. EU-15 duty-paid price (euro/ton) | | calculated = (3x4) | 834 | 755 |
| 6. Ratio wholesale EU15/EU25 | [d] | undisclosed data; see Table 4 | 0.946 | 0.918 |
| 7. EU-25 duty-paid price (euro/ton) | | calculated = (5x6) | 789 | 693 |
| 8. EU-25 unit values (euro/ton) | | see Table 5 | 559 | 559 |
| 9. Specific tariff equivalent (euro/ton) | | calculated = (7-8) | **230** | **134** |
| 10. Ad valorem tariff equivalent (%) | [e] | calculated (see footnote) | **52.4** | **30.6** |

**European Commission's sources and footnotes:**

[a] EU duty-paid green bananas prices (Source: www.fao.org/es/esc/prices, with a Ü/ Dmark exchange rate of 1.95583).

[b] Ratio between Central and South American bananas CIF unit values.

[c] Weekly data from Member States authorities for wholesale yellow banana prices (Regulation 896/2001:27a).

[d]. Estimated by comparing the wholesale banana price in the EU15 with partial data transmitted by several new Member States.

**Authors' footnote:**

[e] Based on non-ACP import value of 438 euros/ton in 2003 (see Table 6).

instead of Antwerpen which is the largest EU banana port. As a result, the first (very modest) source of revision comes from the fact that not rounding FAO prices (as the Commission did) slightly lowers the estimated duty-paid prices, as shown by the right column of Table 1.

Three successive adjustments are then introduced by the Commission. What follows shows that two of them lead the Commission's estimates to be significantly biased upward, so that the final Commission's result does not fulfill correctly the obligation of "*at least maintaining total market access*" stressed by the Doha Decision I.

*The first adjustment*. Line 2 consists in calculating the ratio of the German unit values of banana imports from Central and South America, respectively, in order to take into account the geographical origin of imports. The Commission uses the unit values of bananas imported from Panama and Costa-Rica as a proxy for Central America's unit values, and those of bananas imported from Ecuador and Colombia as a proxy for South America unit values. As shown by the bottom panel of Table 2, using these proxies instead of the total imports from the two regions makes no difference.

However, such a limited adjustment relies on an implicit key assumption—namely, that the German imports and the imports by the rest of the EU-15 have the same origin (quality and price) structure. Indeed, Table 2 shows that this assumption is wrong by presenting the same calculations as those made for Germany by the Commission—but based on EU-15 wide imports. Instead of the adjustment ratio of 0.998, a EU-15-based approach ends up with a ratio of 0.904—in other words, the Commission's assumption significantly biases the results up. The revised lower figure makes a lot of sense. It reflects better the differences between the origin pattern of the bananas imported by the other EU15 Member states, as well as the many differences in the structure and efficiency of the distribution sector in Germany, compared to the distribution sectors in the rest of the EU15. These differences are essential in order to ensure the respect of the WTO condition of "*at least maintaining total market access*." As these differences are not taken into account in the following adjustments introduced by the Commission when shifting from German-based observations to EU-wide estimates, it is thus essential to take them into account at this stage by using the ratio based on EU-15 unit values.

**Table 2. German and EC unit values of Central and South American bananas, 2000-2002**

| | Commission calculations German unit value (euro/ton) | | | | Revised calculations EC-15 unit value (euro/ton) | | | |
|---|---|---|---|---|---|---|---|---|
| | 2000 | 2001 | 2002 | 2000-02 [b] | 2000 | 2001 | 2002 | 2000-02 [b] |
| Ecuador | 611 | 595 | 621 | 609 | 526 | 574 | 596 | 566 |
| Colombia | 616 | 600 | 621 | 613 | 527 | 537 | 613 | 559 |
| Panama | 609 | 603 | 620 | 611 | 607 | 617 | 665 | 630 |
| Costa Rica | 609 | 608 | 620 | 613 | 562 | 618 | 663 | 615 |
| Ratio [a] | 1.007 | 0.987 | 1.002 | 0.999 | 0.900 | 0.900 | 0.910 | 0.904 |
| Central America. | 609 | 607 | 620 | 612 | 583 | 619 | 666 | 623 |
| South America. | 614 | 597 | 622 | 611 | 528 | 557 | 603 | 563 |
| Ratio | 1.007 | 0.984 | 1.002 | 0.998 | 0.906 | 0.901 | 0.905 | 0.904 |

Source: Eurostat.
Note [a]: the Central/South ratio is defined as the ratio of (Panama-CostaRica)/(Colombia-Ecuador).
Note [b]: simple annual averages.

*The second adjustment*. Line 4 aims to estimate the duty-paid price in the EC-15. It is based on wholesale prices for the period of reference shown in Table 3. Table 3 is based on information provided by the Member States that the Commission has made public for the first time. However, as there is no way to cross-check the data provided and properly assess their economic value—a regrettable fact—the figures are reported in Table 3 and taken as given. That said, it is important to note that this information has—at least—two severe limits. First, it does not include France and Ireland, two key countries for banana markets and banana trade policy. Second, wholesale prices reflect distortions that the current tariff-quota regime has generated in the banana distribution networks in Europe as well as distortions or specificities in the EU Members states distribution regimes which may not be related to the banana sector *per se*, but which may have an influence on it. Ignoring these limits are likely to bias the results up—in other words, the following calculations are likely to provide the maximum tariff rate in the context of the Doha Decision.

**Table 3. EC15 wholesale prices, euro/kg**

| | 2000 | 2001 | 2002 | Average |
|---|---|---|---|---|
| Austria | 0.924 | 1.023 | 1.038 | 0.995 |
| Belgium | 0.942 | 1.051 | 1.059 | 1.017 |
| Britain | 0.854 | 0.972 | 0.927 | 0.918 |
| Denmark | 0.866 | 1.024 | 0.900 | 0.930 |
| Finland | 0.958 | 1.044 | 1.108 | 1.037 |
| Germany | 0.894 | 1.034 | 0.973 | 0.967 |
| Greece | 0.667 | 0.586 | 0.747 | 0.667 |
| Italy | 0.848 | 0.963 | 0.930 | 0.914 |
| Netherlands | 0.911 | 1.014 | 1.014 | 0.980 |
| Portugal | 0.695 | 0.862 | 0.800 | 0.786 |
| Spain | 0.663 | 0.808 | 0.793 | 0.755 |
| Sweden | 0.928 | 0.956 | 0.908 | 0.931 |
| EC-12 | 0.846 | 0.945 | 0.933 | 0.908 |
| EC-12/Germany | 0.946 | 0.914 | 0.959 | 0.939 |

Source: EC Commission, December 2004.
Note: No information is available for France and Ireland.

*The third adjustement*. In line 6, the Commission estimates the EU-25 price by using another wholesale price ratio—the ratio between the EU-15 and the EU-25. For doing so, the Commission has gathered information on the wholesale prices of the 10 Member States (EU-10) which have acceeded to the EU in May 2004. However, this time, the basic data are not even disclosed by the Commission. They are merely vaguely described in a footnote ("*partial data transmitted by several new Member States*," as reported in footnote 4 of Table 1). All this raises serious doubts (from a purely statistical point of view) about the robustness and representativity of the data used by the Commission.

There is a good additional reason for such doubts from a purely economic perspective. Line 4 (the second adjustment, see above, which relies on the same kind of information) was based on the banana trade regime enforced since 1994, closely monitored by the EU-15 Member States since then, and giving to a few trading firms a key role. Since then, both trading firms and EU-15 Member States have thus had strong incentives to get the best possible information on wholesale prices. In sharp contrast, there is no reason to believe that the EU-10 Member States and the firms operating in these markets have had the same motives to gather data. Until their accession, six of these EU-10 countries imposed no tariff at all, and the other EU-10 Member States imposed only *ad valorem* tariffs (no specific tariffs and no quotas). In other words, the EU-10 countries have had little—if any—incentive to collect representative data on wholesale prices, and the trading firms have been in the same situation. There is thus good reasons to believe that the data collected by the Commission are of poor quality.

As a result, it seems more appropriate—and indeed more consistent with the initial steps of the Commission's procedure—to use again the FAO price series (the FAO collects specific data on exports shipped to Central Europe though Hamburg) in order to estimate the EU-15/EU10 ratio. Table 4 presents the available price data. The prices are weighted by trade volumes (as provided by the Commission) for the EU-15 and EU-10. Import-weighted FAO prices can then be calculated for the EU-25, leading to a ratio of 0.918.

**Table 4. Adjustment for estimating the EU-25 prices, 2001-2002**

| | 2000 | 2001 | 2002 | 2000-02 |
|---|---|---|---|---|
| | FAO prices (euros/ton) [a] | | | |
| EU-15 | 805.73 | 925.59 | 936.92 | 889.41 |
| EU-10 | 406.18 | 503.29 | 557.00 | 488.82 |
| | | | | |
| | Imported volumes (tons) [b] | | | |
| EU-15 | 2543133 | 2474568 | 2561256 | 7578957 |
| EU-10 | 592953 | 559089 | 527885 | 1679927 |
| EU-25 | 3136086 | 3033657 | 3089141 | 9258884 |
| | | | | |
| | FAO prices (weighted by import volumes) | | | |
| EU-25 | 730.19 | 847.76 | 872.00 | 816.65 |
| ratio EU-25/EU-15 | 0.906 | 0.916 | 0.931 | 0.918 |

Sources: [a] FAO banana price series [b] Commission's data.

*The last step*. Finally, the revised estimate of the EU-25 duty-paid price is 693 €/ton (line 7), compared to the Commission's estimate of 789 €/ton. As a result, the specific tariff equivalent to the current regime amounts to 134 €/ton—almost half the 230 €/ton tariff tabled by the Commission (see line 9 in Table 1). It is important that, for reasons mentioned above, this result is very likely to be biased up.

However, stopping there is not enough to fulfill the Doha Decision I obligation of *"at least maintaining total market access for MFN banana suppliers."* This is because it is essential to underline that only an a*d valorem* tariff is consistent with the Doha Decision I expression. This is because the protective capacity of specific tariffs varies when world prices fluctuate (as they do in the banana case). They protect less the domestic market when world prices are high—a situation which, by definition, generates few incentives to protect markets since high prices are the sign of short supply—than when world prices are low—a situation which, by definition, fuels strong incentives to protect markets since low prices are the sign of excess supply.

In sum, a full compliance with the Doha Decision I obligation of "*at least maintaining total market access*" requires that the EU express in *ad valorem* terms (that is, in percent of the unit value of banana imports from non-ACP countries, estimated to 438 €/ton for 2003) the

estimated specific tariff. Our revised calculations suggest an *ad valorem* tariff of at most 30 percent (this is the *ad valorem* equivalent of 134 €/ton).

## 3. The Economic Impact of the Current EU Proposal

In this section, we have modeled the situation where the EU imposes its proposed duty of 230 €/ton (from Table 1) even though the appropriate duty is 134 €/ton (also from Table 1). In other words, the experiment consists in (i) removing the current regime (where the combination of tariffs and rents accrue to the EU, and where there is a price wedge of 134 €/ton) and (ii) replacing it with the tariff-only regime with a EU's proposed duty of 230 €/ton.

Starting with trade data for 2003 and our estimates in Table 1 of the price impact of the current regime, we work with a world model, similar to the non-linear multi-region Armington model discussed in Francois and Hall (2002) and Francois (2003). Critical differences are the inclusion of specific tariffs, and the non-linear specification of the model (which yields more accurate estimates).

Our set of model coefficients are presented in Table 5. We also use the conversion of specific tariffs, in €/ton, to percent equivalents based on prices in 2003, as shown in Table 1. These are representative. In the actual model results, percent equivalents of the specific tariffs we model will depend on changes in producer prices. As producer prices rise, the percent impact of these tariffs will fall. We model both tariffs and quota rents as accruing to the EU. There are varying estimates available of supply elasticities in the literature, and some disagreement across recent studies. We have taken supply elasticities from the FAO (2003) for this application. They report both short-run and long-run elasticities. We have taken the long-run estimates. Our demand elasticity is also from the FAO, and is also used by Vanzetti et al (2004). The substitution elasticity is from our own econometric modeling of past banana trade.

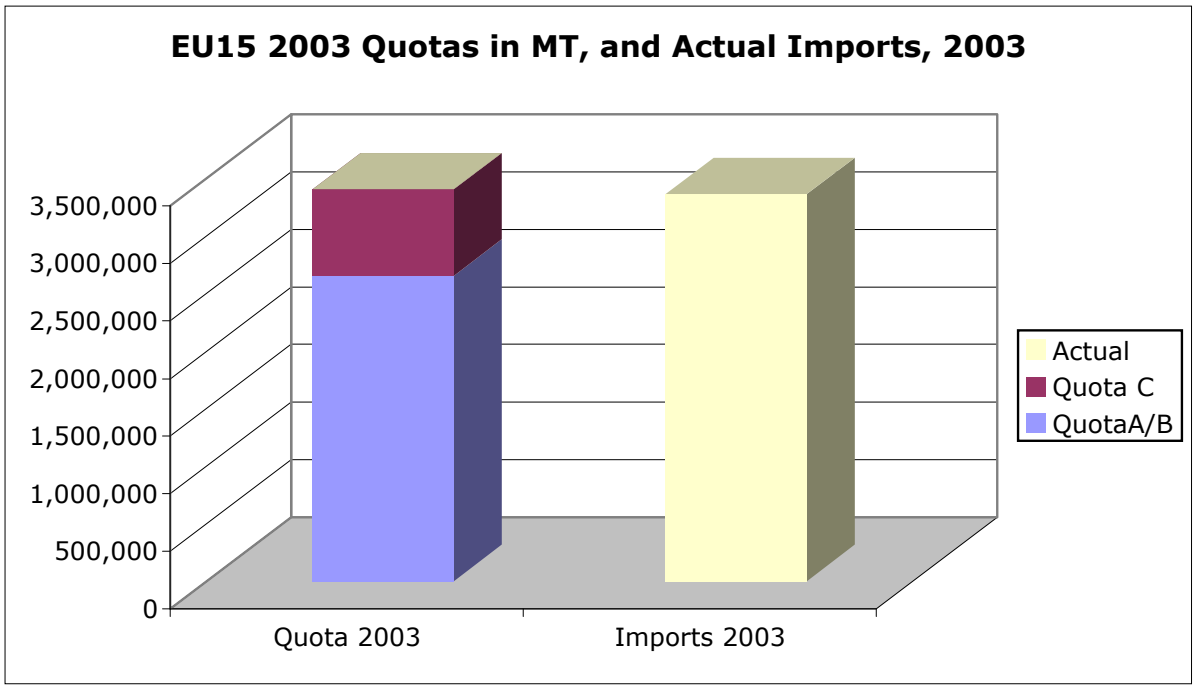
**Table 5. Elasticities used in model**

| | Demand Elasticity 1/ | Substitution Elasticity 2/ | Supply Elasticity 3/ |
|---|---|---|---|
| EU15 | -0.89 | 2.7 | 0.2 |
| EU10 | -0.89 | 2.7 | . |
| NonEU Europe | -0.89 | 2.7 | . |
| USA+CAN | -0.89 | 2.7 | . |
| ROWimporters | -0.89 | 2.7 | . |
| ACP | -0.89 | 2.7 | 0.2 |
| Ecuador | -0.89 | 2.7 | 0.7 |
| FA countries | -0.89 | 2.7 | 0.4 |
| Dollar & other exporters | -0.89 | 2.7 | 0.7 |

1/ From Vanzetti et al 2004.
2/ From econometric estimates (see text). 3/ From FAO (2003)

Before proceeding, it is important to recall that under the current regime, the banana quotas are filled exactly. In other words, the level of trade in bananas is determined by the quotas, which restrict banana imports, and not by tariffs or tariff preferences. Because the competitive ACP and non-ACP suppliers have a similar cost structure, they face a similar quota markup on delivery to EU consumers. This point is reflected in Figure 1, which shows that EU quotas are filled exactly. In the current regime, ACP supply is limited by quotas, not by preference margins. The same is true for non-ACP supply.

**Figure 1.**



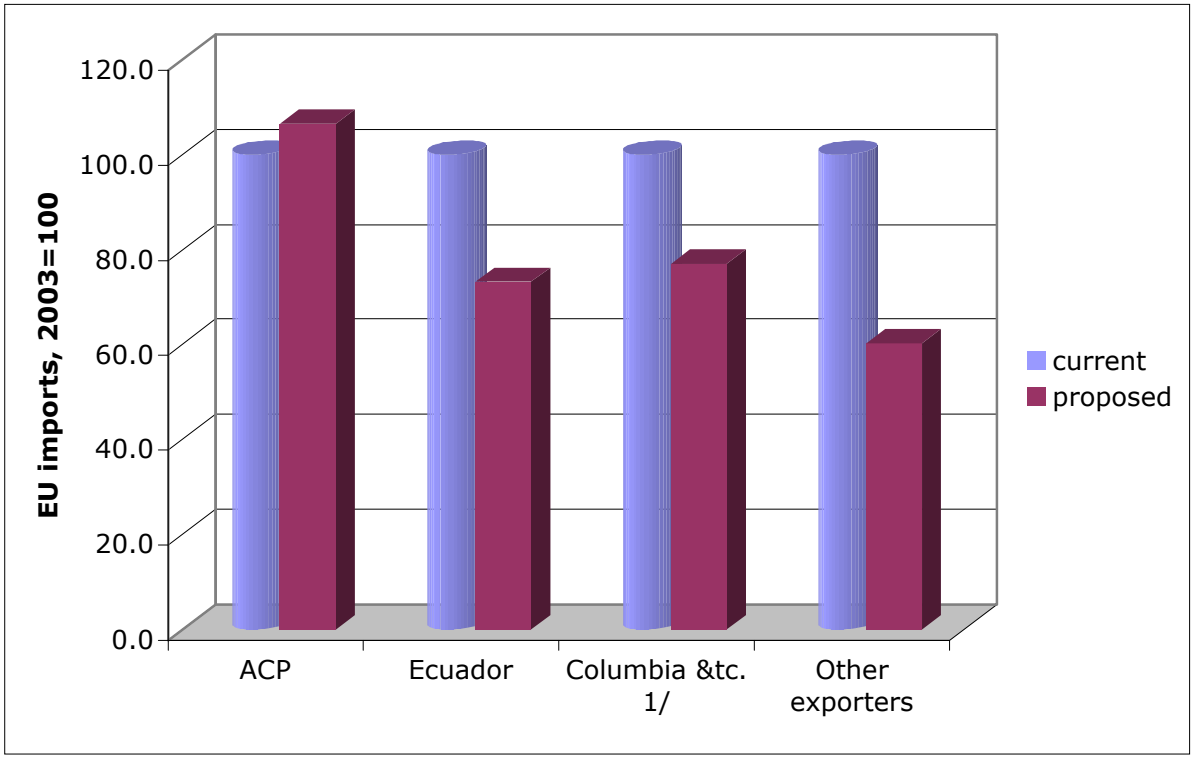

Source: Quantity data are from Eurostat reports. Note: MT: (metric) tons.

The results for market access in the EU are shown in Figure 2. We have modeled a situation where all suppliers face the same tariffs, except ACP suppliers who are then instead given a preference margin equal to the full new specific tariff. This has a dramatic effect on the supply of bananas to the EU. The ACP suppliers experience a 6.4 percent increase in supply. At the same time, non-ACP suppliers are forced out of the EU market, compared to current market access levels. Because the EU has overestimated the current level of protection, and because the ACP suppliers do not actually benefit from tariff preferences under the current regime, the combination of higher protection and new preferences leads to a drop in Ecuador's exports to the EU of roughly 27 percent. Exporters in Columbia, Costa Rica, Nicaragua, and Venezuela see a 23 percent drop in exports to the EU25, while other suppliers see a 40 percent drop. One reason for this dramatic effect is the imposition of the old EU15 regime across the EU10 (the new Member States). In a non-preferential, low tariff regime, dollar producers had strong exports to the EU10. They are placed at a tremendous disadvantage under the new regime, in a market that has traditionally not been subject to trade preferences like those offered in the EU15 market.

**Figure 2.**

The change in exports to the EU25 (based on actual 2003 trade)

| *exporter* | regime | | |
|---|---|---|---|
| | current | proposed | change (%) |
| ACP | 100.0 | 106.4 | 6.4 |
| Ecuador | 100.0 | 73.2 | -26.8 |
| Columbia &tc. 1/ | 100.0 | 77.0 | -23.0 |
| Other exporters | 100.0 | 60.2 | -39.8 |




1/ Columbia &tc includes Columbia, Costa Rica, Nicaragua, and Venezuela.

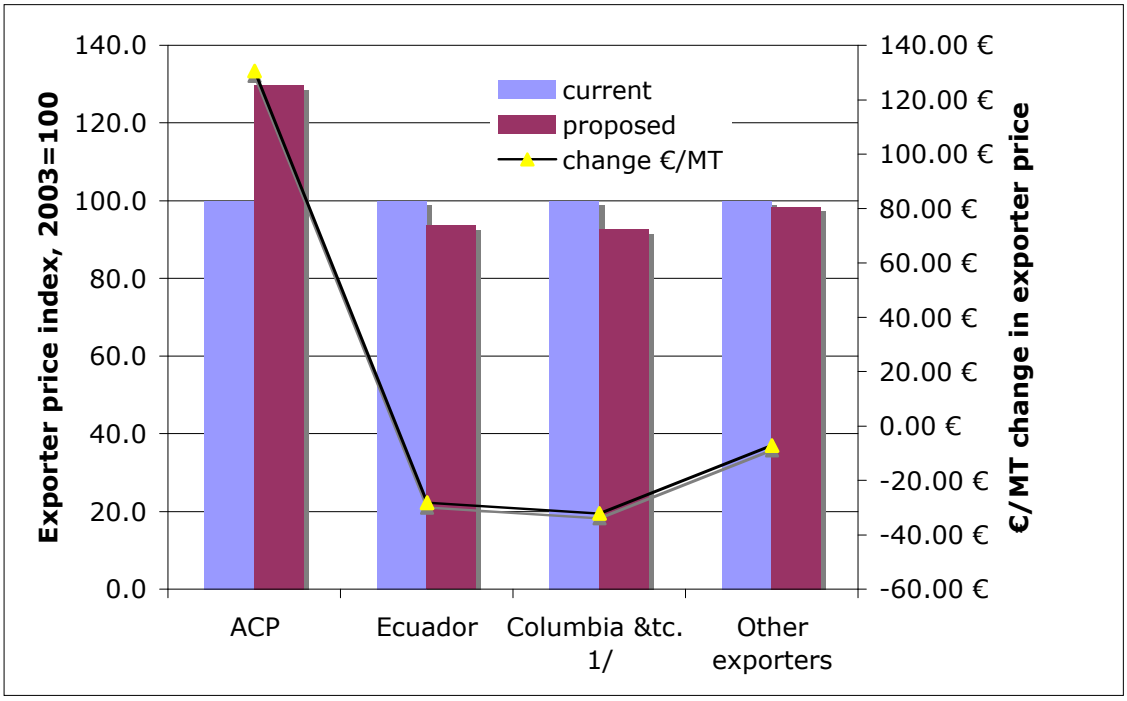
Along with the drop in exports, non-ACP suppliers will also experience a drop in export prices under the new regime. Figure 3 shows our estimates of the likely effect of the new regime on exporter prices. It reports, relative to the left axis, changes in relative prices (*f.o.b.*). These are the bars in the chart. The line then plots changes in prices, measured in €/ton. (We work with average exporter prices, from Table 1 and from EU estimates). The ACP suppliers experience a windfall under the proposed regime. Prices rise by almost 30 percent, or by 130 €/ton compared to the current regime. In contrast, non-ACP suppliers are forced to cut prices, in addition to cutting back on exports to the EU25 market. We estimate that Ecuador will see a 6.4 percent drop in price, or roughly 28 €/ton. Columbia, Costa Rica,

Nicaragua, and Venezuela see a 7.4 percent drop, or roughly 32 €/ton. Other non-ACP suppliers experience a 1.6 percent drop in price, or approximately 7 €/ton.

**Figure 3.**

The change in exporter prices (based on actual 2003 trade)

| *exporter* | regime | | | |
|---|---|---|---|---|
| | current | proposed | change Ū/MT | change (%) |
| ACP | 100.0 | 129.8 | 130.49 | 29.8 |
| Ecuador | 100.0 | 93.6 | -28.17 | -6.4 |
| Columbia &tc. 1/ | 100.0 | 92.6 | -32.26 | -7.4 |
| Other exporters | 100.0 | 98.4 | -7.13 | -1.6 |




1/ Columbia &tc includes Columbia, Costa Rica, Nicaragua, and Venezuela.

# PART II. SHIFTING TO THE EU CONTEXT

The calculation of a maximum 30 percent tariff leaves three questions unanswered. First, will such a tariff-only regime provide effective "preferences", as claimed by the EU? Second, will it deliver an effective "development" component? Third, as the answer to these two questions is no, what would be the EU tariff only regime which would guarantee the EU's proclaimed goals? The following sections address all these questions.

## 4. The Illusion of Preferences

A critical step in the analysis of tariff-quota elimination and the move to a tariff-only regime is an understanding of the impact of the tariff-quota regime before and after 2001.

Before April 2001, the tariff-quota regime imposed by the EC 1994 Regulation defined quotas by exporting country: Eight specific-country quotas were defined within two broad "global" quotas (ACP and non-ACP) with the rest of each global quota not subjected to a country-specific allocation of quantities. This non-attributed portion was particularly large in the non-ACP case. Almost half of the non-ACP global quota was not allocated. In addition, efficient producers, such as Ecuador, were among the countries not protected by a specific quota. This situation generated substantial competition within the non-ACP group amongst the alternative sources of bananas which did not enjoy specific quotas. By contrast, country-specific quotas were much more important within the ACP global quota, and the key producers (Ivory Coast and Cameroon) did enjoy specific quotas. As a result, potential competition between ACP producers was much more limited.

Changes introduced in the post-April 2001 import regime dramatically changed this situation. Since then, quotas have been defined only for the two wide groups of countries (ACP and non-ACP) with no country-specific quotas. Crucially, the new EU tariff-quotas have relied on quotas defined by "operator"—that is, firms producing, ripening, transporting, trading and distributing bananas. These operator-based quotas have been made even more pivotal by institutional and economic factors. First, the EU Member States close monitoring of the quota implementation has ensured the dominant role of the operator-based quotas, at least in the

Member States willing to do so. Second, the operator-based quotas have strongly reinforced the oligopolistic (collusive to many respects) structure of the EU banana market (Messerlin 2001).

From an economic perspective, the key consequence of this shift away from country-specific quotas to "operator"-based quotas is that exporting countries within each broad group (ACP or non-ACP) have been put in a competitive position by the operators. Within each of these two broad groups, operators could choose first the most efficient sources, then fill up the remaining quotas with increasingly less efficient sources. As a result of these dramatic changes, some ACP producers actually have demonstrated a substantial competitive advantage over some of their ACP fellows and over some non-ACP producers as well. In other words, the tariff-quota regime does not provide improved market access through "preferences" to ACP countries. Quota rents go to the operators in the EU, while quotas actually limit overall ACP exports. The tariff preferences are totally irrelevant in this context.

**Table 6. EC15 banana imports: unit values, 2000-2003**

| | Prices and unit values (euro/ton) | | | |
|---|---|---|---|---|
| | 2000 | 2001 | 2002 | 2003 |
| **ACP countries [a]** | | | | |
| Belize | 600 | 581 | 598 | 438 |
| Cameroon | 633 | 676 | 607 | 444 |
| Cote d'Ivoire | 516 | 599 | 556 | 406 |
| Dominica | 694 | 684 | 705 | 526 |
| Dominican Rep. | 551 | 588 | 686 | 459 |
| Jamaica | 821 | 775 | 733 | 536 |
| St Lucia | 711 | 695 | 711 | 519 |
| St Vincent | 704 | 695 | 711 | 520 |
| *Average* | *628* | *645* | *625* | *446* |
| **Non-ACP countries [b]** | | | | |
| Brazil | 509 | 491 | 475 | 344 |
| Colombia | 527 | 537 | 613 | 392 |

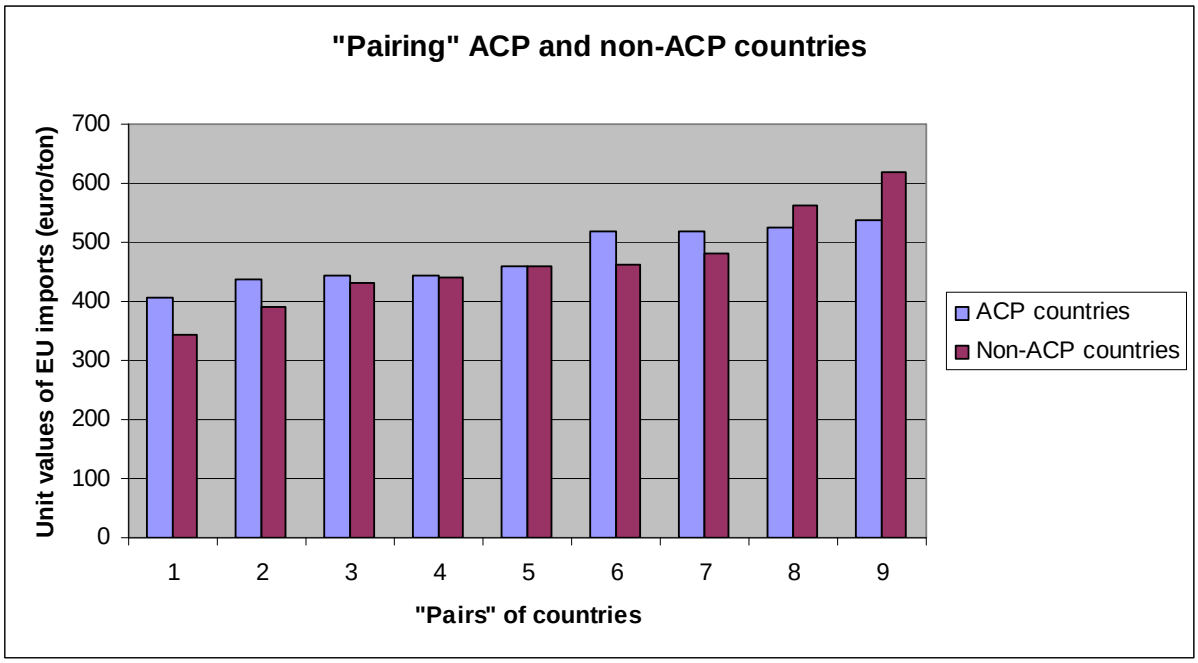
| | | | | |
|---|---|---|---|---|
| Costa Rica | 562 | 618 | 663 | 481 |
| Ecuador | 526 | 574 | 596 | 441 |
| Honduras | 621 | 627 | 777 | 564 |
| Panama | 607 | 617 | 665 | 431 |
| Venezuela | 656 | 718 | 853 | 618 |
| *Average* | *554* | *584* | *628* | *438* |

Source: Eurostat trade data.

Would the new tariff-only regime change this situation? The answer is no. Efficient ACP countries have already emerged under the post-April 2001 trade regime. This is shown by Table 6 which is based on import unit values (for ACP and non-ACP exporters selling more than 10,000 tons per year to the EU) and which includes 2003 in order to better catch the effects of the post-April 2001 regime. Table 6 highlights the convergence in prices (unit values) across average ACP and non-ACP suppliers between 2000 and 2003. This reflects the more competitive sourcing process since the tariff-quota regime has been implemented.

Figure 4 illustrates this convergence. The Figure compares "pairs" of ACP and non-ACP countries by ranking these exporting countries by increasing unit values (costs). Such a "pairing" of ACP and non-ACP countries reveals the strong similarity in terms of dispersion of costs among exporters from both groups of countries.

**Figure 4.**




Note: ACP countries are illustrated by the left bar of each pair, and the non-ACP countries by the right bar (non-ACP unit values include the 75€/ton tariff). The pairs are: 1. Ivory Coast and Brazil, (2) Belize and Colombia, (3) Cameroon and Panama, (4) Surinam and Ecuador, (5) Dominican Republic and Guatemala, (6) Saint Lucia and Peru, (7) Saint-Vincent and Costa Rica, (8) Dominica and Honduras, (9) Jamaica and Venezuela. The pairs may associate countries with quite different scales of production and exports.

In other words, it would be unwise for many ACP countries to support the current EU plan, which places higher cost ACP and non-APC suppliers at a disadvantage relative to lower cost ACP suppliers. For instance, what could an ACP country, such as Burkina-Faso, gain from such support? Nothing, since it will never become an efficient banana producer—its trade interests are concentrated in quite different crops, such as cotton or beans.

There may be a few ACP countries, such as Angola or Somalia, which could possibly witness the growth of a banana domestic production under preferences. However, the crucial question such ACP countries should ask themselves is: would the banana production be the best sector to invest in these countries in any case, or would it be so only because of preferences focusing on bananas? In the first case, preferences are unlikely to be the best policy. There may be a need of public intervention for allowing the take-off of the banana production in these ACP

countries, but this intervention will be much more efficient if it is based on instruments targetting directly the causes of the currrent deadlock. (For instance, production subsidies or subsidies for improving some basic equipments or infrastructure, possibly partly funded by the EU budget, may be more efficient instruments for such a policy.) In the second case, as soon as preferences on bananas will be removed (a sure evolution in the context of ongoing multilateral negotiations) banana production will become less attractive in these economies than the other sectors in which these countries have robust comparative advantages—hence, adjustment problems (and the higher the preferences, the higher the adjustment problems to be faced by the country in question).

In sum, under a tariff-only regime, efficient ACP producers may maintain or even increase their current export volumes and market share. At the same time, the other ACP producers are likely to lose significant market share, both to non-ACP and ACP suppliers, except if one assumes that the currently inefficient ACP countries could become rapidly efficient—an implausible evolution, as it should have already occurred during the last three years. The proclaimed preference dimension of the tariff-only regime with respect to ACP countries is unlikely to have any positive impact (but it may have many unexpected negative effects, especially if the tariff is high.)

## 5. The Illusory "Development" Dimension

No preferences do not mean that there have been no beneficiaries from the EU tariff-quota regime. Mapping observed imports against the current tariff-quota regime (see Table 7) shows that the EU tariff-quota regime has been binding—that is, the two allocated global quotas have been exactly filled. In other words, tariff preference margins have been meaningless for market access—what counted were the quotas. That said, who have been these beneficiaries?

**Table 7. Quota Allocations, 2003**

| | Quota levels | Allocations | |
|---|---|---|---|
| | | ACP | non-ACP |
| QuotasA/B: 75 €/ton (but 0 €/ton for ACP) | 2,653,000 | 36,556 | 2,575,836 |
| Quota C: 0 €/ton (ACP only) | 750,000 | 750,000 | 0 |
| New quota: 75 €/ton (0 €/ton for ACP) 1/ | 450,000 | | |
| Total | 3,853,000 | | |

1/ It is assumed that the 8 month 2004 new quota of 300,000 will be pro-rated across 12 months in 2005. Note that 17% of A/B quota and 11% of C quota are now freely allocated.

The first beneficiary of the EU tariff-quota regime has been the EU budget to the extent that non-ACP exporters have had to pay a tariff of 75 €/ton. The tariff-only regime will maintain this situation. Indeed it will amplify it all the more, the higher the imposed tariff is. Fundamentally, the 230 €/ton tariff proposed by the Commission is an excessive tariffication of exports by non-ACP developing countries. This massive shift of money to the rich EU budget can hardly be seen as having a development dimension—all the more if such a high tariff induces operators in these non-ACP countries to shift to other exotic crops because they are less taxed, forcing these countries to undergo substantial adjustment costs.

The price-gaps (adjusted for the current 75 €/ton tariff to be paid by the non-ACP countries) constituted rents. Who have benefited from such rents? The EU tariff-quota regime coupled with the monitoring of the Member States has largely granted these rents to a few large operators—by fuelling competition among countries for getting access to these trading firms, hence to the EU banana markets. Rents did not accrue to the exporting countries (farmers), even though these countries have tried to create legal structures uniting farmers (such as state trading companies or farmers' cooperatives) in order to counter-balance the market power of the large operators. The tariff-only regime will not change the situation of these rents—other than tariffying a portion of them and transferring money from operators to the EU coffers.

## 6. Taking Preferences and Development Seriously

The Council Regulation 216/2001 which lays down the EU pledge to change its banana import regime states that "*the application of a customs duty at an appropriate rate and application of a preferential tariff to imports from ACP countries provides the best guarantees, firstly of achieving the objectives of the common organisation of the market as regards Community production and consumer demand, secondly of complying with the rule on international trade, and thirdly of preventing further disputes*" [recital 2, Official Journal L31/2, 2.2.2001]. As shown above, implementing these proclaimed goals cannot be achieved by a "preferential" tariff. Rather, it would require three actions.

First, solving the problems to be faced by the EU producers in case of liberalisation of the EU banana trade requires the recognition that they face very different problems from those faced by the ACP producers. EU banana growers are in a competitive disadvantage not only because of higher labor costs, but also because of less adequate climatic and soil conditions. As is often the case, certain EU farmers may find niches in order to overcome these handicaps, but the others will have difficulty surviving. Their best option is likely to leave banana production—an evolution that indeed has already been occurring on a large scale during the ten last years. In such a case, the best public policy is not to protect these farmers through trade barriers. It is to provide direct payments to those farmers in a difficult situation, allowing them to stop banana production and to shift to other activities. In other words, the post-2006 EU banana policy should be exactly similar, in its principles, to the rest of the future—WTO consistent—Common Agricultural Policy based on income-support.

Second, the problems faced by inefficient ACP (mostly Carribbean) producers are similar to some extent to the EU producers' problems, but they differ in two respects. First, labor costs are lower, meaning that the competitive disadvantage is smaller—hence a smaller pressure to shift quickly and massively banana support to an income-support policy or to other activities. Second, the public purse to fund such income-support programme is much thinner in these ACP countries than in the EU. However, "preferences" may still have a meaning in these conditions. They do not consist in granting a preferential tariff. Rather, they should consist in the EU granting direct aid (income support) to these ACP countries in order to contribute to the funding of their necessary income-support policies—hence favoring an orderly adjustment of their banana sector to a freer world banana market (including the EU).

Finally, improving the situation of the most efficient ACP (mostly African) countries requires that we pinpoint the exact beneficiaries of a preferential tariff. As shown above, African farmers are unlikely to be the main beneficiaries of a preferential tariff. The large operators investing in Africa are more likely to gain from such preferences, if only because they are the only ones to produce bananas for exports (small African farmers produce bananas mostly for local markets).

Does a development policy providing gains to these large operators make sense? The answer—based on common sense and economic analysis—is no. Large firms should be left free to invest in the best places for growing bananas in the world. And the argument (often mentioned) that banana production should be protected for a transitory period of infancy does not apply. Operators existing in the banana business are large enough to overcome possible market failures.

## CONCLUSION: EUROPEAN INTERESTS

Imposing a new tariff regime requires that we re-open a question which has been often deliberately ignored during the last decade of debates on the EU banana trade regime: what is the expected impact of the proposed regime on European consumers, especially the poorest ones? Contrary to the proclaimed objective of the Council Regulation 216/2001, the current tariffication procedure proposed by the Commission totally ignores the interests of the European consumers. As underlined by some Member States, such as Sweden, the interests of the EU-25 consumers require the lowest tariff possible.

To assess the net impact on the EU as a consumer of bananas, we have estimated the gains to producers (known as producer surplus), costs to consumers (known as consumer surplus) and changes in quota rents and tariffs. The combination of these separate effects yields an estimate of the overall economic benefit (positive or negative) that will be realized by a shift to the new regime. This set of results is reported in Table 8. As the EU is imposing a new regime on the EU10 (the new Central and East European Members), we have reported the impact on the EU10 Members separate from that on the EU15 Members. Table 8 presents two sets of estimates. The first is the annual impact of the new regime, compared to the old one. The second is then the present value of the next 15 years under the new regime. This represents the equivalent, in terms of one-time benefits or losses, of 15 years under the new regime.

**Table 8. The costs to exporters and the EU (based on actual 2003 trade), millions of €**

| *country/region* | welfare costs | |
|---|---|---|
| | annual | 15 years |
| EU15 | -83 € | -1,031 € |
| EU10 | -166 € | -2,050 € |
| ACP | 126 € | 1,558 € |
| Ecuador | -87 € | -1,076 € |
| Columbia &tc. 1/ | -123 € | -1,528 € |
| Other exporters | -18 € | -224 € |
| TOTAL | -351 € | -4,351 € |

1/ Columbia &tc includes Columbia, Costa Rica, Nicaragua, and Venezuela.

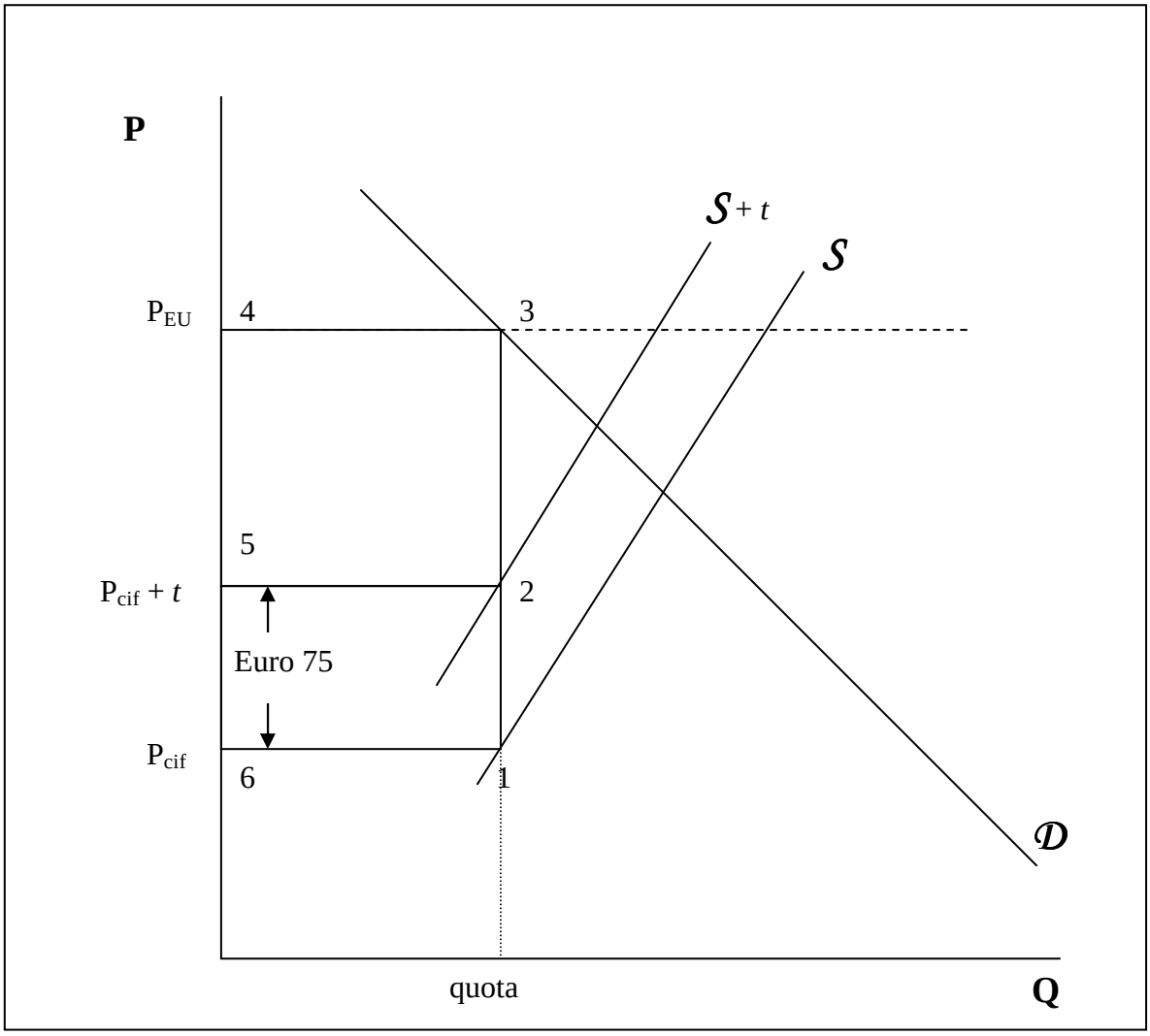
What is the distribution of gains and losses? Operators based in ACP countries gain roughly €1.5 billion under the new regime (spread out over the next15 years). To accomplish this, the EU imposes a cost on its consumers of roughly €3.0 billion over the same period. This does not even address the impact on non-ACP suppliers. We estimate that, over the next 15 years, the total cost of the new regime would add up to roughly €2.75 billion in losses to non-ACP banana suppliers. In total, the cost-benefit ratio of the regime, taking into account third-country effects, amounts to approximately 4:1. In other words, there is approximately €4 in costs to the EU and third countries for every €1 in economic benefits to ACP countries.

Two-thirds of the cost of the new regime are carried by the consumers in the new Members States (the extension of the EU-15 tariff-quota regime to these new Member States was decided, despite the fact that it occurred only 18 months before the scheduled shift to a tariff-only regime, and that several of the new Member States were strongly opposed to this extension). A simple estimate of the potential increase of the level of protection in the new Member States is provided by comparing the *ad valorem* equivalent of the tariff calculated by the Commission (roughly 52%, see Table 1) to the import-weighted average EU-10 tariff prior to May 2004 (roughly 9%). As the new Member States are the lower income members of the EU, the proposed regime is not only highly inefficient (with its cost-benefit ratio of 4:1) but it constitutes also a highly regressive, anti-social, policy. As suggested in Part II, the same result could be realized—more efficiently—by transferring funds directly from the EU budget, where at least most of the costs would then be carried by high rather than low-income EU Members.

# Annex I: The Economics of Quotas and Tariff Preferences

The current tariff preference rate should not be an issue in designing a new regime, as there is no impact of the tariff preference margin on import quantities or prices. This is illustrated in Annex Figure A.1. In the Figure, D represents import demand, and S represents supply. Imports are fixed at the level *quota*, which allows an internal price to be maintained at the price level $P_{EU}$, which is higher than the landed price $P_{cif}$, as well as the landed price inclusive of the specific tariff *t*. If we assume that tariffs are collected, then the government collects the tariff revenues equal to area $\overline{1256}$, while the holders of the quota will be able to collect rents equal to $\overline{2345}$. With tariff preferences, such that the duty (in the case of bananas being € 75/MT) is not collected, then the full amount $\overline{1634}$ goes directly to the holder of the import quota. It involves no change in producer price, no change in consumer price, and no change in trade volumes. In a quota regime, the only benefit of tariff preferences is to transfer money from the tax-collecting authority to the holder of the quota rights. It only benefits the exporters if they are able to control the quotas and extract the underlying quota rents. Based on the data discussed above, non-ACP and ACP prices are comparable, and it seems reasonable to assume that ACP exporters receive price $P_{cif}$ regardless of the scale of tariff preferences. The preferences simply make the importers and distributors wealthier at EU tax-payer expense.

**Annex Figure A.1, Trade Preferences with a Binding Quota**



# Annex 2: An Overview of the Simulation Model

## Introduction

In this annex, we outline a global simulation model for the analysis of EU banana policy actions. Our goal in developing the model was to provide a relatively transparent, yet flexible framework for detailed analysis of the regime. In this sense, we share goals behind the development of the GSIM and SMART models. Where we depart from earlier applications in this area is in (1) taking advantage of available greater computational power, (2) stressing global market clearing conditions rather than import markets, (3) working with a non-linear (and hence more precise) formulation of the model, and (4) including specific duties. By focusing on global markets, we are able to assess value of global market shifts for exporters, in addition to the import market effects stressed by existing tools in this area.

## Basic Relationships

When modeling trade policy at an industry level, the potential exists for our model to quickly become unmanageable. For example, it is well known that the complexity of global general equilibrium models tends to increase geometrically as we add regions and sectors. A similar problem exists even when we focus on an individual sector. For example, if we are modeling trade policy for a product across 100 countries, there are 9,900 potential bilateral trade flows, plus 100 domestic absorption flows.

To avoid this problem, we reduce the solution set of the model to those global prices that clear global markets. Once we have a global set of equilibrium prices, we can then backsolve for national results. Within this context, we work with a non-linear representation of import demand, combined with generic export-supply equations. This is a significant improvement in the linear approach to this problem (See Francois and Hall 2003, 1997). This reduced-form system, which only includes as many equations as there are exporters, is then solved for the set of world (exporter) prices.

A basic assumption is national product differentiation. As developed here, this means that imports are imperfect substitutes for each other. The elasticity of substitution is held to be

equal and constant across products from different sources within a country. The elasticity of demand in aggregate is also constant. These elasticities can, however, be assumed to vary across importing countries. Finally, global supply from each country is also characterized by constant (supply) elasticities. Such an approach is consistent with the Armington (1969) approach to product differentiation at the national level (See Francois and Hall 1997, Roningen 1997), or with the Flam-Helpman (1987) model of firm-level differentiation (where firm-specific capital fixes varieties).[1]

We first spell out the basic structure of the model. This includes the development of relevant own- and cross-price elasticities, and the inclusion of these terms in global supply and demand definitions and market clearing conditions.

*CES (Armington) Import Demands*

A critical element of the model approach developed here is the underlying assumption of product differentiation that can be indexed by country of origin. Formally, we will specify import demand as follows:

$$(1) \qquad M_{(i,v),r} = f(P_{(i,v),r}, P_{(i,v),s\neq r}, y_{(i,v)})$$

where $y_{(i,v)}$ is total expenditure on imports of $i$ in country $v$, $P_{(i,v),r}$ is the internal price for goods from region $r$ within country $v$, and $P_{(i,v),s\neq r}$ is the price of other varieties. In demand theory, this results from the assumption of weak separability. (To avoid confusion on the part of the reader or the authors, Annex Table A.1 summarizes our notation).

We will assume that equation (1) follows from CES demand for imports. From the first-order conditions for CES demand functions, we then have the following:

$$(2) \qquad M_{(i,r),r} = \gamma_{(i,v),r}^{\sigma} (P_{(i,r),r} / P_{i,r})^{-\sigma} E_v P_v^{-1}$$

[1] We have examined banana trade data econometrically. We consistently find a robust, and relatively low elasticity of substitution. For example, with a panel from 1988-2003, Huber robust regressions yield short-run Armington elasticities of 1.28, with t-ratios of 2.75. Corresponding R-squared values under OLS regressions are consistently over .80 with this type of regression. We take twice our short-run estimate for the long-run elasticities.

where $\alpha_i$ is the CES expenditure weight, $E$ is expenditure, $P$ is the CES composite price, and $\sigma$ is the composite demand elasticity.

Having defined demand at the import flow level, we next need to define composite demand for national product varieties. In addition, we will need national supply functions if we are to specify full market clearing.

Defining $P_{i,r}$* as the export price received by exporter $r$ on world markets, and $P_{(i,v),r}$ as the internal price for the same good, we can link the two prices as follows:

(3) $$P_{(i,v),r} = (1 + t_{(i,v),r}) P_{i,r}^* = T_{(i,v),r} P_{i,r}^*$$

In equation (3), $T = 1 + t$ is the power of the tariff (the proportional price markup achieved by the tariff $t$.) We will define export supply to world markets as being a function of the world price $P$*. [2]

(4) $$X_{i,r} = ks_{i,r} (P_{i,r}^*)^{es(i,r)}$$

Here, *ks* is a constant term, and *es* is the elasticity of supply. Finally, we also define composite demand in each region as a constant elasticity function of the regional composite price index, $P_v$.. In expenditure form, this yields the following:

(5) $$E_{i,v} = ka_{i,v} (P_v)^{NAv + 1}$$

where *NAa* is the composite demand elasticity, and *ka* a demand equation constant to be set in calibration.

An important point to make here is that while we center the discussion in the text around production for export, we also include domestic production for domestic consumption

[2] While we do not do so here, it would be straightforward to introduce export subsidies or taxes, in addition to import taxes. These would enter into equations (5) and (7). We could also introduce production subsidies through the same equations. In implementing the model, we also include specific duties, specified as a percent of initial (benchmark) export prices.

within the actual implementation of this framework. In particular, we index home market demand through equation (2), supplied as is other demand for production through equation (3). This means that, when data on domestic production are available, we can include domestic industry effects by modeling home market trade in addition to foreign trade, using a non-nested import and domestic demand structure.

*GLOBAL EQUILIBRIUM CONDITIONS*

From the system of equations above, global equilibrium is defined as the sum of all import demands being set to national supply. Combined with national equations for total composite demand (equation 5), which can be substituted into equations defined by (2), and setting the sum of demands equal to supply, we then have a system of equations equal to the number of regions in the model. With this system of equations, we are able to solve for equilibrium price. This is the approach followed in the spreadsheet. Once the price vector has been solved, we are then able to use equation (4) to solve for the impact on domestic production.

**Welfare and Revenue Effects**

In this section we work with the basic solution set of prices to calculate national welfare and revenue effects. Once we solve the system of equations defined above, we can then use equations (4) to backsolve for export quantities, and equations (2) to solve for import quantities. We can also solve for the change in composite prices for consumers based on a CES price index. From there, calculations of revenue effects are also straightforward, as they involve the application of trade values against tariffs. Price and quantity effects can be combined with partial equilibrium measures of the change in producer (i.e. exporter) surplus $\Delta PS$ and net consumer (i.e. importer net of tariff revenue changes) surplus $\Delta CS_{i,v}$ as a measure of welfare effects. (See Martin 1997).

Conceptually, our measure of producer surplus is shown in Figure A.1 as the area of trapezoid *hsnz*, and approximates the change in the area between the export supply curve and the price line. Formally, this is represented by equation (6) below.

$$\begin{aligned} \Delta PS_{(i,r)} &= R^0{}_{(i,r)} \cdot \hat{P}_{i,r}{}^* + \tfrac{1}{2} \cdot R^0{}_{(i,r)} \cdot \hat{P}_{i,r}{}^* \cdot \hat{X}_{i,r} \\ &= \left(R^0{}_{(i,r)} \cdot \hat{P}_{i,r}{}^*\right) \cdot \left(1 + \frac{E_{X,(i,r)} \cdot \hat{P}_{i,r}{}^*}{2}\right) \end{aligned} \qquad (6)$$

In equation (6), $R^0_{(i,r)}$ represents benchmark export revenues valued at world prices (which is identical to calibrated base quantities).

For consumer welfare, we focus on the implicit composite good, assuming an underlying CES aggregator. This composite good therefore takes the functional form

$$Q_{i,v} = A_v \cdot \left[ \sum_{i=1}^{r} \gamma_{(i,v),r} M^{\rho}_{(i,v),r} \right]^{1/\rho} \tag{7}$$

Because we define the price of the composite good to be 1 in the benchmark equilibrium, the proportional change in the price of *Q* (with total quantity then equal to total consumer expenditure) will be:

$$\hat{P} = \frac{dP}{P} = \sum_{i=1}^{r} \theta_{(i,v),r} \cdot \hat{P}_{(i,v),r} = \sum_{i=1}^{r} \cdot \theta_{(i,v),r} \cdot \left[ \left( (1 + \hat{P}^*_{i,r}) \frac{T_{1,(i,v),r}}{T_{0,(i,v),r}} \right) \right. \tag{8}$$

Where the reader is again referred for Table 1 for help on notation.

Equation (8) is an approximation of the CES composite price equation applied in the spreadsheet example and in the actual model. We use this decomposition here to help the reader understand what happens to this price. It helps to see that it builds on the following relationship:

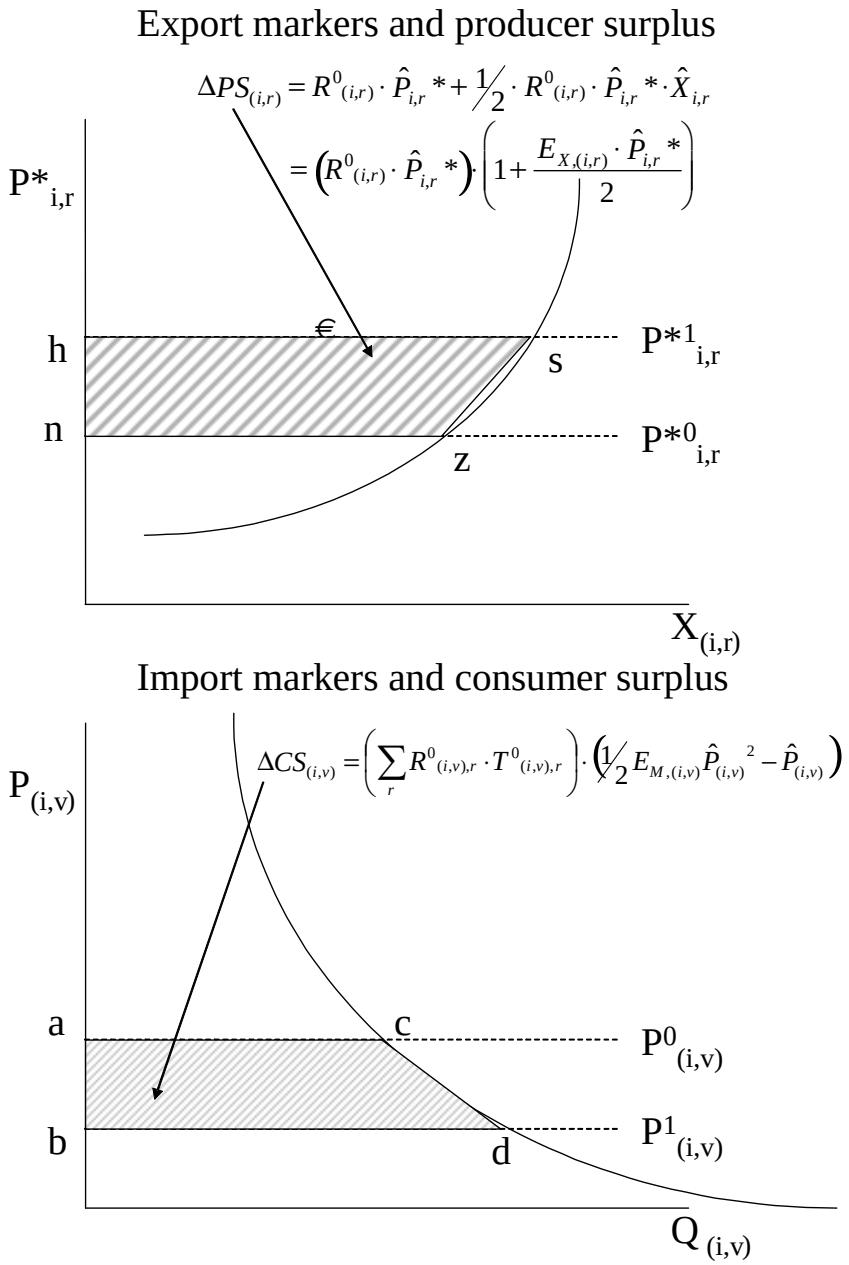
$$\frac{dP_{(i,v),r}}{P_{(i,v),r}} = \frac{\left(P_{(i,v),r}\right)_1}{\left(P_{(i,v),r}\right)_0} - 1 = \left[ \left( \left\{ \frac{\left(P^*_{i,r}\right)_0 + dP^*_{i,r}}{\left(P^*_{i,r}\right)_0} \right\} \cdot \frac{T_{1,(i,v),r}}{T_{0,(i,v),r}} \right) - 1 \right] \tag{9}$$

The change in consumer surplus is also represented in Figure A.1, as the area of trapezoid *abcd*. It is defined as the change in the area between the demand curve for the composite good and the composite good price, as perceived by consumers. This is formalized in equation (10).

(10)
$$\Delta CS_{(i,v)} = \left( \sum_r R^0{}_{(i,v),r} \cdot T^0{}_{(i,v),r} \right) \cdot \left( \tfrac{1}{2} E_{M,(i,v)} \hat{P}_{(i,v)}{}^2 \cdot sign(\hat{P}_{(i,v)}) - \hat{P}_{(i,v)} \right)$$
$$where\ \hat{P}_{(i,v)} = \sum_r \theta_{(i,v),r} \hat{P}_r * + \hat{T}_{(i,v),r}$$

In equation (10), consumer surplus is measured with respect to the composite import demand curve, with $P_{(i,v)}$ representing the price for composite imports, and $R^0_{(i,r)} \cdot T^0{}_{(i,v),r}$ representing initial expenditure (and identically quantity since the implicit calibrated base price is 1 for the composite) at internal prices. To make an approximation of welfare changes, we can combine the change in producer surplus, consumer surplus, and import tariff revenues.

Annex Figure A.2
Producer and Consumer Surplus




Note that integration across the range of price effects yields a relatively precise estimate of producer and consumer surplus, corresponding to changes in the area between the price line and the import demand or export supply curve (where the figures show incremental changes).

Table A.1

**Table 1**
**Notation**

| | |
|---|---|
| Indexes | |
| $r,s$ | exporting regions |
| $v,w$ | importing regions |
| $i$ | industry designation |
| Parameters | |
| $Q_{i,v}$ | The composite good in region $v$. |
| $A_V$ | An efficiency term calibrated so that the price of $Q$, $P$=1. |
| $\gamma_{(i,v),r}$ | The CES expenditure weight term |
| $\rho$ | The CES exponent term, where the substitution elasticity $E_S = \frac{1}{1-\rho}$ |
| Calibrated coefficients | |
| $N_{(i,v),(r,r)}$ | own price demand elasticity |
| $N_{(i,v),(r,s}$ | cross-price elasticity |
| $T_{(i,v),r}$ | The power of the tariff, T=(1+t) |
| $\theta_{(i,v),r}$ | demand expenditure share (at internal prices) $\theta_{(i,v),r} = M_{(i,v),r} T_{(i,v),r} / \sum_s M_{(i,v),s} T_{(i,v),s}$ |
| $\phi_{(i,v),r}$ | export quantity shares $\phi_{(i,v),r} = M_{(i,v),r} / \sum_w M_{(i,w),r}$ |
| Variables | |
| $M$ | imports (quantity) |
| $X$ | exports (quantity) |
| $P$ | Composite domestic price |
| $P^*_{(i,r)}$ | World price for exports from region $r$ |
| $P_{(1,r),v}$ | Internal prices for goods from region $r$ imported into region $v$. |
| $t_{(i,r),v}$ | Import tariffs for goods from region $r$ imported into region $v$. |

REFERENCES

Armington, P. (1969), A Theory of Demand for Products Distinguished by Place of Production," *IMF Staff Papers* 16: 159-177.

Borell, B. and M. Bauer (2004), "EU Banana Drama: Not Over Yet," *Centre for International Economics* March.

Borell, B. (1999). "Bananas: Straightening out bent ideas on trade as aid," *Centre for International Economics* September.

Devarajan, S., D.S. Go, J.D. Lewis, S. Robinson, and P. Sinko, "Simple General Equilibrium Modeling," in J.F. Francois and K. Reinert, eds., *Applied Methods for Trade Policy Analysis: A Handbook*, Cambridge University Press: Cambridge, 1997.

FAO (2003), *The World Banana Economy 1985-2002*, FAO:Rome.

Flam, H. and E. Helpman (1987), "Industrial Policy under Monopolistic Competition," Journal of International Economics 22:79-102.

Francois, J.F. and H.K. Hall, "Partial Equilibrium Modeling," in J.F. Francois and K. Reinert, eds., *Applied Methods for Trade Policy Analysis: A Handbook*, Cambridge University Press: Cambridge, 1997.

Francois, J.F. and H.K. Hall (2003), "Global Simulation Analysis of Industry-Level Trade Policy," World Bank mimeo.

Martin, W., "Measuring Welfare Changes with Distortions," in J.F. Francois and K. Reinert, eds., *Applied Methods for Trade Policy Analysis: A Handbook*, Cambridge University Press: Cambridge, 1997.

Messerlin, P., "Measuring the Costs of Protection in Europe: European Commercial Policy in the 2000s," Institute for International Economics, Washington, DC. 2001.

NERA (2004), "Addressing The Impact Of Preference Erosion In Bananas On Caribbean Countries," A Report for DFID, NERA Economic Consulting, London, August.

Roningen, V.O., “Multi-market, Multi-Region Partial Equilibrium Modeling,” in J.F. Francois and K. Reinert, eds., *Applied Methods for Trade Policy Analysis: A Handbook*, Cambridge University Press: Cambridge, 1997.

UNCTAD/World Bank (1989), A User’s Manual for SMART (Software for Market Analysis and Restrictions on Trade Version 2), Geneva and Washington, DC.

Vanzetti, D., S. Fernandez de Córdoba and V. Chau (2004), “Banana Split: How EU Policies Divide Global Producers,” UNCTAD working paper: Geneva.