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► To cite this version:

Hervé Guyomard, Catherine Laroche, Chantal Le Mouël, . European Economics And Financial Center,londres (gbr), . Statistics Norway,oslo (nor). An economic assessment of the Common Market Organisation for bananas in the European Union. International Symposium : Economic Modelling, Jul 1996, Oslo, Norway. 24 p. hal-01594010

HAL Id: hal-01594010

<https://hal.science/hal-01594010>

Submitted on 7 Jun 2020

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153141

International Symposium on Economic Modelling, Oslo, Norway, 3-5 July, 1996

An economic assessment of the Common Market Organisation for bananas in the European Union

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December 1995 (revised June 1996)

Summary: The objective of this paper is to provide some estimates of how the world banana market can be affected by the Common Market Organisation (CMO) for bananas established in the European Union (EU) on July 1, 1993, and modified in April 1994. We first propose a graphical analysis of the world banana market under the CMO regime. We next quantify the effects of the new EU regulation on world and EU prices, on the structure of EU imports from Latin American countries, African, Caribbean and Pacific (ACP) countries and EU regional suppliers, on the pattern of consumption in the various EU Member States, and on consumers' and producers' welfare using a partial equilibrium model of the world banana market. Simulation results suggest that the two key variables in determining the effects of the CMO are the size of the tariff quota on dollar and non traditional ACP bananas and the capacity of ACP countries to exhaust their ACP contingent share.

Keywords: banana, European Union, tariff quota, welfare.

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HG n:097

DOCUMENTATION ÉCONOMIE RURALE RENNES



ECU per tonne for non traditional ACP bananas and 850 ECU per tonne for other suppliers. 66.5 % of the tariff quota is allocated to traders on the basis of their past trade in dollar and non-traditional ACP bananas (category a traders); 3.5 % is reserved to newcomers (category c traders); and 30 % is allocated to traders on the basis of their past trade in EU and ACP traditional bananas (category b traders). The allocation of licences to operators is determined on the basis of the quantities of bananas marketed, weighted according to the three marketing activities, i.e., primary import (57 %), secondary import (15 %) and ripening (28 %). In addition, following the so-called Framework Agreement, part of the tariff quota is divided up into specific national quotas allocated to four Latin American countries. Costa Rica received 23.4 % of the quota, while Colombia received 21.0 %, Nicaragua 3 % and Venezuela 2.0 %⁴. EU producers are guaranteed a minimum income through a deficiency payment up to 854 000 tonnes. This quantity is divided between the various EU regional suppliers⁵. A one-time premium of 1000 green ECU per hectare is paid to EU farmers to cease production. Other elements of the regulation are mainly the setting of common quality and marketing standards for all bananas, and the creation of a Management Committee.

This regulation represents a compromise solution which does not satisfy many actors. Germany argues that the new policy will increase the price of bananas on the German market. For the five EU member states which applied the 20 % tariff only, it is also possible that the level of protection will increase under the new regime. Latin American producers also have challenged the CMO arguing that the latter implied a significant loss of their market share in the EU and that the system of quotas prevented them from increasing their exports in the future⁶. Furthermore, they fear that a restrictive policy in the EU means more bananas on the world market and hence, a decrease in the world price. Following the Uruguay Round Agreement, the market share and the "advantages" reserved to ACP countries have been reduced with respect to the proposal of July 1993. ACP producers now fear they are not competitive on the EU market with respect to dollar bananas and argue that Lomé Convention commitments are not honoured.

The main purpose of this paper is to compare the EU pre-CMO banana policy with the CMO regime in order to analyse the various effects of the CMO and to determine "the likely losers and winners". We quantify the effects of the new EU regulation on world and EU prices, on the structure of EU imports from Latin America, ACP countries and EU regional suppliers, and on the pattern of consumption in the various EU Member States. The welfare analysis allows us to determine the likely losers and

winners from the CMO. The model used is a competitive static partial equilibrium model of the world banana market. The adopted modelling framework follows those of existing models of the world banana trade (Matthews, 1992; Borrell and Yang, 1990 & 1992; Read, 1994). Relative to these models, the main "originality" of our modelling framework lies in the world market clearing mechanism. More precisely, as the preferential access provided by the EU to some exporting countries actually plays an active role in determining the equilibrium world banana price, both before and after the CMO implementation, these favoured trade flows are explicitly taken into account in the market clearing process.

The paper is organised as follows. In section two, background for the results is provided by a graphical analysis in which the effects of the two regimes (i.e., the pre-CMO and the CMO) are examined. Section three outlines the banana trade model used to evaluate the price, production, consumption, trade and welfare impacts of the CMO policy. Section four analyses the empirical results and section five concludes.

2. Graphical analysis

i) the pre-CMO regime

The consequences of the pre-CMO banana regime in the EU can be studied with the aid of Figure 1. This representation is an adaptation and an extension from Noichl (1985), and Borrell and Yang (1992). Three groups of countries export bananas on the world market: EU regional suppliers (Canary Islands, Crete, French overseas territories and Madeira), favoured suppliers (mainly ACP countries) and non-favoured suppliers (mainly Latin American countries). They are noted x, y and z, respectively. The graphical analysis includes four importing zones within the EU (denoted a, b, c and d, respectively) and the Rest Of the World (ROW). Panel 1.a. reflects the situation in countries of type a (France, Greece, Portugal and Spain) which provide a preferential access to their favoured suppliers at a fixed price and use a quota to limit imports from other sources. The situation in countries of type b (Italy and the United Kingdom) is depicted on panel 1.b. These countries provide a preferential access to some ACP suppliers (Somalia in the case of Italy, and Belize, Jamaica, Surinam and the Windward Islands in the case of the United Kingdom) and protect their market by a quota on dollar bananas in addition to the 20 % common external tariff. Panel 1.c corresponds to countries of type c (the three Benelux states, Denmark and Ireland) which apply the 20 % tariff on

dollar zone imports and otherwise allow for the unrestricted access of bananas. Panel 1.d. represents the situation in Germany, Austria, Finland and Sweden where all bananas enter free of duty⁷. The right panel 1.e represents the supply-demand situation in the Rest Of the World where trade is assumed to be free.

The dollar banana export supply function S_z is assumed to be elastic to reflect the high productivity and the possibility to easily expand the production. The EU domestic export supply function S_x and the favoured nation export supply function S_y are assumed to be less elastic and to start at higher price levels, θ and γ , respectively. S_j^i represents the export supply curve of supplier j to importing country i and D_j^i represents the import demand curve of country i from exporting country j .

The free-trade equilibrium corresponds to point F on panel 1.e. where the world price of bananas equals $p_w(FT)$. At this price level, exports from EU regional suppliers and ACP countries are not competitive with respect to those of the dollar zone. As a result, all Member States of the EU import dollar bananas only.

The main effect of the pre-CMO regime in the EU is to decrease the world price of bananas by restricting Community imports from non-favoured exporting countries z . This result can be shown as follows. In panel 1.a., countries of type a import the quantity q_x^a from EU regional suppliers x at the fixed price \bar{p}^a . At this price, a preferential access for the quantity q_y^a is also given to some ACP countries y and the domestic shortfall is made up by imports from the dollar zone z . By subtracting the export supply functions of EU regional suppliers and favoured exporting countries (S_x^a and S_y^a , respectively) from the domestic import demand curve D^a , one obtains the import demand curve of countries of type a from non-favoured exporting countries z . It is denoted D_z^a . For a fixed price \bar{p}^a , imports of countries a from the dollar zone are thus equal to q_z^a . In panel 1.b, the situation is similar for type b countries except that favoured suppliers are ACP countries only and the fixed price \bar{p}^b is lower than the guaranteed price \bar{p}^a applied in type a countries. In panel 1.c., the common external tariff t is applied to dollar banana imports. This can be portrayed graphically as a leftward shift of the related import demand curve from D_z^c to \tilde{D}_z^c . As a result, countries of type c import the quantity q_z^c

from the dollar zone and the quantity q_y^c from ACP countries. In panel 1.e. depicting the world banana market situation, the pre-CMO regime in the EU induces a leftward shift of the EU import demand curve from the dollar zone, from $D_z^{EU}(FT)$ to $D_z^{EU}(I)$. World market equilibrium now occurs at point E. The world price of bananas decreases from $p_w(FT)$ to $p_w(1)$. As a result, consumption in free-trade countries d increases up to the level q_z^d . Consumption in countries c decreases (with respect to the free-trade situation) since the positive effect on demand of a lower world price is assumed to be more than offset by the negative effect of the tariff. For these countries, the demand price increases from $p_w(FT)$ to p^c . In countries b and a, consumers facing a higher price for bananas reduce their consumption. For these countries, the demand price increases from $p_w(FT)$ to \bar{p}^b and \bar{p}^a , respectively.

With respect to the free-trade situation, the net effects of the pre-CMO regime are thus to lower consumption in all EU Member States but type d countries; to raise the return to preferential exporters, x and y, which can now compete with Latin American producers z, at least on type a, b and c markets; and to lower total exports of dollar banana suppliers to the EU.

(insert Figure 1)

ii) the CMO regime

The consequences of the CMO policy in the EU are described with the aid of Figure 2.

In order to simplify the graphical analysis, we first assume that the tariff quota \bar{Q} is set at the "historical" level, i.e., that EU imports from the dollar zone in the CMO situation are just equal to quantities of dollar bananas imported in the pre-CMO regime⁸. The direct consequence of this assumption is that the world price of bananas does not vary with respect to the pre-CMO case. In panel 1.e, the EU import demand curve to the dollar zone is then D_z^{EU} and the intersection of this demand curve with the supply curve of dollar producers to the EU at point E determines the world price of bananas $p_w(1)$. The domestic price in countries of type d increases up to p_i because imports are now subject to the fixed levy T . As a result, consumption decreases. In countries of type c, the impact of the CMO on prices and consumption is ambiguous since the 20 % ad-valorem tariff t is replaced by the fixed levy T . In order to facilitate the presentation, we make a second

simplifying hypothesis assuming that the domestic price in these type c countries remains unchanged. As a result, consumption does not vary. In countries of type b and a, the domestic price p_i is lower than the support prices \bar{p}^b and \bar{p}^a and consumption increases.

The graphical analysis also shows that the CMO policy might change the pattern of imports in each group of countries a, b, c and d. Panel 2.d shows that ACP countries are now likely to be competitive relative to dollar bananas on the market of type d countries. Panel 2.c. shows that the pattern of imports is unchanged with respect to the pre-CMO situation in type c countries. Finally, panels 2.b and 2.a show that the domestic price decrease on type b and a markets should benefit mainly to dollar bananas. In the pre-CMO situation, the support prices \bar{p}^b and \bar{p}^a acted to improve the competitive position of favoured exporting countries x and y relative to dollar bananas. By decreasing the domestic price in type b and a countries, the CMO tends to deter this competitive position and hence, to induce a decrease in the market share of favoured exporting countries. However, in panel 2.a, we make a third simplifying hypothesis by assuming that the deficiency payments regime where EU regional suppliers are paid the difference between the EU market price and the reference price does not change the export levels of these domestic producers which therefore remain at q_x^a .

In sum, the CMO policy should lead to two opposite effects on ACP and dollar zone exports to the EU. On the one hand, in previously highly protected markets (type a and b countries), the CMO tends to favour dollar bananas to the detriment of other origins, mainly ACP countries. In panels 2.a and 2.b, imports from the dollar zone increase from q_z^a to r_z^a and from q_z^b to r_z^b , respectively, while imports from ACP countries decrease from q_y^a to r_y^a and from q_y^b to r_y^b , respectively. On the other hand, the opposite effect is likely to occur in previously less protected markets. In panel 2.d, imports from ACP countries increase from 0 to r_y^d and dollar banana imports decrease from q_z^d to r_z^d .

A tariff quota set at the historical level \bar{Q} on Figure 2 illustrates the case where the latter is "dollar banana quantity neutral", i.e., the situation where, as regards dollar banana exports to the EU, the decrease in country d imports is exactly compensated by the increase in country a and b imports. Let us now assume that the tariff quota is lower than the historical level. This case is illustrated by a quota fixed at level \tilde{Q} in Figure 2, panel 2.e. The EU import demand curve to the dollar zone is now \tilde{D}_z^{EU} . The EU internal price of bananas is then \tilde{p}_i . It is higher than the one corresponding to the historical

quota case ($\tilde{p}_i > p_i$) while the related world price is lower ($\tilde{p}_w(1) < p_w(1)$). EU imports from the dollar zone are now lower than in the pre-CMO regime since the increase in dollar banana imports in type a and b countries is outweighed by the decrease in corresponding imports in type c and d countries. In sum, a tariff quota more constraining than the historical quota is less favourable to dollar bananas (Latin American countries suffer from a decrease in their market share in the EU and face a lower world price for their exports to other markets) and more favourable to ACP exporting countries (a higher domestic price in the EU improves their competitiveness position relative to dollar bananas on EU markets). The opposite case which corresponds to a quota level set above the historical level would benefit dollar bananas and hurt ACP exporting countries.

At this stage of the analysis, it is interesting to underline that the main change between the July 1993 CMO and the revised version of April 1994 lies in the increase in the tariff quota level (from 2 million tons to 2.2 million tons for the marketing year 1995, for the EU with twelve Member States) and the decrease in the fixed levy (from 100 green ECU per tonne to 75 ECU per tonne). Clearly, the revised version of the CMO tends to favour the dollar zone to the detriment of ACP exporting countries.

In sum, and whatever the final status of the global quota (i.e., lower, equal or higher than the historical level), the CMO tends to decrease the domestic price in the previously highly protected markets (inducing a welfare gain for corresponding consumers) and to increase the domestic price in other EU markets (causing a loss for corresponding consumers). The changes are mainly at the cost of type d countries, i.e., Germany and the three new Member States. As regards to the budget impact of the CMO, deficiency payments to EU producers increase budget expenditure while budget revenue is raised since all imports from the dollar zone are now subject to the fixed levy. The net effect on the EU budget depends on the question which factor outweighs the other.

(insert Figure 2)

3. A policy simulation model of the world banana market

The simulations reported in this paper are carried out with a single commodity, partial equilibrium model of the world banana market. With respect to the graphical analysis presented in the previous section, the model includes a greater number of demanders and suppliers. They are shown in Table 1.

(insert Table 1)

3.1. Model outline

In very general terms, the model consists in seven demand equations and seven supply equations which are written as constant-elasticity functions. Import CIF prices in importing countries and export FOB prices in exporting countries are linked by constant margin equations. The market-clearing equation guarantees the supply-demand equilibrium on the world market. Notations are detailed in Table 2.

(insert Table 2)

i) modelling the pre-CMO policy

Following the graphical analysis of section 2, three demand markets in the EU have to be distinguished in the pre-CMO regime: quota-protected markets (type a and b countries), tariff-protected markets (type c countries) and non-protected markets (type d countries).

The highest support price offered by a type a or b importer i to a type x or y preferred supplier j is denoted \bar{p}_j^i . This support price is fixed and determines the import price for all bananas on this quota-protected market i . We have thus $\bar{p}_j^i = \bar{p}^i, \forall j$. Import demand functions of quota-protected countries may then be written as:

$$(1) D^a = \alpha_a (\bar{p}^a)^{\eta_a}$$

$$(2) D^b = \alpha_b (\bar{p}^b)^{\eta_b}$$

For tariff-protected countries in the EU, import demand functions are:

$$(3) D^c = \alpha_c (p_z^c (1 + t_c))^{\eta_c}$$

For free markets in the EU (i.e., Germany, Austria, Finland and Sweden) and for the Rest of the World (denoted e), import demand functions are simply:

$$(4) D^d = \alpha_d (p_z^d)^{\eta_d}$$

$$(5) D^e = \alpha_e (p_z^e)^{\eta_e}$$

According to the graphical analysis, three groups of exporting countries have to be distinguished on the supply side: EU regional suppliers x, ACP producers y and Latin American countries z.

Let us first consider the case of an EU regional supplier j which benefits from an export support price at level $\bar{p}x_j^i$ (i.e., $\bar{p}x_j^i = \bar{p}_j^i - c_j^i$) from various importers $i, i \in I(j)$, where $I(j)$ represents the subset of type a and b importers i which guarantee a fixed support price to this supplier j . At this stage, it is useful to order importing countries i according to the price they offer to supplier j such that $\bar{p}x_j^1 > \bar{p}x_j^2$ means that the highest-price countries come first. Therefore, if at price level \bar{p}_j^1 , imports of country 1 from supplier j (i.e., \bar{D}_j^1) are greater than export supply of country j (i.e., $b_j(\bar{p}_j^1 - c_j^1)^{\epsilon_j}$), then the shortfall on market 1 will be made up by imports from other preferred suppliers (if any), ACP countries (if they are competitive with respect to dollar bananas at this price level) and/or Latin American suppliers. On the contrary, if at this price level \bar{p}_j^1 , export supply of country j exceeds import demand of country 1 , the latter will import from this preferred supplier only. The "residual" export supply of country j will be exported to other markets, first to other price-supported markets at decreasing prices $\bar{p}_j^2, \dots, \bar{p}_j^{I(j)}$, and second to non price-supported markets if country j is competitive with respect to dollar banana suppliers. The export supply function of an EU regional supplier x in the pre-CMO regime may thus be written as (import prices on non price-supported markets are also ordered, and we assume that $p_x^e - c_x^e < p_x^d - c_x^d < p_x^c - c_x^c$)⁹:

$$\begin{aligned}
(6) \quad S_x &= b_x(\bar{p}_x^1 - c_x^1)^{\epsilon_x} \text{ when } \bar{D}_x^1 \geq S_x^1 = b_x(\bar{p}_x^1 - c_x^1)^{\epsilon_x} \\
&= b_x(\bar{p}_x^2 - c_x^2)^{\epsilon_x} \text{ when } \bar{D}_x^1 + \bar{D}_x^2 \geq (S_x^1 + S_x^2) = b_x(\bar{p}_x^2 - c_x^2)^{\epsilon_x} \geq \bar{D}_x^1 \\
&= \dots \\
&= b_x(p_x^c - c_x^c)^{\epsilon_x} \text{ when } \sum_{i \in I(x)} \bar{D}_x^i + D_x^c \geq \sum_{i \in I(x)} S_x^i + S_x^c = b_x(p_x^c - c_x^c)^{\epsilon_x} \geq \sum_{i \in I(x)} \bar{D}_x^i \\
&= \dots \\
&= b_x(p_x^e - c_x^e)^{\epsilon_x} \text{ when } \sum_{i \in I(x)} S_x^i + S_x^c + S_x^d + S_x^e = b_x(p_x^e - c_x^e)^{\epsilon_x} \geq \sum_{i \in I(x)} \bar{D}_x^i + D_x^c + D_x^d
\end{aligned}$$

Export supply functions of ACP countries are obtained in a similar way¹⁰:

$$(7) \quad S_y = b_y(\bar{p}_y^1 - c_y^1)^{\epsilon_y} \text{ when } \bar{D}_y^1 \geq S_y^1 = b_y(\bar{p}_y^1 - c_y^1)^{\epsilon_y}$$

= ...

$$= b_y(p_y^e - c_y^e)^{\varepsilon_y} \text{ when } \sum_{i \in I(y)} S_y^i + S_y^c + S_y^d + S_y^e = b_y(p_y^e - c_y^e)^{\varepsilon_y} \geq \sum_{i \in I(y)} \bar{D}_y^i + D_y^c + D_y^d$$

Finally, the export supply function of dollar zone producers is simply:

$$(8) S_z = b_z(px_z)^{\varepsilon_z}$$

The world market equilibrium equation defines the world FOB price of bananas, i.e.,

(9)

$$a_a(\bar{p}^a)^{\eta_a} + a_b(\bar{p}^b)^{\eta_b} + a_c((px_z + c_z^c)(1+t))^{\eta_c} + a_d(px_z + c_z^d)^{\eta_d} + a_e(px_z + c_z^e)^{\eta_e} = S_x + S_y + S_z$$

where S_x , S_y and S_z are given by equations (6), (7) and (8), respectively.

The model simultaneously determines the world FOB price of bananas (equation (9)), the import CIF prices of bananas in type c, d and e importing countries (via margin equations), the exported quantity by each supplier j (equations (6) to (8)), and the imported quantity by each demander i (equations (1) to (5)).

ii) modelling the CMO policy

We only consider the case where the global quota in the EU on dollar banana imports is binding (cf. note 8). The export supply function of dollar zone producers is still given by (8) and the import demand function of the Rest of the World remains (5). The supply demand equilibrium equation on non-EU markets defines then the world FOB price of dollar bananas, i.e.,

$$(10) D^e + \bar{Q} = S_z, \text{ i.e., } a_e(px_z + c_z^e)^{\eta_e} + \bar{Q} = b_z(px_z)^{\varepsilon_z}$$

Import demand functions in the various EU Member States depend on the common demand price p in the EU, i.e.,

$$(11) D^i = a_i(p)^{\eta_i}, i = a, b, c, d$$

Under the assumption that the deficiency payment is perceived as coupled and that it exactly offsets the support price decrease, export supply functions of EU regional suppliers x may be written as¹¹:

$$(12) S_x = b_x(\bar{p}_x^i - c_x^i)^{\varepsilon_x} \text{ when } \bar{D}_x^1 \geq S_x^1 = b_x(\bar{p}_x^1 - c_x^1)^{\varepsilon_x}$$

=

$$= b_x(p - c_x^c)^{\varepsilon_x} \text{ when } \sum_{i \in I(x)} \bar{D}_x^i + D_x^c \geq \sum_{i \in I(x)} S_x^i + S_x^c = b_x(p - c_x^c)^{\varepsilon_x} \geq \sum_{i \in I(x)} \bar{D}_x^i$$

$$= b_x(p - c_x^d)^{\varepsilon_x} \text{ when } \sum_{i \in I(x)} S_x^i + S_x^c + S_x^d = b_x(p - c_x^d)^{\varepsilon_x} \geq \sum_{i \in I(x)} \bar{D}_x^i + D_x^c$$

Export supply functions of ACP countries are :

$$(13) S_y = b_y(p - c_y^l)^{\varepsilon_y} \text{ when } D_y^l \geq S_y^l = b_y(p - c_y^l)^{\varepsilon_y}$$

=

$$= b_y(p - c_y^d)^{\varepsilon_y} \text{ when } \sum_i S_y^i = b_y(p - c_y^d)^{\varepsilon_y} \geq \sum_{i=1}^{I-1} D_y^i$$

The demand-supply equilibrium equation in the EU defines then the common demand price p on EU markets, i.e.,

$$(14) \sum_{i=a,b,c,d} D^i = \bar{Q} + S_x + S_y$$

3.2. Model initialisation

i) data

Value and volume bilateral trade flows (i.e., net exports of supplier j to importer i and net imports of demander i from exporter j) are based on FAO and EUROSTAT data. FOB and CIF unit values are derived from these volume and value data. Base period data used for the calibration correspond to a 1989-1991 average and are given in Table 3. Although most recent data related to the pre-CMO situation (i.e., 1992) are available, a 1989-1991 average has been chosen for one reason. 1992 figures clearly show that dollar banana imports in the EU increased substantially in 1992 (cf. Table 6 below). Even if the German Unification may explain a part of this increase, some observers have raised the question of whether the dollar banana supplies flooded the market in 1992, as it is generally expected when a quota is to be introduced (EuroPA & Associates, 1995; Rastoin and Loeillet, 1995). In fact, if import licences are allocated on the basis of past quantities, each importer has an incentive to import more in order to stake claim to future quota rents. Therefore, as 1992 data cannot be considered as "representative" of the pre-CMO market situation due to this "speculative"

trade, the 1989-1991 average has been chosen for the base period. However, it is important to note that all empirical results depend on the choice of the base period. As shown in Figure 2, the impact of the CMO implementation is closely related to the status of the global quota level, i.e., lower, equal or higher than the EU dollar banana imports in the pre-CMO situation.

(insert Table 3)

ii) price elasticities

Supply and demand elasticities used in the simulation exercises are shown in Table 4. Following Borrell and Yang (1992), the price elasticity is set at 1.0 for EU regional suppliers and ACP countries while it is set at 2.0 for dollar zone producers. The responsiveness of export supply to prices in the dollar zone is thus assumed to be very high, mainly because i) plantations do not operate at the limit of output capacity, ii) the proportion of fruit rejected on quality grounds can be varied within limits, and iii) the banana vessels on voyages to export ports in Central and South America can usually make up shortfalls which occur in any one location from adjacent sources of supply (FAO, 1986). In the case of EU regional and ACP suppliers, the availability of land is not so great and supply elasticities have been set at half those of dollar zone producers. Import demand elasticities range between - 0.3 for the Rest of the World to - 1.0 for Italy and the United Kingdom. For some EU Member States (Denmark, France, Germany, Italy and the United Kingdom), it has been possible to estimate econometrically import price-demand elasticities. For other countries, elasticity estimates are derived from the literature. The FAO study (FAO, 1986) estimated price elasticities of demand at retail ranging from - 0.11 (United States) to - 0.84 (the Netherlands) with a weighted price elasticity for the countries analysed in the study of - 0.30. Islam and Subramaniam (1988) found price elasticities of import demand ranging between - 0.3 and - 0.4. The Overseas Development Institute (Davenport and Page, 1991) and Kersten (1994) used an EU demand elasticity of - 0.5 while Matthews used a slightly lower value of - 0.4.

(insert Table 4)

4. Simulating the EU Common Market Organisation for bananas

The model was first run to generate base estimates of price, net export and net import levels under the pre-CMO policy for the base period (baseline scenario). A second run of the model was made to generate the levels of the same endogenous variables if the CMO policy was enacted (CMO

scenario). Welfare changes for producers and consumers may then be calculated by using these simulation results.

The baseline scenario represents an attempt to structurally duplicate the base period price and quantity data observed under the base period pre-CMO policy regime. In order to save space, the results of this first scenario are not presented. They are available from the authors upon request. The important point to note is that the baseline scenario solutions are within less than two percent of observed values in the base period. Accordingly, the empirical results of the CMO scenario are directly compared to the observed data for the base period. Rather than going through the details of the various effects of the CMO policy, empirical results will be mainly analysed following the framework of the graphical analysis presented in section 2. Detailed simulation results are shown in Table 5. Panel a depicts the impact of the CMO upon EU Member States, panel b describes the effects upon ACP exporting countries and EU regional suppliers, and panel c shows the impact upon dollar zone producers and the Rest of the World market.

(insert Table 5)

It is first of interest to analyse the effects of the CMO on the EU market as a whole. The tariff quota of 2.553 million tonnes on dollar and non-traditional ACP bananas would lead the EU banana market to expand by 57 545 tonnes and average price in the EU to increase by 5 ECU, total imports increasing by around 1.55 % compared to the base period and the CIF common price being 1.00 % higher than the average price in the base period.

However, distribution of import and price changes vary significantly between Member States. Consumers in type c and d countries would suffer from a substantial welfare loss to the extent that the common price under the CMO policy is expected to be much greater than corresponding pre-CMO prices. In type c countries, the price is estimated to increase by 45.2 % and consumers suffer from the adoption of the regime by around 34 million ECU at all. The principal loser would be the type d countries, in particular Germany, with the new policy causing prices to increase by 16.9 % and consumers' welfare to decrease by 91 million ECU. One type b country, namely Italy, would also suffer from the CMO policy by around 15 million ECU. This result may be explained as follows. The objective of the pre-CMO policy in Italy was to protect the market for Somalian exports, but the latter's share was small (6.7 % in the base period) and the bulk of the market was supplied by dollar

bananas. As a result, the pre-CMO CIF import price in Italy was much lower than in the other type b country (i.e., the United Kingdom) or in type a countries, and the CMO policy leads thus to an increase in the Italian price. As expected, the estimated changes in banana imports in the United Kingdom and in type a countries are positive. As a result, consumers' welfare increases in these Member States. The principal beneficiary would be France where prices decrease by around 20.9 %, imports increase by 18.3 % and consumers' surplus expands by 79 million ECU. On balance, there would be a small decrease in EU consumers' surplus of 2 million ECU.

The model projects a world FOB price of bananas of 206.7 ECU per tonne in the dollar zone (+ 0.8 % compared to the base period level). The decrease in ROW imports from the dollar zone is almost negligible (- 0.27%). Total exports of dollar bananas increase (from 6.84 million tonnes to 6.95 million tonnes) because the tariff quota in the EU opens imports of dollar bananas more than the total of pre-CMO national policies : the level of 2.553 million tonnes is greater than base period imports of dollar bananas in the EU (2.429 million tonnes). With respect to Figure 2, the analysed situation corresponds thus to the case where the tariff quota is set at a level higher than \bar{Q} . Nevertheless, the quota constraint is assumed to be binding¹². It is clear that the over-quota tariff is prohibitive and hence, that over-quota imports equal zero.

Because compensation to EU producers applies to a maximum quantity of bananas much higher than pre-CMO exports of EU regional suppliers (854 000 tonnes to compare with the highest level of shipment over the past ten years, 659 836 tonnes in 1992), EU producers are guaranteed "effective" prices (i.e., price plus direct aid) similar to what they received in the pre-CMO regime. The quantity exported to the EU by community regional suppliers is almost exactly equal to the quantity exported in the base period.

The CMO allows traditional ACP bananas to enter the EU duty free up to 857 700 tonnes. Simulation results presented in table 5, panel b, show that ACP countries would not be able to totally exhaust this contingent, traditional ACP exports decreasing from 585 600 tonnes to 518 686 tonnes. In that particular case, the choice of 1991 or 1992 as the base year would not change this conclusion to the extent that observed values for these years are still much lower than the contingent limit (see Table 6).

The new EU banana regime is based on a tariff quota for dollar and non-traditional ACP bananas and on the concept of partnership between trade in EU and ACP bananas on the one hand and dollar bananas on the other hand (European Commission, 1994). It is generally recognised that ACP countries are less efficient than Latin American suppliers (Hallam and McCorriston, 1992). Furthermore, dollar bananas are commonly perceived as being of better and more regular quality than bananas from other sources. A fixed percentage (30 %) of the tariff quota is thus allocated to traders (category b traders) on the basis of their past trade in EU and ACP traditional bananas in order to keep the trade in these bananas alive. Our simulation results suggest that some ACP countries would have difficulties to take full advantage of the new EU regulation in penetrating EU markets, and particularly type c and d country's markets where pre-CMO import shares of ACP producers were almost negligible. This is confirmed, at least partially, by figures shown in Table 6 although traditional ACP banana exports to the EU have considerably increased in 1993 and 1994 compared with the base period levels (+ 203 211 tonnes and + 167 102 tonnes, respectively), the order of magnitude of increases being much lower if 1992 is used as the comparison year (+ 20 287 tonnes from 1992 to 1994, i.e., + 2.9 %).

(insert Table 6)

Empirical results presented in Table 5 do not take into account the increase in productivity and production observed in some ACP countries after the implementation of the CMO. According to the FAO (1994), new investments done in 1992 would allow some ACP countries (Belize, Cameroon, and Ivory Coast) to fulfil their share of the global ACP contingent. This result may also be explained by complementary factors. First, some ACP producers may have used receipts on selling licences as a "coupled" transfer which has increased the profitability of their exports with respect to dollar bananas on the EU market. Second, the devaluation of the CFA Franc has clearly improved the competitiveness of some ACP countries, Ivory Coast and Cameroon in particular. The consequences of a productivity increase in some ACP countries may be analysed by reducing exogenously production costs in these countries, i.e., by increasing their relative efficiency with respect to dollar bananas (and hence, also with respect to other ACP countries and EU suppliers). In the model, this possibility is implemented by adding an exogenous shifter in supply equations for the three considered ACP countries so that Belize, Cameroon and Ivory Coast could exhaust their contingent

share. Results of this scenario, called "CMO scenario + productivity increase in some ACP countries", are shown in Table 7.

(insert Table 7)

The single EU banana price is estimated to be 5.4 % lower in the "modified" CMO scenario than in the "initial" CMO scenario (527.6 ECU per tonne and 557.5 ECU per tonne, respectively), while EU consumers' welfare gains are now positive (114 million ECU). Total EU banana imports increase by 134 000 tonnes with respect to the corresponding import levels obtained in the "initial" CMO scenario. By comparing columns 2 and 3 of Table 7, one easily verifies that total EU imports from ACP countries increase by a smaller amount than export increases of Belize, Cameroon and Ivory Coast. This result is due to the fact that other ACP countries face now a relative competitive disadvantage compared with the three ACP countries where productivity increases. As a result, exports of other ACP countries diminish in the "modified" CMO scenario with respect to the "initial" CMO scenario.

5. Concluding comments

Along with the realisation of the Single Market, the EU introduced a Common Market Organisation for bananas which suppresses the disparate national policies applied in the pre-CMO regime. The purpose of this paper was then to analyse the principles of the new EU banana regulation and its consequences on prices, imports, exports, and consumers' and producers' welfare.

Background for the analysis is provided by a graphical analysis which clearly shows the key roles played by i) the size of the tariff quota on dollar and traditional ACP bananas and ii) the capacity of the various ACP countries to exhaust their share of the traditional ACP contingent. The empirical analysis uses a single commodity, partial equilibrium model of the world banana market. Simulation results suggest that if the quota set at 2.553 million tonnes (for the EU with fifteen Member States) is entirely used, consumption in the EU would increase (with respect to 1989-1991 base period data). However, the impact of the CMO on EU consumers varies in each Member State according to the national policy applied in the pre-CMO situation, the previously highly protected markets benefiting from a price decrease and the North of Europe (Benelux, Denmark and Ireland), Germany and the three new Member States suffering from a substantial price increase. The main loser would be Germany and the main winner would be France. Consumers welfare gains in previously highly protected markets would be almost so high than losses in previously lightly protected countries. As a

result, EU consumers as a whole would experience a 2 million ECU welfare loss only (again with respect to 1989-1991 base period data). The impact of the CMO on the world FOB price of dollar bananas and on ROW consumers would be almost negligible.

A complementary scenario illustrates the sensitivity of market equilibrium in the EU to the ability of ACP countries to exhaust their ACP contingent share. According to European Commission estimates, three ACP countries (Belize, Cameroon and Ivory Coast) would be able to fulfil their contingent share thanks to new investments done in 1992 and other factors favouring their relative competitiveness. Simulation results show then that ACP countries' exports to the EU would increase compared with pre-CMO levels. In that case, EU consumers' welfare gain would increase by 116 million ECU with respect to its level in the "initial" CMO scenario. This second scenario highlights the importance of the EU proposal to provide direct aid to ACP countries in order to improve the competitiveness and the quality of ACP bananas with respect to dollar fruits. This proposal has not been yet ratified by the EU Council.

Obviously, the analysis incorporates certain simplifying assumptions and empirical results are subject to several caveats.

To our knowledge, all the models of the world banana market have assumed perfect competition, essentially because of the tractability of this hypothesis. Hallam and McCorrison (1992) and Read (1994) take issue with the Borrell and Yang (1992) estimates of the effects of different scenarios for the EU banana regime arguing that results may be biased because the Borrell and Yang model does not consider the effects of market structure and market power. Unfortunately, they do not provide an alternative model in which perfect competition assumptions would be relaxed. Incorporating imperfect competition into international trade models is a formidable challenge. Even if the importance of capturing market structure in trade policy modelling is now well recognised, all empirical work on industrial organisation and trade suffers from the difficulty in modelling oligopoly in a satisfactory way (on this point, see, for example, McCorrison and Sheldon, 1993, who discuss the problem of using conjectural variations to measure oligopolistic interactions). The question arises now as to how our results may differ when perfect competition assumptions are relaxed. On this point, it is particularly important to note that a "non competitive" behaviour of importers has no impact on the EU's banana import market equilibrium under the condition that the tariff quota is constraining. Empirical evidence suggests that the tariff quota is fully used.

The paper does not address the question of the quota rent and of its allocation between exporting countries, traders and importing countries. It also does not address the problem of licence transfer between operators. The tariff quota is the main policy instrument of the new EU regulation. A pertinent analysis of the quota rent problem does need a careful modelling of all the operators involved in the banana industry and of all the aspects of the market structure. Clearly, the market structure is here the crucial point which is important to correctly represent in order to obtain consistent estimates of the rent sharing. There is an important need for further research in this area.

References

- Borrell, B., Yang, M. C. (1990) EC bananarama 1992. WPS 523. International Economics Department, The World Bank, Washington, D. C.
- Borrell, B., Cuthberston, S. (1991) EC banana policy 1992: picking the best option. Centre for International Economics, Canberra.
- Borrell, B., Yang, M. C. (1992). EC bananarama 1992, the Sequel, the EC Commission Proposal, WPS 958. International Economics Department, The World Bank, Washington, D. C.
- Borrell, B. (1994). EU bananarama III. Policy Research Working Paper 1386. The World Bank, International Economics Department, International Trade Division, Washington, D. C.
- Davenport, M., and Page, S. (1991) Europe : 1992 and the developing world. ODI, London, 1991.
- EuroPA & Associates (1995) Commentary and analysis on Bananarama III, Paper prepared for the CBEA, March 1995.
- FAO (1986) The world banana economy 1970-1984. Economic and Social Development Paper 57.
- FAO (1994) Perspectives à moyen terme du commerce mondial de la banane. Comité des Produits, Groupe intergouvernemental sur la banane, Kingston, 18-22 Juillet 1994.
- Hallam, D., McCorrison S. (1992) Fair trade in bananas ? Agricultural Economics Unit, University of Exeter, Report 239.
- Islam, N., Subramanian, A. (1989) Agricultural exports of developing countries: estimates of income and price elasticities of demand and supply. *Journal of Agricultural Economics*, 40(2) : 221-31.
- Kersten, L. (1994) The world banana market in transition: a spatial QP model analysis. Institut für landwirtschaftliche Marktforschung des Bundesforschungsanstalt für Landwirtschaft, Braunschweig-Völkenrode (FAL), IfIM-Arbeitsbericht 94/2.
- Noichl, A. (1985) European Community trade regulations for bananas and imports from developing countries. *Quarterly journal of International Economics*, 24(1) : 63-77.
- Rastoin, J. L., Loeillet, D. (1995) Le marché mondial de la banane : Globalisation ou fragmentation. Document de travail présenté au colloque SFER-Unigrains-CIRAD "Globalisation des économies agricoles et alimentaires. Situation et perspectives", 16-17 Octobre 1995, Paris.
- Read, R. (1994) The EC internal banana market : the issues and the dilemma. *The World Economy*, 17(2) : 219-235.
- Matthews, A. (1992) The European Community's banana policy after 1992. Discussion Paper 13, Institut für Agrarpolitik und Marktforschung, University of Giessen.
- McCorrison, S., Sheldon, I. M. (1993) Incorporating industrial organization into agricultural trade modelling. Paper presented at Conference on "Agricultural markets: mechanisms, failures, regulations", Toulouse, October 21-23.
- Official Journal of the European Communities (1994), Regulations 3224/94 and 3290/94.

Table 1. Importing and exporting zones distinguished in the model

Importer i		Exporter j	
country	type	country	type
France	a	French overseas territories	x
Greece, Portugal, Spain	a	Canary Islands, Crete, Madeira	x
Italy	b	Somalia	y
United Kingdom	b	Jamaica, Windward Islands	y
Benelux, Ireland, Denmark	c	Ivory Coast, Cameroon	y
Germany, Austria, Finland, Sweden	d	Other ACP countries	y
Rest Of the World	e	Other countries, i.e., dollar zone	z

The type of an importer i or an exporter j is defined on the basis of its status in the pre-CMO regime (see section 2 of the paper).

Table 2. Notations and variable definitions

D^i the quantity demanded by importer i , ($i = a, b, c, d, e,$)

p^i the import CIF price in country i ,

t_i the ad-valorem tariff applied by country i ,

T_i the fixed levy applied by country i ,

η_i the price elasticity of demand in country i ,

α_i the constant parameter of the import demand function for country i ,

S_j the quantity supplied by exporter j ,

px_j the export FOB price in country j , ($j = x, y, z$),

ε_j the price elasticity of supply in country j ,

b_j the constant parameter of the supply function for country j ,

c_j^i the cost coefficient between imports of country i and exports of country j , i.e., $p^i = px_j + c_j^i$,

\bar{p}_j^i the support (import CIF) price offered by importer i to exporter j ,

p the common CIF import price in the CMO regime on EU markets,

D_j^i the quantity imported by country i from supplier j ,

\bar{D}_j^i the quantity imported by country i from supplier j when the latter benefits from a price support from country i ,

S_j^i the quantity exported by supplier j to country i ,

Q the tariff quota on dollar and non traditional ACP bananas in the CMO regime.

Table 3. Base period data used for the model calibration

importer <i>i</i> exporter <i>j</i>	France	South of the EU (except Italy)	Italy	United Kingdom	Benelux, Denmark, Ireland	Germany	Austria, Finland, Sweden	Rest of the World	Total	FOB unit value
French overseas territories	291 944	12	261	1 323	41	81	0	0	293 662	391
Canary Islands, Madeira, Crete	45	414 348	1	11	0	480	0	0	414 884	560
Cameroon, Ivory Coast	170 226	107	7 953	2 759	290	92	0	0	181 427	249
Somalia	0	12 897	28 763	0	124	0	0	0	41 783	264
Jamaica, Windward Islands	179	7 269	23 600	276 395	105	125	0	0	307 672	422
Other ACP countries	0	122	0	51 697	58	0	2 842	0	54 718	289
Other countries	15 325	98 566	371 874	60 601	364 589	1 162 468	355 118	4 408 705	6 837 246	205
Total	477 719	533 319	432 452	392 786	365 208	1 163 245	357 959	4 408 705		
CIF unit value (20 % tariff on dollar bananas included)	709	624	521	648	460	477	511	292		

Note : quantities in tonnes, prices in ECU per tonne.

Table 4. Import demand and export supply elasticities used in the simulation exercises

Demand		Supply	
country	elasticity	country	elasticity
France ¹	-0.7 (-0.70 [22.08])	French overseas territories	1
South of Europe ³ (Greece, Portugal, Spain)	- 0.7	Canary Islands, Crete, Madeira	1
Italy ¹	-1.0 (-1.07 [5.31])	Somalia	1
United Kingdom ¹	-1.0 (-1.09 [5.13])	Jamaica, Windward Islands	1
Benelux, Denmark, Ireland ^{1,2}	-0.4 (-0.73 [3.53])	Ivory Coast, Cameroon	1
Germany, Austria, Finland, Sweden ³	-0.4	Other ACP countries	1
Rest Of the World ³	-0.3	Other countries, i.e., dollar producers	2

¹ In brackets, econometric estimates with the associated t - Student.

² Estimation for Denmark only.

³ Assumed.

**Table 5. Main effects of the Common Market Organisation for bananas in the European Union
(tariff quota of 2.553 million tonnes, EU with fifteen Member States)**

Panel a. Impact upon EU importing countries

	base data		simulation results		
	imports (tonnes)	CIF import average price (inc. tariff) (ECU/tonne)	imports (tonnes)	CIF common price in the EU (inc. tariff) (ECU/tonne)	welfare change (million ECU)
France	477 719	709	565 252	557.5	79
Spain, Portugal, Greece	533 319	624	577 077	557.5	37
United Kingdom	392 786	648	457 218	557.5	38
Italy	432 452	521	404 124	557.5	- 15
Benelux, Ireland, Denmark	365 208	460	337 978	557.5	- 34
Austria, Finland, Sweden	357 959	511	345 698	557.5	- 17
Germany	1 163 245	477	1 092 884	557.5	- 91
EU	3 722 688	552.5	3 780 233	557.5	-2

Panel b. Impact upon exporting countries (ACP and EU territories)

	base data		simulation results		
	exports (tonnes)	FOB export average price (ECU/tonne)	exports (tonnes)	FOB export average price (ECU/tonne)	welfare change (million ECU)
French overseas territories	293 662	391	293 662	354	0
Canary Islands, Crete and Madeira	414 884	560	414 884	449	0
Somalia	41 783	264	57 692	365	5
Jamaica and Windward Islands	307 672	422	243 892	335	- 24
Ivory Coast and Cameroon	181 427	249	143 918	198	- 8
Other ACP countries	54 718	289	73 184	383	6
Total	1 294 147		1 227 233		- 21

Panel c. Impact upon dollar banana producers and the Rest Of the World

	base data	simulation results
dollar zone exports (tonnes)		
to the EU	2 428 541	2 553 000
to the ROW	4 408 705	4 396 687
total	6 837 246	6 949 646
dollar zone FOB average price (ECU/tonne)	205	206.7

Table 6. EU banana imports by origin, 1991 to 1994, in tonnes (EU with twelve Member States)

Origin	1989	1990	1991	1992	1993	1994
EU regional suppliers	808 815	826 392	780 593	794 784	743 334	654 174
ACP countries, incl.	544 439	621 863	602 777	689 713	748 106	722 546
Belize	26 580	24 040	19 616	28 493	38 517	46 980
Cameroon	56 071	77 628	115 841	110 714	146 901	154 034
Ivory Coast	85 159	95 159	116 425	146 265	161 257	148 880
Dollar banana producers	1 716 932	2 024 253	2 389 713	2 412 897	2 153 263 (1)	1 963 883 (2)
Total	3 070 186	3 472 408	3 773 082	3 897 394	3 713 047	3 450 341

Source : European Commission; For the year 1989-1991, European Commission data differ slightly from EUROSTAT data (COMEXT database) used in this study (see Table 3).

(1) The CMO came into effect on 1 July 1993. Imports from the dollar zone were equal to 1.18 million tonnes for the first semester of 1993; the quota for the second semester was set at 1.1 million tonnes but imports were slightly lower (966 000 tonnes) than this quantity.

(2) The tariff quota is set at 2.1 million tonnes for 1994 and 2.2 million tonnes for 1995 for the EU with 12 Member States.

Table 7. Impact of a productivity increase in some ACP countries on CMO scenario simulation results

	base year (average 1989-90-91)	"initial" CMO scenario	"modified" CMO scenario(1)
exports (in million tonnes) to the EU from the dollar zone	2.429	2.553	2.553
ACP countries	0.586	0.519	0.653
Ivory Coast, Cameroon	0.181	0.144	0.310
Jamaica and Windward Islands	0.308	0.244	0.222
Somalia	0.042	0.897	0.052
other ACP countries (including Belize)	0.055	0.073	0.067
total EU imports (in million tonnes)	3.723	3.780	3.914
EU consumers' welfare change (million ECU) w.r.t. the base year	-	- 2	+ 114
CIF import price in the EU (ECU/tonne)	552	557.5	527
FOB export price from the dollar zone (ECU/tonne)	205	206.7	206.7

(1) CMO scenario + productivity increase in some ACP countries, i.e., Belize, Cameroon and Ivory Coast.

Figure 1. Graphical analysis of the world banana market: the pre-CMO case

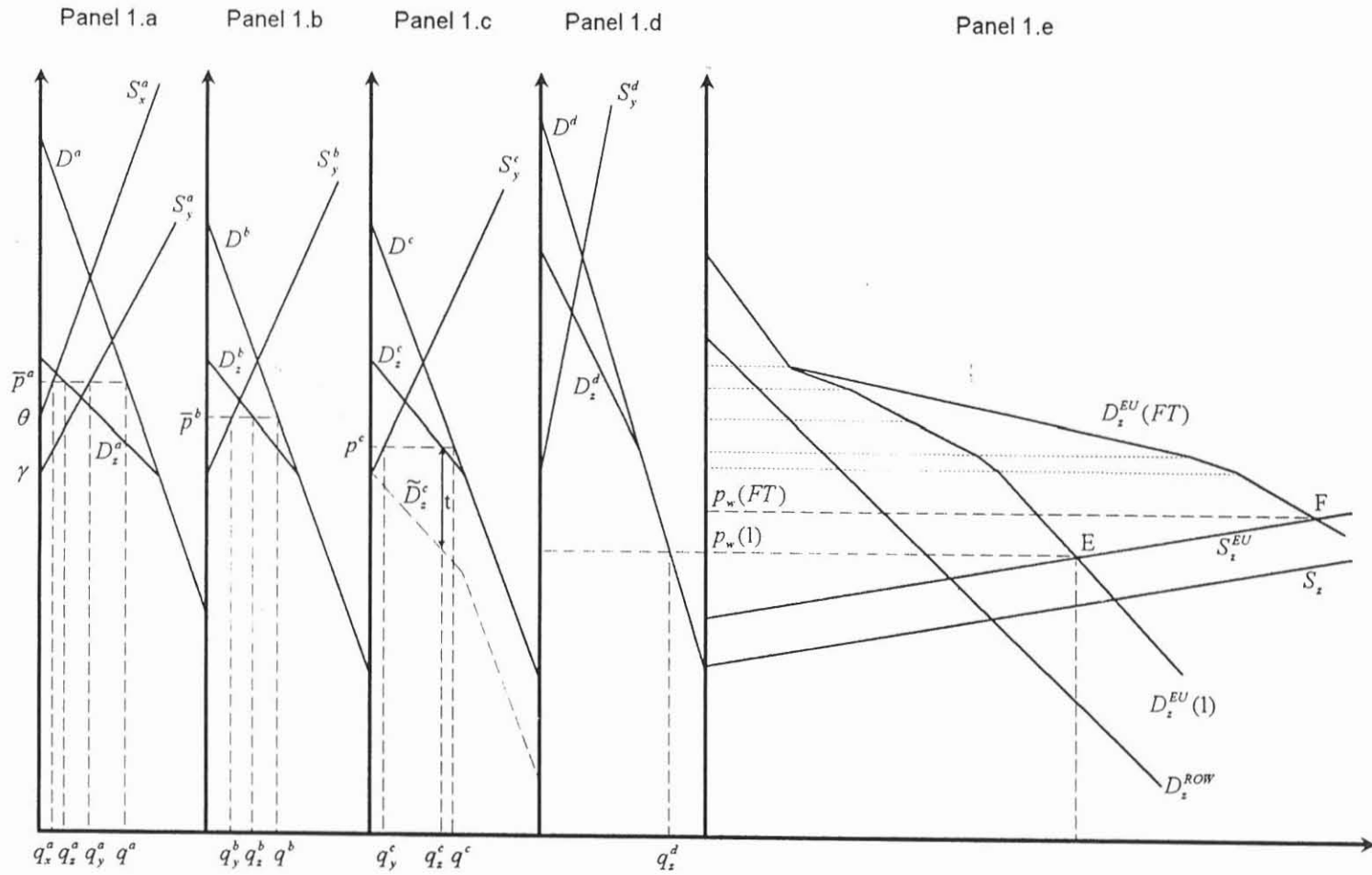
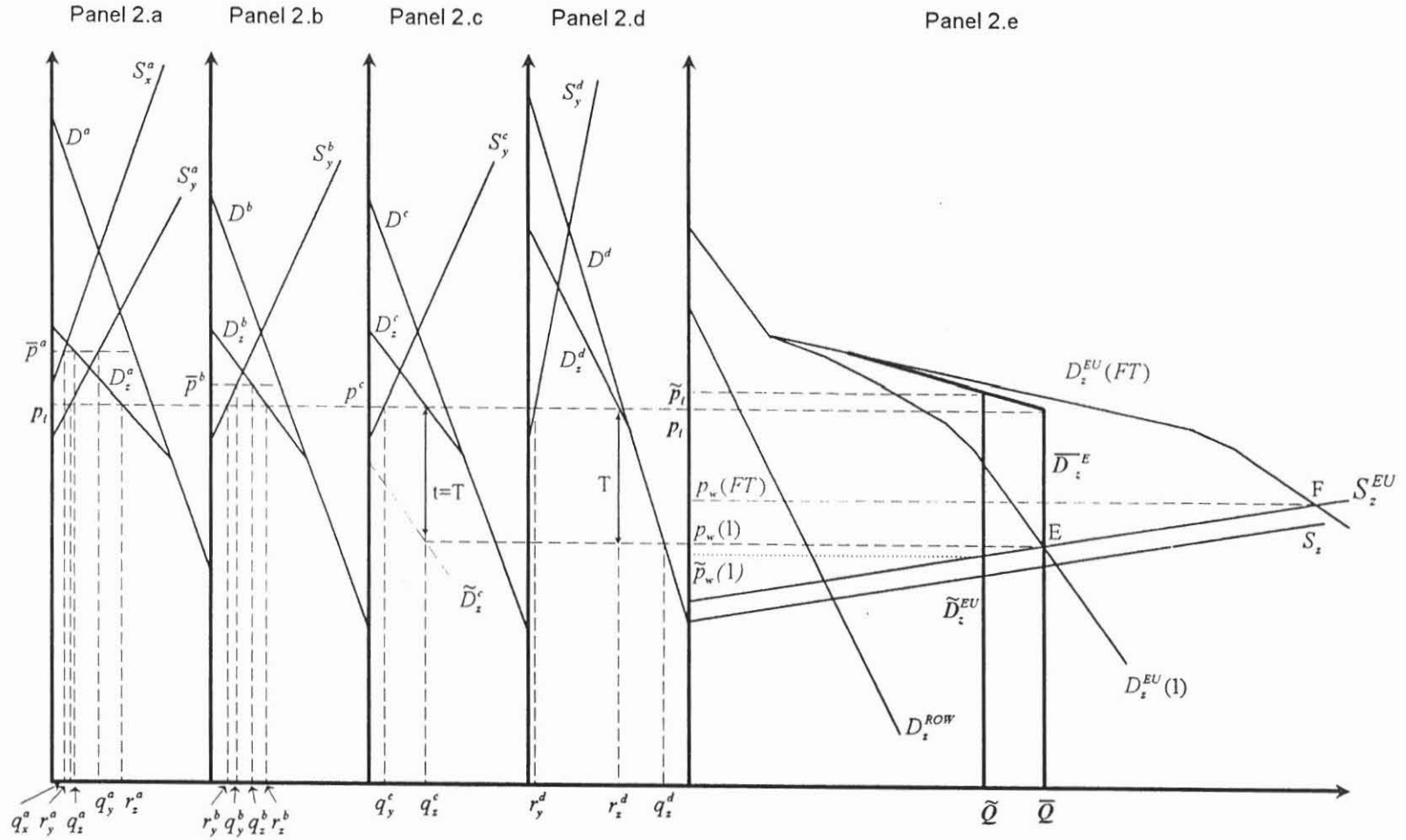


Figure 2. Graphical analysis of the world banana market: the CMO case



¹ This regime was the one applied in Austria, Finland and Sweden as well before they join the European Union.

² Protocol 5 of the Lomé Convention states that "... no ACP country shall be placed, as regards access to its traditional markets and its advantages on those markets, in a less favourable situation than in the past or at present".

³ Ivory Coast 155 000 tonnes, Cameroon 155 000 tonnes, St. Lucia 127 000 tonnes, Jamaica 105 000 tonnes, St. Vincent and the Grenadine 82 000 tonnes, Dominica 71 000 tonnes, Somalia 60 000 tonnes, Belize 40 000 tonnes, Surinam 38 000 tonnes, Grenada 14 000 tonnes, Madagascar 5 900 tonnes, and Cape Verde 4 800 tonnes.

⁴ In return, these four suppliers have agreed to take no further action on a GATT panel which found against the EU banana regime.

⁵ Canary Islands 420 000 tonnes, Guadeloupe 150 000 tonnes, Martinique 219 000 tonnes, Madeira 50 000 tonnes, and Crete 15 000 tonnes.

⁶ The CMO is also of interest for the US mainly because several of the major suppliers of Latin American bananas are US multinational companies.

⁷ Austria, Finland and Sweden became EU Member States during the CMO implementation time period. Accordingly, the analysis considers the EU with 15 Member States in both the pre-CMO and the CMO regime.

⁸ We will relax this assumption in the empirical analysis since evidence suggests that the tariff quota on dollar bananas is binding.

⁹ Obviously $\bar{p}_x^i = \bar{p}^i, \forall i$, and $p_x^k = p^k, \forall k = c, d, e$.

¹⁰ Obviously $\bar{p}_y^i = \bar{p}^i, \forall i$, and $p_y^k = p^k, \forall k = c, d, e$.

¹¹ In order to simplify the presentation, we assume the same price order as in the pre-CMO regime.

¹² As noted before, empirical results depend on the choice of the base period for comparison. If the model was calibrated with 1991 or 1992 data, pre-CMO imports in the EU from the dollar zone would be higher than the tariff quota. The choice of 1991 or 1992 as base year corresponds to a quota set at the level \tilde{Q} in Figure 2.