Food Policy xxx (2009) xxx–xxx

Contents lists available at ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol

EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market

Giovanni Anania *

Department of Economics and Statistics, University of Calabria, 87036 Arcavacata di Rende (Cs), Italy

ARTICLE INFO

Article history:
Received 23 March 2009
Received in revised form 13 October 2009
Accepted 2 November 2009
Available online xxxx

JEL classification:
Q17
Q18
F13

Keywords:
Bananas
WTO
Doha round
Economic Partnership Agreements
Trade preferences
Preference erosion

ABSTRACT

The paper provides a quantitative assessment of the impact on the banana market of the expansion of trade preferences the European Union granted Africa, Caribbean and Pacific (ACP) countries with the Economic Partnership Agreements (EPA) and of the possible erosion of these preferences as a result of different possible conclusions, if any, of on-going WTO negotiations. The results of the simulations performed suggest that the impact of the EPA on production and consumption of bananas in the EU will be limited, while benefits for ACP countries will be significant (at the expense of Most Favoured Nation (MFN) exporters). An agreement between the EU and MFN countries to end the outstanding WTO disputes on bananas and/or the conclusion of the WTO Doha round may bring an erosion of the preferential margins currently enjoyed by ACP countries of such an order of magnitude as to cancel out most of these benefits.

Introduction

Trade preferences for developing country exports are widely used, either under a multilateral umbrella, such as the Generalized System of Preferences (GSP) schemes, on a regional basis, such as the US African Growth and Opportunity Act (AGOA) scheme, or bilaterally. The expected *a priori* effects of preferential trade agreements are well known; obstacles which may limit their effectiveness in practice have been discussed, among the others, by Bureau et al. (2007), Candau and Jean (2005), Gallezot and Bureau (2004), Manchin (2006) and Panagariya (2002). A reduction of Most Favoured Nation (MFN) tariffs as a result of multilateral negotiations would imply a reduction of existing trade preference margins, or their disappearance. Applied MFN tariffs in agriculture are much higher than those for manufactured goods; this implies that both the value of existing preferences and potential losses associated with the reduction of MFN tariffs are much more pronounced in agriculture than in other sectors (Alexandraki and Lankes, 2004; Bouët et al., 2005, 2006; Bureau et al., 2007; Goodison, 2007; Lippoldt and Kowalski, 2005; Low et al., 2006; Tangermann, 2002; Yang, 2005; Yamazaki, 1996; Yu and Jensen, 2005; Wainio and Gibson, 2004). It has already been decided that the final agreement of the Doha Development Agenda (DDA) round of WTO negotiations on agriculture, if there is one, will include provisions on the issue of preference erosion (WTO, 2004, p. A-7, # 44).

This paper focuses on trade preferences and preference erosion with reference to the banana market, possibly the one market in which benefits from trade preferences and potential losses from preference erosion are the largest (Alexandraki and Lankes, 2004; Low et al., 2006; Yang, 2005) and conflicts among the different interests involved are the most evident and vocal. Using an original model of the banana market, the paper first provides a quantitative assessment of the expected benefits for African, Caribbean and Pacific (ACP) banana exporters of the elimination, as a result of the Economic Partnership Agreements (EPA), of the European Union (EU) preferential import quota for ACP banana exports in place until the end of 2007, and then of the reduction of these benefits as a result of the erosion of preferential margins deriving from the conclusion of WTO negotiations currently taking place. In particular, the paper considers the effects of the preference erosion which

* Tel.: +39 0984 492406; fax: +39 0984 492409.
E-mail address: ganania@unical.it

0306-9192/$ - see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.foodpol.2009.11.001

would derive from the lowering of the EU MFN tariff as a result either of the conclusion of the DDA round in accordance with the general consensus on agricultural market access reached in Geneva in July 2008 or, if the DDA round should not end, of the successful conclusion of the bilateral negotiations on bananas involving the EU, on one side, and several MFN exporters and the US, on the other.

The results obtained suggest that the impact of the EPA on production and consumption of bananas in the EU will be limited, while benefits for ACP countries are definitely expected to be significant. However, the final agreement of the WTO DDA round (if any), or a conclusion of the negotiations between the EU and MFN exporters to put an end to the banana dispute, may bring an erosion of the preferential margins currently enjoyed by ACP countries of such an order of magnitude as, in the worse case, to wipe out most of these benefits.

Trade preference granting and erosion in the banana market

The EU is the world's largest importer of bananas and among the top 20 largest producers. Domestic production covers around one sixth of domestic consumption, with imports from MFN and preferred ACP countries covering two thirds and one sixth of the EU market, respectively. All major exporters of bananas are developing countries and in most of them bananas account for an important share of export revenue. For Costa Rica, Ecuador and Panama in 2006 this share was around 10%; for Guatemala and Honduras around 7.5%, but the share was much higher for some of the smaller banana exporting countries, such as Dominica and Saint Vincent and the Grenadines, where it was equal to 21% and 29%, respectively. Historically the EU import regime for bananas has been a source of heated political confrontations, involving the conflicting interests of domestic producers and consumers, multinational firms that control a large share of international trade, holders of quota licences under the previous EU trade regimes, LDC (least developed country) exporters, preferred developing country exporters and developing country exporters subject to MFN conditions (Anania, 2006; Goodison, 2007; Josling, 2003; Read, 2001; Tangermann, 2003a,b; Thagesen and Matthews, 1997).

On 1 January 2008 the EU implemented the EPA it negotiated with many ACP countries (EC, 2007).[1] The EPA will progressively remove barriers to trade between the EU and several groupings of ACP countries, creating free trade areas which are expected to be compatible with WTO rules.[2] All agricultural exports from ACP countries which have successfully concluded the negotiations are now allowed duty- and quota-free access to the EU. Bananas (along with sugar and rice, for which, however, the EPA call for a progressive removal of EU market protection by 2010) have been indicated as the three single agricultural commodities for which most of the export benefits of the EPA for ACP countries are to be gained.

In July 2008 negotiators gathered in Geneva in an attempt to find a compromise to conclude the WTO DDA round. Bananas were considered among the sensitive issues which could potentially lead certain countries to block any final agreement. In fact, early in 2008 Pascal Lamy, the Director General of WTO, decided to take negotiations on bananas in his hands to prepare the ground for a mutually acceptable solution. The Geneva meeting failed to find an agreement to conclude the round, but not because of bananas. In fact, on July 26 eleven Latin American countries, the US and the EU found an agreement to bring to an end the long-standing so called "Bananas III" dispute at the WTO.[3] The agreement called for a reduction of the EU MFN tariff on bananas from 176 to 114 €/t between January 1 2009 and 2016, with a 28 €/t tariff cut in the first year, and for this tariff to be excluded from further cuts resulting from the conclusion of the DDA round.[4] ACP countries expressed dissatisfaction with this agreement, but the general impression was that they were ready to accept it in exchange for concessions from MFN banana exporters in the definitions of the list of the tropical products (including dropping sugar from the list, the other commodity for which preference erosion is a serious concern for them) and for aid from the EU to improve the competitiveness of their agricultures. Products defined as tropical are to be subject to larger tariff reductions to be more rapidly implemented than the other products; for ACP countries the key issue in the negotiation on tropical products are the losses resulting from the erosion of the preferences granted by the EU. A tentative agreement regarding tropical products had been reached in Geneva to set equal zero all tariffs below or equal 20% and to reduce by 80% over five years all other tariffs (ICTSD, 2008b)[5]; bananas were to be included among the tropical products for all countries except the EU and a separate "banana protocol" containing the agreement reached between the EU, MFN exporters and the US was to be included as an Annex into the final Agreement on agriculture.

The failure of the WTO meeting in Geneva to find an agreement to conclude the DDA round left the banana dispute unresolved. In fact, the tentative bilateral agreement reached by the EU, on one side, and MFN exporters and the US, on the other, cannot hold without the agreement of all other countries. In principle, an agreement on bananas can still be signed by all the countries involved without a conclusion of the DDA round. However, in this case, on the one hand, ACP countries cannot be sure that the DDA round will ever be concluded and that what they asked in exchange for accepting the agreement on bananas will ever be delivered (in addition, they have an obvious interest in the reduction of the EU MFN tariff being delayed as long as possible); on the other hand, only if the agreement is "multilateralized" by making it part of the final agreement of the DDA round can the EU be sure that the reduced tariff it is willing to impose on its MFN banana imports will not be subject to further cuts.

Finally, not surprisingly, negotiations on bananas have been among the most sensitive elements in the negotiations on regional trade agreements between the EU and the Andean Community, as well as those between the EU and Central American countries. As a result, these negotiations are interlinked with those taking place at the WTO, and interfere with them. In fact, countries that reach a regional trade agreement which provides them new significant banana export opportunities to the EU are

[1] These are actually "interim" agreements, with the exception of the one signed with the Caribbean CARIFORUM countries.

[2] A WTO waiver allowing the EU to grant ACP countries under the Cotonou Agreement unilateral trade preferences which discriminated against other developing countries expired at the end of 2007.

[3] The dispute dates back to 1996. The most recent episodes of the dispute refer to complaints by Ecuador in November 2006 and the US in June 2007 that the "tariff only" regime the EU had introduced on 1 January 2006 did not comply with WTO rules. In both cases the panels concluded that preferences granted by the EU under the pre-EPA import regime in place until January 1 2008 to bananas originating in ACP countries were not compliant with its Most Favoured Nation obligations; these conclusions were upheld by the WTO Appellate Body in November 2008.

[4] A tariff equal to 114 €/t is greater than that resulting from the provisions on market access for both agricultural products in general and tropical products on which a wide consensus existed in the negotiations (the EU had already made known its intention not to include bananas among its "sensitive" products).

[5] The December 2008 revised draft of the modalities for agriculture, acknowledges the progress made in July in Geneva in the negotiations on the provisions regarding tropical products, but chooses to maintain, unaltered, the text of the July 10 version of the modalities (WTO, 2008: 2), the one circulated before the gathering in Geneva of negotiators. This version offers two alternatives: one is the elimination in four years of tariffs imposed by developed countries not exceeding 25% and the reduction by 80% of those above 25%; the alternative text is less generous in terms of liberalization and foresees the elimination of tariffs not exceeding 10%, a lower reduction of tariffs above this threshold, and cuts being implemented over the longer general tariff reduction implementation period (WTO, 2008: 26).

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001

in no hurry to see a solution of the dispute at the WTO materialize, as this would reduce their relative competitiveness *vis a vis* the other MFN exporters. These negotiations are politically sensitive for the EU as well, because of the problems the conclusions of such regional trade agreements would raise with both the MFN countries not involved and ACP countries; for this reason a conclusion of negotiations on regional trade agreements in which bananas are a key component of trade is unlikely to occur before the WTO dispute is settled.

The model

The model developed is an expanded and updated version of the one used in Anania (2006, 2008); the main differences are: the data base refers to 2005 (in Anania (2006, 2008) it referred to 2002); the five EU banana producing member states being modelled individually; the modelling of the 2007 EU enlargement to Bulgaria and Romania; and the use of an innovative calibration procedure.

It is a single commodity, spatial, partial equilibrium, mathematical programming model (Takayama and Judge, 1971); a "quasi-welfare" function (Samuelson, 1952) is maximized subject to a set of constraints describing relevant demand and supply functions, price linkages (due, for example, to transportation costs and policy interventions) and policies which cannot be represented through an exogenously determined price wedge (such as input quotas, or support to domestic producers provided through a "deficiency payment").

In the area of trade, modelers have a wide variety of tools at their disposal, such as spatial and non-spatial partial equilibrium models, and computable general equilibrium models. Pros and cons of different classes of models are addressed, among the others, in Anania (2001), Bouët (2008), Francois and Reinert (1997), and van Tongeren et al. (2001). Partial equilibrium models tend to better accommodate explicit representations of complex policy instruments, allow for a more detailed representation of markets and require less restrictive assumptions. On the contrary, partial equilibrium models cannot take into account the indirect effects of the policy changes considered, such as those on supply functions deriving from changes in input prices or those on the demand functions as a result of changes in incomes.

The fact that the model is "spatial" – i.e. it is solved for the trade flows between each pair of countries – makes it particularly suitable for representing policies that apply different regimes to imports from different countries without having to impose unrealistic assumptions; current and recent previous EU trade regimes for bananas considered in this paper include tariff rate import quotas (TRQs) applied on imports from specific groups of countries and preferential tariffs. Spatial models of the type proposed by Takayama and Judge (1971) have been used to analyse the banana market by Anania (2006, 2008), Kersten (1995) and Spreen et al. (2004). More often, however, non-spatial models have been used (Arias et al., 2005; Guyomard et al., 1999a,b, 2006; Guyomard and Le Mouël, 2003; Vanzetti et al., 2005). The inability of a non-spatial model to generate bilateral trade flows implies that it cannot model discriminatory trade policies, i.e. policies which change as a function of the country of origin of imports or the country of destination of exports, and, as a result, that it cannot include country specific TRQs and preferential tariffs. With respect to trade policies relevant for the banana market, this means that non-spatial models cannot consider the Everything But Arms (EBA) initiative,[6] the TRQs for ACP and MFN exporters part of recent EU import regimes, or the preferential tariff regime benefitting ACP countries currently in place. The second limitation has often been circumvented by assuming *a priori* that existing TRQs are either binding or not binding (Arias et al., 2005; Guyomard et al., 1999a,b; Vanzetti et al., 2005). However, whether a quota is binding or not is an empirical question, which needs to be answered endogenously by the modelling exercise. In addition, non-spatial models cannot include the possibility of out-of-quota imports subject to a tariff higher than that imposed on in-quota imports. In Vanzetti et al. (2005), the limitations of non-spatial models in dealing with discriminatory trade policies are circumvented by assuming imperfect substitution between bananas produced in different countries (Armington, 1969), implying that bananas are not a homogeneous good and that consumers are able to differentiate between them by their country of origin.

The model assumes perfect competition on domestic and international markets,[7] and bananas as a homogeneous product. It includes five sources of domestic supply within the EU,[8] 15 exporting[9] and five importing countries/regions.[10] Import demand and export supply functions, as well as domestic supply functions in the EU, are assumed to be linear, or to be well approximated by linear functions in their portions relevant for the simulations conducted. Functions in the base year are obtained from observed imported, produced and exported quantities, observed import, production and export prices, and import demand, supply and export supply price elasticities at the equilibrium in each country/region. The values of the elasticities used are exogenously determined and are based on those used elsewhere (Anania, 2006; Arias et al., 2005; Guyomard et al., 1999a,b; Kersten, 1995; Spreen et al., 2004; Vanzetti et al., 2005) (Table 1). Net imports, net exports, average import and export unit values were computed from information in the FAOSTAT and COMTRADE databases. Production and prices in Martinique and Guadeloupe, Canary Islands, Madeira and Azores, and Crete are based on official information from the European Commission.

The modelling of the EU-25 import regime in 2005 includes:

(a) "quota A/B": a 3,113,000 t TRQ, with in-quota imports subject to a 75 €/t tariff (ACP exports can enter this quota duty-free);
(b) "quota C": a 750,000 t TRQ allocated to duty-free imports from ACP countries only;
(c) an out-of-quotas MFN import tariff of 680 €/t (380 €/t for imports from ACP countries).

For Bulgaria and Romania, US and the "Rest of the world net importers" the model includes the tariffs applied in 2005; these equal 19.1%, 0.5% and 18.9%, respectively.

The basic structure of the model in the base year (2005) can be synthesized as follows:

[6] With the EBA initiative (EC Regulation 416 of 28 February 2001) the European Union granted duty-free and unlimited market access to all exports except arms and ammunitions ("*everything but arms*") from LDC. Full implementation of the EBA initiative for bananas occurred on 1 January 2006.

[7] Few firms control a large share of bananas world market (FAO, 2003; Taylor, 2003). However, studies which attempted to empirically assess the degree of competition in the banana market disagree on whether these firms actually exert market power (Deodhar and Sheldon, 1996; McCorriston, 2000; Herrmann and Sexton, 2001). Scoppola (2008) analyzes the introduction by the EU in 2006 of the new trade policy regime for bananas assuming imperfect competition.

[8] France (Martinique and Guadeloupe), Spain (Canary Islands), Portugal (Madeira and Azores), Greece (Crete) and Cyprus. Banana production in continental Portugal is negligible and has been ignored.

[9] Six ACP countries/regions (Ivory Coast, Cameroon, Dominican Republic, Belize and Suriname, other non-LDC ACP net exporters, and LDC ACP net exporters) and nine MFN countries/regions (Ecuador, Colombia, Costa Rica, Panama, Honduras, Brazil, Guatemala, other non-LDC MFN net exporters, and LDC MFN net exporters).

[10] EU-15, EU-10, Bulgaria and Romania, United States, Rest of the world net importers.

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001

$$\text{Maximize} \quad W(x_{in}, xab_{ie}, xc_{ie}, xoq_{ie}) = \sum_j \int_0^{q_j^d} p_j^d(m)dm - \sum_i \int_0^{q_i^s} p_i^s(r)dr - \sum_i \sum_j (TC_{ij}x_{ij}) - \sum_i \sum_e (xab_{ie}TQAB_{ie} + xc_{ie}TQC_{ie} + xoq_{ie}TOQ_{ie}) - \sum_i \sum_n (x_{in}\,T_{in}) \quad (1)$$

$$\text{subject to} \quad q_i^s = \sum_j x_{ij}, \quad (2)$$

$$q_j^d = \sum_i x_{ij}, \quad (3)$$

$$ss_i = BSP_i/(BSQ_i ES_i), \quad (4)$$

$$si_i = BSP_i - ss_i BSQ_i, \quad (5)$$

$$p_i^s = si_i + ss_i q_i^s, \quad (6)$$

$$ds_j = BDP_j/(BDQ_j ED_j), \quad (7)$$

$$di_j = BDP_j - ds_j BDQ_j, \quad (8)$$

$$p_j^d = di_j + ds_j q_j^d, \quad (9)$$

$$\sum_i \sum_e xab_{ie} \leqslant TRQAB, \quad (10)$$

$$\sum_i \sum_e xc_{ie} \leqslant TRQC, \quad (11)$$

$$x_{ie} = xab_{ie} + xc_{ie} + xoq_{ie}, \quad (12)$$

$$x_{ij},\ xab_{ie},\ xc_{ie},\ xoq_{ie},\ p_i^s,\ p_j^d \geqslant 0, \quad (13)$$

where

i	index for the exporting countries and the sources of domestic supply in the EU;
j	index for the importing countries;
e	index for the importing EU member states (EU-15 and EU-10 in the 2005 base model);
n	index for non-EU importing countries;
BDP_j	country j import price (cif) in base year (2005) ($/t);
BDQ_j	country j net imports in base year (2005) (t);
BSP_i	country i export price (fob) in base year (2005) ($/t);
BSQ_i	country i net exports in base year (2005) (t);
di_j	country j import demand intercept;
ds_j	country j import demand slope;
ED_j	country j import demand elasticity;
ES_i	country i export supply elasticity;
p_j^d	country j (cif) border price ($/t);
$p_j^d(m)$	country j inverse import demand function ($/t);
p_i^s	country i (fob) border price ($/t);
$p_i^s(r)$	country i inverse export supply function ($/t);
q_j^d	country j total imports (t);
q_i^s	country i total exports (t);
si_i	country i export supply intercept;
ss_i	country i export supply slope
T_{in}	per unit import tariff imposed by country n on its imports from country i ($/t);
TC_{ij}	per unit international transaction cost for shipments from country i to country j (border to border) ($/t);
$TQAB_{ie}$	per unit in-"quota A/B" import tariff imposed by EU member state e on its imports from country i ($/t);
TQC_{ij}	per unit in-"quota C" import tariff imposed by EU member state e on its imports from country i ($/t);
TOQ_{ie}	per unit out-of-"quotas A/B and C" import tariff imposed by EU member state e on its imports from country i ($/t);
$TRQAB$	EU "A/B" tariff rate quota (t) ;
$TRQC$	EU "C" tariff rate quota (t) ;
x_{ij}	trade flow from country i to country j (t);
xab_{ie}	in-"quota A/B" trade flow from country i to EU member state e (t);
xc_{ie}	in-"quota C" trade flow from country i to EU member state e (t);
xoq_{ie}	out-of-quotas trade flow from country i to EU member state e (t).

The EU Common Market Organization (CMO) for bananas in place until the end of 2006 provided generous and fully "coupled" support to domestic producers through a "deficiency payment" scheme; the per unit production subsidy was given by the difference between a reference price, which did not change over time, and the observed domestic price. These "compensatory aid" deficiency payments to domestic banana producers in France, Spain, Portugal and Greece in place in 2005 are explicitly modelled (Anania, 2008); "compensatory" and "supplementary aid" payments are subject to the financial stabilizer mechanism. Domestic support being based on deficiency payments implies that in the base 2005 model domestic banana production in the EU is independent of the market price of bananas.

The capacity of the 2005 base model to reproduce observed country net trade positions appears satisfactory. The simple average percentage difference, in absolute value, between observed and predicted country net exports in 2005 is 3.1%; the analogous value for imports is 1.2%. If the exports- and imports-weighted percent differences, in absolute value, are considered instead, the average differences become 1.9% and 0.4%, respectively.

However, as it is often the case for mathematical programming spatial models, predicted bilateral trade flows show an overspecialization with respect to observed ones. Out of the 100 potential trade flows, the observed and predicted ones different from zero are 40 and 26, respectively (Table 2). Twenty-three pairs of observed and predicted trade flows are both non-zero, while 57 are both equal to zero; in the remaining 20 cases either the predicted or observed trade flow equals zero, while the other is positive. The reason why the solution of mathematical programming spatial models often includes a number of non-zero trade flows smaller than those observed is because of the optimization procedure used, as well as the inability of the constraints included in the model to represent all relevant elements describing the functioning of the market under scrutiny; this is usually due to both, the lack or poor quality of available information, and the simplified representation of market agent behaviours which the model, by its nature, can provide.

In the model developed in this paper the information used which appears weaker is the matrix of bilateral international transaction costs; this has been obtained expanding available industry information on international transaction costs for few specific trade flows to all the others, using distances between countries to explain differences in the variable component of transaction costs.

An innovative two step calibration procedure has been used to make up for the lack and poor quality of per unit transaction costs and improve the capacity of the model to reproduce observed net trade positions as well as bilateral trade flows. In the first step the base model has been augmented by a set of constraints imposing predicted bilateral trade flows to equal observed ones. The values of the dual variables associated to these constraints in the solution of the augmented model give the adjustments of the per unit international transaction costs used in the base model which make the model able to exactly reproduce observed country net trade positions; by correcting bilateral transaction costs to make the model calibrate net trade positions, its capacity to reproduce bilateral trade flows is improved as well. A calibrated model is generated in step two by modifying the base model correcting bilateral international trade transaction costs using the adjustments obtained in step one. The solution of the calibrated model perfectly replicates observed country net trade positions. Anania et al. (2009) show that in general there are multiple optimal sets of bilateral trade flows associated to observed net trade positions, the observed trade flows being one of these sets. There are two main

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001

Table 1
Base model input data (2005).

Country/ region	Base net imports[a] (000 t)	Base net exports[b] (000 t)	Import prices ($/t)	Export prices[c] ($/t)	Export supply price elasticities	Import demand price elasticities	Domestic demand income elasticities	% Yearly changes in yields[d]	% Yearly changes in population	% Yearly changes in per capita GDP[e]
EU-15	4368.5		703.1			−0.50	0.5		0.4	1.19
EU-10	203.4		773.4			−0.75	0.9		−0.2	4.27
Bulgaria and Romania	45.8		611.2			−0.80	1.0		−0.7	7.28
USA	3843.2		411.6			−0.40	0.4	1.79	1.0	1.85
Other importers	4580.4		533.2			−0.80	0.5	3.25	0.8	3.46
Spain		384.0		957.5	1.0			0.04		
France		308.5		607.0	1.0			0.00		
Portugal		18.8		757.3	1.0			0.00		
Greece		2.8		667.8	1.0			0.00		
Cyprus		8.9		485.6	1.0			2.42		
Ivory Coast		196.6		565.6	1.5		0.5	5.00	1.6	−1.98
Cameroon		245.8		416.0	1.5		0.5	0.00	1.9	1.94
Dominican Republic		152.9		518.5	1.0		0.5	5.00	1.5	0.60
Belize and Suriname		111.0		493.8	1.0		0.5	1.87	1.6	0.63
Other ACP non-LDC		59.6		467.1	1.0		0.5	4.77	1.7	2.62
ACP LDC		8.1		369.9	1.5		0.5	0.00	2.3	3.10
Ecuador		4084.8		308.5	1.3		0.5	1.95	1.5	3.69
Colombia		1379.4		328.5	1.3		0.5	0.00	1.6	1.94
Costa Rica		1589.7		321.7	1.0		0.5	1.65	1.9	2.15
Panama		322.5		345.3	1.0		0.5	0.00	1.8	2.58
Honduras		468.0		301.6	1.5		0.5	0.00	2.3	1.30
Brazil		211.9		244.8	1.0		0.5	1.58	1.4	0.80
Guatemala		1121.6		267.2	1.5		0.5	5.00	2.4	0.10
Other MFN exporters non-LDC		2305.5		363.8	1.0		0.5	1.18	1.5	1.07
MFN LDC		60.9		249.0	1.5		0.5	0.00	2.1	3.49

[a] For EU-15 and EU-10 apparent consumption (imports + domestic production – exports).
[b] For Spain, France, Portugal and Greece average production in 2002–2006.
[c] For Spain, France, Portugal and Greece official farm gate prices, including compensatory aid; for Cyprus it is the official farm gate price. The average unit value of exports of Panama from FAO was unrealistically high compared with values for other countries in the region and average unit values based on the COMTRADE database; it has been adjusted based on the differences in average unit values for exports of countries in the region calculated using COMTRADE.
[d] Percentage changes below 0 and above 5 have been set equal to 0 and 5, respectively.
[e] For Belize and Suriname this is the 2004/2005 annual rate of change due to lack of data for the period 2000/2005.

assumptions implicit in the calibration procedure used: (a) that observed trade flows are measured with no error and are generated by unobservable behavioural rules governing decisions by the economic agents and (b) that the only piece of information in the model which is potentially ill-measured is the matrix of per unit bilateral international transaction costs. Essentially, the procedure assumes that observed trade flows are generated by behaviours which obey to rules which cannot be fully described by the model and the information it includes; observed trade flows are then used to infer the errors in international transaction costs which, once corrected, make the model perfectly calibrate observed country net trade positions data. The reasoning and rationale behind the calibration procedure used follows that in Positive Mathematical Programming (PMP) developed for production models by Howitt (1995). However, there are at least two relevant differences between the two procedures: in this paper per unit international transaction costs are corrected but remain invariant to the quantity traded, and adjustments in transaction costs can be either positive or negative; in PMP the calibrated model is obtained by adding to the base model a quadratic cost function, i.e. per unit costs are a function of the quantities produced and adjustments to production costs are non negative (observed production costs can only equal or underestimate actual production costs).

All simulations have been generated with reference to 2016, when it will be possible to assess the market effects of the adjustments in production decisions as a result of changes in both the EU import and domestic policy regimes, as well as the implications of a successful conclusion of the bilateral negotiations between the EU and the MFN countries and/or the conclusion of the DDA round, should this be the case. The 2016 base reference model has been obtained from the base 2005 one by modelling:

(a) the 2007 enlargement of the EU-25 to Bulgaria and Romania;
(b) the introduction on 1 January 2006 of the EU "tariff-only" import regime;
(c) the implementation of the EBA initiative;
(d) the 2006 reform of the EU Common Market Organization (CMO) for bananas; and
(e) the changes in import demand and export supply functions in all countries/regions resulting from expected shifts in domestic demand and supply functions.

The dollar/euro exchange rate in 2016 has been assumed to be 1.5 (in the 2005 base model it was 1.2441).

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001

The 2007 EU enlargement has been modelled by removing barriers to trade between Bulgaria and Romania and the EU-25 and by extending to them the EU import regime.

Imports from MFN countries are now only subject to a 176 €/t tariff.[11] ACP countries are granted preferential duty-free access within a 775,000 t TRQ while out-of-quota exports are subject to the 176 €/t MFN tariff.

Banana exports from LDC countries enter the EU tariff-free and are not subject to any quantitative limitation.

Import demand and export supply functions shift according to expected changes, *ceteris paribus*, in the quantities produced and consumed in each country/region.[12] Consumption is assumed to vary over time on the basis of observed changes in population and in per capita incomes between 2000 and 2005[13]; the values used for domestic demand income elasticities are provided in Table 1. Production in each country/region is assumed to change over time, *ceteris paribus*, in line with observed changes in banana yields between 1992–1995 and 2002–2005.[14]

The December 2006 reform cancelled the EU CMO for bananas (EC, 2006; Anania, 2008). For banana producing areas outside the "outermost regions" (Greece, Cyprus and continental Portugal) support (€4.6 million) has been "decoupled" and included in the Single Farm Payment introduced by the June 2003 Fischler reform of the Common Agricultural Policy. For the "outermost regions" (France; Spain; Azores and Madeira in Portugal) financial resources of a similar order of magnitude to those previously absorbed by deficiency payments (€278.8 million) have been added to the budget allocation of their POSEI programmes; these programmes finance the use of a wide range of policy instruments, whose aim is to increase the competitiveness of agricultural production in these "disadvantaged" outermost regions. The decision on which policy instruments to implement is left to the individual member country. The effects of the reform in France, Spain and Portugal are introduced in the model by removing the deficiency payments in place in 2005 and by modelling the policy instruments they introduced with their POSEI implementation decisions for 2007 (these have been confirmed, unchanged, for 2008):

(a) in France the entire budget allocation (€129.1 million) is devoted to "decoupled" payments calculated for each farm on the base of bananas produced in a reference period. In order to receive the full entitlement of "decoupled" payments, farms have to produce at least 80% of what they produced, on average, in the reference period; if production is between 70% and 80% of what it was in the reference period, the farm will receive 80% of its entitlement of decoupled payments; if it is below 70% it will receive the same percentage of the entitlement. However, it turns out that the financial incentive (around 11,600 €/ha) is large enough to ensure that farms find it profitable to produce the minimum volume of bananas needed to enable them to claim the full amount of "decoupled" payments;

(b) in Spain the aid for open air banana production is assumed to be used to its maximum extent (7600 ha; 9.1 million €) and the remaining budget allocation (€132 million) to be devoted to "decoupled" payments calculated on the base of bananas produced by each farm in a reference period. In order to receive their full entitlement of "decoupled" payments, farms have to produce at least 70% of what they produced, on average, in the reference period. In this case too it turns out that the financial incentive (decoupled payments are in this case around 11,800 €/ha) is large enough for farms to find it profitable to produce the minimum volume of bananas needed to be able to claim their full entitlement of decoupled payments;

(c) in Portugal the entire financial allocation is devoted to the introduction of a fully "coupled" fixed production subsidy. The amount of the per unit subsidy is given in the model by the financial allocation divided by the volume of banana production in Madeira and Azores used in the proposal for the POSEI programme for bananas put forward to the Commission by Portugal in 2007; this yields a subsidy equal to 455.2 €/t.[15] The subsidy expenditure cannot exceed Portugal's financial allocation (€8.7 million); if production is such that expenditure would exceed the maximum allowed, the per unit subsidy is cut *pro rata* so that the expenditure equals the budget allocation.

Results of the simulations

The results of the simulations are presented in Tables 3 and 4.

In the "Base 2016" reference scenario the EPA and the outcome, if any, of the multilateral and bilateral WTO negotiations are ignored. As explained above, with respect to the "Base 2005" simulation this scenario includes the 2007 enlargement of the EU-25 to Bulgaria and Romania, the EU "tariff-only" import regime introduced on 1 January 2006, the EBA initiative, the 2006 reform of the EU CMO for bananas, as well as changes in import demand and export supply functions as a result of expected changes in yields, population and per capita incomes. EU-27 domestic price of bananas is expected to decline by 36 €/t, and consumption to expand between 2005 and 2016 by 800 thousand t; this is due to the combined effects on the EU demand for bananas of several factors: the enlargement of the EU to Bulgaria and Romania, expected changes in per capita income and population (Table 1), and the significantly stronger euro. Domestic production drops from 723 thousand t to 579 as a result of the reform of the CMO for bananas; in fact, in France and Spain banana production is forecasted to equal the minimum threshold required for farms to claim the full amount of their entitlements of "decoupled" payments[16]: 255 and 294 thousand t (Table 4), respectively, vs. 309 and 384 thousand t produced in 2005 under the previous domestic policy regime. In Portugal, where support remains fully "coupled" (although under a different policy instrument), production equals 23 thousand t, while it was 19

[11] While in the original (uncalibrated) base model quota rents can be estimated, in the calibrated model they are included in the corrected per unit international transaction costs. It is so because in the augmented model developed in step one of the calibration procedure estimated trade flows are imposed to equal observed ones and TRQ constraints become irrelevant. When in the 2016 models the TRQ on banana imports from MFN countries is removed, relevant per unit transaction costs (those related to MFN–EU-27 trade flows) are adjusted by subtracting the estimate of the quota rent associated to the MFN TRQ obtained in the original base model solution, where both EU TRQs are binding and no out-of-quota exports take place; the estimated rents associated to the EU MFN and ACP TRQs equal $141.9 and $88.9, respectively. These estimated rents are distorted, because they are generated using the uncalibrated model; however, the distortion can be safely assumed to be quite small, because, as discussed above, the uncalibrated base model satisfactorily calibrates country net trade positions and TRQ fillings.

[12] The FAOSTAT data base is the source used for production and consumption data in 2005.

[13] In both cases the data source is World Bank (various years).

[14] The source is the FAOSTAT database.

[15] The actual policy choice by Portugal is to introduce two different subsidies in Madeira and the Azores, equal to 446 and 600 €/t, respectively; however, the structure of the model does not allow us to consider banana production in the two outermost regions separately.

[16] The model does not include uncertainty and, as a result, ignores the effects of risk on producer decisions in France and Spain. If producers are risk averse, their *ex ante* production decisions will target an expected volume of production above the minimum required for them to collect the full amount of support they are entitled to; this means that, *ex post*, on average, risk averse producers will overshoot their minimum production target and the model underestimates the expected value of domestic production in the EU.

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001

Table 2
Base model input data[a] (in bold), uncalibrated model solution (in italics) and percent differences (in bold and italics) (2005).

	EU-15		EU-10		Bulgaria and Romania		USA		Other importers		Total exports		
Spain	**384,000**	*384,000*	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**384,000**	*384,000*	***0.00***
France	**292,781**	*308,500*	**15,719**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**308,500**	*308,500*	***0.00***
Portugal	**18,800**	*18,800*	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**18,800**	*18,800*	***0.00***
Greece	**2800**	*2800*	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**2800**	*2800*	***0.00***
Cyprus	**8900**	*10,567*	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**8900**	*10,567*	***−18.73***
Ivory Coast	**196,600**	*176,818*	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**196,600**	*176,818*	***10.06***
Cameroon	**245,800**	*256,133*	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**245,800**	*256,134*	***−4.20***
Dominican Republic	**152,900**	*146,754*	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**152,900**	*146,754*	***4.02***
Belize and Suriname	**111,000**	*105,124*	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**111,000**	*105,124*	***5.29***
Other ACP non-LDC	**59,600**	*57,119*	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**59,600**	*57,119*	***4.16***
ACP LDC	**8100**	*8051*	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**8100**	*8051*	***0.60***
Ecuador	**1,126,402**	*2,904,112*	**75,225**	*0*	**33,844**	*0*	**894,658**	*1,229,227*	**1,954,671**	*0*	**4,084,800**	*4,133,339*	***−1.19***
Colombia	**817,632**	*0*	**44,679**	*0*	**0**	*0*	**381,603**	*65*	**135,486**	*1,340,141*	**1,379,400**	*1,340,205*	***2.84***
Costa Rica	**593,808**	*0*	**35,179**	*0*	**0**	*0*	**753,725**	*1,637,237*	**206,988**	*0*	**1,589,700**	*1,637,237*	***−2.99***
Panama	**252,415**	*0*	**32,554**	*0*	**0**	*44,489*	**0**	*283,633*	**37,531**	*0*	**322,500**	*328,122*	***−1.74***
Honduras	**11,151**	*0*	**0**	*0*	**11,940**	*0*	**398,471**	*467,050*	**46,438**	*299*	**468,000**	*467,348*	***0.14***
Brazil	**62,127**	*10,097*	**0**	*198,790*	**0**	*0*	**0**	*0*	**149,773**	*0*	**211,900**	*208,888*	***1.42***
Guatemala	**0**	*0*	**0**	*0*	**0**	*0*	**1,075,162**	*219,319*	**46,438**	*865,257*	**1,121,600**	*1,084,577*	***3.30***
Other MFN non-LDC	**2,3731**	*0*	**0**	*0*	**0**	*0*	**339,548**	*0*	**1,942,221**	*2,289,783*	**2,305,500**	*2,289,782*	***0.68***
MFN LDC	**0**	*0*	**0**	*0*	**0**	*0*	**0**	*0*	**60,900**	*61,467*	**60,900**	*61,647*	***−1.23***
Total imports	**4,368,548**	*4,388,876*	**203,357**	*198,790*	**45,784**	*44,489*	**3,843,167**	*3,836,532*	**4,580,446**	*4,556,947*			
		−0.47		***2.25***		***2.83***		***0.17***		***0.51***			

[a] Trade flows have been obtained from Comtrade data and are meant to be net of re-exports. Trade flows less or equal 10,000 t have been omitted, unless they were the only positive trade flow for that exporter, assuming they were either the result of errors in the construction of the data base, or that they occurred but cannot be justified on the base of profit maximizing behaviours.

thousand t in 2005. EU-27 imports increase by 940 thousand t. In the other two importing regions imports are forecasted to move in opposite directions. They are expected to increase by 570 thousand t in the US and to decline by 85 thousand t in the Rest of the world. Despite the robust increase in population and per capita incomes, imports in the Rest of the world decline as a result of the larger sensitivity of domestic demand to the price increase and, more importantly, because of the large expected increases in yields in domestic banana production (Table 1). ACP countries fill up the 775,000 t duty-free TRQ on the EU-27 market and export 190 thousand t to other countries. In 2006 and 2007, the first two years after the introduction of the new EU import regime, ACP out-of-quota exports to the EU subject to the 176 €/t MFN tariff were 116,000 t and 62,000 t, respectively. The simulation suggests that by 2016 ACP countries, once filled the duty-free quota on the EU market, will find it more profitable to export to countries other than the EU. When changes in individual countries' exports are considered, different results emerge. Changes in yields, on the one hand, and in domestic consumption as a result of changes in population and per capita incomes, on the other, had caused forecasted exports in Cameroon to decline severely between 2005 and the "no policy change" Base 2016 scenario. In contrast, forecasted exports increase sharply for the Dominican Republic, the aggregate of "Other non-LDC ACP net exporters" and, to a lesser extent, Ivory Coast (Table 4). MFN exports to the EU are forecast to increase between 2005 and 2016 by one million t as a result of the change in the EU import regime, of the increase in the €/$ exchange rate and of changes over time in domestic demand and supply functions. Total MFN exports are expected to increase by 1.3 million t. Among MFN countries, banana exports are expected to increase significantly, although by different extents, in Guatemala, Ecuador, Costa Rica and Colombia, while the opposite occurs in Brazil and Honduras. LDC are forecasted to exit the world market for bananas (LDC exports were 69,000 t in 2005) as a result of the loss of competitiveness over time of their bananas *vis a vis* both ACP and MFN ones, despite the introduction by the EU of the EBA initiative.

Six policy scenarios are considered. All simulations are generated with respect to 2016 and they all include the implementation of the EPA; for bananas this meant the removal on January 1 2008 of the quota on EU imports from ACP countries, which now occur duty- and quota-free.[17]

Differences in the six policy scenarios relate to the assumptions made with respect to the conclusion of multilateral and bilateral WTO negotiations and the consequent reductions in banana tariffs.

The future of the DDA round remains unclear; *will an agreement be reached? When will this occur? What will be the "ambition" of the final agreement?* These are all questions to which there is no easy answer. In the first two scenarios it is assumed that no DDA round agreement is reached. In the first it is assumed that bilateral negotiations between the EU, on one side, and MFN countries, on the other, to solve the current dispute in the WTO also fail to achieve a mutually acceptable solution; hence, this scenario simulates the impact of the implementation of the EPA only. The second scenario assumes that, on the contrary, the EU and MFN countries agree to implement the tentative bilateral agreement reached in July 2008 in Geneva that the current 176 €/t MFN tariff is replaced by 2016 by a tariff equal to 114 €/t; because there is no DDA agreement, the import tariffs imposed by the US and the aggregation of all other net importing countries remain unchanged.

In the first scenario, the one simulating the impact of the EPA but with everything else remaining unchanged, the EU market is only marginally affected; total imports and consumption increase and domestic production and price decline as a result of the increased preferential market access, but by a small amount in every case. Where the impact of the EPA is felt is in the composition of EU imports. The removal of the import quota leads to an increase of

[17] Analogously to what has been done when simulating the removal of the EU quota on MFN imports, in this case too relevant corrected per unit transaction costs (those associated to ACP–EU-27 trade flows) have been adjusted by subtracting the estimate of the rent associated to the ACP TRQ obtained by solving the uncalibrated base model.

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001

ACP exports to the EU by one million t; MFN exports to the EU decrease by a similar amount. All ACP exports are now directed toward the EU, which means total ACP exports increase by a smaller amount. Simulation results for individual exporters are provided in Table 4. Imports and consumption in the other importing countries increase as a result of the expansion of the MFN export supply towards countries other than the EU because of the loss in relative competitiveness of MFN banana exports on this market; as a result, MFN exports to the EU decline by 970 thousand t, but total MFN exports decline only by 588 thousand t. Banana export revenue in ACP countries more than triples,[18] while it declines by 8.1% in MFN ones.

In the second scenario, the lower EU MFN tariff leads to an increase in EU imports and consumption and a drop in tariff revenue compared with results of the first simulation; EU domestic price is lower by 11%, consumption and imports increase by 5% and 6%, respectively, and tariff revenue declines by 25%; EU domestic production is only slightly affected by the policy change, as production in France and Spain remains unchanged (it equals the minimum required for farmers to collect their full entitlements of direct payments) and only production in Greece, Portugal and Cyprus adjusts to the change in domestic price.[19] The 114 €/t tariff remains short of "compensating" MFN countries for the loss of competitiveness of their exports on the EU market as a result of the EPA. In fact, MFN banana exports to the EU increase but remain well below those in the "Base 2016" scenario; analogously, ACP exports to the EU decline, but remain well above those when the EPA are not in place.

In order to allow for an assessment of the possible outcome of the negotiation between the EU and MFN exporters, in Fig. 1 total EU imports in 2016 and their composition by origin (ACP and MFN countries) are provided as a function of the EU MFN tariff. EU imports increase as the MFN tariff is reduced, while MFN exports to the EU increase and those from ACP countries decrease. The MFN tariff being equal to 176 €/t corresponds to scenario one in Table 3. If MFN countries are granted the same treatment as ACP ones (i.e. all EU imports of bananas occur duty- and quota-free), total EU imports reach 5.7 million t, MFN exports to the EU equal 4.6 million t and ACP exports contract to 1.1 million t, a volume still above their total exports in the no-EPA, no-DDA agreement, "Base 2016" scenario (the EU is now their only destination). The MFN tariff would have to be set at 60 €/t in order to ensure that 2016 MFN exports to the EU equal those with no EPA (4.076 million t); this tariff would yield EU imports (5.403 million t), and ACP exports (1.330 million t) that are well above their levels in the "Base 2016" scenario.

The other four scenarios (scenarios 3–6 in Tables 3 and 4) all assume that a DDA round agreement is reached, that in 2016 the implementation period is completed, and that bananas are not included by the EU among its "sensitive" products; the latter is mainly based (a) on unofficial information regarding developments in the negotiations on agriculture[20] and (b) on the presumption that the EU will be unlikely to reintroduce import quotas for bananas.

In the third scenario it is assumed that the DDA round agreement on agriculture will include the tentative bilateral agreement on bananas reached by the EU and the MFN countries in July 2008, and that bananas are included in the list of "tropical products"; based on the convergence emerged during the July 2008 meeting in Geneva, this is assumed to imply that all import tariffs on bananas (with the exception of the tariff imposed by the EU) less than, or equal to 20% are set equal zero and all those greater than 20% are reduced by 80%. This means that the EU MFN tariff is equal to 114 €/t, while bananas now enter the US as well as the aggregation of the other net importing countries duty-free. The results of the simulation are only slightly different from those obtained for the second scenario. EU consumption and imports are lower while, because of the increase of MFN exports to destinations other than the EU, EU imports from ACP countries, total MFN exports and imports by the Other net importing countries all increase, and MFN exports to the EU and US imports decline.

The fourth scenario is a reference scenario in which banana trade is fully liberalized, a policy option which is not on the horizon. As expected, EU consumption and imports are the largest among all scenarios considered. The same is true for MFN exports, both in total and to the EU. On the contrary, ACP countries experience a severe erosion of the preferential margins enjoyed under the EPA; ACP exports now equal 1130 thousand t, vs. 970 thousand t in the "Base 2016" scenario (the one with no EPA and no DDA round agreement) and 1780 thousand t in the scenario which is the most favourable for them (this is scenario one, in which the EPA are in place and the EU MFN tariff remains unchanged at 176 €/t). Banana export revenue in ACP countries is now 34% higher than in the "Base 2016" scenario, but 58% lower than in scenario one.

In the final two scenarios it is assumed that the July 2008 tentative bilateral agreement on bananas between the EU and MFN exporters does not become part of the final DDA round agreement and the EU MFN tariff on bananas is subject instead to the provisions for "tropical products." After the November 2008 determinations of the WTO Appellate Body on the more recent episodes of the banana dispute, what the EU bound tariff for bananas is – 680 €/t, the final bound tariff indicated in the EU schedules annexed to the 1994 Uruguay round Agreement on agriculture, or 176 €/t, the tariff introduced by the EU in 2006 – is an open issue. In the fifth scenario the EU bound tariff to be reduced by 80% is assumed to be 680 €/t; in the sixth to be 176 €/t. In both scenarios tariffs imposed by all importers apart from the EU drop to zero while the EU tariff on MFN imports becomes 136 €/t in scenario five and 35.2 €/t in scenario six.[21] These two alternatives possibly represent the boundaries for any decision on bananas in the final DDA agreement.

In scenario five ACP countries are better off with respect to scenario three (when the July 2008 tentative agreement on bananas reached by the EU and the MFN countries is included in the DDA round agreement), while the contrary is true for MFN banana exporters. In scenario six, the opposite is true; the MFN tariff being equal to 35.2 €/t instead of 114 €/t and 136 €/t, everything else remaining unchanged, EU imports are higher, ACP exports lower and MFN ones higher than in both scenarios three and five. US and Rest of the world imports move in the same direction as the EU MFN tariff; when this increases, MFN export supply to markets other than the EU expands, leading to an increase in exports towards these destinations and a decline in import prices.

A number of conclusions can be drawn from the results of the simulations.

EU banana production is only marginally affected by trade policy changes. In fact, production in its "outermost regions" is driven by the EU domestic policy regime, which isolates production decisions from changes in market prices, while production in Cyprus, Greece and continental Portugal, which respond to market price changes, is a very small share of EU banana production. However, all EU domestic producers are affected by trade policy changes because the price changes they induce affect revenues and incomes.

[18] Export revenue for ACP countries in the "Base 2016" scenario does not include quota rents, which are assumed to be enjoyed by holders of quota licences, located outside the exporting country (importers in the EU or multinational trading firms).

[19] This is the case in all other scenarios as well (Table 4).

[20] Bridges weekly (ICTSD, 2008a) reported that MFN exporters had prevailed on preference-receiving countries in having bananas removed from "a potential list of sensitive products" to be designated by major importers.

[21] In both cases the ad valorem equivalent of the tariff exceeds 20%.

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001

Table 3
Simulation results (2016).

	Base 2016 (no-EPA)	EPA					
		no-DDA round agreement		DDA round agreement			
		no EU–MFN countries agreement	EU–MFN countries "tentative" agreement (Geneva, July 2008)	EU–MFN countries "tentative" agreement (Geneva, July 2008)	All $t = 0$	Tariff reduction: $t \leqslant 20\% \rightarrow 0\%$ $t > 20\% \rightarrow -80\%$ and EU current bound $t = 680$ €/t	Tariff reduction: $t \leqslant 20\% \rightarrow 0\%$ $t > 20\% \rightarrow -80\%$ and EU current bound $t = 176$ €/t
		EU $t_{MFN} = 176$ €/t US $t = 0.5\%$ ROW $t = 18.9\%$ [1]	EU $t_{MFN} = 114$ €/t US $t = 0.5\%$ ROW $t = 18.9\%$ [2]	EU $t_{MFN} = 114$ €/t US $t = 0\%$ ROW $t = 0\%$ [3]	EU $t_{MFN} = 0$ €/t US $t = 0\%$ ROW $t = 0\%$ [4]	EU $t_{MFN} = 136$ €/t US $t = 0\%$ ROW $t = 0\%$ [5]	EU $t_{MFN} = 35.2$ €/t US $t = 0\%$ ROW $t = 0\%$ [6]
EU-27 consumption (000 t)	5430	5472	5742	5703	6197	5607	6045
EU-27 production (000 t)	579	579	576	576	570	577	573
EU-15 border price (€/t, tariff inclusive)	529	520	464	472	370	492	401
EU-27 imports (000 t)	4851	4893	5166	5126	5627	5030	5472
from ACP non-LDC	*775*	*1784*	*1542*	*1577*	*1132*	*1662*	*1269*
from MFN non-LDC	*4076*	*3109*	*3624*	*3550*	*4496*	*3367*	*4203*
from LDC	*0*	*0*	*0*	*0*	*0*	*0*	*0*
EU-27 tariff revenue (mill €)	717	547	413	405	0	458	148
USA imports (000 t)	4412	4475	4433	4388	4310	4404	4334
Rest of the world net imports (000 t)	4497	4620	4538	5171	5040	5196	5081
ACP non-LDC, total exports (000 t)	967	1784	1542	1577	1132	1662	1269
ACP non-LDC, export revenue (mill $)[a]	383	1213	918	958	513	1060	636
MFN non-LDC, total exports (000 t)	12,792	12,204	12,595	13,109	13,846	12,967	13,618
MFN non-LDC, export revenue (mill $)	4703	4321	4574	4915	5427	4819	5266
LDC, total exports (000 t)	0	0	0	0	0	0	0

[a] In the "Base 2016" scenarios it does not include quota rents.

Table 4
Simulation results, country details (2016) (000 t).

	Base 2016 (no-EPA)	EPA					
		no-DDA round agreement		DDA round agreement			
		no EU–MFN countries agreement	EU–MFN countries "tentative" agreement (Geneva, July 2008)	EU–MFN countries "tentative" agreement (Geneva, July 2008)	All $t = 0$	Tariff reduction: $t \leqslant 20\% \rightarrow 0\%$ $t > 20\% \rightarrow -80\%$ and EU current bound $t = 680$ €/t	Tariff reduction: $t \leqslant 20\% \rightarrow 0\%$ $t > 20\% \rightarrow -80\%$ and EU current bound $t = 176$ €/t
		EU $t_{MFN} = 176$ €/t US $t = 0.5\%$ ROW $t = 18.9\%$ [1]	EU $t_{MFN} = 114$ €/t US $t = 0.5\%$ ROW $t = 18.9\%$ [2]	EU $t_{MFN} = 114$ €/t US $t = 0\%$ ROW $t = 0\%$ [3]	EU $t_{MFN} = 0$ €/t US $t = 0\%$ ROW $t = 0\%$ [4]	EU $t_{MFN} = 136$ €/t US $t = 0\%$ ROW $t = 0\%$ [5]	EU $t_{MFN} = 35.2$ €/t US $t = 0\%$ ROW $t = 0\%$ [6]
Spain	294	294	294	294	294	294	294
France	255	255	255	255	255	255	255
Portugal	23	23	22	22	18	22	20
Greece	2	2	1	1	1	1	1
Cyprus	5	5	4	4	2	4	2
EU-27, production	*579*	*579*	*576*	*576*	*570*	*577*	*573*
Ivory Coast	243	508	429	441	297	468	341
Cameroon	14	34	28	29	17	31	20
Dominican Republic	353	602	528	539	403	565	445
Belize and Suriname	93	163	142	145	107	153	119
Other ACP non-LDC	264	478	414	423	307	446	343
ACP non-LDC, total exports	*967*	*1784*	*1542*	*1577*	*1132*	*1662*	*1269*
Ecuador	5849	5581	5759	5996	6332	5931	6228
Colombia	1562	1494	1540	1600	1685	1583	1659
Costa Rica	2106	2031	2081	2142	2236	2124	2207
Panama	325	315	322	331	345	328	341
Honduras	405	383	397	416	443	411	434
Brazil	77	73	76	79	83	78	82
Guatemala	2468	2327	2421	2546	2722	2512	2668
Other MFN non-LDC	0	0	0	0	0	0	0
MFN non-LDC, total exports	*12,792*	*12,204*	*12,595*	*13,109*	*13,846*	*12,967*	*13,618*
ACP LDC	0	0	0	0	0	0	0
MFN LDC	0	0	0	0	0	0	0
LDC, ACP and MFN	*0*	*0*	*0*	*0*	*0*	*0*	*0*

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001

Hence, the more open to imports the EU market is, the lower the domestic price and domestic producer incomes. The best scenario for EU banana producers is the one with the EPA in place and no WTO agreement of any sort; the worst is the unlikely scenario in which it is assumed that the conclusion of the Doha round brings a full liberalization of the banana market. The ranking of the policy options for EU consumers is the reverse of that for producers.

In countries other than the EU, imports are affected by the EU import regime as well as by their own. The more open the EU market, the higher the price of bananas in the other importing countries and the lower their imports. However, when import tariffs in importing countries other than the EU are all set at zero as a result of the conclusion of the Doha round and the implementation of its provisions on tropical products, then, everything else held constant, US imports are expected to decrease rather than increase. This is because the tariff the US imposes on its banana imports is very low, much lower than that imposed by the other main net importers. This means that for the US the "trade diversion" effect of the elimination of import tariffs in all countries other than the EU prevails over the "trade creation" effect, and MFN exports to the US (which is the second largest importer of bananas) decrease, while those directed to the "Rest of the world" net importers, which imposed larger tariffs, expand significantly.

For MFN exporters the issue is trade liberalization; the more liberalized banana trade becomes, the higher export prices, exports and export revenue. The preferred scenario is the one in which all import tariffs are set at zero, and the worst one is when EPA are in place and no WTO agreement, either multilateral or the tentative July 2008 accord, is concluded and implemented. For MFN countries the conclusion of the DDA round is always more beneficial than the July 2008 agreement with the EU.

For ACP countries the most favourable scenario is when they have access to the EU market quota- and duty-free and neither the DDA round or the tentative July 2008 agreement are concluded and implemented (scenario one). A successful conclusion of the DDA round could have a limited or a very significant impact on the erosion of the preferences the EU grants to ACP countries, depending on the terms of the final agreement. At one extreme, if bananas are included among the tropical products and the EU bound tariff to be reduced is assumed to be 680 €/t, then preference erosion for ACP countries would be limited. At the other extreme, if a final agreement of the DDA round is reached and it calls for the elimination of all import restrictions for bananas, then most of the benefits to ACP countries from the EPA would vanish. Under this scenario, ACP exports are forecast to be higher than in the no-EPA scenario by only 17%, rather than by 84% when the EPA are in place and no WTO agreement is reached. If only the tentative July 2008 agreement is implemented, it would imply the erosion of one third of the benefits resulting from the preferences granted by the EU to ACP countries with the EPA. If the EU MFN tariff is to be reduced, then it would be better for ACP countries if it occurs within the framework of the conclusion of the Doha round, because this will bring an increase in market access in countries other than the EU and a partial diversion of MFN export supply towards non-EU markets, increasing ACP competitiveness on the EU market as well as the EU import price.

This means that MFN and ACP banana exporters share at least one common interest: if a WTO agreement is to be reached, this should be the conclusion of the DDA round rather than a deal between MFN countries and the EU alone, along the lines of the tentative July 2008 accord.

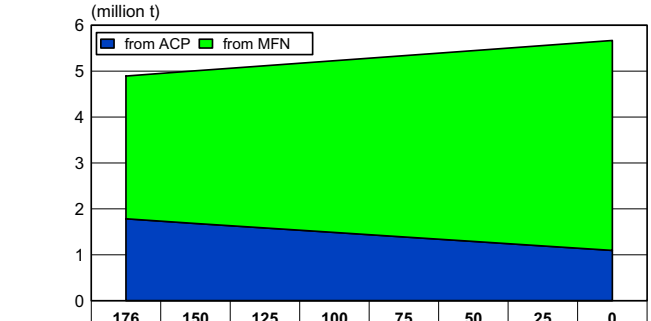
Finally, the modelling exercise suggests that by 2016 LDC will become unable to compete with MFN and ACP countries on the banana market, and that this would be the case regardless of the banana trade policy regimes in place, i.e. even without the implementation by the EU of the EPA (Table 3, "Base 2016" scenario). Nevertheless, the conclusions of the EPA implied an erosion of the preferences granted by the EU under the EBA initiative – an erosion which countries have not so far claimed deserves any compensation. With respect to the different possible WTO agreements considered, the more the EU market is open to MFN exports, the worse for the competitiveness of LDC bananas on this market.

Sensitivity analyses

As is always the case, the results of a modelling exercise depend, at least to a certain extent, on the quality of the information used and the assumptions made. The main issues to be aware of when considering the results of this study are: the quality of the data available; the assumption that all actors involved in the banana market – i.e. countries as well as multinationals involved in banana production and trade and large retail agglomerations – behave competitively; the assumption that bananas are a homogeneous product (which, among other things, means ignoring the growing importance of "fair trade" and organically grown bananas); the assumption that banana producers in France and Spain are risk neutral, or risk averse but operate under no uncertainty; and finally, the assumption that the supply of transportation services is infinitely elastic (i.e. banana trading is not constrained by transportation capacity, and transportation and other transaction costs do not vary either as a function of the volume traded or over time).

In order to assess the robustness of the results obtained to some of the assumptions made regarding the parameters of the model, sensitivity analyses have been performed on some of those which appear potentially more critical: (i) the €/$ exchange rate; (ii) the extent of production increases over time due to technical changes; (iii) the risk behaviour of banana producers in France and Spain; (iv) the price responsiveness of banana exports in ACP countries; and (v) the changes overtime in transaction costs. The sensitivity analyses have been conducted for scenario two in Table 3, i.e. for the scenario in which EPA are in place, no DDA round agreement is reached and the EU implements the July 2008 tentative bilateral agreement with MFN exporters and the US to put an end to the WTO dispute on bananas. The results presented in Table 5 are intended to provide the reader with a sense of "to what extent" and "in which direction" the simulations discussed above would change if different assumptions were made with respect to some of the parameters used in the model.

In the simulations presented above the €/$ exchange rate in 2016 is assumed to be 1.5 (in the "Base 2005" model it was 1.2441); two alternative values have been considered to test the sensitivity of the results to this parameter: 1.8 and 1.2. Changes



	176	150	125	100	75	50	25	0
Total imports	4,893	5,008	5,117	5,227	5,337	5,447	5,558	5,668
from MFN	3,109	3,325	3,533	3,74	3,948	4,156	4,365	4,573
from ACP	1,784	1,682	1,585	1,487	1,389	1,291	1,193	1,095

Fig. 1. EU-27 banana imports (in total and by origin) as a function of the MFN tariff (2016; EPA in place, no DDA round agreement; million tonnes).

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001

Table 5
Sensitivity analysis of simulation results to changes in selected parameters of the model. Policy scenario: EPA, EU–MFN countries "tentative" agreement (Geneva, July 2008), no DDA round agreement. (2016).

	EPA + EU–MFN countries Geneva July 2008 "tentative agreement" + no DDA round agreement (*base simulation*)	Sensitivity analyses					
		US$/€ exchange rate = 1.2 (instead of 1.5)	US$/€ exchange rate = 1.8 (instead of 1.5)	Yearly percent increases in yields limited to max 2%	Banana production in France and Spain equal at least to 115% of the minimum required for producers to receive the full amount of support they are entitled to	Export supply elasticity for Cameroon and Ivory Coast = 1 (instead of 1.5)	All bilateral international trade transaction costs increased by 30%
		[a]	[b]	[c]	[d]	[e]	[f]
EU-27 consumption (000 t)	5742	5335	6018	5586	5746	5740	5617
EU-27 production (000 t)	576	578	574	577	658	576	576
EU-15 border price (€/t, tariff inclusive)	464	547	408	496	463	465	488
EU-27 imports (000 t)	5166	4757	5444	5009	5088	5164	5041
from ACP non-LDC	*1542*	*1428*	*1649*	*771*	*1538*	*1515*	*1542*
from MFN non-LDC	*3624*	*3329*	*3795*	*4238*	*3550*	*3649*	*3499*
from LDC	*0*	*0*	*0*	*0*	*0*	*0*	*0*
EU-27 tariff revenue (mill €)	413	380	433	483	405	416	399
USA imports (000 t)	4433	4457	4419	4211	4439	4431	4339
Rest of the world net imports (000 t)	4538	4585	4511	5422	4550	4534	4245
ACP non-LDC, total exports (000 t)	1542	1428	1649	771	1538	1515	1542
ACP non-LDC, export revenue (mill $)	918	794	1044	509	914	902	920
MFN non-LDC, total exports (000 t)	12,595	12,372	12,725	13,871	12,539	12,614	12,083
MFN non-LDC, export revenue (mill $)	4574	4428	4659	5732	4537	4586	4267
LDC, total exports (000 t)	0	0	0	0	0	0	0

in the exchange rate modify the competitiveness of EU imports, regardless of their origin, *vis a vis* domestic production and effect the price of bananas in the EU market; a higher exchange rate increases the competitiveness of EU imports and lowers the price, while a lower exchange rate makes imported bananas less competitive on the EU market and causes the price of bananas in the EU to increase. When the results obtained assuming the €/$ exchange rate in 2016 to equal 1.2 and 1.8 (simulations [a] and [b] in Table 5) are compared with those obtained in the base simulation, assuming it equals 1.5, differences appear relatively small. When the €/$ exchange rate is 1.8 EU imports and ACP and MFN exports to the EU are 5%, 7% and 5% larger, respectively; MFN total exports increase by 1% only, as their exports to countries different from the EU contract. When the exchange rate is set equal 1.2 EU imports and ACP and MFN exports to the EU are 8%, 7% and 8% lower, respectively (MFN total banana exports decline by 2%).

The sensitivity of the results presented in the previous section to the assumptions made regarding expected technical developments in banana production between 2005 and 2016 has been assessed by imposing a 2% maximum constraint on yearly yield increases; this means using for Cyprus, Ivory Coast, Dominican Republic, Other non-LDC ACP, and Guatemala, and, among the importers, in the Rest of the world, a percent yearly increase in yields lower than the one observed between 1992–1995 and 2002–2005. In this case results appear to be quite sensitive to the assumptions made (simulation [c] in Table 5). Among exporters the main impact is a significant reduction in the aggregate competitiveness of ACP banana exports *vis a vis* those from MFN countries; the reduction in the rate of adoption of technical changes among the "Rest of world net importers" makes their import demand function expand significantly. EU imports are now 3% lower with respect to those in the simulation presented in the previous section and Rest of the world imports 20% higher; ACP exports drop by 50%,[22] while total MFN exports are 10% higher.

In order to test how sensitive the results obtained are to the assumptions made regarding the risk behaviour of banana producers in France and Spain under uncertain production conditions, they have been assumed to be risk averse and, as a result, to overshoot, on average, the production target which allows them to receive the full amount of support they are entitled to; in simulation [d] in Table 5 it is assumed that they decide to produce, on average, 115% of their production target. EU production increases by 14% (production in Cyprus, Greece and Portugal slightly declines as a result of the small reduction in the EU domestic price); the trade impact of this assumption is limited as EU imports decline only by 1.5%.

The sensitivity of the results obtained to the assumptions made concerning the elasticity of the export supply functions in ACP countries has been assessed by lowering those of Ivory Coast and Cameroon (these two countries alone account for almost 60% of ACP banana exports) from 1.5 to 1, making their exports less price responsive (simulation [e] in Table 5). The results obtained in the base simulation appear to be robust with respect to these changes, as ACP exports to the EU are now lower by less than 1%.

Finally, in simulation [f] all bilateral transaction costs associated with international trading are increased by 30% to assess whether the results presented in the section above are robust to the assumption that transaction costs do not change over time or with the volume traded. The relatively large increase in international transaction costs which has been considered has limited effects on the results of the simulations; it makes all exports more costly and changes the relative competitiveness of exports from different sources on each market as a result of the incidence of their transaction costs to that specific destination in the equilibrium price in the latter; while MFN total exports contract by 4.1% (and those to the EU by 3.4%), ACP exports do not change; EU imports decline by 2.4%, and those by the US and the Rest of the world net importers by 2.1% and 6.5%, respectively.

Conclusions

The goal of this paper was twofold: to provide a quantitative assessment of the impact on the banana market (a) of the expansion in trade preferences the EU granted to ACP countries with the EPA and (b) of the erosion of these preferences implied by different possible endings, if any, of the DDA round or by the positive conclusion of bilateral negotiations between the EU, on one side, and MFN exporters and the US, on the other, to find a solution to the seemingly never ending WTO dispute on bananas.

The results presented confirm the importance of the benefits the implementation of the EPA generates for ACP countries on the banana market, at the expense of MFN exporters. The simulations performed suggest the EPA will have only minor implications for the EU domestic market for bananas, while the impact on the composition of EU imports by origin will be significant. The MFN tariff would have to be reduced to 60 €/t, everything else held constant, to leave MFN exports unchanged with respect to the scenario in which the EPA are not implemented (while ACP exports would remain well above their level with no EPA).

A successful conclusion of the DDA round could have a limited or a very significant impact on the erosion of the preferences the EU grants to ACP countries, depending on what is eventually agreed. At one extreme, if bananas are included among the tropical products and the EU bound tariff to be reduced is assumed to be 680 €/t, then preference erosion for ACP countries would be limited. At the other extreme, if a final agreement of the DDA round is reached and it calls for the elimination of all import restrictions for bananas, then most of the benefits to ACP countries from the EPA would vanish; ACP exports are now forecasted to be higher than in the no-EPA scenario only by 17%, rather than by 84% when the EPA are in place and no agreement whatsoever is reached at the WTO. If the tentative bilateral agreement reached in July 2008 in Geneva by the EU and MFN countries is implemented, it would imply the erosion of one third of the benefits resulting from the preferences granted by the EU to ACP countries with the EPA.

While these conclusions appear robust to changes in a number of the assumptions made, they are relatively sensitive to the hypotheses on expected changes in yields. Because ACP exporters are less efficient in producing and marketing bananas than MFN ones, this suggests that aid targeted at improving efficiency in banana production in ACP and LDC countries may be as beneficial as granting them preferential market access, and that the negative effects of preference erosion can be offset by providing developing countries which are granted trade preferences with the financial and in-kind resources needed to improve the logistic infrastructures and technical efficiency of their banana industry. This result is consistent with ACP countries' request for additional technical and financial aid from the EU aimed at improving the market competitiveness of their bananas as a condition for their acceptance of the tentative agreement reached by the EU and MFN exporters in Geneva in July 2008.

[22] Because the changes in the model parameters considered effects only some of the ACP countries, they modify the relative competitiveness of their banana supplies; total banana exports of Dominican Republic and "Other non-LDC ACP" decline by more than 50% and those by Ivory Coast by 22%, while exports by Cameroon and Belize and Suriname expand by 22% and 8%, respectively.

Acknowledgements

I wish to thank Christophe Bellman, Jonathan Hepburn, Quirino Paris, Luca Salvatici, Margherita Scoppola and three anonymous

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001

referees of this Journal for helpful comments on earlier drafts of the paper. Financial support received by the "Agricultural Trade Agreements (TRADEAG)" (Specific Targeted Research Project, Contract No. 513666) and the "New Issues in Agricultural, Food and Bio-energy Trade (AGFOODTRADE)" (Small and Medium-scale Focused Research Project, Grant Agreement No. 212036) research projects funded by the European Commission, and by the "European Union policies, economic and trade integration processes and WTO negotiations" research project funded by the Italian Ministry of Education, University and Research (Scientific Research Programs of National Relevance 2007) is gratefully acknowledged. The views expressed in this paper are the sole responsibility of the author and do not necessarily reflect those of the European Commission.

References

Alexandraki, K., Lankes, H.P., 2004. The Impact of Preference Erosion on Middle-Income Developing Countries. IMF Working Paper. WP/04/169. September.

Anania, G., 2001. Modeling Agricultural Trade Liberalization. A Review. Paper Presented at the Annual Meeting of the American Agricultural Economics Association, Chicago, August 5–8. Available from: <http://ageconsearch.umn.edu/bitstream/20758/1/ap01an01.pdf>.

Anania, G., 2006. The 2005 WTO arbitration and the new EU import regime for bananas: a cut too far? European Review of Agricultural Economics 33 (4), 449–484.

Anania, G., 2008. The 2006 reform of the EU domestic policy regime for bananas. An assessment of its impact on trade. Journal of International Agricultural Trade and Development 4 (2), 255–271.

Anania, G., Drogué, S., Paris, Q., 2009. Calibrating Mathematical Programming Spatial Models. AgFoodTrade Working Paper. Available from: <http://www.agfoodtrade.eu/>.

Arias, P., Hallam, D., Hubbard, L., Liu, P., 2005. The elusive tariff equivalent for the EU banana market. Commodity Market Review 2005–2006, 107–124.

Armington, P. A., 1969. A Theory of Demand for Products Distinguished by Place of Production. IMF Staff Papers.16.

Bouët, A., 2008. The Expected Benefits of Trade Liberalization for World Income and Development. Opening the "Black Box" of Global Trade Modeling. Food Policy Review No. 8. International Food Policy Research Institute, Washington DC.

Bouët, A., Bureau, J.-C., Decreux, Y., Jean, S., 2005. Multilateral agricultural trade liberalization: the contrasting fortunes of developing countries in the Doha round. The World Economy 28 (9), 1329–1354.

Bouët, A., Fontagné, L., Jean, S., 2006. Is erosion of tariff preferences a serious concern? In: Anderson, K., Martin, W. (Eds.), Agricultural Trade Reform & the Doha Development Agenda. Palgrave Macmillan & World Bank, pp. 161–192.

Bureau, J.-C., Disdier, A.-C., Ramos, P., 2007. A Comparison of the Barriers Faced by Latin American and ACP Countries' Exports of Tropical Products. Issue Paper No. 9, June. International Centre for Trade and Sustainable Development (ICTSD), Geneva.

Candau, F., Jean, S., 2005. What Are EU Trade Preferences Worth for Sub-Saharan Africa and Other Developing Countries? CEPII Working Paper No. 2005/19. December.

Deodhar, S.Y., Sheldon, I.M., 1996. Estimation of imperfect competition in food marketing: a dynamic analysis of the German banana market. Journal of Food Distribution Research (October), 1–10.

EC, 2006. Council Regulation amending Regulations (EEC) No. 404/93, (EC) No. 1782/2003 and (EC) No. 247/2006 as regards the banana sector. Reg. No. 1782/2006, 19 December.

EC, 2007. Council Regulation applying the arrangements for products originating in certain states which are part of the African, Caribbean and Pacific (ACP) Group of States provided for in agreements establishing, or leading to the establishment of, Economic Partnership Agreements. Reg. No. 1528/2007, 20 December.

FAO, 2003. The World Banana Economy 1985–2002. Raw Materials, Tropical and Horticultural Product Service. Commodities and Trade Division. FAO, Rome.

Francois, J.F., Reinert, K.A. (Eds.), 1997. Applied Methods for Trade Policy Analysis. A Handbook. Cambridge University Press, Cambridge.

Gallezot, J., Bureau, J.-C., 2004. The utilization of trade preferences by OECD countries: the case of agricultural and food products entering the European Union and United States. OECD, Paris.

Goodison, P., 2007. The ACP Experience of Preference Erosion in the Banana and Sugar Sectors. Issue Paper No. 7, June. International Centre for Trade and Sustainable Development (ICTSD), Geneva.

Guyomard, H., Le Mouël, C., 2003. The new banana import regime in the European Union: a quantitative assessment. The Estey Centre Journal of International Law and Trade Policy 4, 143–161.

Guyomard, H., Laroche, C., Le Mouël, C., 1999a. An economic assessment of the Common Market Organization for bananas in the European Union. Agricultural Economics 20, 105–120.

Guyomard, H., Laroche, C., Le Mouël, C., 1999b. Impacts of the Common market Organization for bananas on the European Union markets, international trade, and welfare. Journal of Policy Modeling 21, 619–631.

Guyomard, H., Le Mouël, C., Levert, F., 2006. The tariff-only import regime for bananas in the European Union: setting the tariff at right level is impossible mission. Paper presented at the 26th Conference of the International Association of Agricultural Economists, Gold Coast (Australia), August.

Herrmann, R., Sexton, R.J., 2001. Market conduct and the economic impacts of a tariff-rate quota policy: the European banana case. In: Moss, C., Rausser, G.B., Schmitz, A., Taylor, T., Zilbermann, D. (Eds.), Agricultural Globalization, Trade and the Environment. Kluwer Academic Press, Dordecht, pp. 153–177.

Howitt, R.E., 1995. Positive mathematical programming. American Journal of Agricultural Economics 77 (May), 329–342.

ICTSD, 2008a. Bridges Weekly Trade News Digest 12(16), 9 May.

ICTSD, 2008b. Bridges Weekly Trade News Digest. Daily Update Issue 1. 28 July.

Josling, T.E., 2003. Bananas and the WTO: testing the new dispute settlement process. In: Josling, T.E., Taylor, T.G. (Eds.), Banana Wars. The Anatomy of a Trade Dispute. CABI Publishing, Wallingford, pp. 169–194.

Kersten, L., 1995. Impacts of the EU banana market regulation on international competition, trade and welfare. European Review of Agricultural Economics 22 (3), 321–335.

Lippoldt, D., Kowalski, P., 2005. Trade Preference Erosion: Potential Economic Impacts. In: OECD Trade Policy Working Papers No. 17. TD/TC/WP(2004)30/FINAL. 26 April. OECD Publishing.

Low, P., Piermartini, R., Richtering, J., 2006. Non-Reciprocal Preference Erosion Arising from MFN Liberalization in Agriculture: What are the Risks? WTO Economic Research and Statistics Division. Staff Working Paper ERSD-2006-02. March.

Manchin, M., 2006. Preference utilisation and tariff reduction in EU imports from ACP countries. The World Economy 29, 1243–1266.

McCorriston, S., 2000. Market structure issues and the evaluation of the reform of the EU banana regime. The World Economy 23, 923–937.

Panagariya, A., 2002. EU preferential trade arrangements and developing countries. The World Economy 25 (10), 1415–1432.

Read, R., 2001. The anatomy of the EU-US WTO banana trade dispute. The Estey Centre Journal of International Law and Trade Policy 2 (2), 257–282.

Samuelson, P.A., 1952. Spatial price equilibrium and linear programming. American Economic Review 42, 283–303.

Scoppola, M., 2008. Tariffication of Tariff Rate Quotas under Oligopolistic Competition: The Case of the EU Import Regime for Bananas. AgFoodTrade Working Paper 2008-02. <http://www.agfoodtrade.eu/>.

Spreen, T.H., Paggi, M., Flambert, A., Jauregui, C., 2004. Implications of Changes in the EU Banana Trade Regime on World Banana Trade. Food and Resource Economics Department, University of Florida, Mimeo.

Takayama, T., Judge, G.G., 1971. Spatial and Temporal Price and Allocation Models. North Holland, Amsterdam.

Tangermann, S., 2002. The Future of Preferential Trade Arrangements for Developing Countries and the Current Round of WTO Negotiations on Agriculture. FAO, Rome.

Tangermann, S., 2003a. European interests in the banana market. In: Josling, T.E., Taylor, T.G. (Eds.), Banana Wars. The Anatomy of a Trade Dispute. CABI Publishing, Wallingford, pp. 17–44.

Tangermann, S., 2003b. The European common banana policy. In: Josling, T.E., Taylor, T.G. (Eds.), Banana Wars. The Anatomy of a Trade Dispute. CABI Publishing, Wallingford, pp. 45–66.

Taylor, T.G., 2003. Evolution of the banana multinationals. In: Josling, T.E., Taylor, T.G. (Eds.), Banana Wars. The Anatomy of a Trade Dispute. CABI Publishing, Wallingford, pp. 67–95.

Thagesen, R., Matthews, A., 1997. The EU's common banana regime: an initial evaluation. Journal of Common Market Studies 35, 615–627.

van Tongeren, F., van Meijl, H., Surry, Y., 2001. Global models applied to agricultural and trade policies: a review and assessment. Agricultural Economics 26, 149–172.

Vanzetti, D., Fernandez de Cordoba, S., Chau, V., 2005. Banana Split. How EU Policies Divide Global Producers, UNCTAD. Policy Issues in International Trade and Commodities Study Series No. 31. UNCTAD, Geneva.

Wainio, J., Gibson, P., 2004. The significance of US nonreciprocal trade preferences for developing countries. In: Anania, G., Bohman, M., Carter, C., McCalla, A. (Eds.), Agricultural Policy Reform and the WTO. Where Are We Heading? Cheltenham:Edward Elgar, pp. 369–389.

World Bank, various years. World Development Report, The World Bank, Washington DC.

WTO, 2004. Doha Work Programme. Decision Adopted by the General Council on 1 August 2004, WT/L/579, 2 August.

WTO, 2008. Revised draft modalities for agriculture, Committee on Agriculture, Special Session, Document TN/AG/W/$/Rev.4, 6 December.

Yamazaki, F., 1996. Potential erosion of trade preferences in agricultural products. Food Policy 21 (4/5), 409–417.

Yang, Y., 2005. Africa in the Doha round: Dealing with Preference Erosion and Beyond. IMF Policy Discussion Paper PDP/05/08. November.

Yu, W., Jensen, T.V., 2005. Tariff preferences, WTO negotiations and the LDCs: the case of the "Everything But Arms" initiative. The World Economy 28 (3), 375–405.

Please cite this article in press as: Anania, G. EU Economic Partnership Agreements and WTO negotiations. A quantitative assessment of trade preference granting and erosion in the banana market. Food Policy (2009), doi:10.1016/j.foodpol.2009.11.001