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An Impact Study of the Economic Partnership Agreements in the Six ACP Regions

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Abstract

This article provides a detailed analysis of the trade-related aspects of economic partnership agreement (EPA) negotiations for the six Africa–Caribbean–Pacific (ACP) negotiation groups including ECOWAS, CEMAC+, COMESA, SADC, CARIFORUM and Pacific. We use a partial equilibrium model—focusing on the demand side—at the HS6 level (covering 5,113 HS6 products). Two lists of sensitive products are constructed: focusing on the agricultural sectors and tariff revenue preservation. For the European Union (EU), EPAs must translate into 90% fully liberalised bilateral trade to be World Trade Organisation compatible. We use this criterion to simulate EPAs for each negotiating regional block. ACP exports to the EU are forecast to be 10% higher with EPAs, than under the generalised system of preference 'Everything But Arms' option. ACP countries, especially African ones, are forecast to lose an average of 71% of tariff revenues on EU imports in the long run. Imports from other regions of the world will continue to provide tariff revenues. Thus, if we compute tariff revenue losses on total ACP imports, losses are only 25% on average over the long run and as low as 19% if the product lists are optimised. The final impact depends on the importance of tariffs in government

revenue and on potential compensatory effects. However, this long-term and less visible effect will depend mainly on the capacity of each ACP country to reorganise its fiscal base.

JEL classification: F13, F15, O55

1. Introduction

The negotiations on economic partnership agreements (EPAs) involving the European Union (EU) and six African, Caribbean and Pacific (ACP) negotiation groups were scheduled to be concluded on 31 December 2007. In 2007, seven interim agreements and a Caribbean EPA were negotiated and signed. All establish free-trade areas (FTAs) for goods between the EU and various ACP countries that are compatible with the provisions of GATT Article XXIV[1] and, in the case of the Caribbean EPA, a services agreement compatible with the provisions of GATS Article V. In total, thirty-six of the seventy-seven ACP countries have concluded an interim agreement or EPA with the EU: ten least developed countries (LDCs) and twenty-six non-LDCs. Among the remaining ACP countries, thirty-one LDCs benefit from duty- and quota-free access to the EU under the generalised system of preferences (GSPs) 'Everything But Arms' (EBA) arrangement. The remaining ten non-LDCs are eligible for the standard GSP. Since then, negotiations have been aimed at full regional EPA, including a large range of trade in goods, services and trade-related areas, to replace the interim agreements.

For these agreements to be World Trade Organisation (WTO) compatible, they need to include reciprocal market access, which covers 'substantially all' the trade.[2] However, EPAs include several other elements, such as support for deep integration and development assistance. Moreover, it was hoped that these agreements would promote regional integration among sub-groups of ACP countries.[3]

ACP negotiation groups are a combination of relatively poor developing countries and LDCs; most of which are highly dependent on trade relationships with the EU. In countries where tariff revenues constitute a

[1] Article XXIV provides exceptions to MFN treatment for customs unions (CUs) and FTAs.

[2] The EU Commission considers that a PTA is WTO compatible if 90% of bilateral trade is fully liberalised.

[3] Deep integration involves integrating policies and institutions that facilitate trade by reducing or eliminating regulatory or behind-the-border impediments to trade.

significant amount of government budgetary resources, this dependence may engender sizeable losses in tax revenue.

Looking at the nature of the trade relations between the EU and the ACP,[4] it is clear that, in these negotiations, the stakes are far higher for the ACP than for the EU. Despite the preferences afforded by the EU in the course of a longstanding partnership, less than 2.5% of EU imports come from the ACP region, with West Africa accounting for half of this amount. In contrast, nearly 30% of ACP exports go to the EU and 28% of their imports come from there.[5]

Moreover, ACP economies are often very specialised. One single product category (out of the 5,113 categories of products in the HS6 classification) accounts for more than 50% of total exports in one country in two, and more than 70% in one country in three.

Computable general equilibrium (CGE) models may be appropriate to assess the overall trade and welfare effects of these agreements. Social accounting matrices are required, with comprehensive information on each economy. However, for most ACP countries, these data are of poor quality, when available, and CGE modelling is not an option.[6] Moreover, due to the high level of product specialisation in numerous ACP countries, applying a CGE model that describes the whole economy at an aggregated level (or even at sector level) risks missing key impacts. Finally, working at product level is crucial to produce the results with policy relevance because of the need to select 'sensitive products' that will be excluded from liberalisation.

Given the trade-off between the detailed product representation and general equilibrium effects, some studies employ a partial equilibrium (PE) model: we adopt the same approach in the present study. The PE models normally address the issue of welfare simply by comparing trade creation and trade diversion effects, ignoring other sources of welfare

[4] See Section 3.2 to know the different sources used to calculate the trade figures presented.

[5] Large heterogeneity exists, not only among the different regional groups, but also within them. Countries such as Cameroon, for which the EU is the major trading partner, contrast with countries in the Caribbean and Pacific areas, for which the EU is a more marginal trading partner, mainly because of geographical distance.

[6] Using the GTAP model and database, Keck and Piermartini (2008) tentatively estimate the impact of a fully reciprocal EPA between SADC countries and the EU. The authors find that the welfare of the SADC sub-region would grow by USD 1.5 billion, due in part to the improvement in their terms of trade. Using the same methodology, Perez (2006) examines whether EPAs are preferable for ACP countries compared with other main alternatives.

effects such as the impact of more efficient reallocation of resources in the economy or in the changes to the terms of trade. Thus, we choose not to analyse welfare effects within this framework. Also, the PE models usually rely on the assumption of common price elasticity for all imports and perfect substitutability between goods. In our study, we pay particular attention to this latter issue.

Both types of approaches tend to ignore some adjustment costs, such as those that emerge from the reallocation of factors of production across sectors, or the reorganisation of the fiscal base and the shift to other forms of taxation to replace tariffs. Both also generally assume that tariff cuts will translate into proportional reductions in prices to the benefit of the final consumer. In reality, it is likely that some of the cut will be captured by the producers/importers, and/or by the exporter due to an incomplete pass-through of tariff changes to consumer prices (see Gasiorek and Winters, 2004).

Overall, the studies that employ PE models tend to show that EU exporters are the main beneficiaries of EPAs, because their sales to ACP markets increase substantially after their implementation (Scollay, 2002; COMESA Secretariat, 2003; Ndlela and Tekere, 2003; Busse *et al.*, 2004; Karingi *et al.*, 2005). EPAs push down the prices of imports from the EU, thus reducing imports from non-EU countries. At the same time, the welfare of ACP consumers increases due to a reduction in prices. In some cases, however, if less-efficient EU producers replace more efficient non-European producers, this type of import substitution is associated with a relative loss in overall economic efficiency, a situation that tends to reduce the welfare of ACP countries. Additionally, PE studies emphasise the potential negative impact of EPAs on the public revenues of ACP countries, with potential large tariff revenue losses.

Milner *et al.* (2005) provide an innovative analysis of the decomposition of welfare effects in a PE framework. Along with trade creation and trade diversion, they explicitly model the resulting consumption effects. The method is applied to an East African Cooperation (EAC: Kenya, Tanzania and Uganda)–EU EPA, as an illustration, and the effects for Tanzania and Uganda are estimated. The analysis points to only limited welfare effects (excluding revenue effects), whether positive (for Uganda) or negative (for Tanzania).

Our analysis aims to improve on the existing PE studies in several ways:

- The model is designed to allow for a detailed evaluation of negotiations over EPA and the alternatives. We use data at the HS6 level for both trade and protection. Working at the HS6 level permits

a better handling of tariff heterogeneity across products and partners, avoiding problems of aggregation. In fact, the gains from tariff removal will depend on the reductions to tariff dispersion (Anderson and Neary, 2007), which is heavily cushioned by increasing levels of tariff aggregation. Moreover, the way tariffs are aggregated plays a crucial role.[7] Although some sophisticated aggregators are available (Anderson and Neary, 2003), they have some severe flaws that can lead to important biases in the results (Anderson, 2006).

- We deal with the situation of concessions to ACP countries to exclude some products from liberalisation. We consider different selection methods in order to establish whether the approach to selection makes a difference. We also take account of the products currently covered by special protocols. Finally, we implement a capacity constraint for some specific products.
- Different scenarios are simulated in order to assess the impact of EPAs and alternatives. In assessing the impact of EPAs, we use the GSP/EBA combination of market access (which is the actual alternative) as the counterfactual rather than the status quo (Cotonou-Lomé).[8]
- We do not rely on the hypothesis of perfect import substitutability. Instead, we introduce a horizontal and vertical differentiation between products. In order to take account of the difference in the levels of development between the two regions, we give centrality to the hypothesis that local or regional products in the ACP countries are different from European products and thus less substitutable.

Although the various computations are made at the level of national economies and the HS6 level, most of the results are presented at the level of ACP negotiating regions and aggregated sectors. This is done for reasons of space.

[7] For instance, a simple average between tariffs has a poor level of relevance, because it gives the same weight to an important product than to a marginal one. On the contrary, the widely used trade-weighted average keeps the ranking between the relative importance of the different products, but there is still a problem of endogeneity between tariff and trade. When a tariff is prohibitive, there is no trade or low trade, which means no weight. In the end, this method biases downwards the protection level.

[8] Many commentators erroneously compare EPA negotiations to the status quo (Cotonou-Lomé). In reality, it has been clearly stated by EU officials, in the absence of EPAs, ACP countries would revert to the situation of other developing economies in the WTO: the GSP or potentially the GSP+ for those developing countries that have signed and implemented a number of international conventions on sustainable development. See, for instance, the EU Commissioner Peter Mandelson speech in front of the EU Parliament on 5 November 2007, excluding any solutions that will maintain Cotonou preferences outside the EPA framework.

Table 1: ACP Average Applied Tariffs. Regional Level (Per cent)

	ECOWAS	CEMAC+	COMESA	SADC	CARIFORUM	Pacific	European Union
ECOWAS	4.0	4.2	7.5	7.3	5.2	6.0	8.1
CEMAC+	11.7	1.3	14.0	16.1	11.9	30.0	13.5
COMESA	11.2	8.6	3.7	12.7	19.7	3.8	13.1
SADC	8.7	10.3	9.6	14.6	3.3	36.4	7.1
CARIFORUM	1.0	0.1	14.0	1.3	0.3	14.0	9.5
Pacific	8.8	16.2	9.2	5.5	12.0	40.9	12.0

Source: Authors' calculations using MAcMapHS6-v2. Reference group weighting scheme.

However, we provide some tentative insights into the heterogenous impacts on countries and sectors. Geographical coverage is constrained by data availability (see Appendix B). It should be borne in mind that there is strong heterogeneity between and within regions. One of the key differences is the number of LDCs within each group, which has an important potential impact on the possible alternatives should the EPA not be signed.

The rest of the paper is structured as follows: Section 2 provides with a brief overview of past and future relationships between the EU and ACP countries. Section 3 describes the model, the data and the design of the experiment. Section 4 presents the results of the simulations, and Section 5 conducts a sensitivity analysis. Section 6 concludes the paper.

2. Current and future trade policies involving the EU and the ACP countries

First, we provide a snapshot of the protection applied and faced by ACP countries, using detailed tariff data at HS6 level. Second, we discuss the current and future trade policies involving the EU and ACP countries. Finally, we design a WTO compatible EPA, optimising the flexibility provided by the 'substantially all trade' clause.

2.1 Current protection pattern

Table 1 displays the average rate of protection applied by ACP regions to EU and regional imports. With the exception of the Economic and Monetary Community of Central Africa (CEMAC) and Carribean countries (CARIFORUM) areas, important gains can be expected from regional integration of the ACP countries. For Southern African Development Community (SADC), the intra-regional tariff is around 15%, twice as

Table 2: Initial EU Applied Protection by Sectors (Per cent)

Sectors	ECOWAS	CEMAC+	COMESA	SADC	CARIFORUM	Pacific	Rest of the World
Total	0.2	0.6	5.4	3.8	3.8	12.9	2.6
Vegetal Prod.	1.0	6.1	13.8	48.2	13.9	20.0	10.8
Livestocks	43.4	27.7	11.3	83.2	84.8	28.8	61.3
Agr. food		0.1	0.1	0.1	0.6	0.1	8.5
Primary							0.4
Elec. and Machinery							1.8
Metallurgy							1.2
Textiles and apparel						0.3	6.4
Other industries	0.1		0.7	0.4	0.1	0.4	1.7

Source: Authors' calculations based on updated version of MAcMapHS6-v2. Reference group weighting scheme.

high as that applied to EU exports to the region. The ACP regions apply different levels of protection to EU exports. CEMAC, Common Market for Eastern and Southern Africa (COMESA) and the Pacific regions appear to apply the most protection, with average duties of 13.5, 13.1 and 12%, respectively, and SADC and Economic Community of West African States (ECOWAS) regions are the most liberal (7.1 and 8.1%, respectively).

The structure of tariffs has the usual shape—the highest level of protection is in agriculture, with peaks in agrofood (COMESA, 36%) and vegetables (Pacific, 56%). In manufacturing, CEMAC and SADC still protect textiles (for both protectionist and fiscal reasons), whereas COMESA protects the metallurgic sector.

Regarding EU trade policy towards the ACP, the Cotonou agreement gives free access to all industrial products, while applying some protection for agricultural goods. Moreover, ACP–LDCs enjoy duty- and quota-free market access under the EU's unilateral EBA initiative, which provides market access to all LDCs.

Nevertheless, some ACP countries face an average tariff rate that is higher than that applied by the EU to imports from the Rest of the World (Table 2) due to the concentration of their exports on some agricultural products which are heavily protected in the EU.[9]

[9] This is the case, for example, for developing countries in the SADC region where producers are disadvantaged by the high level of EU protection in tobacco and rice.

2.2 Trade policies involving the EU and ACP countries

Strictly speaking, the EU introduced a policy of cooperation with the ACP states in 1975. Up to 2000 these relations were governed by the regularly updated Lomé Conventions. Economic cooperation, implemented through a system of trade preferences, ensured that manufactured and agricultural products (not in direct competition with products covered by the Common Agricultural Policy—CAP) could enter the European Community free of customs duties or quantity restrictions. Most importantly, this access was on a non-reciprocal basis, in the sense that ACP states were merely requested to apply the most favoured nation (MFN) clause to the EU and to refrain from discriminating between EU countries. Specific regimes were applied to products of extreme importance for ACP states such as sugar, beef and veal, rum and bananas. In the years before expiry of the Lomé IV convention, the non-reciprocal preferential trade regime provided by the Lomé convention was increasingly seen as unacceptable and 'incompatible' with international trade rules.

The new Cotonou Partnership Agreement was signed by the ACP countries and the EU, on 23 June 2000. It covered a 20-year period and included a clause requiring mid-term reviews every 5 years. The preparation of a new WTO compatible trade policy constituted a major change from the Lomé Convention regime. In 2001, the EU was granted the most recent waiver to the Lomé conventions, which allowed it to maintain the current non-reciprocal tariff preferences for ACP countries to 31 December 2007. Negotiations for the so-called new EPAs, began in September 2002 and were due to be completed by 2007, to comply with the requirements of the waiver.

It was clear that reciprocity and free trade were to be phased in progressively by the EPAs, 'within a reasonable period of time', as required by GATT Article XXIV. However, interpretation of the 'substantially all trade' rule-of-thumb proved contentious. What would happen were the EPAs not signed on time?

EPA negotiations are not mandatory for ACP countries. ACP countries are invited to sign either as groups or individually, building on their own regional integration schemes. ACP–LDCs will still benefit from the EBA initiative whatever their decision. However, LDCs need to compare alternatives including other 'variables' than duties (e.g., rules of origin). The main problems lie with the non-LDC–ACP countries, which are not in a position to enter into an EPA. One alternative is that these countries avail themselves of access to the GSP, the general scheme available to all

Table 3: Average Tariffs Faced by ACP Regions on the EU Market. Different Regimes (Per cent)

Regions	Cotonou	GSP	GSP+
ECOWAS	0.2	1.7	1.7
CEMAC+	0.6	2.9	2.8
COMESA	5.4	13.7	11.9
SADC	3.8	4.5	4.3
CARIFORUM	3.8	16.3	15.9
Pacific	12.9	27.6	27.2
Rest of the World	2.6	2.6	2.6

Source: Authors' calculations using MAcMAp-v2.

developing countries. A more attractive alternative would be the GSP+ scheme, which provides an improved market access for 'vulnerable' countries that show commitment to a sustainable approach to development by ratifying and implementing a series of international conventions. However, both the GSP and GSP+ provide for less favourable treatment.

Table 3 displays the impact in terms of the average tariff applied by the EU to ACP exports where ACP countries move from Cotonou preferences to those provided by either GSP or GSP+ for non-LDCs, or by EBA for LDCs. Even for ECOWAS and CEMAC, which export mainly raw products that tend to have low or zero MFN tariffs (oil, cocoa, cotton), the effects are still visible. The reduction in preferential margins is also large for Caribbean and Pacific regions for sugar and bananas, key exports from both regions. For COMESA, moving to GSP would double the average tariff rate faced. Overall, the difference between GSP and GSP+ is not significant except for Eastern Africa, where several countries, especially Mauritius, are significant exporters in the textiles and apparel sector, where GSP+ eliminates protection and GSP provides only limited advantages.

2.3 Designing a WTO compatible EPA

According to Article XXIV of the GATT, the desire of most ACP countries to maintain some tariffs for protectionist and tax reasons can be fulfilled to some extent. The 'substantially all trade' quantitative requirement is achieved here, following EU guidelines, considering 90% of bilateral trade in volume or 90% of tariff lines in the harmonised system (HS). Choosing sensitive products with the constraint of liberalising 90% of trade in volume would produce 90% (or more) liberalisation in tariffs lines, due to the high concentration of ACP trade with the EU, in a few products.

Assuming full liberalisation on the EU side, this would imply liberalisation of 80% of ACP imports if trade flows were balanced. However, if this criterion is applied at the regional level, important differences appear. Depending on the extent to which ACP regions display negative or positive trade balances with the EU, the extent of liberalisation of imports required to meet the 90% target will vary. For instance, the Pacific region, which exports much more to the EU than it imports (distance effect), could potentially shelter up to 42% of its original imports and still cover 90% of trade. In contrast, in the Caribbean region, which has a negative trade balance with the EU, the share of excluded imports would represent less than 20%. For the other regions, ECOWAS would be entitled to exclude 21% of its imports originating from the EU, 23% from CEMAC and 25% from SADC.

In terms of timing, we assume that EPA will be implemented over a period of 15 years. However, to reflect the asymmetry among partners, the EU is assumed to grant free access to all ACP exports by 2008. Even if such a choice were to exceed the general recommendations of Article XXIV, it could be justified on the grounds of the specific weaknesses of African countries and the number of LDCs.

The last question then is how are sensitive products selected? Two approaches are used following the guidelines provided by EU experts (Directorate-General for Trade).

> **H1 Scenario**: in this scenario, priority for protection is given to agricultural products. Agricultural products are selected first for exclusion, following which, the most sensitive manufactured products, identified here as those contributing the most to tariff revenues, are excluded, up to the overall level of residual protection assumed to be acceptable. Adopting such a strategy does not optimise the choice of products in order to minimise the losses in tariff revenues, but it does provide some way to reflect the political sensitivity of the agricultural sector in most ACP countries. The ranking within this category is given by the theoretical value of tariff revenues (imports from the EU multiplied by the tariff). All computations are at regional level, derived by adding up national effects by product.
>
> **H2 Scenario**: in this scenario, the objective is to reduce tariff revenue losses at regional level. A discrete choice model was built to ensure that products were chosen in order to minimise tariff losses, at the initial trade level, subject to two constraints: share of excluded trade should not exceed the amount allowed and number of products in the regional list should not be above 20% of total tariff lines.

The products included in the exclusion lists vary considerably depending on the approach: agricultural products under H1, manufacturing goods (e.g., cars, clothes) under H2. The consequences of the exclusion lists are

Table 4: ACP Average Tariffs on EU Products at the End of EPA Process (Per cent)

Regions	Reference Situation	EPA H1-2022	EPA H2-2022
ECOWAS	8.1	1.5	3.6
CEMAC+	13.5	3.8	6.4
COMESA	13.1	4.8	6.7
SADC	7.1	2.9	4.4
CARIFORUM	9.5	3.1	4.1
Pacific	12.0	12.0	11.9

Source: Authors' calculations using MAcMAp-v2.

displayed in Table 4. The result is far from full liberalisation. Due to the extensive list of excluded products which the Pacific region could potentially include, the effects of liberalisation are completely neutralised in that region. Other regions could retain between one-fifths and half of their initial protection. Under the H2 scenario, COMESA could still keep half of its initial level of protection by excluding just 19% of EU imports from liberalisation.

3. Methodology

In this section, we describe the structure of the model and the calibration procedure employed. The model equations are contained in Appendix C. The data are described in 3.2. This section concludes with a discussion of the scenario simulated and the choice of relevant counterfactuals, namely the status quo versus GSP.

3.1 The model

In this paper, the quantitative impact of EPAs is addressed using a PE model, expressely built for this purpose. The model, which is based on the usual assumptions in PE analysis, is designed to allow very detailed evaluation of the impact on trade and government budgets of the ongoing EPA negotiations. The model focuses on the demand side.

The supply side is assumed to be perfectly adjustable and thus the elasticity of supply is equal to infinity.[10] There are two main consequences of

[10] This means that production prices are constant over all scenarios, while consumer prices follow the changes in product taxes, in this case tariffs. As a result of this assumption, volume changes and value changes at producer prices will be the same for all the results presented. This assumption, while realistic for the EU side, may seem crude for

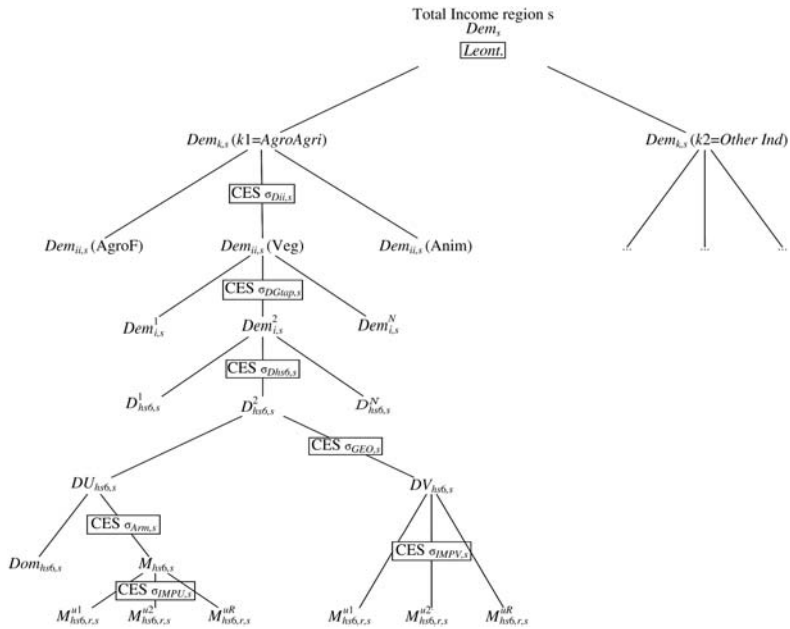

Figure 1: Demand tree.

this hypothesis for the results: we might overestimate the effects on EU exports (in volume) from ACP liberalisation because ACP producers might not reduce their prices in the face of increasing competition, and we might overestimate the effects of EU liberalisation on ACP exports (in volume) because we assume that there are no constraints on supply. In terms of this latter possibility, forecast increases in ACP exports should be interpreted as potential gains. To transform them into real gains, specific policies would have to be formulated to support production in the sectors where the highest increases are forecast.

We represent the demand side as a nested CES structure, where the initial regional income is assumed to be fixed (see Figure 1). Subscripts *ii* and *i* denote aggregated sectors at a decreasing level of aggregation; *hs*6 are the detailed products; and *r* and *s* are, respectively, the source and destination regions. The exact sectoral mapping used in the model is provided at the

ACP countries that may suffer severe capacity constraints when adapting to changes in demand. However, this is the price to be paid to maintain the model tractable at a very disaggregated level (HS6).

aggregated level in Appendix A. The correspondence between the GTAP and the HS6 classifications can be downloaded from the GTAP web site.[11]

Initially, the representative consumer arbitrates between two aggregated sectors: agriculture and agro-food ($Dem_{k1,s}$) and other industry ($Dem_{k2,s}$). Here we assume complementarity between the two (Leontief preferences).

Then, total demand for the aggregated category ($Dem_{k,s}$) is allocated between different broad sectors ($Dem_{ii,s}$) with a weak substitution $\sigma_{Dii} = 0.8$). The demand for each sector ($Dem_{ii,s}$) is further split across GTAP-defined sectors (see Hertel and Tsigas, 1999) ($Dem_{i,s}$) with an elasticity of substitution, σ_{DGtap}, of 0.95. The last stage in the product disaggregation will be from the GTAP level to HS6 nomenclature ($\sigma_{Dhs6} = 1.5$). Although the exact level of substitution is difficult to define, increasing substitutability with the level of disaggregation appears a sound assumption.

As far as consumption choices within each HS6 category are concerned, we make use of a nested Armington assumption (Armington, 1969) which allows representation of geographical differentiation, both vertical and horizontal. This is crucial in the context of EPAs, as in most cases, EU products are not in direct competition with ACP products. Indeed, as documented in Schott (2004) and Fontagné *et al.* (2008), products originating in developed and developing countries remain strongly vertically differentiated within a given HS6 position.

For every HS6 product, a CES (σ_{GEO}) allocates demand among goods originated from countries with the same level of development ($DU_{hs6,s}$) and originating in countries in different categories ($DV_{hs6,s}$). Then, DU is distributed between the local ($M_{hs6,s,s}$) and imported varieties ($M_{hs6,s}$), based on a CES function with an elasticity of substitution of σ_{ARM}. A final stage defines the exact origins of products across groups of similar countries (CES with σ_{ImpU}). DV is distributed across different importers using a CES with elasticity σ_{ImpV}. The allocation of disaggregated imports among the various sources depends also on detailed bilateral prices and detailed imports in volume. In particular, the detailed bilateral import price, ($P^M_{hs6,r,s}$), is defined as the CIF price multiplied by the power of the ad valorem duty.

To have a consistent tree, we need to have $\sigma_{GEO} < \sigma_{ARM} < \sigma_{ImpV}$ and $\sigma_{GEO} < \sigma_{ImpU}$, e.g., for a country, a product will be more substitutable by those from other ACP countries (included in DU) than by EU products (included in DV). While the choice of product origins is at HS6 level, we have access only to Armington elasticities drawn from the GTAP database.

[11] https://www.gtap.agecon.purdue.edu/resources/resdisplay.asp?RecordID=320.

At the HS6 level, estimations provided by the World Bank (WB; Kee *et al.*, 2008) give import demand elasticities for a number of countries.[12] However, the structural form of the model (nested CES) introduces a relation between all elasticities and particularly between direct price elasticities and the elasticities of substitution. We calibrate elasticities at the product level in order to comply with Armington elasticities of substitution at GTAP level and the direct price elasticities computed by the WB at HS6 level. This last source of information allows for country heterogeneity in import demand behaviour, reflecting both preferences and availability of local production. Import elasticities are defined by the gap between the parameters for domestic demand and domestic supply. If we consider our CES nesting, we can quite easily establish the relation between the Armington elasticity, the direct price elasticity and the other substitution elasticities, as in Rutherford (2002):[13]

$$\sigma_{GEO} = \frac{M_{hs6,s}}{M_{hs6,s} - MV_{hs6,s}} \times (|\eta_{i,s}| + MV_{hs6,s}) \times \left(\sigma_{Dii} + \frac{\sigma_{DGtap} - \sigma_{Dii}}{Dem_{ii,s}} + \frac{\sigma_{Dhs6} - \sigma_{DGtap}}{Dem_{i,s}} - \frac{\sigma_{Dhs6}}{M_{hs6,s}} \right)$$

where $\eta_{i,s}$ is the direct price elasticity estimated by the WB (Kee *et al.*, 2008). More precisely, we interpret it as the direct price elasticity of the aggregate *MV* (imports from a different region) rather than overall imports.[14]

Finally, to avoid unrealistic results from the simulations, we limit σ_{GEO} in the range [1.05, 8] and limit σ_{ARM} to [1.1, 8], and assume $\sigma_{ImpU} = \text{Min}(2 \times \sigma_{ARM}, 12)$, $\sigma_{ImpV} = \text{Min}(2 \times \sigma_{ARM}, 12)$ applying the usual 'rule of two' used in the GTAP database to move up in the Armington tree.

This framework is suitable for measuring trade creation and trade diversion effects, where one of the central questions is how the EPA affects the

[12] As some elasticities are missing for some countries and products, we fill the elasticities matrix by an iterative process. For one product, trade-weighted average are computed across group of countries (same level of development and same continent) to fill the missing values. If the value is missing for the reference group, we compute an average by continent, then by the level of development. We ultimately compute a world average to double-check that we have all the elasticities needed.

[13] See Rutherford (2002, p. 32) for a demonstration.

[14] This assumption leads to a slight underestimation of the σ_{GEO} parameter, but in this way we can avoid a more complex calibration procedure due to the fact that in our model imports are distributed among different branches.

regional integration process through the diversion of intra-ACP trade. As already stated, we do not consider the issue of welfare as we are unable to handle it properly: we ignore important sources of welfare changes such as the impact of more efficient allocation of resources or changes to the terms of trade. Ignoring terms of trade effects in a context of unilateral liberalisation, such as EPAs, would be misleading: it has been well established that such effects can be detrimental to liberalising countries.

Before concluding the section we should emphasise an important difference between our model and the two PE models widely used by the WB, namely SMART (Jammes and Olarreaga, 2005) and TRITS (Brenton *et al.*, 2007). Both consider the import demand function at a very detailed level, using a classical Armington assumption. However, they model one market at time (i.e., demand of country *s* from country *r* of commodity *i*), which means that there is no link between different products and countries. To obtain total trade creation or trade diversion resulting from a trade reform, one needs simply to sum the relevant dimensions (e.g., products and countries). However, in measuring trade diversion, it is necessary to impose an *ad hoc* constraint to ensure that the level of the trade diversion is not larger than the initial level of imports from a given country. In our model, there is no need to apply this constraint, as we obtain consistent results based on the fact that all products and markets are linked and initial regional revenue is unchanged.

3.2 Data sources

Although we set our analysis within a PE framework, the model requires data which unfortunately are not always available. So, we have to make some assumptions to account for the missing data.

For trade data, we use a number of sources in order to complete our data, mostly for African countries' trade. Specifically, we employ COMEXT (source Eurostat) for EU–ACP relations and BACI (CEPII),[15] which is a harmonised trade database based on UN–COMTRADE, for all other importers. To reduce annual volatility in trade data, we calibrate the model using a mean figure based on 3 years (2002–2004).

Tariff data for 2004 are obtained from MAcMapHS6 version 2 (Boumellassa *et al.*, 2009). We made an adjustment to take account of the 2006 EU GSP reform. We consider both ad valorem tariffs and tariff rate quotas (TRQs). We do not model TRQs directly, but we consider

[15] http://www.cepii.fr/anglaisgraph/bdd/baci.htm.

the standard MAcMapHS6 methodology which consists of looking at the quota fill rate to decide which protection rate to apply. More precisely, we apply the outside rate if the fill rate is above 98% and the inside rate if the fill rate is below 90% and if the fill rate is between 90 and 98% we use an average of the two rates. The main consequence of this procedure is that, like any other EU partner, all countries filling their quotas de facto liable for the MFN rate to enter the EU market.

Since our PE framework means we have infinite supply capacity, the removal of EU barriers would lead to very high gains for all countries facing high levels of protection and important losses for those benefiting from high initial margin of preferences. However, in such a framework, both gains and losses are overestimated since we know that a large number of ACP countries suffers from supply capacity constraints. The phenomenon is particularly important for sugar and bananas, which represent a high proportion of ACP exports and EU protection. Despite the large number of ACP countries, it is well known that only the most productive, i.e., Brazil for sugar and Ecuador for bananas, would benefit from an increased market access.

In order to mitigate massive gains and losses, for these two products we adopt a specific approach to calibrate the equivalent marginal rate of protection. We take into account the production costs of each country, such that the impact on ACP countries differs depending on their efficiency in producing these particular goods. We assume that the EU domestic price p_a is defined as the sum of the MFN tariff t and the producer cost c on the EU market (F.O.B. export price + transportation costs) for the most efficient country. Then, the ad valorem equivalent for each ACP country is defined, considering the difference between the price p_a and its export price in the EU market p_b, including delivery cost: $AVE = (c + t - p_b)/p_b$. For sugar, we rely on information in LMC (2004). For missing countries, we use FAOSTAT yield data to create a ranking among countries.[16]

In reality, governments never receive 100% of their theoretical tariff duty receipts (computed as the sum of the official tariff rates multiplied by import values). Imperfect tax collection can be explained by legitimate exemptions (food aid, diplomatic services, public and private investment goods) and tax avoidance (corruption, smuggling). Detailed data from the customs services are not easily accessible. Some aggregated figures on

[16] The information on yields in different sectors and countries is available at the following website: http://faostat.fao.org/.

tariff revenues are collected by the International Monetary Fund (IMF). However, using these data can be misleading as some countries mix several tax resources that are not stricto sensu tariffs, e.g., sales taxes, phytosanitary taxes, statistical taxes etc., in their 'customs duties' category. Thus, we rely on a series of figures suggested by the recent literature. In COMESA, Brenton *et al.* (2007) finds the tariff collection rate to be 53% on EU imports (72% on all imports) for Ethiopia, 74% (77%) for Madagascar, 56% (73%) for Malawi and 77% (66%) for Zambia. For Mauritius, the reported rate is below 50%. In CEMAC, Gallezot and Laborde (2007) report tax collection rates of 83% (44%) for Cameroon and 59% (62%) for the Central African Republic. Lastly, Decaluwe *et al.* (2008) report tariff collection rates for ECOWAS, ranging between 38% for Togo and 88% for Burkina Faso.[17] On the basis of this partial evidence, we make an optimistic assumption of an average collection rate of 80% for developing countries and 60% for LDCs.

To include the share of domestic production in domestic consumption for agriculture, we use highly disaggregated data compiled by the FAO. Where data at this level are not available or are inaccurate, we determine the proportion from the GTAP 6.2 database, assuming that the same share holds at the most disaggregated level. There are UNIDO data on industry sectors, but for only a small number of countries. Consequently, we rely on the assumption made in the case of non-accessible agricultural data (i.e., we draw on the GTAP database).

3.3 Experimental design

Two main scenarios, with different 'sensitive products' are simulated.

- The end of Cotonou, successful EPA negotiations with full duty- and quota-free access to the EU for ACP countries and liberalisation of ACP imports under the H1 scenario (sensitive products are not liberalised and are concentrated in agriculture). H1 is our central scenario for the presentation of results.
- The end of Cotonou, successful EPA negotiations with full duty- and quota-free access to the EU for ACP countries and liberalisation of ACP imports under the H2 scenario (sensitive products are not liberalised and they are chosen in order to reduce fiscal losses at regional level).

[17] Other countries include Ghana 84%, Guinee 81%, Nigeria 51%, Benin 45%, Mali 86%, Niger 63%, Senegal 67% and Cote d'Ivoire 67%.

In both cases,[18] we assume that complete implementation of EPA by the ACP countries will be staggered over 15 years. From 2008 to 2015, a cut of 20% is applied to customs duty on non-sensitive products imported from the EU, with complete elimination of duty achieved in 2022. Also in both cases, the 90% criterion is applied as follows: we select sensitive lines up to 10% of the value of bilateral trade and check that no more than 10% of these lines are still liberalised. In addition to the liberalisation process, we deepen trade integration within each negotiating block. More precisely, we assume that each region will become an FTA in 2015.[19] The EU gives free access to all ACP products in 2008. While our comments are focused on the results at the regional level, specific comments are offered on the heterogeneity of the impacts on individual countries. Detailed results at country and product level can be downloaded from a dedicated webpage.[20]

4. Assessing the impacts of EPAs

This section provides an analysis of forecast trade and the fiscal impacts of EPAs. Section 4.1 discusses trade effects, starting with a discussion on the importance of choosing the right reference scenario, when commenting the effects of EPAs. Section 4.2 continues the discussions on trade effects, with special focus on different alternatives in selecting sensitive products. Fiscal effects are addressed in Section 4.3.

4.1 Trade effects: choosing the right counterfactual

The debate over the consequences of EPA is often based on misguided assumptions—in particular that the alternative to EPA is the status quo. In the context of the WTO waiver, there is a commitment to move towards WTO compatibility. Otherwise, ACP countries would revert to the situation of other developing economies in the WTO.

[18] We also performed a scenario of successful EPA negotiations with 100% liberalization on both sides. We will refer to it when presenting the results, whenever necessary, to confirm the importance of sensitive products and to address potential trade diversion.

[19] This choice of an FTA and not a CU is justified by the fact that the current regional negotiations do not appear to envisage common external tariffs in the near future. Furthermore, the complex pattern of the existing trade agreements, in particular, in the Eastern Africa region, makes FTAs the most likely scenario. This movement will be considered as a part of the EPA process, meaning that the tariff revenue losses computed will also include the losses related to the elimination of tariffs between countries within the same region.

[20] See http://ces.univ-paris1.fr/membre/fontagne/data.htm.

Table 5: EPAs Trade Consequences for ACP Regions. Volume Changes (Per cent)

Regions	Exports to the EU (EPA-2022-H1)	Imports from the EU (EPA-2022-H1)	Imports from the EU (EPA-2022-H2)
All ACP	13.7	17.7	13.1
ECOWAS	4.7	15.1	10.3
CEMAC+	8.5	17.2	12.6
COMESA	11.0	20.7	16.0
SADC	30.1	10.6	6.6
CARIFORUM	33.8	27.1	22.5
Pacific	47.6	−0.2	1.0

Source: Simulation results.

LDCs are already eligible for EBA preferences. This alternative, therefore, is the next best option for them. The remaining ACP countries mostly would have to return to the preferences provided under the GSP scheme, which would mean a considerable downgrading of their preferential access although for a limited number of ACP countries there might be the possibility of claiming GSP+ benefit.

Two reference scenarios were simulated. We present the case where, at end 2007, *no EPA has been signed*: EBA is applied to LDCs (including removal of the last restrictions on sugar, rice and bananas in 2009) and GSP is applied for non-LDC ACP. The loss of preferences associated with the lapse of the Cotonou scheme will result in a fall of 4.9% ACP exports to the EU. The reduction will be even greater for the Pacific countries (−8.4%), the Caribbean (−9%) and COMESA (−12.1%).[21]

EPAs are expected to bring a 13.7% increase in the volume of ACP exports to the EU in 2022 (see Table 5). This gain is the result of improved market access compared with a benchmark that is less advantageous than the status quo. If we were to use the status quo as our benchmark, keeping in mind the already mentioned 4.8% drop in ACP exports to the EU, signing EPAs would lead to a more limited gain: 6.3% ((1.137 × (1−0.065)−1). This difference in expected trade impact illustrates the importance of choosing the right counterfactual, i.e., not the current Cotonou preferences.

[21] Alternatively, we considered the situation of a combination of EBA for LDCs and GSP+ for non-LDC ACP. This option makes little difference for most ACP countries −3.5% on average for ACP countries, with the exception of the COMESA region, where the impact is much greater due to the more favourable treatment of textile products in the GSP+ (the fall in exports to the EU is −5.1%). Accordingly, it will not be discussed here.

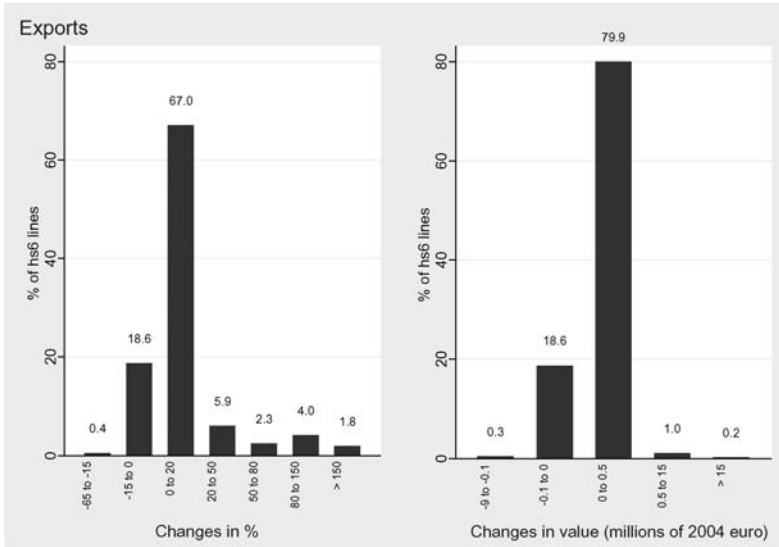

Figure 2: ACP trade with the EU. Distribution of trade volume changes by country. *Source*: Simulation results. *Note 1*: Pacific region is excluded due to the lack of representativity in terms of country coverage. *Note 2*: The box extends from 25 to 75% of the distribution. The black segment in the centre shows the median value. The extreme notches indicate the 5% and 95% of the distribution. Outliers are drawn outside the 5% limits.

The sectoral cost of not signing an agreement is concentrated in products associated with specific protocols—sugar and bananas (exports to the EU would drop by 54.2%)—which also explains the difficult situation of the Caribbean countries. For sugar, the impact of the EU's domestic reform is not directly considered here. However, the consequent fall in sugar prices in the EU market will reduce the preferential margins granted to ACP countries in any case. Other products that are strongly affected are livestock (30% fall in exports) and textiles (-27%). For the latter, under GSP+ losses are cancelled out.

Discussing about the trade effects of EPAs, an important difference emerges in terms of exports and imports, the former being much more concentrated across countries and products than the latter. The top panel of Figure 2 plots the distribution of import volume change by country. There are some outliers for the Caribbean countries and ECOWAS, but the import volume changes never reach 60%. In contrast, the bottom panels of this figure illustrate the distribution of export volume changes by country with and without outliers: clearly, few

countries in COMESA, SADC and Caribbean concentrate most of the gains. Considering exports, large variations in values are found in agricultural products, whereas textiles and apparel is the only manufacturing sector registering sizable changes in value. However, the sectoral level is not the appropriate level of analysis because of the concentration of gains and losses in a limited number of HS6 products. As an example, the large export gains for COMESA in textiles and apparel are driven by only one exporter in a few HS6 products: Mauritius (see Table 6). As a whole, only 3% of HS6 lines represents more than 90% of new exports in value.[22]

Regarding imports, only 20% of the liberalisation of ACP countries in relation to EU imports will be achieved in 2015, while full access will be provided to the EU market in 2022. Accordingly, an average 17.7% increase in ACP imports from the EU is forecast at the 2022 time horizon, and 7.9% in 2015 (see Section 5.2). This in turn implies a transitory gain for ACP countries' trade balances over the corresponding period. On the contrary to exports, the sectoral composition of imports points to a concentration in industrial goods, mirroring traditional trade specialisation in the EU and ACP.[23] Section 4.2 examines how the strategy adopted for sensitive products would restrict manufactured imports, while providing greater opening of ACP borders to EU agricultural products.

4.2 The role of sensitive products

Two contentious issues in the EPA debate are the percentage of products to be excluded from liberalisation (on the ACP side) and the choice of which products to exclude. If we apply the 90% guideline, we achieve a non-negligible smoothing of the liberalisation process.

The outcome of the EPA negotiations is very different from the hypothetical situation where all products are fully liberalised. Without sensitive products, we can forecast a 23.8% increase in total ACP imports from the EU in 2022, compared with 17.7% (for H1) or 13.1% (for H2). Under H2, optimally choosing tariff lines in order to secure

[22] Owing to constraints of space, the distribution of exports by product is not displayed here.

[23] The exception is textiles and apparel, where exports and imports will both increase; this is related to the existing international division of labour in these sectors and the heterogeneity among ACP countries that include both exporters and importers of these products.

Table 6: ACP changes in export values toward the EU, main HS6 products

Products	Gains in value (millions of 2004 euro)				
	15–25	**25–50**	**50–100**	**100–150**	**>150**
Raw sugar—170111				Zimb. 145	Guyana 178.6 Fiji 180.6 Swaz. 397.6 Maur. 511
Bananas—080300	Jam. 16.9	S. Lucia 25.1 Belize 36.9	Dom. Rep 59.2		C. d'Ivoire 245.9 Camer. 309.8
Rice brown—100620		Surin. 26.4 Dom. Rep 35.9			Guyana 259.3
Rice, semi or wholly milled—100630		Surin. 28			
Rice, broken—100640		Guyana 36			
Tuna—160414		Ghana 27.8 Maur. 28.1	C. d'Ivoire 54 Seych. 68.7		
Fish fillets, frozen—030420		Namib. 28.2			
Bovine meat, fresh or chilled—020130		Botsw. 29.5 Namib. 40.8			
Bovine meat, prepared—160250		Zimb. 28.3			
Poultry, fresh or chilled—020714	Nigeria 16.6				
Pineapples—200820	Kenya 15.5				

Flowers—060310		Kenya 47.7	
Tobacco—240120		Zimb 41.1	
Olive oil—151000	Ghana 16.4		
Corn flour—110220	Ghana 18.8		
Cocoa butter—180400	C. d'Ivoire 17		
Aluminium—760110	Ghana 15		
	Camer. 23.1		
T-shirts—610910			Maur. 108
Men overcoats Knitted—610110	Maur. 22.47		
Men shirts Knittedv- 610510	Maur. 16.06		
Men overcoats—610910	Maur. 23.01		
Men shirts—620520	Maur. 19.84		

Source: Simulations results.

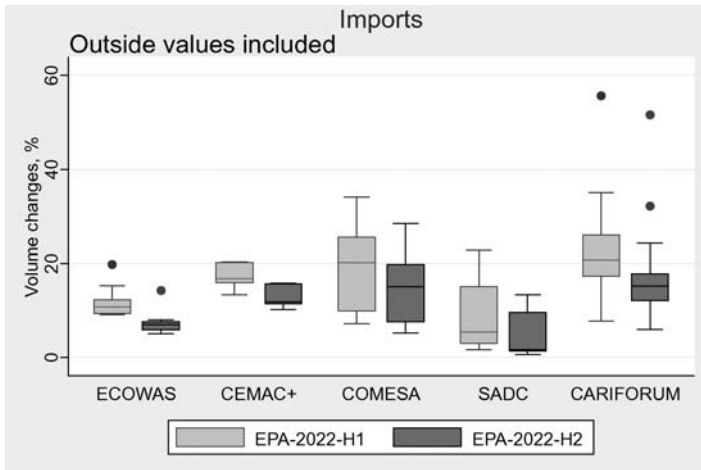

Figure 3: ACP trade with the EU. Distribution of trade changes by hs6 product. *Source*: Simulation results.

tariffs revenues will reduce the amount of ACP imports from the EU, at the expense of a much more liberalised agricultural sector than in H1. For instance, H2 forecasts a 12.1% increase for Livestock and 8% for Vegetable products; in H1, the respective increases would be 0.6 and 0.8%. If we assume H2, in the manufactured sectors with tariff peaks, numerous products will be excluded, which explains why the surge in ACP imports of textiles products from the EU (+36.8% in H1) would be curbed (+7.3% in H2).

Other important effects of alternative selections of sensitive products are highlighted, if we look at the results at HS6 level. As depicted in Figure 3, the reduction in import increase under H2 is actually the effect of two changes in combination. First, there is an enlargement in the scope of HS6 products for which a *decline* in imports is recorded (36% of tariff lines in H2 compared with 17.7% in H1). Secondly, there is a reduced scope of those products showing sizeable increased imports (more than 50% increase): 17.6% of products under H1, but only 8.8% under H2. In both cases, most of the positive changes correspond to small variations in value: under H2 (H1), only 1.4% (1%) of HS6 lines will vary by more than 0.5 million euros of 2004. Consequently, changes in value are concentrated in a limited number of products: in H1 (H2), 90% of HS6 lines correspond to 17% (14%) of total import changes in value.

Reducing potential increases in imports is not the only issue. If imports affect industrial inputs, restraining them and making them more expensive could have a negative impact on overall competitiveness. Unfortunately, the structure of the model does not allow us to address this issue.

4.3 Impacts on tariff and government revenues

The effects of EPA on ACP countries' public finances have been widely debated, but their different impacts have rarely been disentangled. The elimination of customs duties on many European imports produces two main effects: a direct effect (elimination of duties on existing import flows from the EU) and a trade diversion effect. In the first scenario, the overall effect of cutting tariffs will depend on the combined effect of reduced tariffs and increased imports as a result of falling import prices, until liberalisation is complete. The second effect of EPA is trade diversion, expected from any FTA. Here, untaxed imports from the EU—or from countries belonging to the same ACP region—will replace currently taxed imports from the rest of the world. Accordingly, trade diversion produces additional negative impacts on tariff revenue.

Trade diversion is presented in the left panel in Table 7 which shows fiscal losses for the central scenario (H1) and for a hypothetical scenario of full liberalisation between the EU and the ACP countries (full FTA). The direct loss for the ACP as a whole will amount to euro 1,390 million in 2022 under H1. The trade diversion effect will add another euro 467 million losses.[24]

The combination of these effects will result in a forecast average loss in tariff revenue *on EU imports* for all ACP of 71% in 2022 (702 million euros of 2004).[25] The lowest relative losses are forecast to occur in the SADC region (58%), while the region most heavily affected will be ECOWAS,

[24] On the top of the direct and diversion effects, a last and limited impact is the domestic effect: additional imports replace to some extent informal domestic transactions escaping the VAT. Under the conservative assumptions of 50% of domestic transactions escaping indirect taxation, half of the value of additional imports replacing domestic sales is a new tax base in the formal economy. We assume a VAT rate of 16%. This effect ultimately cushions the negative impact of the liberalization on public revenue. Controlling for the domestic effect, we would end up with 1,806 million losses.

[25] See Column 'Base results' in Table 9. Section 1 presents the sensitivity analysis on tariff revenues.

Table 7: Tariff Revenue Losses under Different Scenarios

Regions	Losses in value (millions of 2004 euro)				Losses in %			
	Direct effect		Trade diversion effect		EPA-2022-H1		EPA-2022-H2	
	EPA-2022-H1	Full FTA	EPA-2022-H1	Full FTA	EU products	All origins	EU products	All origins
All ACP	1390	1970	467	569	−71	−25	−52	−19
ECOWAS	530	648	172	178	−82	−38	−57	−27
CEMAC+	246	345	27	32	−71	−41	−53	−30
COMESA	297	478	128	160	−62	−21	−47	−16
SADC	91	157	49	51	−58	−22	−37	−16
CARIFORUM	226	337	84	137	−67	−16	−58	−13
Pacific	0	5	7	11	−1	−9	−2	−9

Source: Simulations results.

where the trade diversion effect will be particularly detrimental (losses of 700 million euros annually in the long run or 82% of tariff revenue in 2022).

However, this threat needs to be viewed in the wider context. First, EPA will not be fully fledged FTAs in that there will not be completely symmetric liberalisation among the parties. Tariff revenues will continue to be collected on EU imports, as a certain number of products can be excluded from tariff cuts. As can be seen from Table 7, total losses for the ACP under scenario H1 are only 73% of the fiscal cost of a full FTA. Moreover, if the objective of ACP countries is to minimise tariff revenue losses, scenario H2 becomes more relevant. In this case, tariff losses would be drastically reduced: from 71 to 52% for all ACP regions (from 82 to 57% for ECOWAS, from 58 to 37% for SADC). Thirdly, the EU is not the only trade partner of the ACP countries. They still collect tariff revenues from third country imports: while scenario H1 may reduce the tariff revenue collected on imports from the EU by 71%, it would represent just a 25% decline in total tariff revenue for the ACP countries when all importers are considered (or 19% under scenario H2, when the exclusion list is optimised).

Finally, tariff revenue is not the only source of income for government. It is clear that the effects of EPA on the ACP countries' public finances will differ across countries depending on the initial importance of tariff revenue in total government income. Table 8[26] provides some insight on this aspect for a relatively small number of countries. Some countries, which are highly dependent on tariff revenue, seem to be those that would register the smallest relative losses. For example, Swaziland, where 47% of public revenue comes from customs duty, would lose only 5.7% of its customs revenue. At the other extreme countries such as Congo, where tariff revenue losses are forecast to be high (almost 33%), depend relatively little on this source of revenue (7.1%). However, several West African countries, such as Ghana and especially Côte d'Ivoire, which are heavily dependent for their budget on this revenue source, may experience difficult transition phases due to heavy predicted losses in customs receipts.

LDCs should benefit the most from an adjustment package allowing them to move progressively from a taxation system based on imports to a more stable, domestic focused, system. The transition to other forms

[26] The analysis is limited to countries where reliable data on collected duties and government income is available from the IMF.

Table 8: Tariff Revenue Losses and Fiscal Dependence (Selected Countries)

Country	Share of government income in GDP[a]	Share of duties in government income[a]	Forecast decline in collected duties[b] (%)	Value of forecast losses[b] (million euros)	Share of forecast losses in GDP[b] (%)
Ghana	30.1	10.6	−29.7	70.4	1.0
Côte d'Ivoire	16.8	28.0	−43.9	55.3	0.4
Togo	14.2	19.2	−40.1	40.2	2.4
Burkina Faso	18.1	9.9	−41.5	16.2	0.4
Central African Rep.	10.1	14.5	−31.3	3.7	0.3
Congo	29.6	7.1	−31.8	46.1	1.3
RDC	7.2	27.8	−32.1	22.7	0.4
Ethiopia	16.7	33.2	−25.9	43.5	0.6
Kenya	21.1	9.3	−22.7	92.1	0.7
Mauritius	20.1	22.0	−23.4	70.2	1.4
Uganda	22.0	15.9	−17.2	7.2	0.1
Namibia	28.2	31.8	−11.2	9.3	0.2
Swaziland	26.8	47.3	−5.7	2.1	0.1
Barbados	35.4	9.8	−17.6	21.3	0.9
Dominican Rep.	16.4	12.6	−10.9	49.3	0.3
Jamaica	31.8	8.6	−7.5	14.1	0.2

[a]IMF, GFD database.
[b]Simulation results.

of taxation will be particularly difficult in post-conflict countries where central government power is weak and the whole administration is in a phase of 'rebirth' (e.g., Central African Republic).

5. Sensitivity

5.1 Sensitivity to elasticities

In this section, we examine the sensitivity of our results on trade and tariff revenues to some key elasticities. We conduct six more simulations for the ACP region: the results are reported in Table 9. We take the H1 scenario and the 2022 horizon as our reference (Column 1 of Table 9). With

Table 9: Sensitivity of Trade Effects and Tariff Changes to Elasticities, Total ACP Countries (Per cent)

	Base results[a]	$0.5\sigma_{Dii}$	$2\sigma_{Dii}$	$0.5\sigma_{Arm}$	$2\sigma_{Arm}$	$0.5\sigma_{WB}$	$2\sigma_{WB}$
Imports total	2.7	2.2	4.2	2.4	4.1	2.6	3.2
Imports from the EU	17.7	13.3	32.0	16.9	24.4	17.5	21.2
Exports to the EU	13.7	8.8	21.4	12.1	13.8	14.0	13.7
Tariff losses from the EU	−70.53	−70.56	−70.70	−70.35	−71.05	−70.52	−70.66

Source: Simulation results.
[a]Base results correspond to EPA-2022-H1.

Table 10: Sensitivity of Trade Effects to FTA within ACP Regions (Per cent)

ACP regions	Import total base results[a]	Import from the EU base results[a]	Import total FTA only	Import from the EU FTA only
ALL ACP	1.0	7.9	−0.1	−0.1
ECOWAS	1.2	7.0	−0.2	−0.1
CEMAC+	2.6	7.8	0.0	0.0
COMESA	0.7	8.8	−0.1	−0.1
SADC	0.2	4.8	−0.3	−0.1
CARIFORUM	1.0	11.9	0.0	0.0
Pacific	−0.3	−0.2	−0.3	−0.8

Source: Simulation results.
[a]Base results correspond to EPA-2015-H1.

respect to initial levels, we alternatively cut by half and double the following parameters:

- The substitution elasticities between sectors at the most aggregated level $\sigma_{Dii,s}$, and consequently $\sigma_{DGtap,s}$ and $\sigma_{Dhs6,s}$.
- The Armington elasticities at the HS6 level, $\sigma_{ARM,s}$.
- The import demand elasticities at the HS6 level provided by the WB.

As the value of $\sigma_{Geo,s}$ is determined endogenously, it will be affected by any changes in the other elasticities.

Table 9 shows that the different elasticities lead to the results in the expected direction. More interesting is that tariff revenue losses on imports from the EU are stable across all the sensitivity experiments, because they are mainly the results of the direct effect of trade liberalisation and are principally impacted by the choice of the products exclusion list.

5.2 FTAs within ACP regions at the 2015 horizon

Table 10 presents the percentage changes in ACP imports from the EU and the world following two different shocks. The first two columns present the central scenario (H1) of EPA referred to above, at the 2015 horizon. Columns 3 and 4 simulate a reduction in tariffs on only a regional basis (i.e., excluding tariffs within regional FTAs). Basically, the effect of FTAs signed within ACP countries would slightly increase intra-regional trade at the expense of the other trade partners, as a result of the expected trade diversion effect. However, this impact would be very limited. The order of magnitude of this type of trade diversion is quite small compared with the size of the figures in the two first columns. On average, this effect represents a tenth of the impact of EPA for all ACPs. The only region where it makes a substantial difference is SADC, where the trade diversion effect would be large enough to compensate for the overall effect of EPA on total imports. The reason why the changes are generally so small is that intra-ACP region tariffs are initially low (except for SADC, see diagonal of 1), whereas intra-ACP trade, on average, is quite small in our data set. Overall, our main conclusions are robust to the inclusion in the simulations of regional FTAs.

6. Conclusions

This article provides an extensive assessment of the market access component of EPA between the EU and the six ACP regions, with a focus on trade and budgetary aspects. In particular, the paper investigates the role played by the choice of sensitive products. Using a PE model at the HS6 level for the EU25 and the 59 ACP countries, we built realistic EPA scenarios, assuming partial liberalisation of the ACP regions in respect of EU interpretation of GATT Article XXIV. Although ACP exports to the EU will be 10% higher with EPA than under the GSP/EBA option, these countries are forecast to lose 71% of tariff revenues on EU imports. However, imports from other world regions will continue to provide tariff revenues. Thus, when tariff revenue losses are computed on total ACP imports, losses are limited to 25% on average, and over the long run, and could even be 19% if product lists are optimised. The final impact depends on the importance of tariffs in government revenue, and on potential compensatory effects. The absolute values of customs revenue losses computed in this article provide a starting point for defining the financial needs of ACP governments. However, long-term

solutions will depend on the capacity of each ACP country to reorganise its fiscal base.

It is, however, important to stress the limitations of the chosen approach. The PE model developed here focuses on the demand side of the economy. Such choice authorises to carefully document the various substitution effects at stake and to fully exploit the richness of the HS6 trade data. The price to pay for this is the absence of supply capacity constraints that led to a specific treatment of sugar and bananas. This is why forecast increases in ACP exports should be interpreted as potential gains. By the same token, general equilibrium issues are absent. For instance, liberalising imports is generally expected to increase competitiveness by reducing the cost of imported inputs. We do not capture this effect, and we do not measure how choosing the scenario H2 would lead to partly missing such gains. The same kind of limitation pertains to income effects. One could also argue that our forecast of tariff revenue loss might be overestimated owing to dynamic growth effects from further trade opening that are not captured in such PE framework. Beyond this dynamic effect, the establishment of EPA with the EU may have further beneficial impacts in the long run. These effects may be derived from the trade liberalisation measures undertaken by ACP countries becoming irreversible and therefore more credible—the so-called 'lock-in' effect (Collier and Gunning, 1995). This, in turn, may bring benefits in terms of increased domestic and foreign investment in ACP countries, although the history of foreign investment in these countries is not very encouraging, making the possibility of a major impact unlikely.

More generally, we refrained to discuss welfare issues as we are unable to handle them properly: important sources of welfare changes such as the impact of more efficient allocation of resources or changes to the terms of trade are absent from our modelling.

This discussion of our results points to possible extensions of our work. Modelling tariff cuts at the HS6 level is of utmost importance when it comes to very uneven tariff structures and to strategies of tariff revenue minimisation. Proceeding with such approach, we have managed to keep consistency between demand at the detailed level and at the sectoral (GTAP) level, in particular thanks to a detailed modelling of elasticities at different levels of aggregation. The next step would be to introduce the information derived on demand into a fully fledged CGE model of the largest African economies considered here. Such bottom up approach, notwithstanding its technicalities, is however conditional on the

availability of harmonised social accounting matrices for many countries in the region, which are currently missing.

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Appendix A. Sectoral aggregation

Table A1: Sectoral Aggregation

Macro sector *k*	Sector *ii*	Sector *i* (GTAP)
AgriAgro = K1	Livestocks and animal prod.	cmt—meat: cattle, sheep, goats, horse
	Livestocks and animal prod.	ctl—Cattle.sheep.goats.horses
	Livestocks and animal prod.	mil—Dairy products
	Livestocks and animal prod.	oap—Animal products nec
	Vegetal prod.	c-b—Sugar cane. sugar beet
	Vegetal prod.	gro—Cereal grains nec
	Vegetal prod.	ocr—Crops nec
	Vegetal prod.	osd—Oil seeds
	Vegetal prod.	pcr—Processed rice
	Vegetal prod.	pdr—Paddy rice
	Vegetal prod.	pfb—Plant-based fibers
	Vegetal prod.	sgr—Sugar
	Vegetal prod.	v-f—Vegetables. fruit. nuts
	Vegetal prod.	vol—Vegetable oils and fats
	Vegetal prod.	wht—Wheat
	Vegetal prod.	wol—Wool. silk-worm cocoons
	Other agr. food	b-t—Beverages and tobacco products
	Other agr. food	fsh—Fishing
	Other agr. food	ofd—Food products nec
OtherInd = K2	Primary	coa—Coal
	Primary	frs—Forestry
	Primary	gas—Gas
	Primary	nmm—Mineral products nec
	Primary	oil—Oil
	Primary	omn—Minerals nec
	Primary	p-c—Petroleum. coal products
	Elec. and machinery	ele—Electronic equipment
	Elec. and machinery	mvh—Motor vehicles and parts
	Elec. and machinery	ome—Machinery and equipment nec
	Elec. and machinery	omf—Manufactures nec
	Metallurgy	fmp—Metal products
	Metallurgy	i-s—Ferrous metals
	Metallurgy	lum—Wood products
	Metallurgy	nfm—Metals nec
	Other industries	crp—Chemical.rubber.plastic prods
	Other industries	omt—Meat products nec
	Other industries	ppp—Paper products. publishing
	Textile	lea—Leather products
	Textile	tex—Textiles
	Textile	wap—Wearing apparel

Appendix B. List of countries included in the study

Table B1: Six ACP Groups in the Negotiations

ECOWAS	CEMAC+	COMESA	SADC	CARIFORUM	Pacific
Benin*	Cameroon*	Burundi*	Angola*	Ant. and Barb.*	Cook Islands
Burkina faso*	Centr. Afr. Rep.*	Comoros	Botswana*	Bahamas*	East Timor
Cape verde	Chad*	Djibouti*	Lesotho*	Barbados*	Fiji
Côte d'Ivoire*	Congo*	Eritrea*	Mozambique*	Belize*	Kiribati
Gambia*	Congo (DR)*	Ethiopia*	Namibia*	Dominica*	Marshall Islands
Ghana*	Eq. Guinea*	Kenya*	South Africa	Dominican Rep.*	Micronesia
Guinea*	Gabon*	Madagascar*	Swaz.*	Grenada*	Nauru
Guinea-bissau*	Sao Tome	Malawi*	Tanzania*	Guyana*	Niue
Liberia		Mauritius*		Haiti	Palau
Mali*		Rwanda*		Jamaica*	P.N. Guinea*
Mauritania*		Seychelles*		S. Kitts*	Samoa
Niger*		Sudan*		Saint Lucia*	Solomon Islands*
Nigeria*		Uganda*		Saint Vinc.*	Tonga
Senegal*		Zambia*		Suriname*	Tuvalu
Sierra Leone*		Zimbabwe*		Trin. and Tob.*	Vanuatu*
Togo*					

*Countries included in the study.

Appendix C. Model equations

C.1 Sets definition

The subscript k refers to the two main macro sectors considered: $k1$ for AgriAgro and $k2$ for OtherInd. The indices ii correspond to a subset of sectors belonging to $k1$ and $k2$ and i refers to the *Gtap* sectors mapped to the subset ii. Finally, we have indices $hs6$ for the hs6 products belonging to each *Gtap* sector.

Indices r and s refer to exporting and importing country, respectively. U indicates the subset of countries with the same development level as country s and V those with a different level of development.

Superscripts for prices P refer to the related variable.

C.2 Variables and Parameters definition

Dem_s:	Total initial demand in the country *s*.
$Dem_{k,s}$, $Dem_{ii,s}$, $Dem_{i,s}$, $D_{hs6,s}$:	Demand at different level of sectoral aggregation in country *s*.
$DU_{hs6,s}$:	Demand in country *s* for *hs*6 products from countries with the same level of development.
$DV_{hs6,s}$:	Demand in country *s* for *hs*6 products from countries with a different level of development.
$M_{hs6,s}$:	Total imports of country *s* for *hs*6 products originating from regions with the same level of development.
$M_{hs6,s,s}$:	Total demand of country *s* for *hs*6 products produced in the country *s*.
$M_{hs6,r,s}$:	Total imports of country *s* for *hs*6 products from country *r*.
$\sigma_{Dii,s}$, $\sigma_{DGtap,s}$, $\sigma_{Dhs6,s}$, $\sigma_{GEO,s}$, $\sigma_{Arm,s}$, $\sigma_{IMPU,s}$, $\sigma_{IMPV,s}$:	Substitution elasticities of goods demand.

C.3 Demand tree

Regional income is assumed to be fixed.

$$\text{Income}_s = Dem_s = \sum_k P^D_{k,s}\, Dem_{k,s} \qquad (C1)$$

Leontieff relation between the two main categories, *k*1 and *k*2: $Dem_{k,s}$ (first stage).

$$Dem_{k,s} = a_{k,s}\, Dem_s (k = 1, 2) \qquad (C2)$$

CES to allocate the demand $Dem_{k,s}$ within each main category (*k*1 and *k*2) to different broad sectors: $Dem_{ii,s}$ (second stage).

$$Dem_{ii,s} = Dem_{k,s}\, a^D_{ii,s} \left(\frac{P^D_{k,s}}{P^D_{ii,s}} \right)^{\sigma_{Dii,s}} \qquad (C3)$$

CES to define the consumption between the GTAP sectors ($Dem_{i,s}$)

($\sigma_{DGtap,s}$) (third stage).

$$Dem_{i,s} = Dem_{ii,s}\, a^{D}_{i,s} \left(\frac{P^{D}_{ii,s}}{P^{D}_{i,s}} \right)^{\sigma_{DGtap,s}} \tag{C4}$$

CES from Gtap to HS6 level (fourth stage).

$$D_{hs6,s} = Dem_{i,s}\, a^{D}_{hs6,s} \left(\frac{P^{D}_{i,s}}{P^{D}_{hs6,s}} \right)^{\sigma_{Dhs6,s}} \tag{C5}$$

Nested Armington (fifth stage).

Differentiation between quality range:
regions with the same level of development

$$DU_{hs6,s} = a^{U}_{hs6,s} D_{hs6,s} \left(\frac{P^{D}_{hs6,s}}{P^{DU}_{hs6,s}} \right)^{\sigma_{GEO,s}} \tag{C6}$$

Regions with different levels of development

$$DV_{hs6,s} = a^{V}_{hs6,s} D_{hs6,s} \left(\frac{P^{D}_{hs6,s}}{P^{DV}_{hs6,s}} \right)^{\sigma_{GEO,s}} \tag{C7}$$

Same quality range: differentiation between Import and Domestic demand

$$M_{hs6,s} = a^{M}_{hs6,s}\, DU_{hs6,s} \left(\frac{P^{DU}_{hs6,s}}{P^{M}_{hs6,s}} \right)^{\sigma_{ARM,s}} \tag{C8}$$

$$M_{hs6,s,s} = a^{Dom}_{hs6,s}\, DU_{hs6,s} \left(\frac{P^{DU}_{hs6,s}}{P^{M}_{hs6,s,s}} \right)^{\sigma_{ARM,s}} \tag{C9}$$

Same quality range: differentiation between origins

$$M_{hs6,r,s} = a^{M}_{hs6,r,s} M_{hs6,s} \left(\frac{P^{D}_{hs6,s}}{P^{M}_{hs6,r,s}} \right)^{\sigma_{ImpU,s}} \tag{C10}$$

Different quality range: differentiation between origins

$$M_{hs6,r,s} = a^{M}_{hs6,r,s}\, DV_{hs6,s} \left(\frac{P^{DV}_{hs6,s}}{P^{M}_{hs6,r,s}} \right)^{\sigma_{ImpV,s}} \tag{C11}$$

C.4 Prices

$$P^{M}_{hs6,r,s} = P^{Cif}_{hs6,r,s}(1 + \tau^{Adv}_{hs6,r,s}) \tag{C12}$$

$$P^{M}_{hs6,s} = \left(\sum_{r \in U(s)} a^{M}_{hs6,r,s} {P^{M}_{hs6,r,s}}^{1-\sigma_{ImpU,s}} \right)^{1/1-\sigma_{ImpU,s}} \tag{C13}$$

$$P^{DU}_{hs6,s} = \left(a^{Dom}_{hs6,s} {P^{M}_{hs6,s,s}}^{1-\sigma_{ARM,s}} + a^{M}_{hs6,s} {P^{M}_{hs6,s}}^{1-\sigma_{ARM,s}} \right)^{1/1-\sigma_{ARM,s}} \tag{C14}$$

$$P^{DV}_{hs6,s} = \left(\sum_{r \in V(s)} a^{M}_{hs6,r,s} {P^{M}_{hs6,r,s}}^{1-\sigma_{ImpV,s}} \right)^{1/1-\sigma_{ImpV,s}} \tag{C15}$$

$$P^{D}_{hs6,s} = \left(a^{U}_{hs6,s} {P^{DU}_{hs6,s}}^{1-\sigma_{Geo,s}} + a^{V}_{hs6,s} {P^{DV}_{hs6,s}}^{1-\sigma_{Geo,s}} \right)^{1/1-\sigma_{Geo,s}} \tag{C16}$$

$$P^{D}_{i,s} = \left(\sum_{hs6} a^{D}_{hs6,s} {P^{D}_{hs6,s}}^{1-\sigma_{Dhs6,s}} \right)^{1/1-\sigma_{Dhs6,s}} \tag{C17}$$

$$P^{D}_{ii,s} = \left(\sum_{i} a^{Gtap}_{i,s} {P^{D}_{i,s}}^{1-\sigma_{DGtap,s}} \right)^{1/1-\sigma_{DGtap,s}} \tag{C18}$$

$$P^{D}_{iii,s} = \left(\sum_{ii} a^{D}_{ii,s} {P^{D}_{ii,s}}^{1-\sigma_{Dii,s}} \right)^{1/1-\sigma_{Dii,s}} \tag{C19}$$