Reforming the European Union Sugar Program: What Are the Market and Trade Implications?

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Abstract

The European Union sugar policies, in place for over 49 years, underwent a first major reform in 2005, yielding to mounting pressures coming from the EU 2004 enlargement, the recent EBA initiative to least developed countries and the recent WTO-panel ruling on EU sugar export subsidies. The reform package consists of lowering administrative prices as well as modifying the structure of production quotas leading to lower sugar production and bringing down subsidized export to within WTO limits. However, these reforms do not address other components of the EU sugar policies such as non-preferential tariffs, quota reallocation across regions, or opening up the competitive structure of the EU sugar industry. This makes it difficult to assess the economic and trade implications of the reform package. This paper offers a dual-modeling approach to examine the impact of the EU sugar policy reform on sugar production and prices in the EU, and the trade implications for third countries with particular distinction between preferential and non-preferential exporters.

***Key words*:** EU sugar policy, Sugar markets, Global sugar trade, General equilibrium model, Partial equilibrium model

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Introduction

The European Union (EU) is one of the leading sugar producers and traders in the world. However, much of EU sugar production and trade operate under heavy protective policies that regulate production, prices, exports and imports. These policies continued unchanged since the Common Market Organization (CMO) Sugar was created in 1968. The main elements of the CMO sugar cover a range of market management tools, namely “intervention” and “minimum price for sugar beet”; a system of national production quotas with “declassification” and “carry over” mechanisms among the quota types; and other tools relevant to sugar used in alcohol and yeast production, the isoglucose quota and the inuline syrup quota. Border measures include export subsidies to dispose of excess supply, arrangements for preferential trade with third countries, and high protective tariffs to protect domestic sugar against foreign competition.

However, pressures have been building recently as high domestic prices generating excess supply have become unsustainable, particularly in light of the EU 2004 enlargement, the expected rise of imports from the 'Everything but Arms' (EBA) initiative to least developed countries (LDC), and a recent WTO panel ruling on EU sugar export subsidies. Moreover, the EU is also faced with new commitments in tariff reductions as part of Doha Round negotiations, with the possible abolition of the special safeguard clause.

Faced with these pressures and beginning in 2005, the EU agreed to replace the existing CMO with a new sugar policy regime. The stated goals of the EU sugar reform is to ensure balance on the internal market under more competitive circumstances. This includes bringing export subsidies in line with WTO commitments and accommodating duty-free imports of EBA sugar (from 2009 and onwards). The new policies include lower price support (36% cut in intervention price, from €631.9 to €404.4 per MT), restructuring production quotas with incentives for voluntary quota buyouts, and compensation for farmers along the new CAP regime (equivalent to 64.2 percent of the price cut paid out as a single farm payment). Moreover, out-of-quota sugar production can no longer be exported. For non-sugar sweeteners, there is a quota increase for isoglucose by 300,000 MT for the existing producer companies phased-in over three years. Moreover, soon after the EU sugar reform was formally approved (by the Parliament, then the Council of Ministers), the EU Commission decided to introduce a mandatory cut in the production quota for 2006/2007 of approximately 2.5 million tonnes (or 15%).

While the new regime represents a significant departure from existing policies, many components of the EU sugar regime are unaffected making it difficult to assess the extent to which the stated goals of narrowing the supply-demand imbalances can be achieved. Even with the support price cuts sugar crops may still be more attractive compared to alternatives, while the high import barriers will continue to shield the domestic sugar industry. The inabilty of quota holders to trade in

quotas across states may restrict the degree of industry adjustment toward a greater cost efficiency environment. Moreover, the possibility of substitution between sugar and alternative sweeteners will continue to be restricted as the new isoglucose production quotas are still highly restrive compared to a more competitive environment.

The domestic effect of EU reform is likely to be more significant than cross-border effects. Under the current EU sugar regime, the principal mechanisms that determine domestic market prices are not intervention buying (which is scarcely used) but rather the control over imports and the disposal of excess supply through subsidized exports. This results in market prices sandwiched within a price band with the floor set at intervention price while the ceiling is formed by the duty-paid prices for non-preferential third country imports. Under perfect competition internally, prices would be driven down to the price floor level. In reality, prices rarely deviate from the price ceiling and are consistently kept 10-15% above the intervention price (NEI, 2000; Swedish Competition Authority, 2002) (see figure 2). A key reason behind this is that the EU sugar industry exercises market power and acts in tacit collusion among processors where firms agree not to interfere outside their designated markets (Swedish Competition Authority, 2002).

Under this monopolistic structure, sugar processing firms can charge a price that far exceeds marginal costs, as long as other firms in the market (but operating in segmented submarkets) do the same. The CMO Sugar has helped incumbent firms' ability to sustain tacit collusion in a number of ways. First, regulation blocks non-preferential imports from outside the Union hence preventing competition from extra-EU sugar. Second, regulations prevent entry of new firms by allocating sugar quotas only to incumbent firms. Finally, the CMO Sugar severely restricts competition with sugar substitutes such as isoglucose by limiting production quotas. To be sustainable, such tacit collusion requires a retaliatory mechanism which is provided by export subsidies. This enables firms to use the threat of shifting quantities from exports to domestic sales within the Union.

Consequently, firms are deterred from deviating by the threat of a price war during a retaliatory period, where all firms price at marginal cost and profits are low or zero for all firms.

Under the new policy regime it is not clear what the net effect on the industry competitive behavior will be and how this will affect producers' incentives. While the WTO-ruling on subsidized exports might limit the industry's tacit collusive behavior, the tendency toward processor consolidation means that existing oligopolistic firm behavior is likely to persist with domestic prices higher than otherwise warranted under greater inter-firm domestic competition. In such a case, domestic prices may be kept consistently above the floor intervention price.

Also key to understanding the potential implications of cutting intervention price is the relationship between market price and supply response, which is not adequately studied or understood. Given the overlay of quota allocations, differential cost structures between regions, price supports and the long run nature of the contracts between processors and growers for sugar supply, it has been difficult to assess the EU sugar supply response and its relations with marginal costs. The production quotas limit the competitive ability of efficient producers and create entry barriers since sugar beet growers are tied to long term supply contracts with regional sugar processors. Under a drop in price support, high cost producers producing only within the A-quota could continue to produce as long as the quota rent (defined as the difference between received price and marginal cost) is still positive. Supply response for low cost producers (who may supply C-sugar in addition to A and B quota sugar) is in principle linked to world prices rather than to domestic prices (Frandsen et al., 2003). However, this assumption implies that any changes in intervention price will only bite into the quota rents without affecting production, an unreasonable outcome at the EU-wide level. Gohin and Bureau (2005) argue that given the coexistence of quota sugar (A and B) with out of quota sugar in some regions (C-sugar), and the presence of cross-subsidization of C-sugar, the marginal cost for C-sugar is higher than the world price of sugar. This

implies that any policy reform that reduces domestic support price will trigger a supply response and not just changes in quota rents.

On the trade side, while EBA countries are expected to increase sugar shipment to EU after 2009, there is some uncertainty about the extent of import increase. Because of the "SWAPS"[1] provision in the EBA treaty, EBA members would be able to import sugar at world prices and then export locally produced sugar to the EU. With lower intervention prices under the new reform, some EU member states doubt that the EBA countries will be able to profitably export raw sugar to the EU at the lower proposed institutional prices. Given this, how are sugar imports from preferential and non-preferential sources likely to be affected by the EU sugar policy reform? And what are the likely effects on world sugar prices?

To sort out these issues and to provide a formal assessment of the economic and trade impacts of EU sugar policy change, a dual-modeling approach is used drawing from both partial equilibrium and general equilibrium models. Properly specified quantitative models must reflect the complex structure of the EU sugar regime bringing into the picture to the extent possible the quota management structure, the complex price support regime, export subsidies, and the highly regulated import flows dominated by preference-type imports. Given the complexity of the EU sugar regime and the various interconnected issues to disentangle, there is no single economic model that can adequately represent all these specifications. In this report, we apply two models: a partial equilibrium (PE) model of agricultural trade (PEATSIM) which incorporates the main EU Common Agricultural Policy (CAP) instruments including EU sugar policies. The model also allows for yearly baseline-type projections of changes in production, consumption and prices and the results can be compared to comparable and commonly used PE models. The second model is a global CGE

[1] "SWAPS" or "triangular trade" is a feature of the EBA treaty which enables LDCs to import agricultural products from third countries for their domestic consumption in order to export their own domestic production.

model of trade and production (GTAP). The GTAP explicitly deals with various preferential trade regimes and allows for a more complete representation of the global sugar trade on a bilateral basis. Besides production and trade effects, the CGE model also provides a more complete economy-wide welfare assessment of policy change. Moreover, the CGE model enables an analysis under imperfect competition which more closely represent the market structure of the EU Sugar industry.

This paper is divided into the following sections. Section two offers an overview of the current EU sugar policy regime and market implications. Section three presents the models. Section 4 describes the results and section 5 concludes.

An overview of the EU sugar market and policies

Sugar production in the EU is regulated via national sugar quotas based on historical production levels, not on consumption needs. The sugar quota allocated may be transferred between firms, but not between member States. Two types of quotas are recognized: A-quota (83% of total, subject to 2% production levy of 2% of intervention price) and B-quota (17% of total, subject to up to 37.5% of production levy to meet export subsidy costs). Sugar produced above and beyond A and B sugar must be declassified and considered C-sugar. The over-quota production must be 'carried over' to the next marketing year or exported without subsidies. However, exported C-sugar at world prices is still profitable because the prices obtained for sales of quota sugar (A and B) are high enough to cover all the fixed costs of the processing companies. This cross-subsidization effect has been one of the main arguments raised against the EU in the recent WTO ruling on EU export subsidies. According to the WTO Appellate Body, total subsidized exports amount to almost 4 million tonnes per year, which far exceeds the EU's WTO commitment limit (1.273 million MT). Similarly, the ruling also means that taking ACP sugar re-exports into account, the EU's spending on export

subsidies is close to 1.3 billion € per year, compared to the official ceiling (and WTO notified amount) of 499 million €.

In the EU, sugar external trade is highly managed principally through three instruments: export subsidies, contractual agreements with third-countries as part of preferential agreements and high import protection for non-preferential sugar. These policies regulating the two-way flow of sugar, have placed the European Union in an unusual position of being both a significant importer and exporter of sugar (figure 1). Export subsidies, which insure that processors receive the same price as they would in domestic markets, are the key mechanisms to dispose of surplus production and ensure domestic market balance. Subsidies are paid for sugar obtained from beet or cane harvested in the EU and sugar imported under the ACP Protocol/Agreement with India. The sum of export subsidies and world market price thus gives the producers close to € 67/100 kg exported sugar. Given the wide gap between domestic and world prices, subsidies of the order of 75% of the EU intervention price are currently needed to enable the quota surplus to be sold.

EU exports, subsidized directly and indirectly, average 6 million tonnes a year, or about 30% of total world exports. Of these, an average 3.5 million tonnes of sugar (including sugar in processed products) is exported with a direct export subsidy. In addition, The European Union subsidies the re-export of 1.6 million tonnes of refined sugar from imported raw ACP sugar; bringing the total volume of subsidized exports to more than 4 million tonnes.

The EU imports sugar through several bilateral or regional agreements. The ‘Sugar Protocol’ enables the EU to import cane-sugar under quotas from 19 African, Caribbean, and Pacific (ACP) countries which are exempt from duties and receive EU domestic prices for raw sugar (52.37 €/100 kg). Adding a separate agreement with India for 10,000 MT imports, the total imports under the “Sugar protocol” amount to 1,304,700 MT. The Special Preferential Sugar (SPS) is an additional set

of bilateral preferential agreements designed to fill the gap in meeting estimated national processing needs. The SPS quota covers approximately 200,000 MT which can be imported duty free.

The Everything-but-arms (EBA) initiative was launched in 2001 whereby the EU agreed to offer progressive duty-and quota-free access to exports from 48 countries among the least developed countries (LDC). Amounts began with 74,185 tonnes in 2001 and increase by 15% annually until 2009, when free access will be allowed. This implies that more preferential imports would continue to flow into the EU, especially from low cost countries such as Zimbabwe, Ethiopia, Sudan and Mozambique. However, there is much uncertainty about the capacity of EBA countries to export significant amounts of sugar to the EU. With the start of the EBA initiative, EBA imports have also been counted as part of the SPS quota.

The EU also has a tariff-rate quota (TRQ) regime with the Balkan countries who can export 193,000 MT to the EU duty-free. Also under the Uruguay Round and as a result of the accession of Finland, Austria and Sweden, the EU agreed to an MFN access quota covering 85,463 tonnes of raw cane sugar for refining with reduced duties of 98 €/t and applying to Cuba (58,969 t) and Brazil (23,930 t). However, this sugar does not qualify for a price guarantee. Following the 2004 enlargement, the EU is also obligated to allocate “current access” quotas in the amount of 490,000 MT to third countries to compensate for the accession of ten new states from Eastern Europe.

Outside the preferential duties, border protection is in the form of a combination of two duties, one fixed and one variable resulting from the application of the special safeguard (SS) clause. The fixed duty is set for €419 per tonne for white sugar and €339 per tonne for raw sugar. The variable duty under the special safeguard clause is linked to the trigger price set at 531 €/t for white sugar and 418 €/t for raw sugar in the WTO Agreement on Agriculture. The special safeguard clause can be applied whenever the world market price falls below the trigger price. Because the EU

negotiated a high trigger price for sugar in the Uruguay round, the safeguard clause and, hence, the additional duty, have been applied permanently since 1995.

The high degree of protection from the combined fixed tariff plus special safeguard has reduced non-preferential imports to the minimum. This can be seen in two ways. First average overall duty was only 115 €/T in 2003 (87 €/T in 2002). Second, average annual imports of pure sugar at full import duty (non-preferential) have been only 28 000 tonnes, compared to the total imports of 1.5 million tonnes and the annual EU consumption of 12.7 million tonnes.

The EU sugar reform's stated aim is to facilitate reductions in EU sugar output, dampen incentives of exports to EU from EBA countries, and reduce the subsidized sugar exports. The key instruments targeted in the reform include a cut in intervention price by 36 percent (from €631.9 to €404.4 per MT), coupled with a compensation to farmers (64.2 percent of the price cut). The current quota system is streamlined (A and B combined) and voluntary buy out of quotas is offered for the first few years. No exports of declassified sugar (C-sugar) will be permitted under the new regime and to discourage production outside quota ("C-sugar"), a prohibitive super levy (similar to dairy) will be applied. On top of this and outside the formal reform agreement, the EU Commission later decided to cut the production quota for 2006/2007 by approximately 2.5 million t (or 15%). On the border protection side, no change is envisioned in the reform program aside from reducing exports and subsidies to WTO-limits and maintaining the existing international import commitments. Non-preferential import duties (including the special safeguards) are not affected by the new regime.

Overall the EU continues to play a big role in world sugar markets, but much of its sugar imports and exports are driven by policies and subsidies. Globally, sugar trade is marked by several features including a regional character, the dichotomy between raw and refined sugar, and the preponderance of trade impacted by policies and subsidies. Over 60% of trade takes place under long term contracts, preferential agreements and with subsidies, while only 40% only is traded at

world market prices. Within this global sugar situation, the EU plays a significant role in influencing world prices, particularly white sugar, due to subsidy-enabled large export quantities of sugar. Out of the total of 21.307 million MT white sugars exported worldwide, the EU exports over 6.412 million MT, and thus contributing to the downward pressure on world market price within the narrow residual market segment.

Model and Analysis

Partial Equilibrium Model of Agricultural Trade: PEATSIM

The PEATSIM is a multi-commodity multi-region agricultural trade model. The PEATSIM is partial equilibrium type model with net trade specification. This means that each region can either be specified as net importer or exporter. In our case we treat EU as a net sugar importer since we are most interested in import responses to EU sugar reform. Ideally, given that the EU is a major player on both exports and importers, a two-way trade specification is preferred. But the model is not built to handle such trade structure. Sugar production in the model is handled on raw sugar equivalent basis and production is adjusted to include preferential imports (from ACP, India and Balkans). The model specifies a support price in the form of reference price treated as intervention price. For the import regime, import tariffs are based on two-tier tariffs using the *ad valorem* equivalent of specific tariffs. Under the EU policy reform, sugar farm payments set equivalent to 64.2% of price cuts are introduced into the model starting in 2006 and treated as decoupled payments. Following the 2003 CAP reform, set aside payments are ignored given that their reallocation is linked to all arable crops (and not just to *Grandes cultures* as before the 2003 CAP reform). Therefore, one would expect little influence on production patterns.

For supply management, the model is initially set so that the quota is equal to beginning production. To model the impact of the reforms besides cutting intervention price by 36%, we set the future target production quota to balance consumption, preferential imports and WTO-permitted exports. For the baseline simulations, the desired domestic production is set to balance domestic consumption, WTO-permitted exports, and preferential imports from ACP, India and Balkans. For production quota, we implement a phased quota reduction in the reform scenario from 2006 to 2010. The desired quota level in 2010 is determined by taking into account the EU's WTO export commitment, preferential imports and domestic consumption. Therefore in the reform scenario with PEATSIM we induce a target production quota cut that is not explicitly reflected in the reform law but rather reflects the target production to achieve supply-demand balance under given assumption of preferential imports. Moreover, we also "restraint" exports by preventing C-sugar from being dumped on world markets; thus implicitly accounting for EU compliance with WTO ruling on export subsidies.

Global CGE Model of Production and Trade: GTAP

The applied general equilibrium GTAP (Hertel, 1997) is a multi-region and multi-sector global model of production and trade that follows the standard theoretical specifications of trade CGE models. In this analysis we use a special version of GTAP that deal with imperfect competition and oligopolistic behavior of firms (Francois, 1998; Elbehri and Hertel, 2004). The model distinguishes between the sugar industry and the sugar beet/sugar cane crop sectors. Given the market structure of the sugar industry and the collusive market power practices, the sugar processing activity is modeled under oligopolistic competitive behavior with increasing returns to scale. This allows for modeling separately cases with or without firm entry or exit and hence enables a separate assessment between firm versus industry level production effects.

Sugar production in the EU is also constrained by quota limits and the sugar production quota is modeled under a complementary condition allowing for endogenous regime change from binding to non-binding with associated quota rents expressed as tax equivalent. Sugar is treated on a raw sugar equivalent basis and the sugar import regime is modeled as a system of bilaterally allocated import quotas following the Armington specification. The model includes 28 regions, 14 of which are EU regions (Belgium, Denmark, Germany, Spain, France, Italy, Netherlands, Austria, Poland, Sweden, UK, Hungary, Czech Rep, Other-EU) and 14 non-EU regions (USA, Canada, Mexico, Brazil, China, India, Australia, Thailand, ACP, LDC, Mediterranean, Central America, Other-Asia, and rest of world aggregate). Preferential imports are treated via bilateral tariff rate quotas for a specific set of partners (ACP, India). Moreover, these preferential exporters are assumed to capture the quota rents to mimic the fact that these countries receive guaranteed prices equivalent to domestic prices.

Results

Using the PEATSIM model, the EU sugar "reform scenario" is compared to an alternative "status quo" scenario without reform. Under the "reform scenario" the intervention price is cut by 36% while under the "status quo" scenario the expected impact of EBA imports induces lower domestic prices and leads to downward adjustment of the intervention price (by 11%). The model baseline under both scenarios is run from 2004 to 2009. However, being a net trade model, we do not separate out EBA from non-EBA sugar imports into the EU. Rather import changes are gross imports into the EU from all sources. Results are shown in Table 2.

Under the reform scenario, given the combined effect of cuts in intervention price and production quota, EU sugar output is cut by 17.7% by 2009 (compared to the 2004 base). At the same time we have an increase in consumption (by 8.9% over 5 year period or 1.7% annually) as consumer prices are also reduced (-39.25%; see table 2, 3rd column). Despite a significant reduction

in exports (-53.1%), imports also expand sharply by over 113.5% (from base) due to the combination of reduced production and increased demand. Bringing more disciplines to exports (by preventing non-subsidized exports) also dampens somewhat the influx of more imports in response to price cuts.

Under the reform scenario, the world price over the period 2004-2009 rises by 8.04% compared to the base (2004). By comparison, Andino, Taylor and Koo (2005) using a partial equilibrium world sugar model found that the combined 33% cut of intervention price and 15% cut in production quota for EU sugar pushed the world sugar price up by 14.5%, a larger result reflecting the higher drop in exports in the ATK study compared to our analysis. Nevertheless these world price increases need to be viewed as upper bound limits for at least two reasons. First, there is the price-inelastic nature of sugar markets both on the supply and demand sides and second is the simplifying assumption, typical in partial equilibrium models, that sugar is homogeneous and of the same quality across suppliers and countries. In addition, higher prices will trigger incentives to increase sugar production, which would in turn create downward pressure on the world price.

Overall, while the PEATSIM shows a sharp rise in imports, it doesn't separate out the import sources. Moreover, being net trade, the model only deals with export subsidies implicitly. Therefore to fully examine the implications of changing export subsidy policies and to directly examine the trade implications by trading partner in light of preferential agreements, we now turn to the global CGE model GTAP.

In our CGE analysis, the model scenarios are summarized in table 4. Starting from the initial benchmark for GTAP database 6.5 for 2001, a preliminary projections scenario was carried out to bring the world economy to 2004 and to implement the 2004 EU enlargement. Before we tackle the implications of the new EU sugar regime, we first assess the impacts of the EBA Initiative. This is followed by EU sugar reform scenarios under two alternatives: with or without the EU sugar

production cut (of 15%) decided later by the EU Commission after the reform agreement. Finally, we examine the implications of the reforms under two assumptions of competitive behavior: with or without free entry and exit of sugar processing firms.

EBA Initiative Impacts

In the EU-EBA scenario, the European Union removes tariffs and quota restrictions on imports of all goods (not just sugar) from the LDCs. This policy scenario is modeled to generate medium term static effects with no additional investments (in processing capacity) and no new land brought to agricultural use. Rather any changes in sugar production come strictly from reallocation of existing land in agriculture. As expected, implementation of EBA results in a rise of imports from LDC to EU by 473.1% compared to base (table 5) but EU sugar production is little affected (less than 1% drop compared to base) as overall EU sugar consumption rises to absorb the added EBA imports (table 6). There is also some trade diversion away from non-LDC ACP regions to the benefit of the LDC group. Under this scenario, the impact on third countries is very small but countries restricted from exporting to the EU, such as Brazil, manage to channel some of their exports via LDC and ACP (table 5).

Given the debate about the extent of increased EBA sugar exports to EU, we look closely at the reported volume of sugar export increases from LDCs and perform a sensitivity analysis by varying our assumption for the degree of production differentiation for sugar. Most partial equilibrium-based analyses typically assume perfect substitution (homogeneity) for sugar, an assumption that is hardly justified by econometric evidence and which assumes away any quality differences in sugar. Moreover, the homogeneity assumption does not account for the difference between raw and refined sugar in international trade. The sensitivity analysis allows for a range of values for the Armington trade elasticity of substitution (which reflects the degree of export demand elasticity)

starting from the central value[2] and considering two extreme cases: lower trade elasticity (meaning sugar is more differentiated between sources or production regions) and higher trade elasticity (meaning sugar is more homogenous between regions). The quantitative results do not change qualitatively except for the magnitude. EBA sugar exports to the EU range from 321% (highly differentiated case) to 485% (homogenous case) (compared to 473% increase in the central case). Van Berkum, Roza, Tengeren (VRT) (2005) also applied a CGE model to examine the impact of the EBA initiative and found that LDC exports to the EU increase by 384,000 MT but that quantity is raised to 0.9 million tonnes under a more homogeneous assumption. However, these results are still much smaller than the EU Commission projections of 2.8 to 3.5 million MT of EBA imports by 2014 (EU Commission 2005).

EU Sugar Reform: industry impacts

From the new post-EBA benchmark data and to better isolate the economic effects of key reform components we implement three scenarios representing the EU sugar reform for 2005. In scenario EU-Reform1, we implement the EU reform package as agreed to in November 2005. This consists of cutting border tariffs with an amount equivalent to domestic price cuts plus a cut in export subsidies to force total subsidized exports to comply with WTO ruling. In scenario EU-Reform1Q, we implement both the reform package (in EU-Reform 1) plus the 15% production quota cut (2.5 MMT) decided by EU Commission for 2006/07. Finally, in scenario EU-Reform1QE, we rerun EU-Reform1Q by allowing EU sugar processors to enter and exit the industry as production adjusts to EU reforms.

Under the base reform scenario (EU-Reform1, domestic price cut via border protection but without quota production cut), the EU-wide output impact of the reform is relatively small (-3.2%) and in a presence of binding production quotas, production actually doesn't decrease for most EU

[2] We use the value of 5.4 following on recent econometric work by Hertel et al. (2003) on trade elasticities.

Member States, except for France, Italy and smaller sugar producing regions (table 6). The producer price drop is also small (-2.6%) despite a much larger drop in the sugar market price (-9.2%). The differential between producer and market prices is linked to price wedges ("tax equivalents") stemming from the presence of production quotas (which create rent) and markups by oligopolistic sugar firms both captured as "tax" wedges in the price linkages. The smaller drop in producer price compared to market price stem from the offsetting "tax" effect of the production quota which becomes more binding for some Member States.

Under the second reform scenario (EU-Reform1Q, with production quota cut), the impacts are significantly different. Output declines by 14.3% over the EU-25 but the market price for sugar now increases (+22.5%). The latter results arise from an increase in markups charged by firms and the big drop in quota rents is reflected as "taxes" in producer-to-market price linkages. The producer price as a whole drops for EU sugar while the market price rises.

When entry and exit of firms is allowed for EU sugar firms (scenario EU-Reform1QE), the impact of EU sugar reform leads to a significant exit of firms in the industry (greater degree of restructuring) as the number of firms shrinking from 13 to 17% for 14 EU regions in the model except for Italy (table 7). However for the remaining firms, sugar output either drops slightly (Germany, Italy) or increases slightly (France, Netherlands). The remaining firms either maintain existing production or slightly adjust production up or down depending on individual countries within the EU. The main difference between this scenario and the scenario with no entry is that with entry the overall producer price now rises (+2.9%) pulling the market price higher (+23.7%) as the overall production at the industry level is down by close to 15% on average.

The comparison of the three reform scenarios, suggest that given the market structure of the sugar industry in the European Union, direct cuts in production quotas combined with price support cuts will have greater impact on EU sugar industry output adjustments than relaying only on price cuts

alone. The quick decision by the Commission to mandate quota cuts for 2006/07 following the reform may support this finding. Also the EU sugar reform effect on demand shows that the price changes arising from EU sugar reform only result in small increases in EU sugar consumption ranging from 1.1% increase under EU-Reform1 to -0.02% under EU-Reform1Q scenario as demand for sugar is very inelastic in the EU. Even though we do not directly model sugar-Isoglucose substitution in this general equilibrium analysis, this is unlikely to have much effect on the results because the possibilities for substituting sweeteners for sugar remain limited in the EU[3]. Other studies also find little increase in consumption from cuts in sugar prices (Gohin and Bureau, 2005).

In terms of world price effects, the reform scenarios show relatively small changes in world prices as a result of the EU sugar policy reform. Under scenario EU-Reform1, world price is slightly down (-0.85%), as the scenario lead to smaller output changes, while the scenario EU-Reform1Q (with production quota cut) sugar world price rise by 1.06% as EU sugar output and trade adjustments are larger compared to the case without quota cut. These magnitudes of world price changes, though typically smaller than those typically reported by partial equilibrium models, are consistent with the general equilibrium nature of the model due in part to the treatment of sugar as differentiated product in world trade.

Trade and Income impacts

Trade effects reflect the combined impact of reducing export subsidy rates (to WTO compatible levels) and reductions in border tariffs (necessary to bring about the same effect as support price cut). The volume of world sugar trade increases by 2.5% under EU-Reform1 scenario (no quota cut) and by 14.5 % under EU-Reform1Q (with quota cut). On the export side, the EU sugar exports drop by 25.8% under the EU-Reform1 but the addition of quota cuts (EU-Reform1Q) lead to much

[3] Unlike in the US where the soft drink industry rely heavily on High Corn Fructose Syrup, the EU soft drink industry uses mainly saccharose but very little use of isoglucose, hence limiting potential substitutions with sugar.

higher drop in sugar exports: -60.1%. On the import side however, EU sugar imports increase by 19.6% under EU-Reform1 and imports jump to 62.3% higher under EU-Reform1Q. The rise of imports benefits mostly ACP countries which expand exports outside the sugar protocol as the result of lower import barriers for out-of quota sugar. Since the reform scenarios start from a post-EBA benchmark, LDC countries now already benefit from duty and quota free access, and therefore see no additional benefits from lower border tariffs under the various reform scenarios. Rather LDC countries see some contraction in exports to the EU as a result of trade diversion.

Among the non-preferential suppliers, there is some growth of exports from Brazil and Central America but minimal change for Australia and Thailand whose exports are mostly concentrated on Asian markets and since world price changes are not large enough to affect non-EU demand for sugar. Gohin and Bureau (GB) (2005) using a general equilibrium model found that the impact of the EU reform proposal including a removal of export subsidies lead to larger imports under MFN-access and SPS but ACP exports are not affected.

In our study, income effects show that under the EBA-only initiative the LDC group as a whole show significant income gains mostly as the result of tariff removal on non-sugar exports (since initial sugar exports to the EU are relatively small compared to other commodities for LDCs). For the European Union, the income loss is due mostly to the loss of tariff revenues in the wake of the EBA initiative. However, under the EU reform package (EU-Reform1 and EU-Reform1Q scenarios), this loss is turned into an income gain due to the interplay of several factors, including lower prices for sugar, leading to lower cost for sugar using industries and consumers; contraction of the sugar industry leading to reductions in deadweight losses in the form of rents; and reductions in export subsidies. For preferential partners, there is some income loss under the EU reform scenario due in part to lower quota rents from lower price received under the reform. In the case of the ACP group the situation is only turned around into a positive income effect under the second

reform scenario (EU-Reform1Q) where the production quota cut resulted in a much larger export expansion overtaking the quota rent losses. Other exporters who increase their exports under EU reform scenario 2 also show some income gains, but these are relatively small.

Conclusions

Up until 2005, the EU sugar policy regime escaped any attempts at reforms since it was first put in place in 1968. The EU sugar policy has been criticized for distortions in the domestic and world market, high consumer prices, and its adverse effect on certain developing countries. However, the EU sugar regime has recently become unsustainable due to the combination of several pressures including the 2003 CAP reform (excluding sugar), EU 2004 enlargement, the EBA initiative and the recent WTO-ruling against EU subsidized exports. The reform package was designed to lower production incentives and to bring into line supply and demand in light of additional EBA sugar imports and tighter constraints on exporting excess sugar with subsidies beyond WTO limits. The crux of the reform consisted of reducing the intervention price (by 36%); allowing for voluntary quota buy out; reducing production; and refraining from exporting sugar beyond the WTO cap. Moreover, immediately after the reform package was finalized, the European Commission mandated a production quota cut of 15%. While reform measures like curbing export subsidies and production quotas quota cuts have predictable effects on exports and production, the impact of the intervention price cut is ambiguous given the sugar structure which results in market prices consistently above intervention prices due a tacit collusive behavior of processors, a continued restriction on sugar substitutes (despite an increase in quota under reform) and maintenance of high protection duties restricting competition with imports.

Nevertheless, the reforms are expected to have significant impact on EU sugar production in the near future. The inability to export excess out-of quota sugar will likely cut C-sugar production.

However, since quotas continue to be distributed at the national level, the expected shift of production from high cost regions to lower cost regions may not fully materialize. On the other hand, the trade implications of the EU reform are more nuanced and may be more significant for current preferential exporters than non-preferential sugar players. The reduction of intervention prices may have adverse effects on those developing countries that currently benefit from preferential import access and receive the guaranteed EU domestic price. It is expected that within the ACP group some countries may export less to the EU while others step in to fill the gap. However, the EU Commission expectation of a significant surge of sugar imports from LDCs after 2009 is surrounded with lot of uncertainty as LDC countries are dependent on new investments in sugar processing which are by no means guaranteed, given the price reduction in the EU and the unstable environment in many LDC countries. For non-preferential exporters, the EU reform may have limited impact since it doesn't relax the high import barriers (outside preferential access). Even with reductions in EU subsidized exports, the regional character of world sugar markets and the limited effect on world sugar demand suggest a small effect of EU sugar reform on world prices.

Finally, what are the implications of the EU reform in light of the WTO Doha negotiations? The reduction of export subsidies can bring the EU within the current WTO limits and could make it easier for the EU to go along with a phased removal of export subsidies. In the area of domestic support, cuts in intervention price and lower production means reduced AMS for the Amber box. Moreover, classifying sugar payments as decoupled could also shift such support from Amber to green. However, in the area of market access, the EU reform allows for a small margin to maneuver in the context of multilateral tariff liberalization. The EU reforms and the fall of domestic prices could make the special safeguard redundant. Moreover an equivalent cut in border tariffs may not be enough to change the structure of sugar imports into the EU which will continue to be dominated by preferential and not MFN-based sugar flows.

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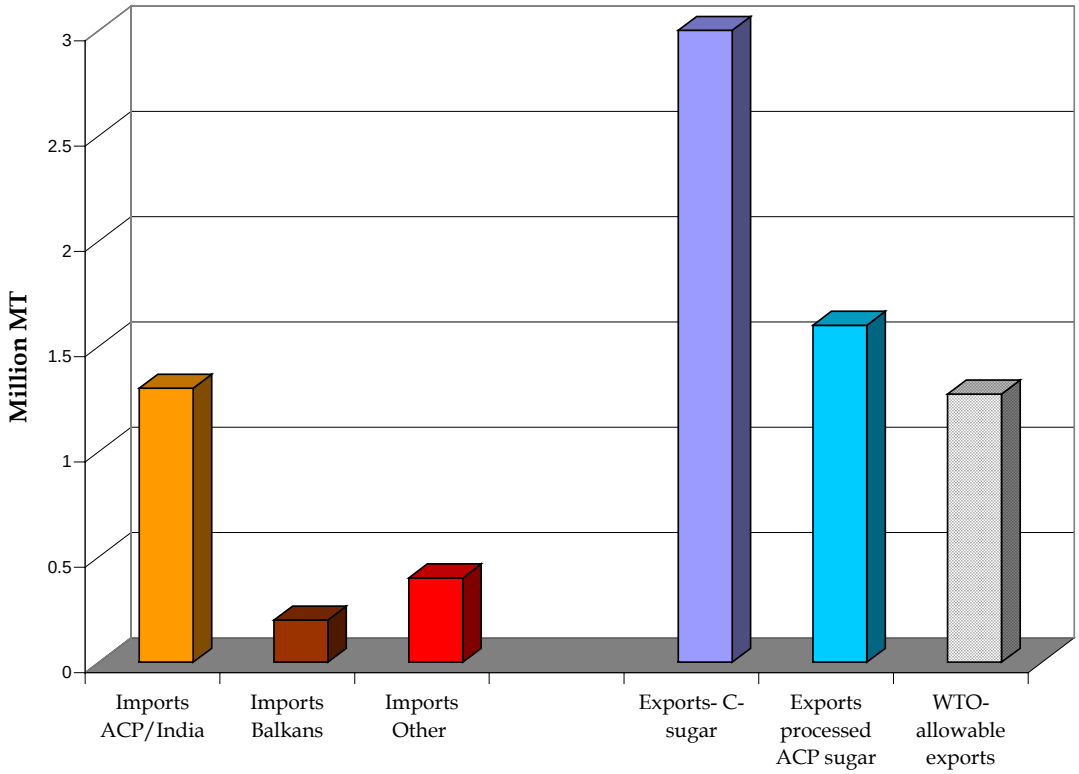
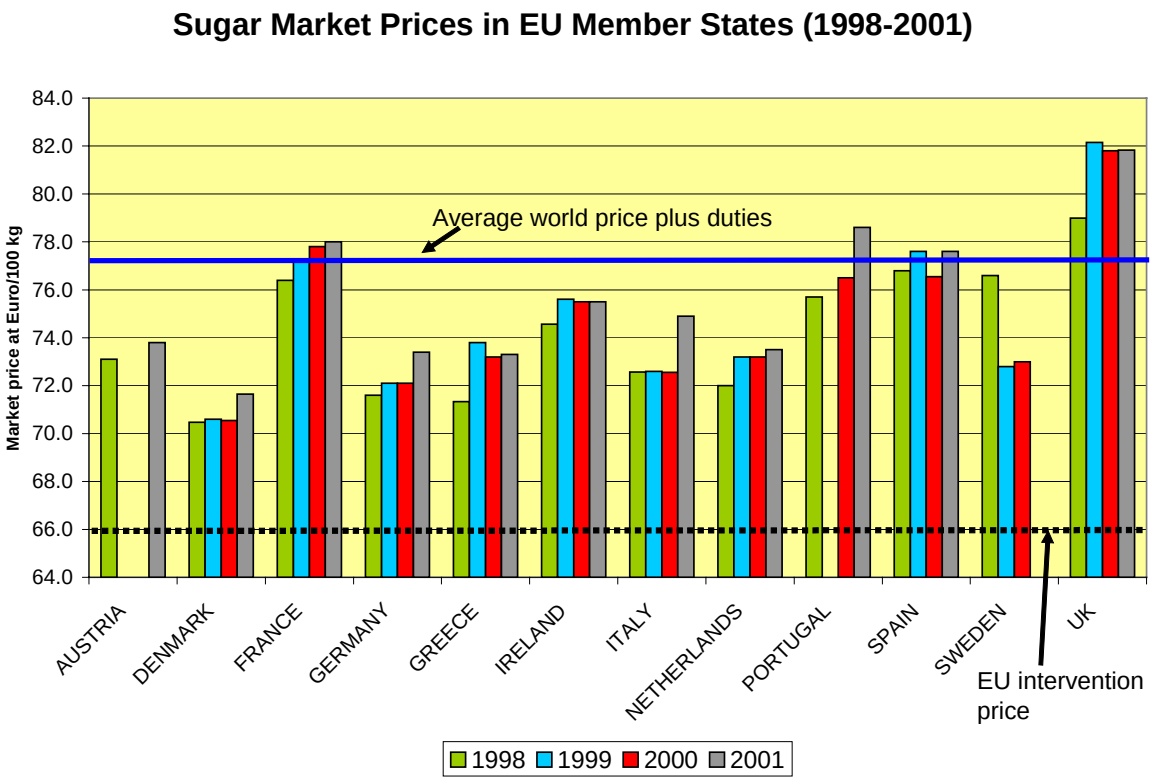
Figure 1
Structure of EU Sugar Trade (2004)



Source: EU Commission; Agra Europe

Figure 2
Market Prices by EU Member States



Source: NEI(2000) and Swedish Competition Authority (2002)

Table 1
EU Sugar Industry (2002-03)

	Number of factories	Number of companies	Daily beet tonnage (tons)	White sugar yield (tons/ha)	Sugar beet yield (t/ha) (ton/ha)
AUSTRIA	3	1	36.8	10.3	68.4
BELGIUM	8	6	81.3	10.4	66.0
DENMARK	3	1	29.4	9.3	57.1
FINLAND	2	1	12.6	5.3	38.6
FRANCE	34	17	391.0	11.6	77.5
GERMANY	28	7	292.6	8.8	58.9
GREECE	5	1	29.9	7.2	73.1
IRELAND	2	1	15.8	6.3	52.3
ITALY	20	9	141.4	5.7	51.8
THE NETHERLANDS	5	2	75.2	9.6	60.0
PORTUGAL	4	4	3.6	9.0	62.5
SPAIN	13	3	102.0	10.4	76.8
SWEDEN	2	1	24.4	8.0	48.5
UNITED KINGDOM	6	2	57.8	9.7	64.7
E.U. 15 COUNTRIES	**132**	**56**	**1293.8**	**8.7**	**61.8**

	Production + carry over (x1000 tons)	A sugar (x1000 tons)	B Sugar (x1000 tons)	C Sugar (x1000 tons)	Sugar consumption (x1000 tons)
AUSTRIA	454	314	73	67	300
BELGIUM	888	675	145	68	530
DENMARK	501	325	96	80	230
FINLAND	166	133	13	20	210
FRANCE	4105	2789	752	564	2130
GERMANY	3798	2613	804	381	2080
GREECE	370	289	29	52	305
IRELAND	223	181	18	24	130
ITALY	1563	1311	162	90	1410
THE NETHERLANDS	953	684	180	89	625
PORTUGAL	56	56		.	320
SPAIN	1086	957	40	90	1220
SWEDEN	427	335	33	59	360
UNITED KINGDOM	1260	1035	104	121	2160
			.		
E.U. 15 COUNTRIES	**15585**	**11697**	**2449**	**1705**	**12800**

sources: CEFS delegations

Table 2
Comparing EU reform to status quo: EU production, consumption, trade, and price effects.

	Base year	EU reform scenario	Percent change from base	No reform scenario	Percent change from base
Production	20.550	16.988	-17.33	20.550	0.00
Consumption	18.362	20.000	8.92	18.590	1.24
Exports	4.374	2.050	-53.14	4.310	-1.46
Imports	2.370	5.061	113.54	2.353	-0.72
Producer price	0.630	0.383	-39.22	0.563	-10.63
Consumer price	0.628	0.381	-39.25	0.562	-10.51
Export price	0.628	0.381	-39.25	0.562	-10.51
Import price	0.628	0.381	-39.25	0.562	-10.51
World price	0.199	0.215	8.04	0.196	-1.51

Source: PEATSIM Model runs (2006)

Table 3
GTAP Model scenarios

Experiment:	Modeled policies and structural changes	Starting Database
P0 (prelim Scenario)	Growth projections 2001-2005 2004 European Union Enlargement: (removal of interbal trade barrriers between EU15 and EC10)	GTAP database 6 2001
EU-EBA	Elimination of all tariff barriers on imports from LDC countries	Post-P0 2005 database
EU-EBA-S	Same as EU-EBA with smaller trade elasticity: (sugar is imperfect substitutes)	Post-P0 2005 database
EU-EBA-B	Same as EU-EBA with large trade elasticity: (sugar is homogeneous across coutnries)	Post-P0 2005 database
EU-Reform1	Reduction of export subsidy rates (to conform with WTO limits) Cut in border price by 36% (to parallel cut in domestic price)	Post-EBA database
EU-Reform1Q	Reduction of export subsidy rates (to conform with WTO limits) Cut in border price by 36% (to parallel cut in domestic price) Product quota cut by 15%	Post-EBA database
EU-Reform1QE	Reduction of export subsidy rates (to conform with WTO limits) Cut in border price by 36% (to parallel cut in domestic price) Product quota cut by 15% Allow for firms' entry and exit in sugar processing industry	Post-EBA database

Table 4
GTAP Model Results: EU Reform and changes in bilateral trade flows

Bilateral trade flows tn the intitial base 2004 (raw sugar equivalent in 2001 $US million):

	Total Initial exports	Of which to: EU-25	ACP	LDC	Mediterran.	USA	South Asia	Others
EU-25	1662.7	1299.1	13.1	40.1	70.0	33.0	61.2	146.2
ACP	2337.1	924.0	155.9	67.8	62.5	175.8	210.5	740.6
LDC	217.7	88.4	5.1	84.3	8.5	22.2	2.7	6.5
Brazil	1723.9	29.2	13.7	95.3	313.5	74.6	109.9	1087.8
C. America	944.2	31.9	41.9	9.3	9.7	239.7	119.2	492.5
India	241.5	43.4	0.3	28.6	8.9	2.7	37.2	120.5
Australia	852.2	0.7	3.1	0.0	32.2	51.1	535.6	229.5
Thailand	625.7	5.2	0.3	33.6	0.3	13.7	432.0	140.6
Others	1537.6	435.2	23.6	25.9	63.9	337.6	272.6	378.9
WORLD	10142.6							

Change of sugar exports (raw equivalent) due to Implementation of EBA for LDC

	Total export change	which to: EU-25	ACP	LDC	Mediterran.	USA	South Asia	Others
EU-25	3.7	-22.2	0.9	4.6	5.7	1.4	3.6	9.5
ACP	-96.2	-100.3	-0.2	2.3	0.1	0.5	0.4	0.9
LDC	402.7	404.0	-0.2	0.1	-0.3	-0.7	-0.1	-0.2
Brazil	-3.2	-3.8	-0.1	2.9	-0.3	0.0	-0.1	-1.9
C. America	-3.8	-3.3	-0.2	0.3	0.0	0.0	-0.1	-0.6
India	-2.0	-2.5	0.0	0.9	0.0	0.0	-0.1	-0.3
Australia	-1.0	-0.1	0.0	0.0	0.0	0.0	-0.6	-0.3
Thailand	0.0	-0.4	0.0	1.0	0.0	0.0	-0.5	-0.2
Others	-36.7	-36.8	-0.1	0.8	0.0	0.0	-0.2	-0.3
WORLD	263.4							

Change of sugar exports due to post-EBA EU sugar reform (no production quota cut)

	Total export change	Of which to: EU-25	ACP	LDC	Mediterran.	USA	South Asia	Others
EU-25	-129.4	-34.4	-4.6	37.3	-24.6	-16.3	-28.3	-58.4
ACP	363.5	368.2	0.9	-1.2	-0.4	-1.3	-0.1	-2.6
LDC	-45.8	-45.6	0.1	-0.5	0.0	0.1	0.0	0.0
Brazil	36.7	31.1	0.2	-1.0	0.6	0.0	0.8	5.0
C. America	22.8	18.5	0.6	-0.1	0.0	0.2	1.0	2.5
India	8.7	8.1	0.0	-0.3	0.0	0.0	0.3	0.6
Australia	5.7	0.0	0.0	0.0	0.1	0.1	4.4	1.0
Thailand	4.8	3.0	0.0	-0.4	0.0	0.0	2.0	0.2
Others	-30.7	-34.6	0.3	-0.3	0.1	0.4	2.0	1.3
WORLD	236.3							

Change of sugar exports due to post-EBA EU sugar reform (including 15% production quota cut)

	Total export change	Of which to: EU-25	ACP	LDC	Mediterran.	USA	South Asia	Others
EU-25	58.4	283.8	-7.9	-1.6	-45.2	-23.4	-44.2	-103.2
ACP	770.4	779.1	2.0	-1.5	-0.8	-3.0	-1.4	-4.0
LDC	9.3	8.8	0.2	0.1	0.1	0.1	0.0	0.1
Brazil	59.8	38.9	0.5	-0.2	2.2	0.2	1.5	16.7
C. America	47.2	36.6	1.4	0.0	0.1	0.7	1.7	6.7
India	65.8	64.2	0.0	-0.1	0.0	0.0	0.4	1.4
Australia	11.9	0.9	0.1	0.0	0.3	0.2	8.0	2.5
Thailand	11.6	8.6	0.0	-0.3	0.0	-0.1	2.9	0.4
Others	363.5	354.2	0.8	0.0	0.5	0.9	3.7	3.4
World	1397.8							

Source: Model Simulation results

Table 5
Summary of results: EBA and Reform scenarios (GTAP simulations)

	Initial base	EBA		EU-Reform1		EU-Reform1Q	
		% change	Value change[1] ($US Mi)	% change	Value change ($US Mi)	% change	Value change ($US Mi)
Imports into EU-25							
TOTAL (Extra-EU)	**1363.8**	**5.7**	**273.8**	**19.6**	**361.2**	**62.4**	**1170.3**
ACP	924.0	-10.9	-100.3	45.7	368.2	92.5	779.1
LDC	88.4	473.1	404.0	-8.4	-45.6	1.6	8.8
MEDTR	197.4	-8.7	-17.4	9.0	9.0	120.8	201.0
USA	56.4	-7.8	-4.5	-11.8	-6.8	113.6	56.4
CAN	18.7	-6.9	-1.3	-35.8	-6.4	60.8	11.0
BRZL	29.2	-12.6	-3.8	123.7	31.1	155.8	38.9
CHN	0.7	-8.6	-0.1	77.9	0.5	231.3	1.5
IND	43.4	-5.5	-2.5	29.8	8.1	158.1	64.2
AUS	0.7	-7.9	-0.1	11.2	0.0	143.8	0.9
THLND	5.2	-7.8	-0.4	89.7	3.0	224.8	8.6
Exports from EU-25							
TOTAL (Extra-EU)	**183.2**	**7.1**	**14.6**	**-25.7**	**-19.6**	**-60.1**	**-97.0**
ACP	13.1	7.0	0.9	-34.4	-4.6	-58.2	-7.9
LDC	40.1	11.5	4.6	83.2	37.3	-6.4	-1.6
MEDTR	70.0	8.2	5.7	-33.7	-24.6	-61.6	-45.2
USA	33.0	4.3	1.4	-48.1	-16.3	-70.1	-23.4
CAN	5.1	7.7	0.4	-37.5	-2.0	-70.2	-3.8
BRZL	3.3	5.3	0.2	-46.0	-1.6	-76.2	-2.6
CHN	3.6	8.3	0.3	-39.4	-1.5	-67.5	-2.6
IND	4.5	4.9	0.2	-26.4	-1.3	-48.8	-2.2
AUS	5.2	8.3	0.4	-41.1	-2.2	-70.4	-3.8
THLND	5.4	6.9	0.4	-46.8	-2.7	-71.5	-4.1
Output (raw sugar equivalent)							
EU-25	**26164.0**	**-1.0**	**-251.5**	**-3.2**	**-791.0**	**-14.3**	**-3653.3**
ACP	3981.6	-2.5	-98.8	9.6	374.0	20.4	792.6
LDC	5322.2	7.6	403.2	-1.3	-73.0	0.3	14.4
MEDTR	16358.7	-0.1	-23.1	0.2	32.5	1.7	269.2
USA	32477.9	0.0	-8.6	0.0	12.5	0.4	121.5
CAN	331.4	-0.5	-1.5	-1.9	-6.3	4.2	13.8
BRZL	5800.6	-0.1	-4.1	0.8	45.1	1.3	74.4
CHN	412.7	-0.1	-0.3	0.4	1.7	1.0	4.2
IND	7171.9	0.0	-2.5	0.1	9.7	1.0	68.1
AUS	2196.4	-0.1	-1.9	0.5	9.8	0.9	20.2
THLND	1527.6	0.0	-0.3	0.5	7.1	1.0	15.7
Income (millions of 2001 USD)							
EU-25	**8988151.1**		**-317.2**		**1302.0**		**1600.7**
ACP	385024.0		-21.0		-19.1		79.9
LDC	344329.3		362.9		-14.5		-8.3
MEDTR	1178657.0		3.5		4.1		24.3
USA	11057000.0		-39.6		-13.7		48.4
CAN	780615.4		4.2		-2.3		7.4
BRZL	595336.6		1.8		2.4		27.0
CHN	1384773.0		-6.2		-2.3		-4.1
IND	567009.9		-12.6		-1.7		10.4
AUS	400031.3		5.8		-2.4		9.8
THLND	142727.5		0.4		-2.4		5.5
ROW	1310200.1		7.7		-3.5		-11.4
Sugar quota rent transfer by	1151.4		135.1		-478.6		-455.7

1: value change is expressed in constant 2001 US dollars
Source: Model simulation results

Table 6
EU Reforms and market structure for EU sugar industry (GTAP Model results)

	Change in number of firms	Change in output per firm (%)	Change in markups (%)	Change in industry output (%)	Change in industry output ($US Mi)	Change in exports ($US Mi)	Change in imports ($US Mi)	Change in regional income ($US Mi)
	EU-Reform1Q Scenario (No firm entry or exit)							
Belgium	0	-15	4.51	-15	-226.9	-26.89	158.5	83.34
Denmark	0	-15	5	-15	-57.7	-4.07	106.4	4.71
Germany	0	-15	1.39	-15	-770.7	-31.93	1534.2	-55.24
Spain	0	-15	4.83	-15	-145.2	-17.06	223.2	32.4
France	0	-15	-0.82	-15	-487.9	-48.41	862.9	305.42
Italy	0	-2.1	0.02	-2.1	-27.7	-30.97	66.8	52.54
Netherlands	0	-15	1.91	-15	-108.5	-21.26	113.9	36.81
Austria	0	-15	5	-15	-66.9	-3.03	135.1	13.17
Poland	0	-15	4.6	-15	-862.6	-7.09	7398	-183.27
Sweden	0	-15	4.59	-15	-88.4	-5.64	138.8	-4.8
UK	0	-15	5.03	-15	-509.4	-12.58	366	884.73
Hungary	0	-15	4.77	-15	-44.7	-0.78	68.2	0.74
Czeck Rep	0	-15	4.54	-15	-132.8	-0.68	204.9	-28.55
Other-EU	0	-14.65	5.34	-14.65	-319.6	-17.97	460.3	458.7
	EU-Reform1QE Scenario (with free firm entry or exit)							
Belgium	-15.42	0.5	0	-15	-228.7	-26.52	199.2	19.81
Denmark	-15.15	0.18	0	-15	-57.8	-4.06	108.4	-10.27
Germany	-13.64	-1.57	0	-15	-772.4	-31.85	1550.1	-117.53
Spain	-15.05	0.06	0	-15	-145.4	-17.01	223.7	-7.85
France	-17.33	2.81	0	-15	-489	-48.19	869.3	325.47
Italy	-0.11	-1.86	0	-1.96	-25.9	-30.99	66.6	51.38
Netherlands	-16.13	1.35	0	-15	-108.8	-21.15	116.2	25.75
Austria	-15.15	0.18	0	-15	-67	-3.03	136.4	-6.61
Poland	-16.11	1.32	0	-15	-890.2	-6.42	10064.2	-289.34
Sweden	-14.88	-0.14	0	-15	-88.8	-5.62	144.5	-25.33
UK	-14.96	-0.04	0	-15	-511.7	-11.24	413	727.48
Hungary	-15.08	0.09	0	-15	-45	-0.76	71.5	-10.27
Czeck Rep	-14.71	-0.34	0	-15	-134.3	-0.67	216.2	-55.02
Other-EU	-14.18	-0.34	0	-14.48	-317.3	-17.71	472.4	343.96

Source: Model simulation results