Preferential Trade of Agricultural Commodities in the Caribbean Basin

Nathan Loper
PhD Candidate
Department of Agricultural Economics
Purdue University
Phone: (765)-494-7939
e-mail: nloper@purdue.edu

Philip Abbott
Professor
Department of Agricultural Economics
Purdue University
Phone: (765)-494-4274
e-mail: abbottpc@purdue.edu

Ken Foster
Professor
Department of Agricultural Economics
Purdue University
Phone: (765)-494-1118
e-mail: kfoster@purdue.edu

Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Montreal, Canada, July 27-30, 2003

Preferential Trade of Agricultural Commodities in the Caribbean Basin

Nathan Loper, Philip Abbott, and Ken Foster[1]

ABSTRACT

Preferential agricultural trade under the Caribbean Basin Initiative has been beneficial to participating countries, particularly for differentiated goods. Goods that have not performed well were either subject to policy changes, eroding preferences and deteriorating market trends or structural changes that diminished CBI exports.

Keywords: Caribbean Basin Initiative, GSP, Preferential Trade Arrangements, Armington model, preference erosion

[1] We gratefully acknowledge financial support from Cooperative Agreement No.43-3-AEK-9-80057 with the Markets and Trade Division, Economic Research Service, USDA.

Preferential Trade of Agricultural Commodities in the Caribbean Basin

Nathan Loper, Philip Abbott, and Ken Foster

Introduction

The U.S. engages in nonreciprocal preferential trade arrangements with many developing countries via programs like the Generalized System of Preferences (GSP), the Caribbean Basin Initiative (CBI), and the African Growth and Opportunity Act (AGOA). Under these programs tariff concessions are offered to select beneficiary countries. Their objectives are to foster economic growth in those countries by granting concessions that give those countries improved access to U.S. markets. Unlike free trade agreements and outcomes under multilateral trade negotiations, these market access improvements are granted without requiring concessions from beneficiary countries.

The Caribbean Basin Initiative[2], which began in 1983, is one of the oldest and most successful of these programs. Significant increases in exports from CBI countries to the U.S. have occurred since the program's inception, and improvements in export performance have helped to foster more rapid economic development in Caribbean countries (Leon and Salazar-Xirinachs, 2001). While these programs were initially introduced to foster industrialization, agricultural commodities were also included among those goods receiving tariff concessions. There is evidence that the CBI program has

[2] CBI eligible countries are Antigua and Barbuda, Aruba, the Bahamas, Barbados, Belize, British Virgin Islands, Costa Rica, Dominica Islands, The Dominican Republic, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Montserrat, Netherlands Antilles, Nicaragua, Panama, St. Kitts-Nevis, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago. Of the 24 countries in the CBI agreement, only six are ineligible for GSP exports: Aruba, the Bahamas, British Virgin Islands, Montserrat, Netherlands Antilles, and Nicaragua. We look at combined CBI and GSP exports form the Caribbean because terms are similar, so exporters are generally indifferent between these two programs.

helped foster agricultural export growth, and in the 1990's the CBI program has helped agricultural exports more so than industrial goods exports to the United States.

The continuation of these nonreciprocal preferential trade arrangements became a contentious issue during negotiations on the Uruguay Round of the General Agreement on Tariffs and Trade (GATT). Since adoption of the Uruguay Round agreement in 1994 and creation of the World Trade Organization (WTO), both the U.S. and the European Union have requested (and been granted) special permission from the WTO to continue these programs. Their future is currently under debate in negotiations on both bilateral and multilateral agreements.

Critics of nonreciprocal preferential trade arrangements argue that they should be eliminated during ongoing WTO Doha Round negotiations, because they are discriminatory and because they have been ineffective in achieving their goals of expanding developing country exports and fostering economic growth. While evidence reported here argues that some preferential trade arrangements have realized success in the past and continue to confer advantages to beneficiary countries, continuing liberalization of trade regimes may erode benefits to countries now participating in them.

In some cases, erosion of preferences may have already taken place. Reduction of most favored nation (MFN) tariffs as a result of successful GATT/WTO negotiations in 1994 has already reduced some benefits from nonreciprocal preferential trade arrangements. Even where market shares have been maintained the benefits from not paying tariff charges have diminished because the preference margin, the difference between the MFN tariff rate and the beneficiary preferential rate, has been decreasing.

Moreover, bilateral and regional trade agreements, such as the North American Free Trade Agreement (NAFTA), and future trade agreements currently under negotiation, including free trade agreements with Jordan, Chile, Singapore, and Morocco as well as expansion of NAFTA to a Free Trade Area of the Americas Agreement (FTAA), can also limit the effectiveness of nonreciprocal preferential trade arrangements for a particular developing country exporter. The critique that nonreciprocal preferential trade arrangements are discriminatory remains, because benefits from the program accrue only to those countries being granted specific tariff concessions, potentially at the expense of other developing country exporters.

The purpose of this paper is to investigate the performance of agricultural exports under the Caribbean Basin Economic Recovery Act (CBERA), the trade component of the CBI, and GSP programs to the U.S. from beneficiary countries. To do this, trends in aggregate trade flows of agricultural commodities will be presented, and then these exports will be decomposed into three groups in order to better understand the observed trends in those exports[3]. The first group includes non-preferenced goods-- because these commodities are not covered under either CBERA or GSP programs. The second group includes politically sensitive goods covered under CBERA and GSP programs, where imports are primarily affected by U.S. policies that include quantitative restrictions like tariff rate quotas (TRQs). The third group includes other goods benefiting from CBERA and GSP programs. However, the commodities in this group may be directly affected mostly by changes in preferential tariffs, and are not subject to quantitative restrictions.

[3] All data used in this study (including export values, tariffs, and transportation costs) was collected from the United States International Trade Commission's web page: www.usitc.gov.

Among this third group of CBERA beneficiary commodities, three further classifications will emerge: goods whose imports (but not necessarily market share) declined due to declining U.S. import demand; goods crowded-out by preference erosion –where market share and so exports were lost; and goods that found targeted niche markets and have continued to perform well in spite of preference erosion.

The last two classifications of goods are the focus of the empirical analysis for this paper. Both of these groups are similar in that their preference margins have eroded considerably through time, but are different in that exports of some commodities flourished while exports of other goods withered. It is hypothesized that the goods that succeeded in spite of preference erosion may have done so because they are differentiated, found a niche market, and so have less competition from other sources. On the other hand, the many crowded out goods may be more homogeneous, and faced stiffer competition from alternative sources competing in the U.S. market.

The last section of this paper will test the above hypothesis-- that goods that have been successfully exported may be differentiated and goods with declining exports may be homogeneous and so have been crowded-out. This will be done by estimating the extent of substitutability among sources for these two commodity groups, done by estimating elasticities of substitution (EOS) via the Armington (1969) technique for five specific commodities- two crowded-out commodities and three successful commodities. It is expected that differentiated goods will have a small EOS while crowded-out goods will have a larger EOS. Elasticity estimates will then be used to decompose the effect of preference erosion from WTO/Uruguay Round Agreement on Agriculture (URAA) and

NAFTA versus price changes due to U.S. import demand or Caribbean supply on market share changes. These calculated market share changes will then be compared to observed market share changes to assess the importance of preference erosion. This analysis can also be used to assess consequences on old and new beneficiaries and competitors as future trade agreements are negotiated such as FTAA or the WTO Doha Round.

Agricultural Exports from CBI Countries

Both total agricultural exports and preferenced agricultural exports follow nearly the same increasing trend from 1989 to 1997 (see Table 1 and Figure 1). In 1997, peak levels of these exports were reached for both measures, with declines in both categories in 1998. Preferenced exports then increased each year from 1999 to 2002, with this being the reason total agricultural exports increased as well. Preferenced exports have grown faster than non-preferenced exports, which can generally be taken as the norm throughout the time periods in question for this study. The share of preferenced exports of total exports has become significantly larger, from 38% in 1989 to 54% in 2002. This is direct evidence that CBI countries have come to rely more heavily on CBERA and GSP programs for export earnings.

The export trends of non-preferenced goods, the first group in this paper, can mostly be explained by investigating three commodities that have very little or no competition from U.S. producers: bananas, coffee, and cocoa. These goods enter into the U.S. duty free (zero MFN tariff rate) and account for nearly 90 percent of all non-preferenced exports to the United States (see Table 1). Worldwide imbalances between supply and demand have led to low prices and so low export earnings from these

commodities. Exports values for these three commodities declined from nearly $1.5 billion in 1997 to just over $1 billion in 2002.

The next two groups consist of commodity exports that are covered under CBERA and GSP programs. The first of these two groups are politically sensitive goods-meat and sugar. Both of these commodities are considered politically sensitive because their importation could potentially damage U.S. producers. Therefore, farm programs and trade barriers have protected domestic producers, and those barriers have not been reduced since U.S. farm policy reforms in the early 1990's or in the U.S. Uruguay Round commitments. Consequently, U.S. imports of these goods have historically been restricted by non-tariff barriers such as quotas. More recently, due to the enactment of the URAA, these imports have been restricted by TRQ's.

U.S meat import policy from 1965 to 1994 can be traced to the Meat Import Law of 1965. This law required meat exporters to the U.S. to comply with voluntarily export restraints (VER) where the U.S. and the exporting country would negotiate a set quantity that the exporter would "voluntarily" export.[4] After 1995, VER's were changed to TRQ's. When this happened, the U.S. granted 7 countries guaranteed U.S. market access with country-specific quota allocations. Canada and Mexico negotiated unrestricted access to U.S. markets under NAFTA for their meat exports. Since CBI countries together shared a very small quota allocation under the meat TRQ, it was no longer beneficial for them to produce large amounts of meat for export to the United States. Consequently, meat exports to the U.S. from CBI countries have dropped considerably,

[4] A VER is similar to an import quota except that under a voluntary export restraint program the exporting nation receives the quota rent.

from a peak level of $179 million in 1993 down to $54 million in 2002. Illustrating the benefit of the reciprocal NAFTA agreement, Mexican meat exports increased from $200,000 in 1989 to $16.2 million by 2002, and Canadian meat exports increased from $527 million in 1989 to just under $1.9 billion by 2002.

Sugar, a commodity suitably grown in climates native to CBI countries, has historically been an important commodity for these countries to gain export earnings. However, sugar production in the U.S. has been protected by both a loan rate program that supported U.S. producer prices and by a quota that controlled the level of sugar imports. Therefore, sugar exports (primarily sugar cane) from CBI countries to the U.S. were hurt by the enactment of the URAA and U.S. domestic farm policy changes, which both influenced U.S. sugar trade policy, and led to lower CBI quotas.

In 1995, the U.S. negotiated a minimum access commitment level at the URAA for sugar imports at 1.26 million short tons, which was considerably higher than the historical levels of the total import quota allotment. The U.S. TRQ for sugar imports was 2.41 million short tons for the 1996 marketing year. It decreased to 1.28 million short tons in the marketing years from 1999 to 2001. Consequently, CBI countries were hurt by this diminished allocation because their total quota allotments shrank from 794,502 short tons in 1996 to 407,324 short tons in 1999 and thereafter. Quota allocations were filled by CBI countries, thus export values fell accordingly. CBERA and GSP exports of sugar steadily increased from 1989 to a peak level of $473 million in 1997, and then decreased steadily to $223 million in 2002, following these quota reallocations.

The enactment of NAFTA has put further pressure on CBI exports of sugar. In

addition to CBI countries losing their market share in sugar exports due to diminished quotas, under NAFTA Mexico and Canada were granted expansions of sugar quota allocations. Prior to fiscal year 1998, Canada did not have an allocation for the export of beet sugar and Mexico exported very little sugar. Both of these countries were given "in addition to" allocations that do not count under the U.S. sugar program total quota allotment. This has allowed both Canadian and Mexican exports of sugar guaranteed U.S. market access, with Mexico's quota allotment increasing significantly in the future. It is unsure if future additional sugar allocations to Canada and Mexico will diminish CBI sugar allocations in the years to come, but such market impacts appear to have influenced quota levels in the past.

The next commodity group includes all other commodities exported under CBERA and GSP programs- except meat and sugar. These goods will be grouped into 3 sub-categories: demand driven, successful, and crowded-out. These three groups of goods are similar to the politically sensitive goods in that preferences have eroded, but dissimilar as to how the erosion occurred. The politically sensitive goods' preferences eroded by both increasing quantitative restrictions and through falling MFN tariff rates, while the remainder of the goods' preferences were eroded through the tariff mechanism (only).

Even though the preference margin has been falling for all of these goods, exports of demand driven goods, e.g., tobacco (mostly high-valued cigars), were affected mostly by demand and supply fluctuations in the U.S. market. High-valued cigars are another commodity (like meat and sugar) whose exports largely help explain the fall in total

CBERA agricultural exports after 1997 (their cumulative exports are illustrated in Figure 1). The enactment of NAFTA, WTO/URAA negotiations, or U.S. domestic farm program changes had no effect on the policies governing exports of this good from CBI countries.[5] CBI exports of high valued cigars went from $32 million in exports in 1989 to $335 million in 1997, and back down to $244 million by 2001. Additionally, total U.S. imports match the export trend of high valued cigars from CBI countries. CBI countries have averaged over 90 percent of the U.S. market from 1989 to 2002 with no decline evident after 1997. Trade performance of this good is another factor behind the seeming failure of CBI programs for agricultural exports after 1997.

There are two factors that contribute to the large upswing, then decrease, in imports of this product. First, U.S. consumption of cigars increased considerably throughout the 1990's, which also caused prices to increase. While U.S. consumption increased, U.S. production did not increase enough to satisfy demand. This caused net U.S. import demand to increase considerably in both 1997 and 1998 (the two years that high-valued cigar exports peaked to the U.S.), and CBI countries satisfied this increased demand. U.S. production caught up thereafter. Essentially, CBI countries only export this good to satisfy the deficit of demand less production in the United States.

Disaggregated Commodity Assessment

Meat, sugar, and high-valued cigar exports to the U.S. from CBI countries make up nearly all of the CBERA beneficiary exports from their respective 2-digit harmonized system (HS) chapters. If these three chapter exports from CBI countries are subtracted

[5] The U.S. does have TRQ's in place for almost all other tobacco products imported into the United States.

from total CBERA exports from CBI countries, a completely different picture on export trends under CBERA is revealed. The remaining goods, which account for roughly half of all CBERA exports to the U.S., have grown considerably, at 10.5 percent per year. This is significantly higher than the 6.2 percent per year growth of total CBERA agricultural goods. Additionally, CBERA agricultural exports less meat, sugar, and tobacco have shown very little variability, with export levels steadily increasing each year, with no export decreases following 1997. From this disaggregated commodity perspective, CBERA programs for CBI countries now appear to be more successful than previously observed. Figure 1 shows this outcome.

The purpose of the remainder of this section is to decompose the remaining commodities according to their susceptibility to preference erosion: goods that have been successful under CBERA trade and goods that appeared to have been crowded-out due to trade policy changes.

There are 6 specific commodities at the 8-digit HS classification level that explain the upward trend in CBERA exports less meat, sugar, and tobacco. They are live tree slips or cuttings, dasheens (a tropical root), fresh or dried pineapples, cantaloupes (off-season with U.S.-grown cantaloupes), frozen orange juice, and ethyl alcohol. Exports of these 6 goods go from $87 million in 1989 to $447 million by 2002 (see Table 1).

A graphical representation of total CBERA exports less sugar, meat, and tobacco chapters, the 6 goods that have performed well under CBERA programs, and the remainder of goods exported under CBERA programs is presented in Figure 2. These remaining goods may have been crowded out because exports from CBI countries may

not have been as competitive as goods from other sources. This is demonstrated by the crowded-out residual line in Figure 2 being flat from 1997 and thereafter.

Why were the exports of some goods very successful under CBERA programs and a large bundle of other goods exported not successful and crowded out from CBI countries? It appears that CBI countries may have found a niche in the U.S. market with these 6 successful commodities and benefited considerably from this. These six 8-digit HS commodities are highly disaggregated and may be differentiated. For example, fresh or dried pineapples under CBI are differentiated from other types of pineapples because they are shipped by bulk. Cantaloupes are differentiated because different HS classifications detail different growing seasons. Also, specific tastes or preferences generally associated with brand or good loyalty may have determined consumption, therefore long run trade patterns.

The story is quite different for crowded-out goods. The crowded-out goods may be homogeneous, because the preference erosion generated by both NAFTA and URAA enabled preference margins to decrease enough to shift any cost advantage away from CBI countries and toward other suppliers. Hence, the enactment of CBI program policies may have induced "comparative advantage" for CBERA exports, while NAFTA and the WTO/URAA eroded this mechanism.

Preference Margins

Behind the premise that the 6 successful commodities exported from CBI countries under CBERA may be more differentiated than homogeneous is the fact that their preference margins have been falling in the same fashion as preference margins fell

for the crowded-out bundle (see Table 2) [6]. Tariffs for the 6 successful commodities fell from 1994 to 2000. Tariffs do not fall in 2001 and 2002 because WTO/URAA required tariff reductions were completely implemented in 2000, and new negotiations have not yet led to any agreement on further tariff reductions. All tariffs fell incrementally except for dasheens. Since there is almost no production of dasheens in the U.S., it appears the committed MFN tariff reduction was accomplished in one year, from 1994 to 1995.

As for the crowded out goods, the tariff calculations -median and average- both clearly exhibit a downward trend. The simple average tariff declined from 9.86 percent in 1993 to 6.08 percent in 2002, while the median value declined from 7.50 percent in 1993 to 4.58 percent in 2002. Most notable is that both measures decline faster from 1997 to 2002 than from 1993 to 1997. This is not a coincidence, considering that this same bundle of goods exhibited stagnant export growth from 1997 to 2002 (see Figure 2).

Five Commodities for Empirical Analysis

A market share analysis of five commodities is conducted to verify the nature of these trends, showing that competition from other sources and not a decline in U.S. import demand led to the observed trends in CBI exports to the United States. Three commodities are successful goods (bulk pineapples, dasheens, and frozen orange juice), and the other two commodities are crowded-out (limes and oranges). The market shares of U.S. imports for these five commodities are listed in Table 1. The market share is defined as the percent quantity of the exported good from CBI countries of total landed

[6] The respective ad valorem or specific tariff the 6 goods are displayed in Table 2, while an average and median ad valorem tariff is listed for the crowded-out residual goods in the bottom section of Table 2. The crowded-out tariffs are presented in this fashion instead of each tariff listed at the 8-digit HS classification because there are over 50 goods in this bundle.

U.S. imports of the same good. The two crowded-out goods clearly have decreasing market shares. For limes, CBI countries go from having 5.2 percent market share in1989, up to 32.4 percent in 1995, and back down to 0.5 percent in 2002. Similarly, the CBI market share for oranges goes from 66.8 percent in 1989 to 7.2 percent in 2002.

There is a completely different story for successful goods. One might think that the market share would increase for a commodity, especially bulk pineapples, if the export value increased 5-fold from 1989 to 2002. This did not occur. CBI countries lost in the market share for bulk pineapples, going from 99.7 percent in 1989 to 92.2 percent in 2002. Dasheens are a similar case. CBI countries had a larger decrease in their U.S. market share, going from 91.9 percent in 1989 to 83.5 percent in 2002. The last successful good in question is frozen orange juice, whose market share went from 0.5 percent in 1989 to a high of 20.93 percent in 2000, then back down to 3.88 percent in 2002.

In order to disentangle the seemingly non-intuitive nature of export value trends relative to their market share trends, and to test our hypothesis related to crowded-out and successful goods, elasticities of substitution were estimated and used with price changes and tariff changes to estimate market impacts. The theory for these estimates is largely drawn from Armington's (1969) seminal paper. The Armington model has been used by many to estimate substitution parameters representing competition between import suppliers, including Grennes, Johnson, and Thursby (1977), Abbott, Paarlberg, and Patterson (1988), and Webb, Figueroa, Wecker, and McCalla (1989).

The Armington model recognizes that goods may be differentiated. This means

that source providers from different countries that export the same good, as defined by its 8-digit HS category, may be imperfect substitutes. Consequently, it is assumed that each exporting country has some degree of market power in the given importer's market. One result of this innovation is that there are unique prices for the differentiated product coming from each exporter.

The Armington model utilizes a two-stage utility maximization process where the first stage determines the total demand for a "good" (or total excess demand) while the second step determines the share of "products" that are demanded from each exporting source. Because the goods are differentiated, the second stage typically specifies a constant elasticity of substitution (CES) demand function that is based on the following three assumptions: product demands are separable (or independent) from all other products and are separable between all source providers in an importing market; market shares depend only on relative prices and not the size of the market (homotheticity); and elasticities of substitution are constant in each market (in this case, the U.S. import demand market) and are constant among any other two products in that same market.

Equations 1 and 2 illustrate the Armington equation and the price index used to implement it, respectively:

$$X_i = M\, b_i \left(P_i \Big/ P^* \right)^{-\sigma} \quad \forall \text{ i.} \tag{1}$$

$$P^* = \prod_{i=1}^{m} P_i^{\,w_i} \tag{2}$$

where $P_i \Big/ P^*$ is the landed price ratio of product from source i relative to the price index, P_i is the landed price (including both U.S. import tariffs and transportation costs) of that

product from source i, P^* is Stone's Price Index, w_i is the expenditure share from source i where $w_i = P_i X_i / P^* M$, b_i is a flow specific constant from source i, M is the total quantity imported, X_i is the source specific product flow from source i, and finally σ is the CES elasticity of substitution between products from the alternate sources[7].

The σ is interpreted as follows: a one percent increase in the importer's landed price ratio of any of the source countries yields a σ percent decrease in that source's market share in that importer's market, if σ is positive. As a result for this analysis, a positive sign would be the expected outcome because it signifies that the sources export goods that are substitutes. A non-positive result would mean that sources export goods which are complements. The expectation on the models' parameters may be used to gauge how price changes due to tariff changes may affect the magnitude of market share. If tariff decreases to non-CBI members lead to large market share gains, σ should be large and the good may then be considered homogeneous.

A natural log transformation of equation 1 with equation 2 substituted in allows Armington elasticities to be estimated directly. In order to calculate the elasticity of substitution parameters, the iterative seemingly unrelated regressions (SUR) method is used where each source or groups of sources is represented by its own equation. Autocorrelated errors are corrected and seasonal dummy variables employed when appropriate.

There is debate on the validity of the very restrictive Armington assumptions,

[7] It is recognized that Armington's 1969 paper did not use Stone's Price Index. However, it was found estimation results were invariant to using Stone's Price Index over an average price index called for by Armington. The Stone's Price Index is used in our estimation.

particularly due to Winters (1984 and 1985) and Alston, Carter, Green, and Pick (1990). Alston et al. suggests a more flexible model, such as a linear-approximate Almost Ideal Demand System (LA-AIDS) due to Deaton and Muellbauer (1980a and 1980b) where own and cross-price elasticities can be calculated according to the method used in Green and Alston (1990).

In theory, the LA-AIDS model is an excellent choice due to its flexibility. However, in practice, Alston, et al. concede that non-intuitive estimates may result, which is consistent with results from other studies using that functional form, including Chen, Brooks and Chen (2000) and Capps, Church and Love (2003). Chen et al. suggested using the nonlinear version of the AIDS model. However, the collinear nature of international trade data prohibits its employment in many studies due to difficulty in finding acceptable instruments. Estimates employing the LA-AIDS model have been performed for the five goods in question and the authors have found that elasticity estimates were largely non-intuitive, with many incorrectly signed coefficient estimates. Therefore, only Armington estimates will be reported in this paper.

Even though Armington estimates are the only results reported in this study, a special nesting structure will be used to help relax some of the model's restrictive assumptions criticized by Winters and Alston et al. In particular, the nesting technique will relax the assumption that all product demands are separable between all sources in an importing market. Nesting will be accomplished by aggregating two or more sources together as one. Typically all CBI sources will be combined because they are likely to be similar and competitive with one another, but possibly differentiated from distant

sources. For the case of the five goods empirically investigated for this study, nesting of source providers, thus the aggregation of trade flows, will largely be determined by understanding the characteristics of these commodities exported to the United States. This will be primarily accomplished by assuming that goods produced within close geographic proximity of each other are closely related when compared to commodities produced far from each other, such as on different continents or hemispheres.

EOS Results

The Armington elasticity estimates of the 5 previously mentioned commodities are listed in Table 3. There are three different groups of EOS estimates. The first group includes all import sources individually; the second group includes all CBI sources together; and the last group lists the CBI countries aggregated as one source along with the remaining source providers to the United States. This nesting scheme generally indicates two levels of competition: competition among CBI countries for U.S. markets and competition of CBI countries collectively with world sources. This means that the first group of estimates has no nesting (the traditional Armington model), the second group of estimates represents within CBI competition, and the third group of estimates aggregates CBI sources that then compete together against the remaining world suppliers. Additionally, there are some instances in the first two groups where aggregated sources are used since there are incomplete data sets due to missing observations.

There are three different estimates for dasheens, and each estimate used quarterly data from 1989 to 2001. The first estimate's sources include all major CBI exporters individually, with the remaining CBI members aggregated together as one. The other

three sources are China, Japan, with an aggregate of the remaining world suppliers listed as ROW (rest of world). The EOS for this group is 0.105 and is statistically significant at the 1 percent level. The very small magnitude of the parameter indicates that these source providers export types of dasheens that are highly differentiated.

The second estimate is the within CBI group estimate. It is 0.551 and is statistically significant at the 1 percent level. The sign is correct and the magnitude is much higher than the previous estimate. The larger magnitude means that CBI countries themselves export a less differentiated good when competing against each other as hypothesized above. However, this parameter, still being very small, means the good is highly differentiated. The last estimate is with all the CBI countries aggregated together competing with Japan, China, and the ROW. This estimate has the wrong sign (negative) and is not statistically significant. This means that even though dasheens from CBI countries, China, Japan, and ROW exported to the U.S. may be categorized as the same 8-digit HS good, in practice they seem unrelated.

There are only two estimations for bulk pineapples. Each estimate used quarterly data from 1989 to 2002. The first estimate reported is the with-in CBI group of Costa Rica, Honduras, and the remaining CBI sources aggregated together. The results yield a 0.597 EOS, which means that bulk pineapples coming from CBI countries seems to be highly differentiated. The estimate is also statistically significant at the 1 percent level. The second estimate is for the CBI aggregate, with the remaining world sources aggregated together as one source. The resulting EOS is 1.541, which is nearly three times greater than that of the with-in CBI group estimate. This may mean that CBI

exports of bulk pineapples are more substitutable with world sources than they are with each other. This is a surprising result in that it appears that CBI countries do not compete directly against each other in this instance.

The last successful good is orange juice. Each estimation used quarterly data from 1991 to 2002. There are two estimates that help explain this market behavior. The first is the CBI with-in group, where Costa Rica and the remaining CBI countries are aggregated together. The estimate is 2.02 and is statistically significant at the 1 percent level. For results in this paper, this EOS is fairly large. The second estimate aggregates Costa Rica and all CBI countries together as one source while Brazil, Mexico, and ROW are the other sources. This estimate is low, at 0.597, which represents a more differentiated commodity with rigid trade patterns. This is nearly the opposite story from bulk pineapples, but similar to dasheens and our original hypothesis. For orange juice, CBI countries generally compete with themselves more so than with other source providers.

Limes appear to be crowded-out according to both the export value changes and the market share analysis. There is only one estimate for this good. The estimation used annual data from 1989 to 2002. This estimate has all CBI countries aggregated together as one source with Mexico, Ecuador, and ROW each being the remaining sources[8]. The EOS is 2.23 and is statistically significant at the 1 percent level. Again, in this context of this study, this estimate is fairly high. It can be said that limes are a relatively homogenous good.

[8] There is no estimate for a with-in CBI nest because there is not a complete data series without zero export flows for at least one CBI country

The last good in question is oranges. There are two different estimates and semi-annual data is used from 1993 to 2002. The first estimate is the with-in CBI group estimate and has only the Dominican Republic and Jamaica as the source providers[9]. The EOS is 1.66 and is statistically significant at the 1 percent level. The second estimate also only has two source providers: the Dominican Republic and Jamaica aggregated together as one source and Mexico as the other. The EOS for this group is 3.00 and is also statistically significant at the 1 percent level[10]. The Dominican Republic and Jamaica apparently compete very little with each other, while these two countries' exports together appear to be more competitive relative to Mexican exports.

Market Share Analysis

In order to better understand the role of tariff decreases due to preference erosion, an analysis using EOS estimates reflecting competition between aggregate CBI country exports against other source providers to predict market share changes based on different price changes will be conducted and compared to the observed market share changes. Thus, for all cases except dasheens, the CBI aggregate with the remaining world suppliers EOS will be used[11].

For this analysis, observed price ratio changes, caused by both import demand changes and by preference erosion, and observed market share changes have been calculated. For all three of these calculations, the first three years and the last three years of data for each of the above five commodities were averaged separately based on the

[9] The rest of the CBI countries aggregated together could not fill a complete data series for estimation.
[10] There is only an estimate of CBI countries relative to Mexico because it appears CBI countries only compete with Mexico in their export of oranges to the United States.
[11] Using the CBI aggregate and ROW sources EOS for dasheens in this analysis would be faulty because this EOS is the wrong sign and insignificant.

time periods used for EOS estimation. These beginning and ending averages were then used as data points to estimate percent changes in market shares for their respective categories using the Armington model. It is expected that the observed price ratio changes, $\Delta\left(P_I/P^*\right)$, may go up or down depending on how import demand changes affected landed price ratios. Variations in supply or demand conditions and structural changes appear to contribute to substantial variability in landed price ratios for these goods and sources. However, the observed price ratio change due to only preference erosion should increase, and that change can be calculated. This is because as MFN tariffs decrease from either NAFTA or WTO/URAA commitments, landed competitor prices fall since tariffs on their exports fall, so $\Delta P^* < 0$, therefore $\Delta\left(P_I/P^*\right) > 0$. These calculated price changes were then used with EOS estimates, and the results are reported in Table 4.

For the successful goods, it appears that preference margin decreases had very little effect on predicted market share changes for both dasheens and bulk pineapples. The landed price ratio changes based on import demand changes seem to be the contributing factor explaining observed market share changes. For dasheens, the EOS used is very small. Therefore, the predicted market share change based only on the preference margin change is roughly 5 percent of total predicted market share change and just under 3 percent of the observed market share change. Similarly, bulk pineapples lost market share, but they lost market share from overall import demand price changes and not simply from preference erosion. In these two cases, it appears that even though these

goods seem to be successful while exhibiting crowded-out market shares, exports were lost because CBI countries became less price competitive when compared to all other source providers, as evidenced by total price increases being much larger than price changes due to preference margin changes only.

The last successful good is quite different. The observed market share increase for orange juice is not replicated based on the price ratio changes. The predicted results would represent a good that has been crowded-out mostly by preference margin decreases. However, CBI exports of orange juice increased its market share by 949 percent. This is a classic case of when the Armington model does not capture market behavior. This model has a difficult time capturing structural change, which is particularly evident here because the observed market shares by CBI countries go from 0.5 percent in 1989 to 20.9 percent in 2000.

The last two goods are considered crowded-out. Both limes and oranges have large observed market share changes, with predicted market share changes nearly the same as the observed. Nonetheless, the predicted market share changes from diminished preference margins, albeit larger for these two goods than the other three just explained, only minimally explains the large fall in market share. Thus, market share changes for these two crowded-out goods are mostly explained by CBI countries being less price competitive. This is caused by U.S. import demand or source provider export supply changes that caused relative landed prices from sources to change, with diminishing preference margins having a small effect.

Conclusion

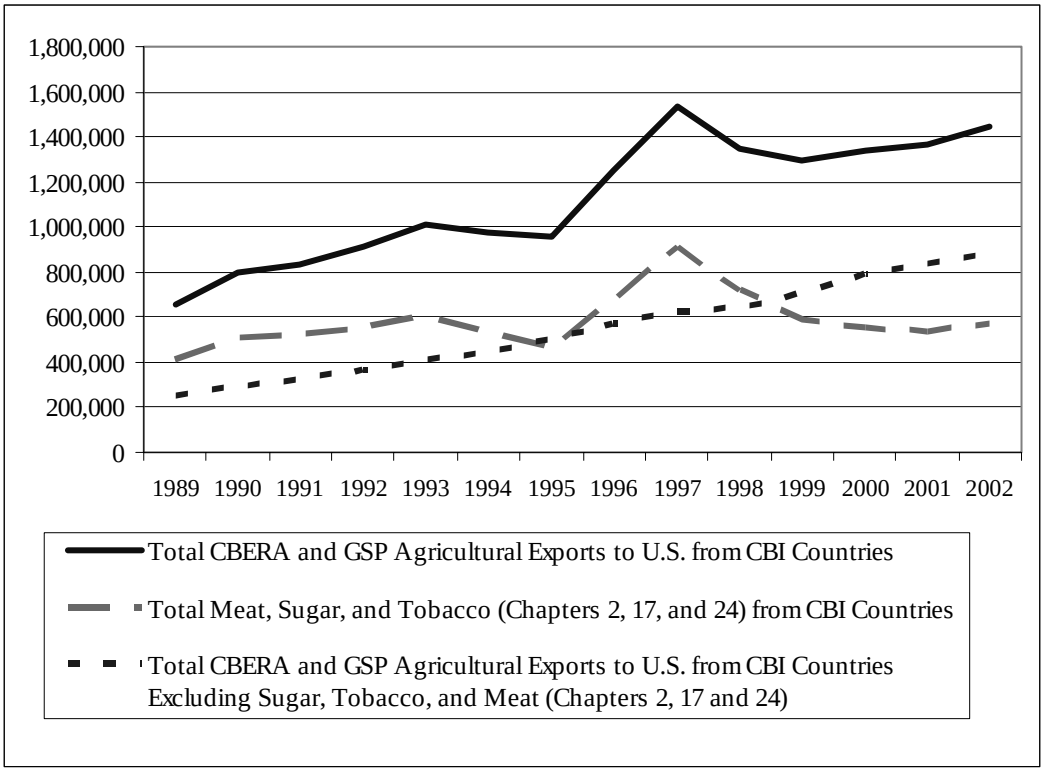
At first glance, the Caribbean Basin Economic Recovery Act and the Generalized System of Preferences appear to be unsuccessful because agricultural exports from CBI countries have not returned to peak levels attained in 1997. However, preferenced exports from CBI countries have become a larger component of total agricultural exports, increasing from 38.3 percent in 1989 to 54 percent in 2002. Additionally, by disaggregating the trade data, we found six goods -- live tree slips or cuttings, dasheens, fresh or dried pineapples, cantaloupes, frozen orange juice, and ethyl alcohol -- for which these preferential trade programs have been continuously successful, and have expanded at faster than 10 percent per year from 1989 to 2002. These goods now account for 31 percent of CBI agricultural exports to the U.S. The successful goods appear to be differentiated and satisfy a niche market in the United States. Other goods' exports diminished. Exports of politically sensitive goods (meat and sugar) fell because trade barriers were revised to further limit CBI access to U.S. markets. U.S. import demand reductions for other goods, notably high value cigars, account for part of the declining trend. Also, many other goods with decreasing export trends appear to be homogenous and were crowded-out by more price competitive exporters.

Disentangling the characteristics of disaggregated goods led to a better understanding of preferential trade for CBI countries. By using the Armington model and relaxing the separability restriction through nesting, we were able to decompose preference erosion effects versus import demand, export supply and structural change effects on market share changes. We found that preference erosion is only a small part of

the story behind falling market shares, and that the large variations in market shares through time can mostly be attributed to relative import price changes. These price changes were much larger than predicted by tariff or preference margin changes. We also found that even though the Armington model was tractable for our analysis, it was not good at predicting structural change observed in the trade data, which is important for some goods that have been successful under CBERA and GSP programs.

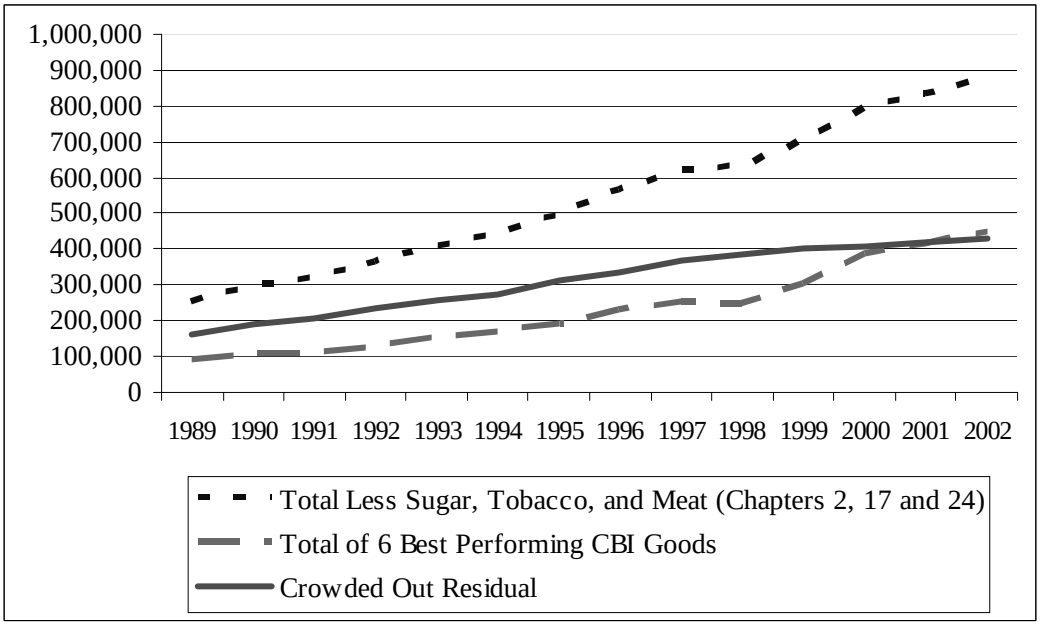
While our nesting approach offers an improved methodology for forecasting impacts of future bilateral and multilateral trade arrangements such as the WTO Doha round or FTAA, capturing structural change will be important to understanding the consequences of these trade agreements on exporters now receiving CBI preferences. Moreover, preference erosion as calculated by model predictions from tariff changes accounted for only a fraction of observed market adjustments.

Figure 1. Total AG CBERA Exports to U.S. of Selected Totals ($1,000)



Source: United States International Trade Commission and calculations.

Figure 2. Selected Totals of AG CBERA Exports to U.S. ($1,000).



Source: United States International Trade Commission and Calculations.

Table 1. Summary Statistics of CBI Members' Exports to the United States

CBI exports to the U.S. ($ Millions)	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Agricultural Commodities	1,720	1,825	1,855	1,944	2,034	2,130	2,384	2,667	3,187	2,931	2,618	2,834	2,594	2,657
Without Preferences	1,061	1,023	1,020	1,033	1,024	1,158	1,423	1,417	1,654	1,580	1,326	1,493	1,227	1,214
Bananas, Coffee, Cocoa	943	910	863	941	904	1,028	1,290	1,257	1,493	1,433	1,190	1,353	1,095	1,062
Under CBERA and GSP	659	802	835	911	1,010	972	961	1,250	1,533	1,351	1,292	1,341	1,367	1,443
Share of Preferenced Exports of Total Exports (percent)	38.3	43.9	45.0	46.9	49.7	45.6	40.3	46.9	48.1	46.1	49.4	47.3	52.7	54.3
Politically Sensitive Goods	347	437	452	463	497	439	362	501	536	361	310	272	264	277
Meat	133	155	155	125	179	165	109	73	63	36	42	51	55	54
Sugar	214	281	297	338	317	273	252	427	473	325	268	221	210	223
Import Demand Driven - Tobacco	62	69	68	85	106	90	101	184	380	356	279	279	269	289
High-Valued Cigars	32	37	34	34	39	51	75	157	335	316	236	237	227	244
Successful	87	104	108	131	152	169	188	229	250	246	299	385	415	447
Live Tree Slips or Cuttings	3.5	4.5	3.9	5.5	6.6	8.0	10.6	12.3	13.0	14.9	15.5	20.7	27.2	29.4
Dasheens	7.7	7.3	7.3	7.5	8.4	11.7	15.6	18.4	20.6	22.6	19.7	23.0	26.5	20.9
Bulk Pineapples	32.0	34.2	29.4	33.7	35.4	35.9	35.2	43.0	72.6	68.5	106.1	113.8	133.6	168.3
Cantaloupes	13.4	22.8	28.6	37.3	48.6	51.1	53.8	63.7	76.8	66.9	82.2	97.6	114.5	122.4
Frozen Orange Juice	9.6	20.4	6.2	23.0	11.8	14.5	19.1	31.6	38.9	39.7	30.6	66.3	58.7	52.5
Ethyl Alcohol	21.1	14.5	32.4	23.8	40.7	47.5	54.1	59.9	28.1	33.7	45.1	64.0	54.9	53.1
Crowded-Out	162	192	208	232	256	274	310	337	367	388	404	406	418	431
Limes	0.284	0.590	0.635	0.678	1.025	1.388	0.457	0.400	0.330	0.368	0.432	0.659	0.628	0.659
Oranges	1.635	1.460	1.178	1.083	0.840	0.934	1.101	1.325	1.271	1.120	1.546	0.642	0.810	0.932
Commodity	*- - Market Share of Exports of CBI Countries in US Market (percent) - -*													
Successful														
Dasheens	91.9	91.6	92.6	93.1	88.4	93.7	94.4	95.1	92.3	89.6	94.8	90.4	86.3	83.5
Bulk Pineapples	99.7	99.5	98.8	96.7	96.1	99.5	96.5	95.5	95.0	97.3	96.6	95.4	93.5	92.2
Frozen Orange Juice	0.5	0.3	0.8	1.8	1.0	2.8	9.4	4.9	4.5	7.4	3.3	20.9	13.2	3.9
Crowded-Out														
Limes	5.2	4.6	3.6	2.8	3.3	9.2	32.4	17.1	0.8	0.4	0.5	0.5	0.6	0.5
Oranges	66.8	46.6	6.4	47.5	27.9	23.3	21.7	16.8	10.6	9.3	4.6	3.8	9.9	7.2

Source: United States International Trade Commission and calculations.

Table 2. CBERA Commodity Tariffs at the 8-Digit HS Classification.

Successful Goods	*Units*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*
Live Tree Slips or Cuttings	*Ad Valorem*	7.5	7.5	7.0	6.6	6.2	5.7	5.25	4.8	4.8	4.8
Dasheens	*Ad Valorem*	5.0	5.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Pineapples	Specific, Cents/KG	1.31	1.31	1.28	1.24	1.20	1.17	1.135	1.1	1.1	1.1
Cantaloupes	*Ad Valorem*	35	35	34.1	33.3	32.4	31.5	30.67	29.8	29.8	29.8
Frozen Orange Juice	Specific, Cents/KG	9.25	9.25	9.02	8.78	8.55	8.32	8.03	7.85	7.85	7.85
Ethyl Alcohol	*Ad Valorem*	3.0	3.0	2.9	2.8	2.8	2.7	2.6	2.5	2.5	2.5
Crowded Out Goods	*Units*										
Average	*Ad Valorem*	9.86	10.10	8.95	8.40	8.37	7.33	7.63	6.84	6.66	6.08
Median	*Ad Valorem*	7.50	7.50	7.30	6.70	6.95	6.27	5.92	5.40	5.40	4.58

Source: United States International Trade Commission and Calculations

Table 3. Summary EOS Calculations

Commodity	All Sources	With-in CBI Group Sources	CBI Aggregate and ROW Sources
Dasheens	Costa Rica, Dom. Republic, Jamaica, Rest of CBI, China, Japan, ROW	Costa Rica, Dom. Republic, Jamaica, Rest of CBI	CBI, China, Japan, ROW
	σ = 0.105 T = (3.17)**	σ = 0.551 T = (6.60)**	σ = -0.0098 T = (0.45)
Bulk Pineapples		Costa Rica, Honduras, Rest of CBI	CBI, ROW
		σ = 0.597 T = (2.67)*	σ = 1.541 T = (8.78)**
Orange Juice		Costa Rica, Rest of CBI	CBI, Brazil, Mexico, ROW
		σ = 2.02 T = (5.73)**	σ = 0.597 T = (3.53)**
Limes			CBI, Mexico, Ecuador, ROW
			σ = 2.23 T = (11.4)**
Oranges		Dom. Republic, Jamaica	CBI, Mexico
		σ = 1.66 T = (6.89)**	σ = 3.00 T = (6.17)**

** indicates significant at p = 0.01.
* indicates significant at p = 0.05.

Table 4. Market Share Analysis Using Armington Estimates.

Commodity	*Price Ratio Changes*			*Market Share Changes*		
	Total over Estimation Period	Due to Preference Margin	EOS	Total	Due to Preference Margin	Observed
Dasheens	8.82%	0.43%	0.105	-0.93%	-0.05%	-1.69%
Pineapple	1.51%	0.03%	1.541	-2.33%	-0.04%	-5.69%
Orange Juice	2.61%	2.02%	0.597	-1.56%	-1.21%	949.10%
Limes	41.93%	5.69%	2.23	-93.49%	-12.69%	-87.77%
Oranges	24.01%	1.19%	3.00	-72.02%	-3.56%	-71.40%

References

Abbott, P. C., P. Paarlberg, and P. Patterson. "Supplier Substitutability by Importers: Implications for Assessing the 1980 U.S. Grain Embargo." *Southern Journal of Agricultural Economics.* 1988 20(2): 1 – 14.

Alston, J. M., C. A. Carter, R. Green, and D. Pick. "Whither Armington Trade Models?" *American Journal of Agricultural Economics.* 72(1990):455- 67.

Armington, P. S. "A Theory of Demand for Products Distinguished by Place of Production," *International Monetary Fund Staff Papers.* 16(1969): 159 – 178.

Capps, O., J. Church, and H.A. Love. "Specification Issues and Confidence Intervals in Unilateral Price Effects Analsyis." *Journal of Econometrics*. 2003 113(1): 3 – 31.

Chen, K., H. Brooks, and C. Chen. "Import Demand for Malt in Selected Countries: A Linear Approximation of AIDS: Comment." *Canadian Journal of Agricultural Economics*. 2000 48(3): 355 – 360.

Deaton, A. S., and J. Muellbauer. "An Almost Ideal Demand System." *American Economic Review.* 70(1980a): 391– 410.

Deaton, A. S., and J. Muellbauer. *Economics of Consumer Behavior*. Cambridge: Cambridge University Press, 1980b.

Green R. , and J.M. Alston. "Elasticities in AIDS Models." *American Journal of Agricultural Economics.* 72(1990): 442 – 445.

Grennes, T., P. Johnson, and M. Thursby. *The Economics of World Grain Trade.* New York: Praeger Publishers, 1977.

Leon, R. and J. M. Salazar-Xirinachs. "The New Caribbean Basin Initiative: Impact and Opportunities," *Integration and Trade*, Jan.-April 2001; 5(13): 113-25.

Webb A., E. Figueroa, W. Wecker, and A. McCalla. "Impact of the Soviet Grain Embargo- A Comparison of Methods," *Journal of Policy Modeling.* Fall 1989. 11 (3): 361-389.

Winters, L. A. "Separability and the Specification of Foreign Trade Functions," *Journal of International Economics,* 1984(17):239 – 263.

Winters, L. A. "Separability and the Modeling of International Economic Integration." *European Economic Review.* 27(1985): 335- 53.