Staff Paper

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The Competitiveness of Mexican and Caribbean Basin Horticultural Products in the U.S. Market

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L) INTRODUCTION

Horticultural product trade has increased significantly in world markets--in both volume and value terms. East-west as well as north-south trade has increased and the latter has increased at a faster rate. Historically, most north-south product flows were from poorer southern hemisphere countries to more affluent northern hemisphere countries. This pattern of trade still accounts for a significant share of total trade, but north-to-south flows are becoming more significant. Most trade has been to adjacent countries--U.S.-Canada, U.S.-Mexico, intra-EEC, Argentina-Brazil, etc. And the perishability of most horticulture products (this paper primarily addresses fresh market products) is a key reason why trade has historically been limited to adjacent neighbors. The pattern of trade has also been undergoing change and will likely continue to change, to the extent that more and more horticultural products will move from southern Chile and/or South Africa to North America and/or northern Europe.

A number of countries have implemented trade policies to encourage the exports of "non-traditional" products (in many instances, it has meant horticultural products) while importing countries have implemented policies to protect--through phytosanitary regulations among others--domestic crops. In addition, importing countries have also used seasonal tariffs to protect domestic crops. Conversely, the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) for the first time included language applicable to the agricultural sectors of trading countries. A number of bi-lateral trade agreements have been negotiated and signed over the past ten years that also include language on agricultural products. Therefore, the individual as well as aggregate result(s) of these developments is difficult to ascertain.

The U.S. is a leading trading partner with respect to horticultural products. It has initiated and signed a number of trade agreements and/or policies that have significantly affected horticultural product trade.

Among the agreements/policies are: the Caribbean Basin Initiative (CBI); the U.S.-Canada Free Trade Agreement (CFTA); the Andean Pact (AP); the North American Free Trade Agreement (NAFTA); and it is currently negotiating with Chile for its inclusion in NAFTA. All of the preceding efforts have been negotiated and signed under the assumption--supported by a number of studies--that in the long-run these trade pact(s) will lead to increased trade and thereby increasing the welfare of the citizens of the trading countries. Many economic papers have been written and most have addressed how these changes in trade policy will affect the economies of the *signatuers* to the trade agreements. But, as may be expected, there is no unanimity in measuring outcomes. One important and popular theme of many of these papers has and continues to be the assessment of the "competitiveness" of individual countries, industries, sectors, or sub-sectors. Though horticultural product trade as a percentage of total world or agricultural (excluding coffee and tobacco) trade is relatively small, for a number of countries this sector is very important. Among those countries for which horticultural product trade is very important are countries covered by the CBI, Chile and Mexico.

This paper presents an analysis of methods used to evaluate "competitiveness" of the horticulture products sector. CBI country exports as well as Mexican exports are used to illustrate certain issues. The paper's focus is the U.S. market and uses three commodities to illustrate the main points of the analyses. The paper presents arguments based on the available data, but no effort is made to quantify--with sophisticated econometric models--the assertions of the paper. Indeed, the paper will argue that some econometric models may not provide reliable nor useful results for analyzing horticultural product trade.

The paper will first present and discuss the contemporary paradigm(s) utilized for international trade policy analysis. An argument is presented for adjusting and/or reinterpreting the paradigms to better evaluate horticultural product trade. Secondly, the primary factors for evaluating "competitiveness" are identified and discussed, particularly as they apply to horticulture products. Three horticulture products--cantaloupes, Honeydew melons, and pineapples--are used to illustrate the "competitiveness" of CBI countries and Mexico in the U.S. market. Measures which have been used in the past to evaluate "competitiveness", such as cost of production, are scrutinized with respect to their usefulness in measuring horticultural product trade. Evolving and relevant issues for future horticultural product trade "competitiveness" are presented and discussed. The paper closes with a set of recommendations for future research.

II.) FRAMEWORK FOR ANALYSIS

II.a.) Macro Framework

Before presenting a working definition of what is meant by "competitiveness", a structural paradigm for trade policy analysis is presented. Trade policy analysis is not synonymous with analysis of "competitiveness", but it provides a framework for assuring the incorporation of the relevant areas into an analysis. Figure 1 illustrates a structural paradigm for trade policy analysis. The "demand side" begins with individual preferences that are translated and/or articulated by the various interest groups representing individual preferences. The "supply side" begins with the individual preferences of policy makers and the institutional structure of government transforms and/or channels these preferences. An 'equilibrium' is therefore reached where trade policy outcomes are observable, and to varying degrees, measurable.

One may reinterpret and/or adapt the structure in Figure 1 for analyzing "competitiveness." Figure 2 shows a modified Figure 1. In Figure 2, individual preferences are interpreted similarly to Figure 1--i.e. it is important to measure import and export country preferences for, say, attributes of cantaloupes. However, interest groups now represent import and export country firms and/or relevant commodity associations/groups. Policy maker preferences are also interpreted similarly to policy analysis, but the institutional structure of government is now interpreted to represent the institutional structure of trade. Export and import trading boards are an important component of this redefined institutional structure as are multinational firms such as Dole, Del Monte, Chiquita, etc. Trade policy outcomes are interpreted to include not only "trade policy outcomes", but actual and/or projected trade volumes/values of, say, cantaloupes.

The "seasonality" and "transportation" triangles in Figure 2 are added because horticultural product trade is significantly affected by these two elements. Further in this paper these two elements of trade are discussed more fully, but suffice it to say that both affect the demand and supply sides of the framework and therefore manifest their effect on trade outcomes. The direction of the effect(s) are not linear--for trade outcomes affect seasonality and transportation availability and cost.

As an alternative structure for analyzing the "competitiveness" of an **industry**, Figure 3 illustrates a model recently developed and utilized by Canadian researchers. It is a model that focuses on firms--strategy, structure, and rivalry--and "chance" is explicitly incorporated into the model. Dr. Gary Tompson and

colleagues at the University of Arizona are using a variant of this model--relying heavily on interviews with firm owners/managers. Their ongoing research includes tomato, lettuce, and melon shippers who have operations in the U.S., Mexico, and Central America. More specifically, they are interested on how firm structure and strategy affects their competitive position. Their preliminary finding suggest the importance of incorporating seasonality in any evaluation of "competitiveness" in horticulture markets.

II.b.) Micro Framework

Table 1 presents five categories of factors influencing sector "competitiveness." It is a more detailed account of the elements identified in the preceding figures. Under the first category -- (International) Market Demand Conditions -- the, "non-tariff barriers into import markets", are of critical importance when analyzing horticultural markets. This is not to say that the other factors are not important. Rather, the gap between what we know of how to incorporate and measure non-tariff barriers into an analysis and their respective impact on "competitiveness", is the largest as compared to the other factors in the category. For example, quantifying the impact of current and future (in a probabilistic sense) phytosanitary barriers is mostly absent from most papers evaluating horticultural product trade.

Within the second category--Natural Resources and Human Capital--the first two are the primary factors for horticultural production. Many studies on horticultural product "competitiveness" focus on these two factors and thereby erroneously assume that production "competitiveness" translates to overall market "competitiveness." Absent from many of the analyses are efforts to measure the impact horticulture production--which is almost universally seasonal--has on the welfare of unskilled/migratory labor. For example, horticulture product harvesting generally requires large inputs of labor over a relatively short period of time, but the larger the migratory labor pool, the lower the costs of harvesting because of lower wage rates induced by labor over-supply. Will increasing the migratory labor pool increase the "competitiveness" of the horticulture sector? In the short run, it will.

The third category--Macroeconomic and Sector Policies--are fairly well understood and incorporated into horticultural "competitiveness" analyses. What has been quantified in some studies (see Hubbard or Machado) is the impact of exchange rate movements on horticulture product flows. More specifically, the

increase during the 1995-'96 season of Mexican winter tomato exports to the U.S. market can be largely attributed to the devaluation of the *peso*. Therefore, one can recognize the importance of exchange rates on horticultural product trade (or most any other commodity), but because forecasting exchange rate movements is very difficult, one is constrained from accurately evaluating future "competitiveness."

In developing countries, the fourth category--Physical, Technical, and Social Infrastructure--is the most important for horticulture product "competitiveness." The ability of multinational firms to provide all or part of these factors in developing countries is why they become competitive. The producing country (or Non-Governmental Organizations [NGOs]) generally provides the capital for transport infrastructure within the country, but the multinational firm is the entity which provides or manages international transport. Also, the ability of multinational firms to provide and use market information (intelligence) enhances "competitiveness." Unfortunately, literature quantifying the collective effect of these factors on long term horticultural product "competitiveness" is lacking, though papers evaluating individual factor effects are available. A critical question is whether the collective effect is additive or synergistic.

The most diverse set of factors are found in the fifth category--Micro-Marketing and Coordination Elements. With the possible exception of the last factor, the larger the firm (or any other production/marketing entity) the better and more efficient it is at managing the other factors. Therefore, the higher the probability of increasing the firm's "competitiveness." The product development factor will become increasingly more important to horticultural product trade because of the developments in bio-technology. Indeed, one could argue that one single development in bio-technology could render a producing region "uncompetitive". The opposite could also occur--i.e. regions never in the market could enter and become very competitive. For example, if strawberries are bio-engineered to not require the use of methyl bromide in their production and distribution, then Florida would continue to compete in the fresh strawberry market.

In short, it is essential to incorporate firm structure and strategy into any framework analyzing horticultural product "competitiveness." Analytical frameworks need to be developed that incorporate the effects of a bundle of factors such as those listed in Table 1. One has to be very careful when evaluating "competitiveness" based on historical data and then using the results to forecast "competitiveness." For example, seasonal effects are critical because they affect all of the factors in category one and transportation

effects all the factors in category five.

Table 2 presents a definition of competitiveness which best captures this paper's use of the term. It is presented here, rather than at the beginning of the paper, because it is hoped that the reader had a working definition of the term as he/she read section "II." Each reader's working definition allowed him/her to study the principles and arguments just presented without having to construct them under a new definition. Now, however, it is important to operate within a generally accepted definition and therefore the remainder of the paper should be read using this definition of competitiveness. It is clear from this definition that firms and government have key roles to play.

III. THE CASE OF CBI AND MEXICAN CANTALOUPE, HONEYDEW MELON, AND PINEAPPLE EXPORTS TO THE U.S.

These three fresh market horticulture products serve to illustrate some of the points made in the preceding sections. The markets are similar in some aspects while in others they are not. Total U.S. imports for all three products increased from 1978 to 1990, but the rate of increase was different from the two exporting areas and therefore the market share patterns were different. Monthly U.S. consumption shares of imports versus domestic production are different for each of the three products, but domestic shares (1988) are still larger than import shares. For all three products, the competitiveness of CBI exports has been greater than Mexican exports. The majority of the data used is this section is from Hubbard's thesis.

III.a.) Cantaloupes

Figure 4 presents Mexican and CBI cantaloupe exports--in 1,000 cwt units--to the U.S. between 1978 and 1990. Exports from other areas are relatively inconsequential. Of the three products, cantaloupes represent the largest volume of imports and the lowest priced product (approximately **$295 per imported metric ton in 1994**). In 1978, Mexican exports were approximately 2 million cwt while CBI exports were nearly zero. By 1990, Mexican exports increased to 3.2 million cwt representing a 60% increase, while CBI exports increased to 2 million cwt [1]. Imports from both exporting areas increased by 160% over the

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[1] Imports in 1994 were: 1.89 million cwt from Mexico; 3.65 million cwt from CBI; and 0.35 million cwt from others.

thirteen years (195% over the past seventeen years).

The pattern of U.S. market shares of the two exporting areas are shown in Figure 5. It is clear how the shares changed as of 1983. The CBI was established by the U.S. in 1992 and therefore one can comfortably conclude that it had an effect on the cantaloupe market. Cantaloupes fall under the "Not Dutiable" category of the CBI -- i.e. a tariff advantage of CBI cantaloupes over Mexican cantaloupes. Almost all CBI cantaloupe exports have originated in two countries--Costa Rica and Honduras. Guatemala has become a significant exporter in the past three years and in 1994 it exported 1.1 million cwt, representing 18% of total U.S. imports.

Figure 6 shows the **1988** monthly distribution of cantaloupes in the U.S. The majority of cantaloupes consumed in the U.S. are produced in the U.S.--mostly in California (the pattern in 1994 is similar). U.S. consumption in May of 1988 was 5.3 million cwt, while November consumption was only 0.1 million cwt. The pattern is partly due to the seasonal tariffs--35% between May 16 and July 31, 20%, between August 1 and September 15, and 35% between September 16 and December 31. The CBI removed tariffs in 1982 and Mexican tariffs will be phased out by 2005 because of NAFTA. Nonetheless, cantaloupe consumption in the U.S. is largely seasonal--April to August--and an analysis of the competitive position of the CBI and Mexico requires that it only be evaluated between October and March. Indeed, a critical component for analyzing the competitiveness of these two areas in the U.S. market is measurement of consumer demand--price and income elasticities--during the October to March time period.

III.b.) Honeydew Melons

Figure 7 presents Mexican and CBI Honeydew exports to the U.S. between 1978 and 1990. Exports from other areas are relatively inconsequential, but between 1980 and 1985, nearly 25% of imports came from countries other than Mexico and CBI countries. Of the three products, Honeydews represent the smallest volume of imports and the highest priced--approximately $354 **per MT** in 1994. In 1978, Mexican exports were approximately 0.37 million cwt while CBI exports were 0.05 million cwt. By 1990, Mexican exports increased to 1.37 million cwt representing a 270% increase, while CBI exports increased to 0.8 million

cwt, representing a 1,500% increase [2]. Imports from both exporting areas increased by 417% over the thirteen years (546% over the past seventeen years). The rate of increase for both Mexican and CBI exports to the U.S. noticeably changed after 1982.

The pattern of U.S. market shares of the two exporting areas is shown in Figure 8. Contrary to the cantaloupe market, there is no discernible difference in market shares before and after 1982. Therefore, on a share basis, the CBI had a relatively small impact on the U.S. Honeydew market. Honeydews also fall under the "Not Dutiable" category of the CBI and therefore one would have expected a tariff advantage of CBI cantaloupes over Mexican cantaloupes. However, because of production difficulties such as controlling white fly in Central America, CBI Honeydew exports did not displace Mexican exports in the 80's. Most CBI Honeydew exports have originated in two countries--Costa Rica and Panama.

Figure 9 shows the **1988** monthly distribution of Honeydews in the U.S. The majority of Honeydews consumed in the U.S. are produced in the U.S. (the pattern in 1994 is somewhat similar). The pattern is partly due to the seasonal tariffs which have been in existence over part of the time period of the analysis--8.5% and 20% from December to April for Mexico and CBI, respectively, and 35% for the remainder of the year for both exporting regions. As with cantaloupes, tariffs for CBI exports were removed in 1982 and Mexican tariffs will be phased out by 2005 because of NAFTA. Honeydew consumption in the U.S. primarily takes place between May and September and during these five months, the majority of Honeydews consumed in the U.S. are produced domestically. U.S. consumption in June of 1988 was 1.9 million cwt, while in December it was only 0.2 million cwt. Similarly to cantaloupes, an analysis of the competitive position of the CBI and Mexico requires that it be evaluated between November and April. An analyst should measure consumer demand-- price and income elasticities--during November to April, but also attempt to identify the factors that will increase consumption for the entire year.

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[2] Imports of "melons other than cantaloupes" in 1994 were: 0.993 million cwt from Mexico; 1.72 million cwt from Costa Rica and other countries.

III.c.) Pineapples

Figure 10 presents Mexican and CBI pineapple exports to the U.S. between 1978 and 1990. Exports from other areas are relatively inconsequential. Of the three products, U.S. pineapple imports represent an intermediate volume between cantaloupes and Honeydews and they are also priced at a level in between--in 1994, the price was **$314 per MT.** In 1978, Mexican exports were approximately 0.8 million cwt while CBI exports were 0.6 million cwt. By 1990, Mexican exports decreased to 0.2 million cwt representing a 75% decline, while CBI exports increased to 2.4 million cwt, representing a 300% increase [3]. Imports from both exporting areas increased by 85.7% over the thirteen years (95.7% over the past seventeen years). Also, Figure 10 clearly shows a pronounced growth for CBI exports to the U.S. as of 1984.

The pattern of U.S. market shares of the two exporting areas are shown in Figure 11 and it is clear that Mexico has ceased to be competitive in the pineapple market. As with the cantaloupe market, there is a discernible difference in market shares before and after 1982 (two-year lag for establishing a pineapple plantation). Therefore, the CBI had a relatively large impact in share terms and a significant impact in volume terms. Pineapples fall under the "Dutiable Fast track" category of the CBI and therefore one would not have expected a tariff advantage of CBI pineapples over Mexican pineapples if the tariff had been implemented. It was not been implemented. This tariff advantage clearly manifested itself. Most CBI pineapple exports have originated in two countries--Costa Rica and Honduras.

Figure 12 shows the **1988** monthly distribution of pineapples in the U.S. and contrary to both cantaloupes and Honeydews, there is no seasonal pattern to U.S. consumption (the pattern in 1994 is not similar, showing more seasonality). During 1988, U.S. pineapple consumption is evenly distributed between domestic--Hawaii--producers and imports. By 1994, however, domestic production has declined significantly and most pineapples consumed in the U.S. are imported. Tariffs for pineapple imports were assessed on a unit basis--1 1/6 cents per pineapple for all imports and the tariff does not vary within the year. After 1982, the 1 1/6 cents has not been used on CBI imports. Though tariffs for Mexican pineapples will be phased out by 2005 because of NAFTA, it is unlikely that Mexico will export pineapples to the U.S. in the near future.

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[3] U.S. imports of pineapples in 1994 were: insignificant from Mexico and 2.74 million cwt from CBI countries.

III.d.) Summary

Table 3 summarizes what has occurred in the three markets discussed in this section. In reverse order, CBI countries have taken over the U.S. pineapple import market. Also, CBI countries have taken over the entire market--i.e. domestic U.S. production--Hawaii--has declined significantly in the past five years. The unit tariff was relatively inconsequential in protecting U.S. domestic producers. However, the tariff advantage for CBI exports *vis-à-vis* Mexico was likely responsible for pushing Mexican pineapples out of the U.S. market. Figure 11 shows that the rate of growth of CBI import shares was greater between 1979 and 1983 than between 1984 and 1990. However, in volume terms, CBI exports grew significantly as of 1984, indicating that plantations were developed in 1982 and 1983 in CBI countries. Two firms--Dole and Del Monte-- dominate the world pineapple market and therefore they clearly took advantage of the 1 1/6 cent unit tariff differential. Indeed, a unit tariff--as compared to an *ad vacorum* tariff--encourages increases in export volume because the margin is fixed.

In the Honeydew market, Mexico had a 60% market share in 1982, dropped to 52% by 1990, and in 1994 it stood at 35%. Therefore, most of the market share loss occurred after 1990 indicating that the CBI had relatively little impact on the competitiveness. Table 4 supports the idea that the tariff rate changes had little impact on the competitive position of Mexico and CBI countries in the U.S. Column four of the Table lists the year-to-year percentage changes in tariff rates for Mexican Honeydews entering the U.S. and column five lists the year-to-year percentage changes in Mexican Honeydew export volumes to the U.S. One would expect that the two columns would change in opposite directions--i.e. as tariffs <u>increase</u> from one year to the next exports should <u>decrease</u> during the corresponding year. The data does not support this expectation. In only four of the twelve years were the changes consistent with economic expectations and there is no discernible pattern for the magnitude of the changes.

In percentage terms, Honeydew imports increased by nearly 550% over the past 17-years even though they primarily have entered the U.S. market between November and May.

Of the three product import markets, the cantaloupe market is the largest, but represents the smallest share of total U.S. consumption. Figure 4 shows it is clear that CBI countries increased their exports after 1982, but Mexican export growth was not affected--i.e. total U.S. consumption was growing at a relatively fast

rate. Table 3 indicates that Mexican shares of the U.S. cantaloupe import market declined by a third between 1982 and 1990, but by half between 1990 and 1995 (in volume terms, the changes were similar). It is likely that the relatively low unit price of cantaloupes initially precluded production in CBI countries because Mexico still had a transportation cost advantage. However, as CBI export volumes increased, the unit cost of transportation declined to the point where they became competitive with Mexican cantaloupes.

Table 4 indicates that Mexican tariff rate changes did not translate to appreciable changes in Mexican export volumes. Similar to the Honeydew market, in only four of the twelve years were tariff rate changes consistent with cantaloupe export volume changes.

IV. RELATED FACTORS AFFECTING COMPETITIVENESS

This section presents constructive criticism of past efforts to measure competitiveness in the horticulture products sector. Emerging issues that likely will play more important roles in assessing horticultural product competitiveness are identified, particularly as they affect demand for horticulture products. The section is brief and serves only to present rather than analyze and evaluate.

The first issue was identified in the introductory section of the paper and it relates to the **usefulness of econometric models** is assessing competitiveness. Many studies have been completed--particularly when evaluating the impacts of NAFTA--which have relied on some form of econometric model specification and estimation. Most have been partial equilibrium models, while a smaller number have been computable general equilibrium (CGE) models. The partial equilibrium models have only modeled the horticulture sector or they have modeled the entire agricultural sector and horticultural as a sub-sector. Most CGE models pay scant attention and detail to the horticultural sub-sector. Unfortunately, because of data limitation--availability and accuracy--, seasonality, product form, firm structure and strategy, transportation availability, cost, and phytosanitary barriers, many of the results are not as reliable as, say, similar models for wheat or corn trade. More problematic are efforts which attempt to use model simulations for forecasting purposes. For example, Table 5 presents simulation forecasts for Mexican shares of the U.S. import market for cantaloupes and Honeydews. The forecast for cantaloupe shares for 1994 is 47%, whereas Table 3 presents the actual share of 31%. Based on the actual share, the forecast error is 51%. For honeydews, the simulation estimates a 61%

share, while the actual was 35%--a forecast error of 75%. The magnitude of the error is significant because 1994 is only four years out from the base year of the model used for the forecast.

Many researchers, including the author, have developed models for estimating demand elasticities. The better estimates incorporate monthly shifters to estimate seasonal differences. In relative terms, many of these estimates have been useful and reliable. Conversely, efforts to estimate **export-demand-elasticities** present more of a challenge. Table 6 presents export demand elasticities estimates for the major exporters of bananas. These results are but one table from a major effort to model world banana trade. The estimates infer that all of the exporting regions face aggregate export demand elasticities in the range of -0.28 to -0.44--i.e. fairly uniform and inelastic export demand. Is this an accurate picture of world banana demand? Most likely not, because the evidence suggests that banana exports from the countries listed in the table have changed at very different rates within the past three years. The cause of the different rates of change can be attributed to how the EEC's banana policy, and the policy reactions of the various trading partners, affected export demand.

Table 7 presents a typical **'cost of production'** comparison for assessing competitiveness. Suffice it to say that the author's familiarity with New York production of bush beans and sweet corn is not consistent with the figures presented in Table 7. The figures show New York as the low cost producer and achieves the highest net returns per acre for bush beans, but bush bean production in New York has been declining. The figures also indicate that New York is the low cost producer and attains the highest net returns per acre for sweet corn, but sweet corn production has shifted to other states, particularly Wisconsin. As stated previously, assessing competitiveness in cost of production will not necessarily yield information for accurately assessing market competitiveness.

All of us are aware of the necessity of pesticides for production of horticultural products, but I hope all of us are also aware of consumer concerns relative to **pesticide use** and their potential impact on the environment and consumers' health. Table 8 presents the dollar value of pesticides sold to U.S. agriculture--by sub-sectors--in 1990. Sales to fruit and vegetables producers represent 12.4% of all pesticide sales, but 35% of all fungicide sales--i.e. the sub-sectors rely relatively heavy on fungicides as compared to herbicides and insecticides. Future efforts to assess competitiveness that do not explicitly incorporate producer pesticide demand--particularly fungicides--nor consumer and government demand for pesticide use reductions, will not

accurately measure horticultural sub-sector competitiveness.

Finally, Figure 13 presents a pie-chart of the distribution of **agricultural research** dollars allocated in the U.S. in 1993. The total was $2.97 billion dollars, but only 4% of the total was allocated to marketing and trade. First, will overall dollar support for agricultural sector research continue at rates similar to historical trends? Most likely not. Will the distribution depicted in the chart continue at similar allocations? Most likely not. The gainers will be "resources/technology", marketing/trade", food/nutrition", and "environmental/natural resources." Over the long term, the structural change in agricultural research funding will translate into a structural change in market competitiveness. Therefore, efforts to estimate world and country specific allocations to agricultural research will yield more robust estimates of long-run competitiveness.

V. SUMMARY AND RECOMMENDATION

The paradigms discussed at the beginning of the paper will aid in prioritizing issues and factors pertinent to analyzing horticultural product competitiveness. The three commodities--cantaloupes, Honeydews, and pineapples--serve to illustrate how horticulture products should not be treated as homogeneous by factors impacting on market competitiveness. Emerging issues need to be incorporated in future analyses of horticultural product competitiveness if such efforts seek to improve on prior research.

Seasonal consumer demand, rather than total consumer demand, is the relevant and appropriate model for evaluating horticultural product competitiveness. The scale, structure, and strategies of horticulture trading firms is difficult to estimate with the use of econometric models, but assuming that these factors do not play a role in competitiveness will not yield accurate results. Phytosanitary barriers will become more "binding" in the future, even though the stated preferences of policy makers are to harmonize these standards. The impact of product volume on transportation availability and costs plays a critical role in enhancing competitiveness.

Tariffs will play relatively minor roles on competitiveness, particularly if import demand is increasing significantly. The likelihood that consumer demand for horticulture products will increase is high. The higher the per unit price of a horticulture product, the lower the likelihood that production costs play an important role on competitiveness. Firm dominance of a market--i.e. Dole and Del Monte in the pineapple market--plays a very significant and positive role on competitiveness.

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Figure 1

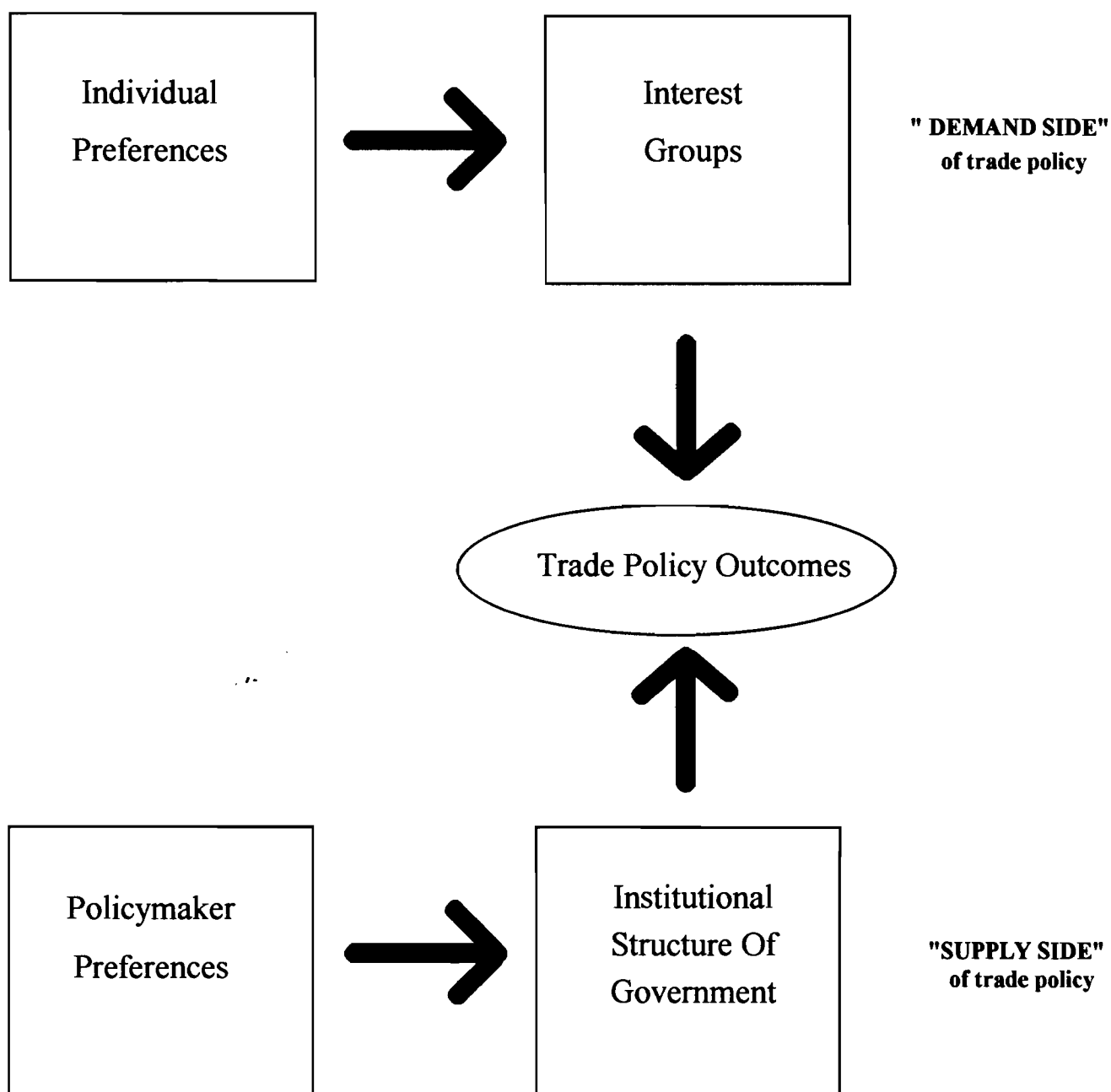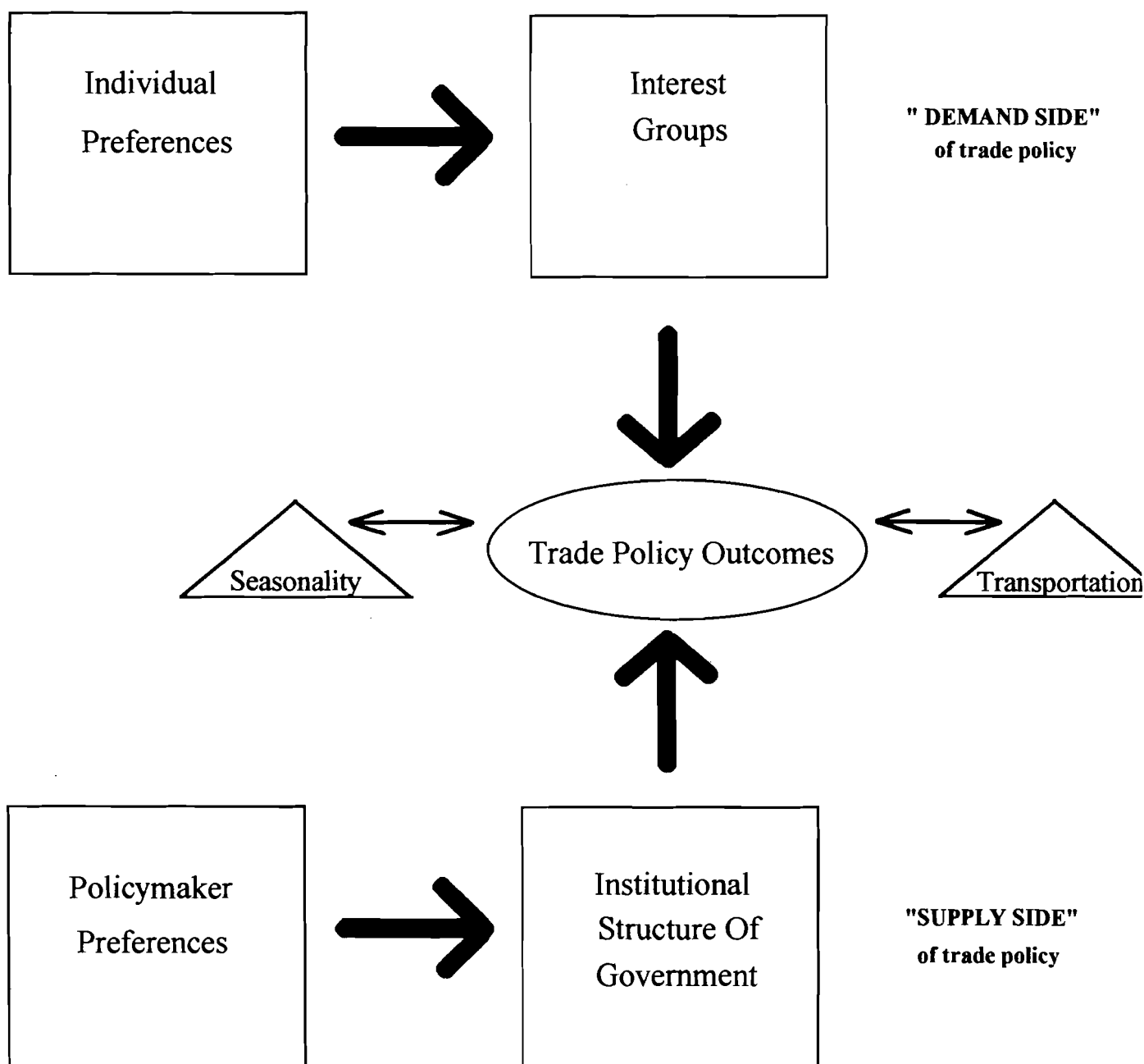# STRUCTURAL PARADIGM FOR INTERNATIONAL TRADE POLICY ANALYSIS

Individual Preferences → Interest Groups

" DEMAND SIDE"
of trade policy

Trade Policy Outcomes

Policymaker Preferences → Institutional Structure Of Government

"SUPPLY SIDE"
of trade policy

Adapted from: Rodrik, Dani. "What Does The Political Economy Literature On Trade Policy (Not) Tell Us That We Ought to Know."
National Bureau of Economic Research, Working Paper No. 4870, September 1994.

Figure 2

STRUCTURAL PARADIGM FOR INTERNATIONAL TRADE POLICY ANALYSIS MORE SUITABLE FOR PERISHABLE AGRICULTURAL PRODUCTS

| Individual Preferences | → | Interest Groups | **" DEMAND SIDE"** of trade policy |

Seasonality ←→ Trade Policy Outcomes ←→ Transportation

| Policymaker Preferences | → | Institutional Structure Of Government | **"SUPPLY SIDE"** of trade policy |

Source: Figueroa, E. E.,Department of Agricultural, Resource and Managerial Economics, Cornell University. September 1995.
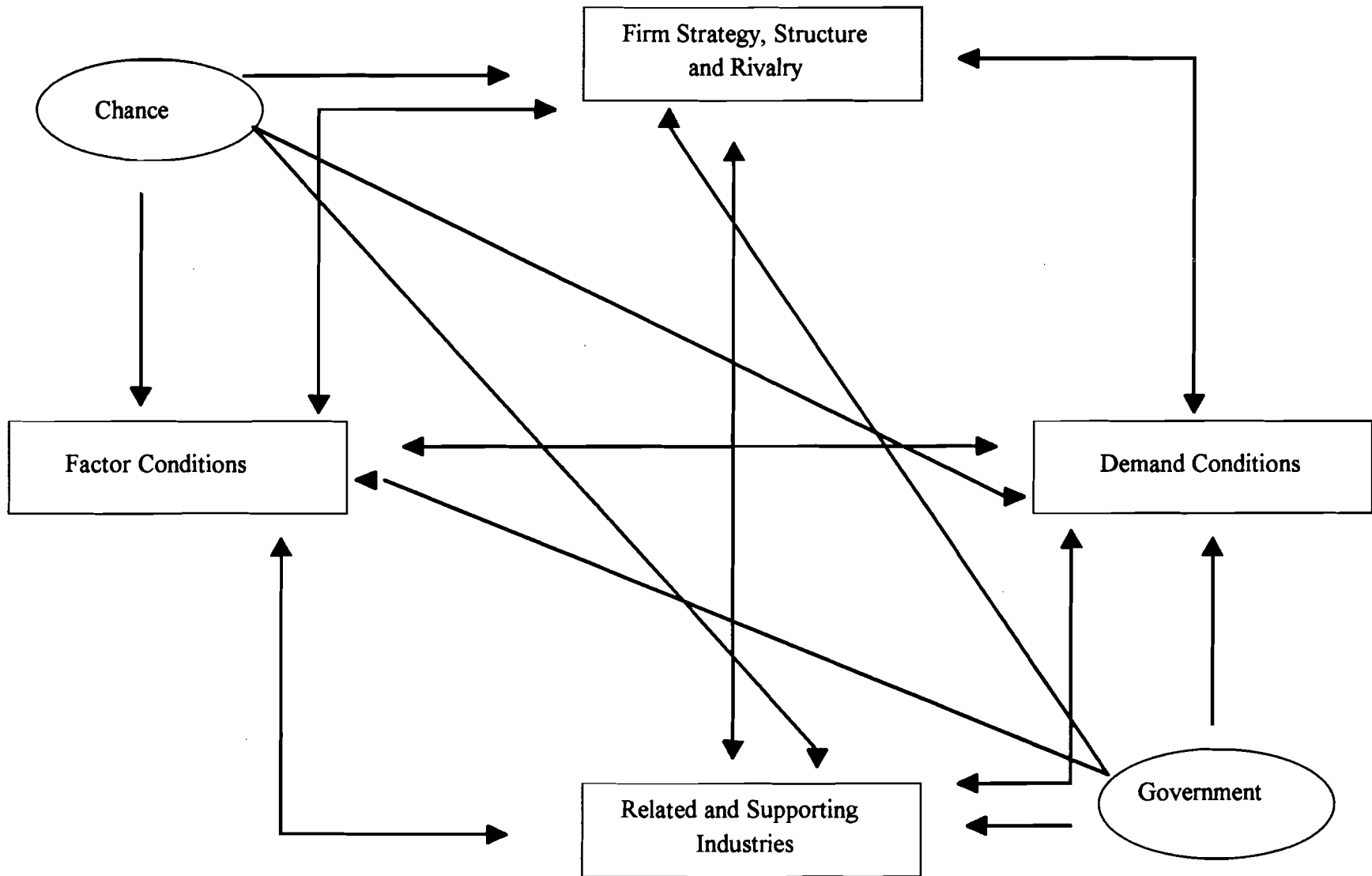
Figure 3

DETERMINANTS OF COMPETITIVENESS

Table 1

FACTORS INFLUENCING COMMODITY SECTOR COMPETITIVENESS AND GROWTH

A.) (International) Market Demand Factors

    Income and Population Levels and Growth
    Income and Price Elasticities
    Consumer Tastes
    Settlement and Work Patterns
    Tariff/Non-tariff Barriers into Import Markets
    Resources/Political Strength of Competing Suppliers

C.) Macroeconomic and Sector Policies

    Fiscal and Monetary Policies
    Exchange Rate Policies
    Trade and Licensing
    Price Policies
    Labor Policies

B.) Natural Resources and Human Capital

    Land, Water, and Other Natural Resources
    Climate and Sunlight
    Skilled and Unskilled Labor
    Entrepreneurial and Trade Experience

D.) Physical, Technical, and Social Infrastructure

    Transport Infrastructure
    Communications/Utilities Infrastructure
    Marketing Facilities/Market Information
    Agricultural Research and Extension
    Post-Harvest Technology Research
    Credit Facilities

E.) Micro-Marketing and Coordination Elements

    Costs/Efficiency of Physical Marketing (Processing, Storage, Transport)
    Costs/Efficiency of Buying + Selling
    Coordination of Production + Marketing
    (New) Product Development
    Quality Control
    Quantity Control for Sales and Market Power
    Risk Sharing/Reduction Measures
    Marketing Research and Promotion

Table 2
DEFINING COMPETITIVENESS

In this study we use the Agri-Food Competitiveness Task Force's definition of competitiveness, which is **the sustained ability to profitably gain and maintain market share**. Two dimensions of this definition are particularly important to this study.

First, the definition suggests that the combination of profitability and the increase or maintenance of market share is an appropriate indicator of competitiveness, at any level of aggregation: the nation's economy as a whole, a sector or and individual firm.

Second, the definition suggests that the profitable gain or maintenance of market share must be sustainable. This implies that government intervention must be of a type that allows the continuation, or further enhancement, of the positive effects of the intervention after it is removed.

Figure 4

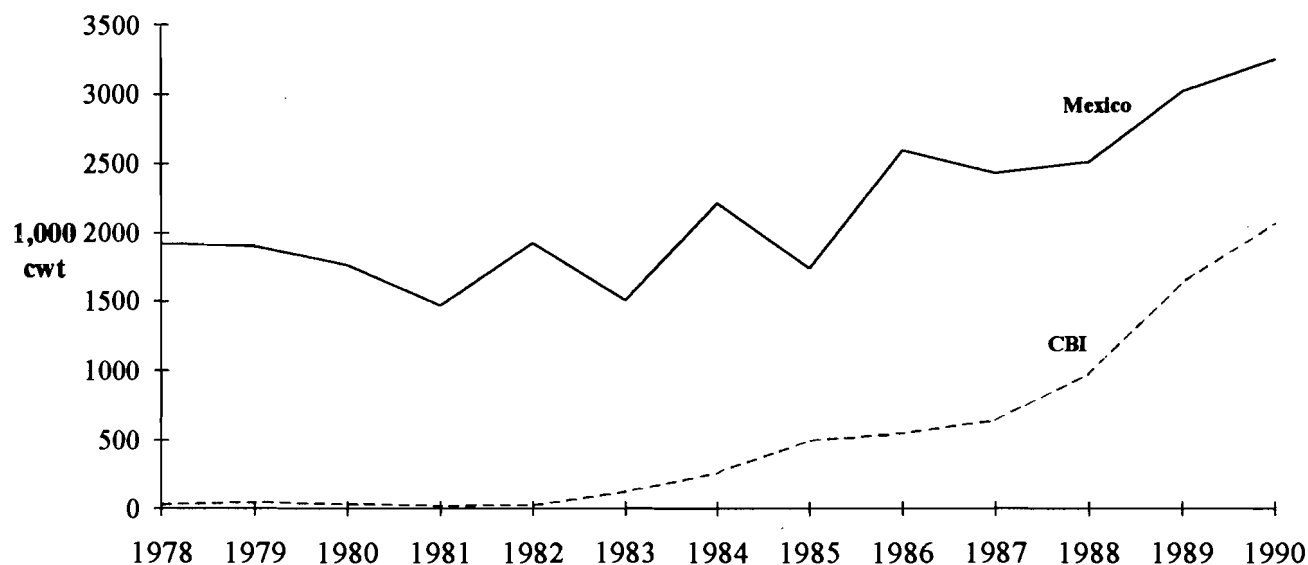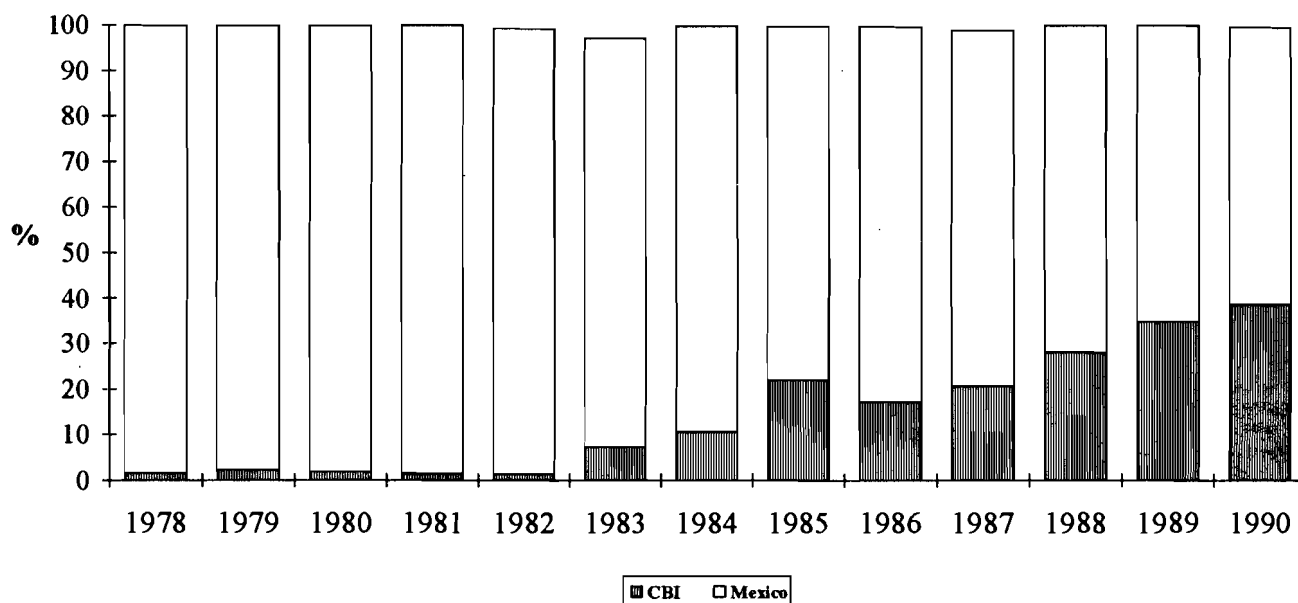# U.S. IMPORTS OF CANTALOUPE FROM MEXICO AND CARIBBEAN BASIN (1,000 cwt), 1978-1990

Figure 5

U.S. IMPORT MARKET SHARES OF CANTALOUPE FROM MEXICO AND CARIBBEAN BASIN (percent), 1978-1990

Source: Hubbard, K. J. "Trade Diversion of Melons and Pineapples From the Caribbean Basin Under a North American Free Trade Agreement." Thesis, Department of Agricultural, Resource and Managerial Economics, Cornell University. May 1993.pps. 161-162.

Figure 6

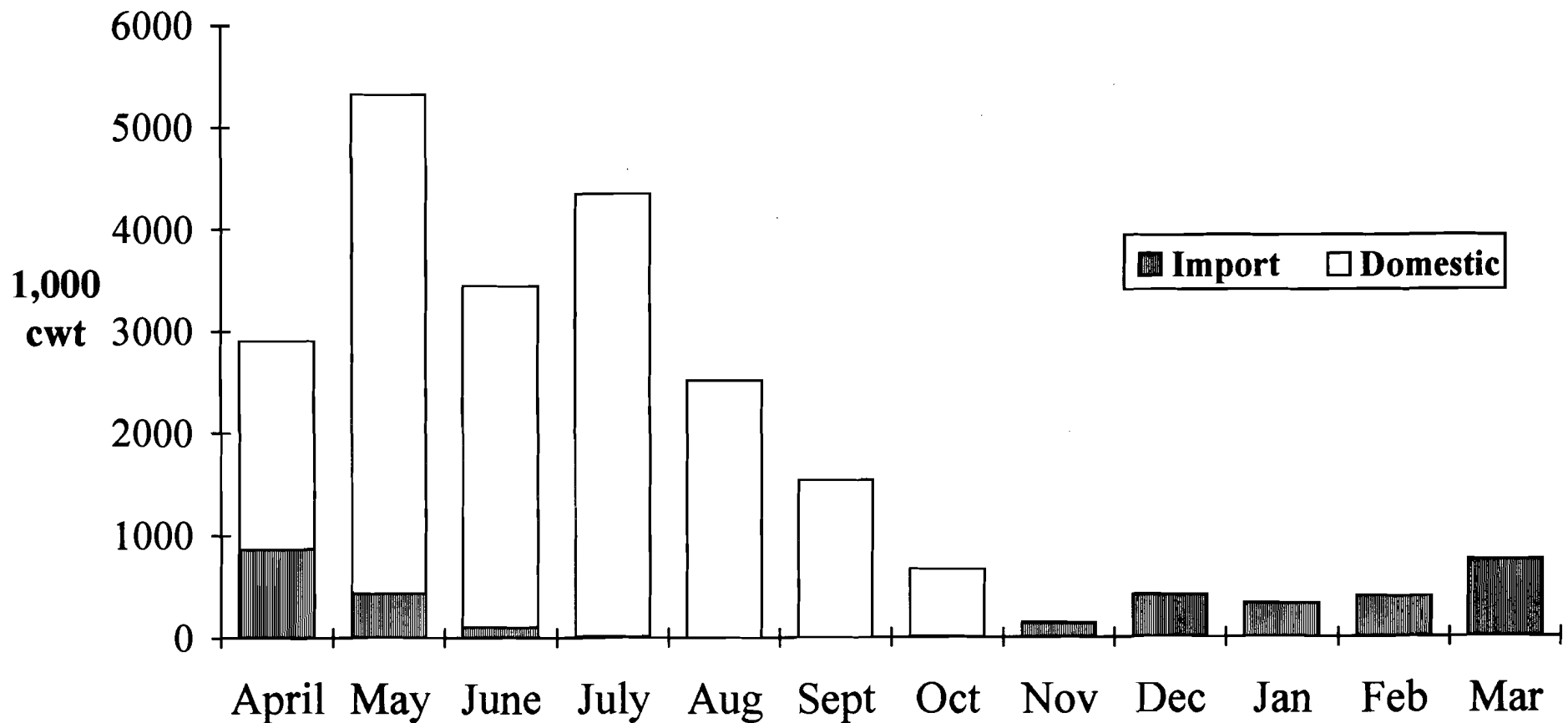# DISTRIBUTION OF CANTALOUPES IN THE U.S. MARKET IN 1988

1,000 cwt

Legend: ▒ Import ☐ Domestic

Y-axis: 0, 1000, 2000, 3000, 4000, 5000, 6000

X-axis: April, May, June, July, Aug, Sept, Oct, Nov, Dec, Jan, Feb, Mar

22

Figure 7
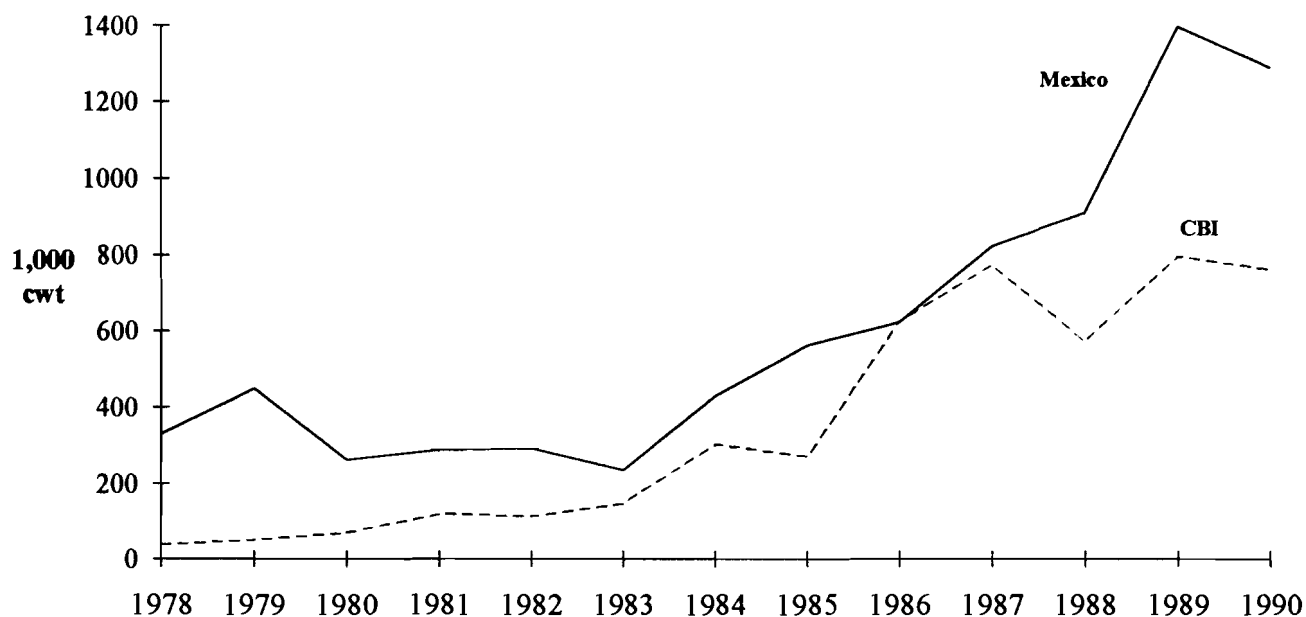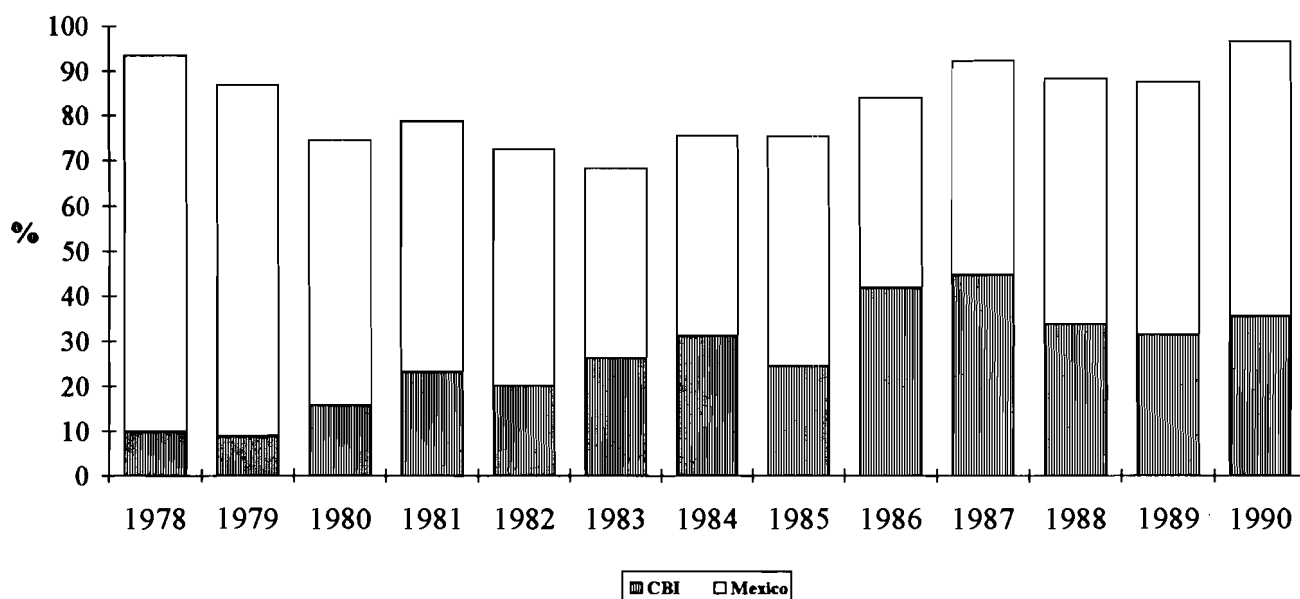# U.S. IMPORTS OF HONEYDEW MELONS FROM MEXCO AND CARIBBEAN BASIN (1,000 cwt), 1978-1990
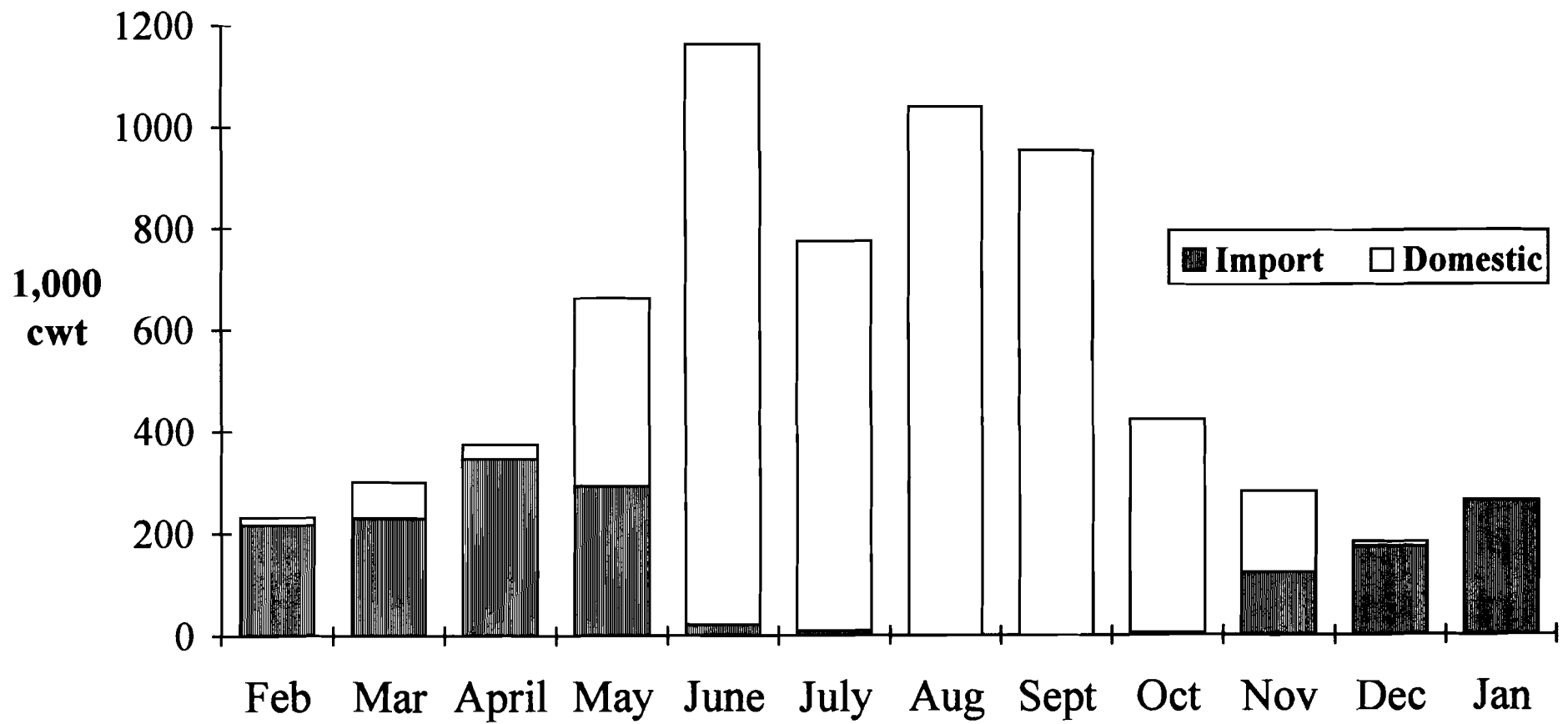

Figure 8
U.S. IMPORT MARKET SHARES OF HONEYDEW MELONS FROM MEXICO AND CARIBBEAN BASIN (percent), 1978-1990

Source: Hubbard, K. J. "Trade Diversion of Melons and Pineapples From the Caribbean Basin Under a North American Free Trade Agreement." Thesis, Department of Agricultural, Resource and Managerial Economics, Cornell University. May 1993.pps. 164-165.

Figure 9

DISTRIBUTION OF HONEYDEW MELONS IN THE U.S. MARKET IN 1988

1,000 cwt

Legend: ■ Import □ Domestic

Y-axis: 0, 200, 400, 600, 800, 1000, 1200

X-axis: Feb Mar April May June July Aug Sept Oct Nov Dec Jan

Source: Hubbard, K. J. "Trade Diversion of Melons and Pineapples From the Caribbean Basin Under a North American Free Trade Agreement." Thesis, Department of Agricultural, Resource and Managerial Economics, Cornell University. May 1993. p. 158.

Figure 10

U.S. IMPORTS OF PINEAPPLES FROM MEXICO AND CARIBBEAN BASIN (1,000 cwt), 1978-1990
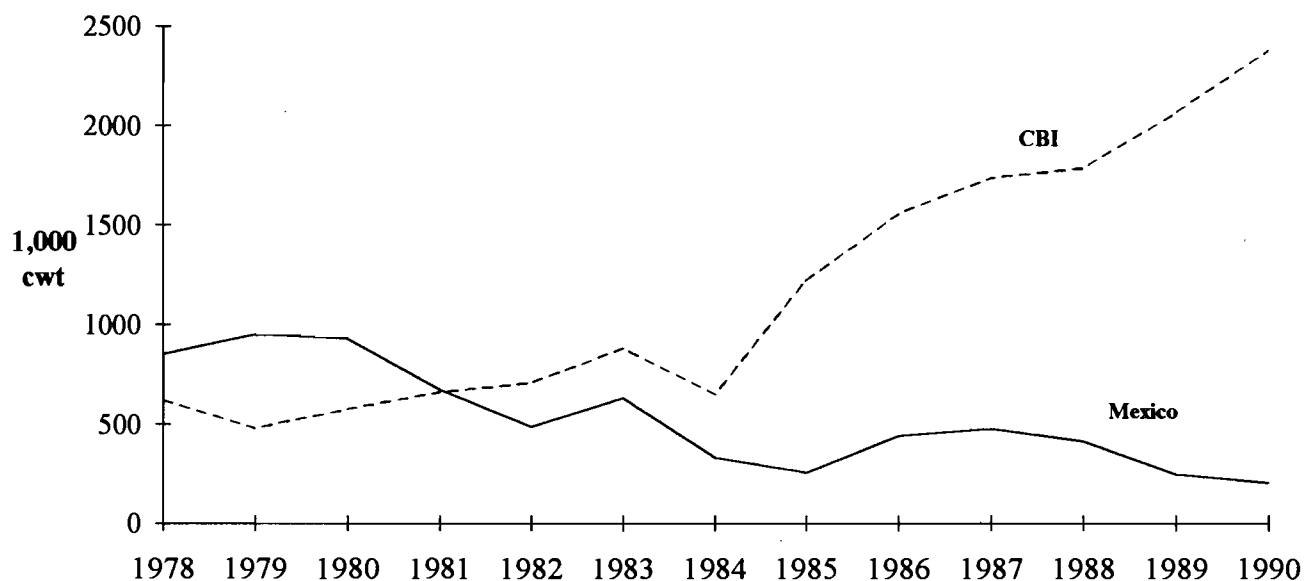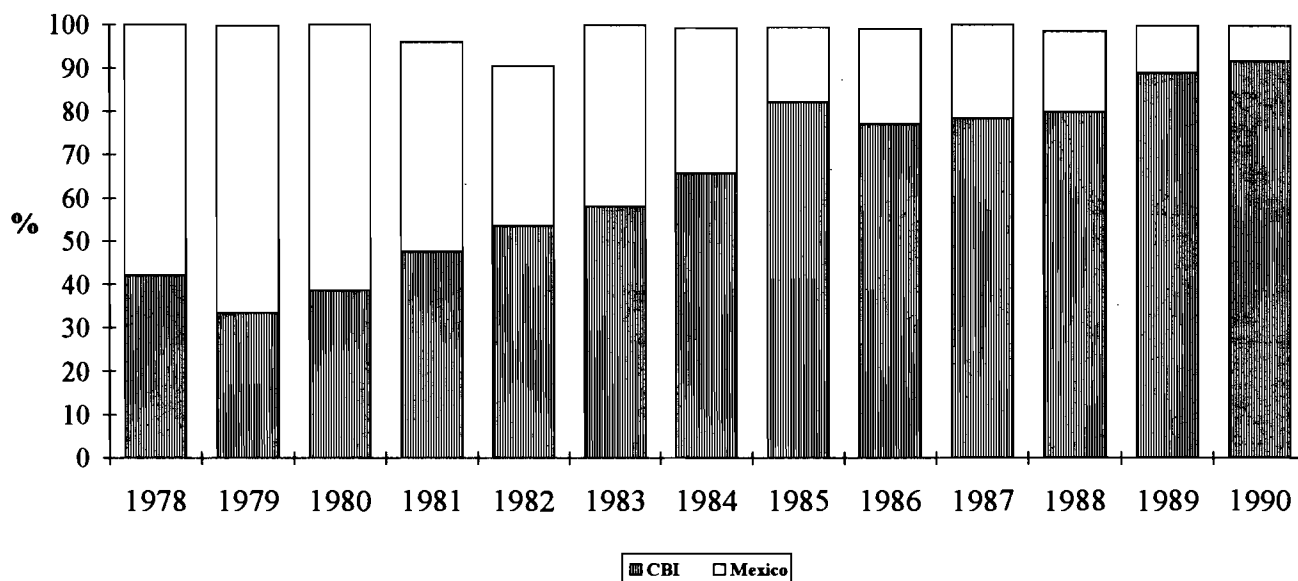

Figure 11

U.S. IMPORT MARKET SHARES OF PINEAPPLES FROM MEXICO AND CARIBBEAN BASIN (percent), 1978-1990

Source: Hubbard, K. J. "Trade Diversion of Melons and Pineapples From the Caribbean Basin Under a North American Free Trade Agreement." Thesis, Department of Agricultural, Resource and Managerial Economics, Cornell University. May 1993.pps. 166-167.

Figure 12

DISTRIBUTION OF PINEAPPLES IN THE U.S. MARKET IN 1988
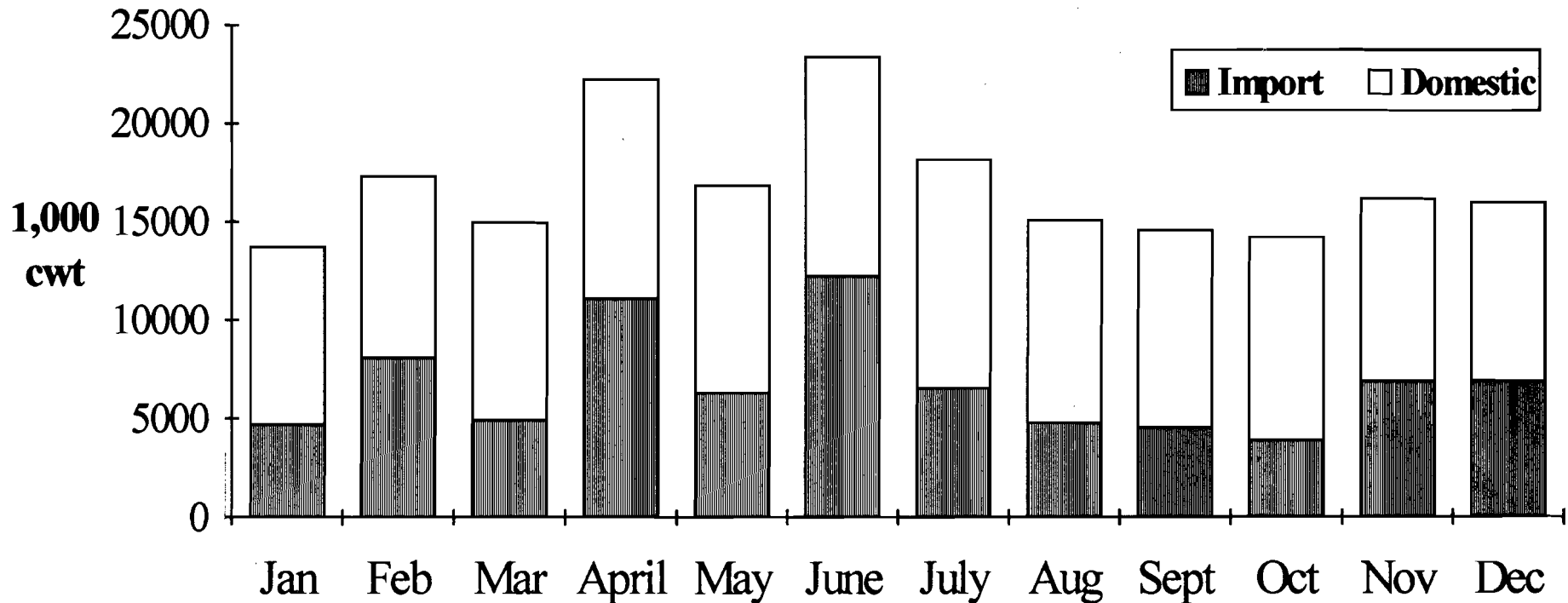
Source: Hubbard, K. J. "Trade Diversion of Melons and Pineapples From the Caribbean Basin Under a North American Free Trade Agreement." Thesis, Department of Agricultural, Resource and Managerial Economics, Cornell University. May 1993. p. 159.

Table 3

PERCENT OF U.S. IMPORTS OF CANTALOUPES, HONEYDEW MELONS, AND PINEAPPLES OBTAINED BY MEXICO AND C.B.I. COUNTRIES, 1982, 1990, 1994/5

Product/Year	Mexico	C.B.I. Countries
Cantaloupes:		
1982	97%	1.2%
1990	60%	40%
1995*	31%	60%**
Honeydew Melons:		
1982	61%	20%
1990	52%	36%
1995*	35%	65%***
Pineapples:		
1982	37%	54%
1990	8%	92%
1994	--	87%****

*--May 1994 to April 1995
**--Costa Rica, Guatemala, and Honduras
***--Costa Rica=25% and "other countries"=40%
****--Only Costa Rica and Honduras

Source: Hubbard, K. J. "Trade Diversion of Melons and Pineapples From the Caribbean Basin Under a North American Free Trade Agreement." Thesis, Cornell University, 1993. Figueroa, E. E. Department of Agricultural, Resource and Managerial Economics, Cornell Univeristy. August, 1995.

Table 4

ANNUAL PERCENT CHANGES IN TARIFF RATES AND IMPORT VOLUMES FOR U.S. IMPORTS OF MEXICAN CANTALOUPES AND HONEYDEW MELONS, 1978 TO 1990

Years	Cantaloupes		Honeydew Melons	
	% change in Tariff	% change in Import Vol.	% change in Tariff	% change in Import Vol.
1978 - '79	0.0	-1.2	+12.5	+36.6
1979 - '80	0.0	-7.2	-9.1	-41.7
1980 - '81	0.0	-16.8	-5.6	+10.3
1981 - '82	0.0	+31.2	0.0	+1.0
1982 - '83	-63.7	-21.5	0.0	-19.6
1983 - '84	-42.5	+46.4	+180	+83.3
1984 - '85	+379	-21.4	-23.1	+31.0
1985 - '86	0.0	+49.5	+6.0	+10.9
1986 - '87	0.0	-6.4	-78.4	+32.1
1987 - '88	-75.7	+3.2	+2.4	+10.6
1988 - '89	-32.9	+20.0	+9.3	+53.3
1989 - '90	+68.4	+7.7	+36.2	-7.7

Source: Hubbard, K. J. "Trade Diversion of Melons and Pineapples From the Caribbean Basin Under a North American Free Trade Agreement." Thesis, Cepartment of Agricultural, Resource and Managerial Economics, Cornell University. May 1993. Figueroa, E. E. Department of Agricultural, Resource and Managerial Economics, Cornell University. August, 1995.

Table 5

MEXICAN MARKET SHARES OF THE U.S. IMPORT MARKET, SIMULATIONS FOR 1991 TO 1997

| Year | *Cantaloupes* (% Market Share) | | *Honeydew Melons* (% Market Share) | |
	Tariff (1)*	Tariff (4)**	Tariff (1)	Tariff (4)
1991	55.1%	55.1%	57.2%	57.2%
1992	52.3	52.3	58.3	58.3
1993	49.6	50.4	59.4	61.3
1994	46.9	47.7	60.6	62.4
1995	44.3	45.1	61.8	63.6
1996	41.7	42.6	63.1	64.8
1997	39.3	40.1	64.4	66.1

*--Tariffs Maintained at 1990 Levels.
**--Complete Removal of Tariffs in 1993

AGGREGATED "EXPORT DEMAND" ELASTICITIES FOR BANANAS

Exporting Country	Export Demand Elasticity
Colombia	-0.3386
Costa Rica	-0.4431
Ecuador	-0.3454
Guatemala	-0.2793
Honduras	-0.3303
Panama	-0.4363
ACP	-0.3207
ROW	-0.5262

ACP = African, Caribbean, and Pacific Countries
ROW = Rest of the World

Source: Machado, K.B. "Implications of Changing European Union Trade Policies on Latin America's Trade in Bananas." Masters Thesis, Department of Agricultural Resource and Managerial Economics, Cornell University. January, 1995. p. 179.

Table 7

PROCESSED VEGETABLE COST AND RETURN DATA BY STATE, 1986

Crop and Region	Yield (tons)	Price Received $/ton	Gross Returns $/A	Variable Cost $/A	Total Cost $/A	Gross Margin $/A	Net Return $/A
BUSH BEANS							
Oregon	6.0	175	1050	612	837	439	213
Wisconsin	4.0	152	608	246	396	362	212
New York	2.4	184	442	225	328	217	144
SWEET CORN							
Oregon	8.0	70	558	302	528	256	30
Wisconsin	4.5	69	309	98	218	211	91
New York	5.4	60	326	112	199	213	126
Washington	9.0	64	573	260	417	313	120
CARROTS							
Oregon	30.0	42	1260	881	1159	379	101
California	18.0	82	1472	753	1001	719	471
BROCCOLI							
Oregon	4.5	319	1436	982	1241	453	195
California	5.5	388	2118	2072	2330	46	-211
BEETS							
Oregon	22.0	58	1265	808	1077	457	188
Texas	13.0	53	683	455	573	228	110

Table 8

PESTICIDE SALES IN U.S. AGRICULTURE BY CLASS AND USE, 1990, MILLION $

Crops	Herbicides	Insecticides	Fungicides and Others	Total	Percentage*
Corn	$1,164	$276	$20	$1,460	32.1%
Cotton	157	244	96	497	10.9
Soybeans	852	13	10	875	19.2
Sorghum	44	10	4	58	1.3
Vegetables	43	109	99	252	5.6
Fruits	87	123	100	310	6.8
Other Crops	716	145	241	1,102	24.2
Total	$3,063	$920	$571	$4,554	100.0
Corn, cotton, soybeans, and sorghum as percentage of total*	72.4%	59.0%	22.8%	63.4%	100.0

*Percentages may not add up to 100 due to rounding.

Source: NACA, Industry Profile, 1990. Fernandez-Cornejo, J. and S. Jans, "Quality-Adjusted Price and Quantitly Indices for Pesticides.", American Journal of Agricultural Economics, 77 (August 1995): 645-659.

Figure 13

AGRICULTURAL RESEARCH DOLLAR BREAKDOWN, 1993

Communities, institutions 3%

Environment/natural resources 12%

Forestry 13%

Food/nutrition 6%

Marketing/trade 4%

Resources/technology 4%

Crops 34%

Animals 24%

Total Funding $2,970,911,000
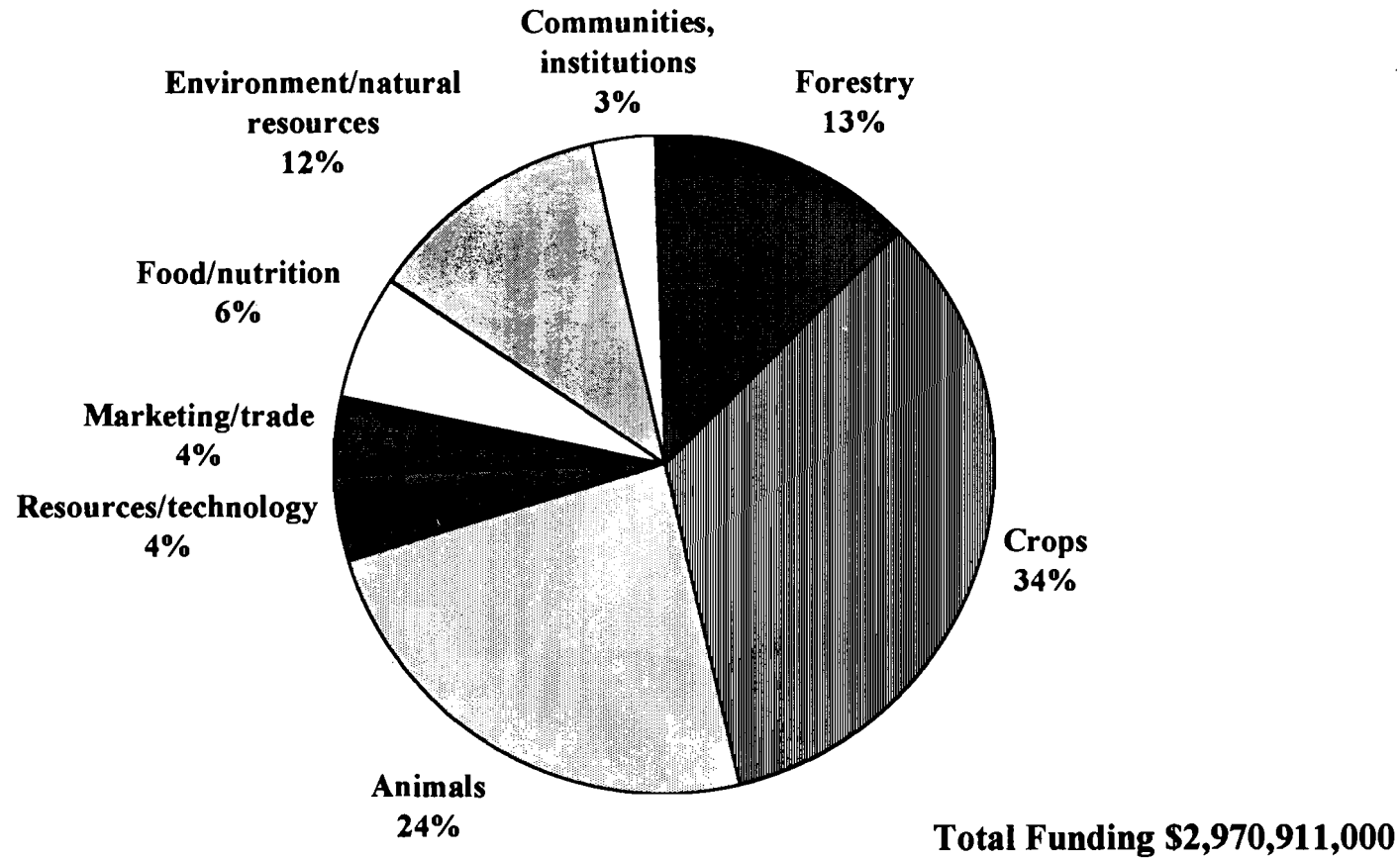
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