WELFARE AND NUTRITIONAL IMPLICATIONS FROM CHANGES IN GOVERNMENT EXPENDITURES FOR U.S. AGRICULTURAL EXPORT PROMOTIONS

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ABSTRACT

Trade promotion programs that subsidize exports of agricultural products continue to be employed in the United States (e.g., the Market Access Program) and elsewhere. In addition, many countries, including the United States, Canada, Australia and European member states have domestic promotion programs for agricultural products that are funded by both industry and government. Trade promotion programs have been heavily criticized as inefficient government expenditures while recently Kinnucan and Cai (2010) argue that they also can lead to reductions in domestic consumer welfare.

Here we extend this line of research to examine the market and welfare effects of the changes in government export promotion expenditures. An equilibrium displacement model that considers domestic and foreign markets, and two types of food products— foods and energy-dense foods—has been employed in this study; Alston et al. (2009) adopted a similar approach that included healthy and unhealthy foods. Several scenarios are investigated within our framework to quantify the impacts of hypothetical changes in government and industry promotion expenditures allocated for different purposes on consumers in domestic food markets: i) increased expenditures on trade promotion programs, ii) reduced expenditures on trade promotion programs, and iii) reduced expenditures on trade promotion programs coupled with increased expenditures on domestic promotional efforts. Furthermore, due to the fact that much of the expenditures for export promotions are applied to specialty crops, we also examine how changes in government monies spent on promotional efforts in foreign markets have impacted domestic consumption of

horticultural and non-horticultural products respectively and domestic dietary-intake as a whole. This is done to shed new light on the potential health consequences (in terms of caloric and nutrient intake) of government support applied to agricultural markets both overseas and in the United States, and further build on a growing literature in this area (e.g., Rickard, Okrent and Alston 2012). Our simulations employ promotional elasticities estimated here and demand elasticities published by previous studies, in combination with information from government and academic sources to parameterize the model. Simulation results show that even modest changes in trade promotion expenditures coupled with a corresponding increase in domestic promotion efforts have the capacity to influence domestic market conditions, nutrient consumption (most notably for dietary fiber and selected micronutrients), and caloric intake.

This research is expected to contribute towards a better understanding of likely economic and nutritional effects induced by changes in public funding for export promotions on domestic markets across two food categories, horticultural and non-horticultural products. We extend previous work in this arena by examining how trade promotions would have influenced domestic food consumption, and moreover consider how alternative promotion strategies might have affected markets and consumption patterns across two food categories in the United States. Overall, our research develops a bridge between economic evaluations of agricultural export promotion programs and relevant policy analyses that look at the impacts of consumer food choices and consequent health effects.

BIOGRAPHICAL SKETCH

Shuay-Tsyr Ho was born in 1988 and grown up in Taipei, Taiwan. Before continuing her graduate study in the United States, she had received the bachelor degree from the Department of Agricultural Economics (major) in National Taiwan University. Research has not become one of her career choices until the senior year when she started out on her first research project and devoted to public affairs that inspires her to bridge the academic knowledge with field experiences. In the pastime, she enjoys reading, hiking and taking a long walk.

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I. Motivation and Objective

1.1 U.S. Market Development Programs: Policy, History and Critique

Since the inception of Targeted Export Assistance Program (TEA) in 1985, government has begun a decades long effort in subsidizing promotion efforts in the form of research, trade shows or advertising campaigns by nonprofit organizations and dedicating funds to support small private agribusinesses or farmer cooperatives of their farm products in overseas markets. In 1990 the Market Promotion Program (MPP) replaced its predecessor, the Market Access Program (MAP), and now serves as the main officially funded program in supporting export promotions for high-value agricultural products (e.g., fruits, salmon, almonds, wine) in foreign markets (GAO, 1999). With the first authorization of this mandatory spending program in 2002 Farm Bill, the promotion expenditures in MAP have grown from $120 million in 1997 (GAO, 1999) to nearly $200 million dollars in 2010 (USDA, 2011). These funds have been employed to raise the market share of agricultural goods in the gradually competitive international food markets. At the same time, the Foreign Market Development (FMD) program, reauthorized by the Agricultural Trade Act in 1978, provides funds, nearly $35 million per year between 2005 and 2010 (USDA, 2009), from the U.S. Department of Agricultural (USDA) Commodity Credit Corporation (CCC) to help maintain and expand long-term export markets for bulk products (e.g., soybean, cotton, grains, meat, wheat rice).

Total available FY 2011 funding on MAP program is summarized with government allocation, from highest to lowest level, on horticultural, non-horticultural and other agricultural products in Table 1.1.1 and 1.1.2; around a quarter of the funds goes to horticultural products and more 50% of the funds goes to non-horticultural products.

Table 1.2 summarizes total available FY 2011 funding on FMD program in terms of government allocations, from highest to lowest level, on non-horticultural and other agricultural products; more than 50% of the funds goes to non-horticultural products.

As the whole, total market development spending on U.S. export promotion programs has grown by nearly $250 million between 2001 and 2008. Recent studies show a positive influence of MAP and FMD on their promotion effectiveness overseas: U.S. agricultural exports have increased by $35 for every additional dollar that government and industries spend on promotion and market development (Global Insights. 2010). Regardless of the substantial economic benefits associated with these export market development programs, MAP, especially, has been the target of criticisms that claims it provides "corporate welfare" at the expense of domestic taxpayers. It is also purported ot benefit the large farmer-owned cooperatives using government funds since its first implementation in 1980s. Further opposition against MAP has recently occured in the aftermath of national economic downturn and financial crisis. Some have argued that the government should be more effective in operating MAP to remedy worsened federal debt and rein in wasteful national spending (Shields, 1997; 1999). For the fiscal year 2012 federal budget, president Obama's administration proposes "Termination, Reduction and Savings" that identifies MAP as a potential spending reduction by 20 percent as it's considered to overlap with other USDA trade promotion programs (Office of Management and Budget, 2012).

1.2 U.S. Fruit and Vegetable Markets: Demand, Promotion and Dietary Implications

The number of fruits and vegetable servings per capita per day in the United States is less its counterpart in other countries with similar level of economic development and

relatively homogeneous socioeconomic makeup (Offner, 1999; Burfield, 2003), Richard and Patterson (2005) attempted to empirically explain the observed difference between fruits and vegetable consumption in the United States and Canada market to provide practical policy recommendation for raising current consumption level of fresh produce in the United States. Similar evidences are also found in other developed countries like Australia and United Kingdom that broad-based advertising programs for all fruits and vegetables have received large-scale public attention and also proved to effectively increase domestic consumption of fresh produce (Pollard et al., 2008; Capacci and Mazzocchi, 2011). However, in the United States, commodity-specific promotion programs instead receive more support at the state or federal level, along with little media and official attention paid to broad-based promotions, to promote only certain agricultural produce at home. From an experimental economics approach, Rickard et al. (2011) provide more accurate evaluation of certain promotion effort on domestic healthy food choices with the consumption of more fruits and vegetables as well as less fat- and sugar-laden junk food. Their empirical findings support the advertising strategy of multiple-products promotions since this type of broad-based promotions would not only be profitable for domestic producers but also be beneficial to consumers by developing individual's healthier dietary habit in the United States.

1.3 Research Questions

Extending the research by Kinnucan and Cai (2010) to consider a two-commodity setting, this study examines the economic impact of changes in export promotion expenditures by the government for horticultural and non-horticultural products. I

evaluate how a change in the level of export promotion subsidy impacts prices, quantities consumed and welfare measures in the domestic market.

In addition to the economic impacts, I also assess the health implications for such a change in export promotion subsidies. Here I focus on changes in caloric consumption and nutrient intake, while accounting for the likely cross-product relationships between horticultural and non-horticultural products. Following Alston et al. (2009), I simulate the effect of external shocks on the demand for horticultural and non-horticultural products and model any second-round effects when the products are assumed to be substitutes or complements.

Bringing together research themes from these earlier studies, the key objective here is to study the impacts of export promotion programs for U.S. farm products in the domestic market in terms of both the economic and nutritional outcomes.

1.4 Thesis Outline

This paper begins with an overview on export promotion programs and on food consumption of fresh produce in the United States. Chapter 2 reviews relevant studies on the impacts of export promotion programs, methodologies employed to provide economic analysis, and linkages between obesity and domestic food consumption patterns. Graphical illustrations for the economics of non-price export promotion program are presented in Chapter 3. Next, an equilibrium displacement model and econometric model are introduced in Chapter 4 to simulate the welfare and nutritional impacts of change in government expenditures for agricultural export promotions. Chapter 5 summarizes parameterization results and Chapter 6 concludes with relevant food policy implications and future research direction.

II. Literature Review

2.1 Economic Impacts of U.S. Agriculture Export Promotions

Extensive research has been done in investigating the promotion effectiveness in foreign markets from various evaluation methodologies. Regarding the effect of promotions on the competition among products, Comanor and Wilson (1979) surveyed a number of studies with a focus on the influence of advertising expenditure on both direct and cross-elasticity demands for farm products. They found a positive relationship between promotion and price inelasticity. Echoing with this relationship between advertising and competition through the application on foreign market promotion with specific commodity, the study by Richards et al. (1997) employed Anderson's iterative two-stage estimation method to examine U.S. apple promotion efforts in Singapore and the United Kingdom. They suggest that export promotion would be more effective if applied to products that are more price-inelastic, or easier to differentiate. Another exploration of cost-effectiveness of programs for cotton drew the conclusion that non-price promotion has an advantage over price subsidy with higher advertising elasticity and lower price elasticity of export demand (Kinnucan, et al., 1995). Besides the use of demand elasticity as an indicator for the effectiveness measurement of export promotions, Rosson, Hamming and Jones (1986) showed the responsiveness of different agricultural commodities to foreign market development expenditures with a regression technique. They found that apple and tobacco are responsive while the response to the U.S. poultry promotions in foreign countries was not different from zero.

As the export promotion programs evolved over time, the increase in public funding used to promote high-value agricultural crops overseas have ignited a series of debates and concerns among Congress members, media and taxpayers. In response to

these criticisms and questionings, Halliburton and Henneberry (1995) studied on the effectiveness of fund used to promote almonds in the Pacific Rim countries. While returns to government ranged from $4 to $9 per dollar of promotion expenditures spent in Japan, Taiwan and Hong Kong, insignificant effects were found for South Korea and Singapore. However, such positive evidence was subsequently questioned about the estimation of instable promotion elasticity (Kinnucan and Christian, 1997). Another study regarding the export performance of U.S. red meat in Asia examines the effectiveness of such promotion efforts as well as the optimal reallocation of expenditures across different foreign markets using simulation analysis (Le, Kaiser and Tomek, 1998). Research has also been carried out to investigate the economic impacts of export promotions with optimality analysis to explore the investment allocation of promotion for California raisins in the United Kingdom (Kaiser, Liu and Consignado, 2003) and U.S. rice in the world market (Rusmevichientong and Kaiser, 2009). This work adds to the work that employs the simulation procedure estimate the magnitude of promotion impacts on exports of certain crops. Rules are also developed for optimal allocation of promotion expenditures in achieving efficiency goals between markets both domestically and overseas (Ding and Kinnucan, 1996) as well as among goods distinguished by countries of origin (Goddard and Conboy, 1993).

As a whole, the research on the effectiveness of export promotion program, in terms of export sales and market shares, has been conducted for various agricultural products across different regions. However, most of the earlier work has not fully examined the distributional issues of benefits from promotion in terms of overall economic surplus for various parties. Estimation of the distribution of returns from

promotion has been made to broaden the scope of investigating such substantial government outlays (Wohlgenant, 1993). Research has explored the benefits from advertising for different producer groups selling various but closely related commodities, known as beggar-thy-neighbor behavior (Alston, Freebairn and James, 2001) and from different countries competing for import markets of certain products, known as free-rider effects (Kinnucan and Myrland, 2003). Above all, these studies focus mostly on producer gains from the promotion whereas the simultaneous impacts on consumers are rarely addressed. A graphical analysis to illustrate the benefits and costs of advertising by a large exporter has been developed to capture accurate welfare measures for both producers and consumers (Alston, Carman and Chalfant, 1994). An examination of Australia's wine promotion program also considers the domestic consumer impacts, concluding that the domestic consumer loses substantially from the price-raising effect of promotion abroad and its impact in reducing supplies on the domestic market (Zhao, Anderson and Wittwer, 2003). More recently, a study thoroughly examines whether the subsidy use justifies its original goal in successfully exporting agricultural products by taking the domestic consumer welfare into consideration (Kinnucan and Cai, 2010).

With respect to the methodology, the economic evaluations of promotion efforts are often undertaken using comparative static analyses more commonly known as equilibrium displacement models (EDM) and used by Alston et al. (1999); Henneberry (2009), Wohlgenant (1993), Zhao et al. (2000), Zhao et al. (2003). The structure of a food or crop industry is represented by a system of demand and supply equations defining equilibria across different markets. The successful promotion campaigns in various product markets are modeled as shifts in the relevant supply or demand curves. When

exogenous shocks from either demand or supply side displace the equilibrium, the resulting price and quantity changes allows changes in quantity consumed in different markets. Here I extend the analysis to also consider how simulated changes in quantity affect calorie intake and body weight.

Taken together, to my knowledge, no research has evaluated the impact of export promotion program on domestic food consumption and calorie intake. My objective is to further identify the linkage between obesity rates, nutrient consumption and promotion programs targeting foreign markets.

2.2 Methodology: Econometric Estimation and Equilibrium Displacement Model

A number of studies have examined the impacts of U.S. export promotions on foreign markets for various commodities and importing countries. Methods in these studies are designed to estimate either the demand for U.S. commodities in importing countries or the U.S. export demand for commodities. Whether it is the export or import demand that is to be specified, the promotion activities are typically included as an explanatory variable as a way to characterize the effects of advertising expenditures spent on U.S. commodities exports. To effectively identify the impacts of other explanatory variables in these demand equations, determinants such as price, income, exchange rates, population, domestic production, substitute prices, competitors' prices, trend variable, lagged dependent variable and different trade barrier measures are included.

Several studies employ the import demand approach for various commodities in different regions. The promotion effectiveness of the U.S. red meat exports to Hong Kong, South Korea, Singapore and Taiwan had been examined (Le, Kaiser and Tomek, 1998). The carryover effect of export promotion is incorporated into their single equation

model in the form of Cobb-Douglas function. In their model, the per capita imports of red meat in U.S. dollars is the independent variable, and they found that only in South Korea did both the current and past promotion efforts have significant and positive impacts on demand. The sum of current and lagged promotion elasticities was estimated to be 0.598 for South Korea. In terms of the own-price effect on import sales, the price variables denoted for these four countries were all statistically insignificant.

Another study examined the effectiveness of U.S. non-price promotion of Almonds in Japan, South Korea, Taiwan, Hong Kong and Singapore (Halliburton and Henneberry, 1995). They used such various functions and forms (Cobb-Douglas, linear and exponential) to estimate the volume of almond imports to these countries in the Pacific Rim. They found that while the promotion expenditures played rather insignificant role in South Korea and Singapore, export promotions were effective in Japan, Taiwan and Hong Kong when the linear functional form was used. Respective promotion elasticities ranged from 0.2 to 0.5. Despite these inconclusive results in the estimation of export promotions, a consistent relationship between almond prices and import demand was found.

Besides the export promotion efforts, impacts of trade policies such as tariff rates and import quota were also incorporated to examine import patterns for U.S. fresh grapefruit imports in France, Netherland, Canada and Japan (Fuller, Bello and Capps, 1992). A linear demand model that treated per capita import volumes as the dependant variable demonstrated found a positive impact of promotion spending on import demand for U.S. fresh grapefruits by France, Japan and Netherlands (estimated promotion elasticities were 0.11, 0.23 and 0.15) at a 10% level of significance. While the price did

not have significant impact on impacts into the Netherlands, the import demand of the United States, France and Canada were sensitive to prices.

The export demand approach is frequently employed to investigate the effectiveness of export promotion efforts. An attempt to examine the role of foreign market promotion programs for apples, poultry and tobacco was done with the estimation of a simple linear regression model (Rossen, Hamming and Jones, 1986). While promotion efforts did not significantly raise the total export volumes of poultry, the promotion efforts appeared to increase the exports of U.S. apple and tobacco in selected European member states.

Another study examined the impact of selected export promotion programs for U.S. orange juice exports to France, Germany, Japan, Netherlands and United Kingdom (Armah and Epperson, 1997). Their results showed that the promotion efforts by Food Marketing Program, Targeted Export Assistance and Market Promotion Program had a positive and significant influence on U.S. juice sales in all five foreign markets. Additional export volume would have been generated between 0.014% and 0.0302% given 1% increase in government promotion expenditures. Also, the own-price variable played a significantly negative role in determining the volume of orange juice exported to these importing countries. While France, German, Japan, and United Kingdom were less responsive to changes in export price, the demand was more elastic for the Netherlands.

Equilibrium displacement frameworks have been widely used by agricultural economists to model the impacts of different external shocks on foreign or domestic markets for various agricultural commodities.

Some studies emphasized the demand and supply shocks on the U.S. meat sector (Wohlgenant, 1993; Alston, Freebairn and James, 2001; Brorsen et al., 2002; Kinnucan, 2003; Brester, Marsh and Atwood, 2004; Lusk and Anderson, 2004). Specifically for the empirical investigation of promotion effectiveness, studies have focused on the beef market at home (Kinnucan, Xiao and Hsia, 1996; Coulivaly and Brorsen, 1999) or abroad (Henneberry, Mutondo and Brorsen, 2009). Other examined the advantage of non-price export promotions over price promotions for the U.S. cotton (Kinnucan, Duffy and Ackerman, 1995).

2.3 Impacts of Food Choices on Body Weight

It has been widely documented that export promotion programs have spurred the economic and political controversies among government, industries and citizens in the United States. Here, I attempt to examine both the economic and the health effects of trade promotion efforts in the domestic market by assessing effects on food consumption patterns. The MAP program is chosen as the focus here as it applies to high value specialty crops such as fresh fruits and vegetables (Table 1.1.1 and 1.1.2); the FMD program has traditionally applied to bulk agricultural products (Table 1.2).

Concerns over dietary health are rising as we witness the growing obesity epidemic in the United States over the past few decades. The prevalence of obesity has doubled (Zhang and Wang, 2004) and exceeded 30% in most sex and age groups (Flegal et al., 2010). Especially in the recent ten years, the concerns over excessive body weight among American adults have received more and more research attention on relevant research among different disciplines. The overweight phenomenon has been claimed as key health problem facing the United States today (e.g. Mokdad et al., 1999; Mokdad et al., 2001;

Cutler, Glaeser and Shapiro, 2003; Townsend, 2006). Several studies have been carried out on the consequences of obesity and its impacts on chronic disease including diabetes, hypertension, high cholesterol, stroke, heart disease, cancers and arthritis (Must et al., 1999; WHO, 2000; Malnick and Knobler, 2006; Flegal et al., 2007). Higher grades of obesity are even more likely associated with excess mortality (Orpana, 2009). In terms of the social costs, the public health sector faces direct and indirect health care expenses estimated to be $78.5 billion in1998 and $ 117 billion in 2000 (Pronk, Tan and O'Connor, 1999; USDHHS, 2001; Finkelstein, Fiebelkorn and Wang, 2003).

2.4 Health and Dietary Implications for Proposed Food Policies

In response to the excessive weight gain as well as the social costs linked to obesity, government could play a role in critically identifying policy actions that might reverse the obesity trends statewide with effective changes in dietary patterns. To help individuals achieve healthy dietary plan, fitness and fat-loss goals in the United States are provided that stress an improved quality of diet emphasizing distinctions between nutrient rich and energy dense food. The USDA provides a general guide to healthy eating as "the Food Pyramid" (Miljkovic, 2006; USDA, 2005), where a standard serving of five major food groups consumed in varying proportions is outlined and best visualized as the fundamental dietary structure for healthy and balanced living in the long run. The Dietary Guidelines for Americans (USDA/DHHS, 2005) is used to advise consumers to seek out nutrient rich food to meet nutrient requirement without exceeding daily energy need (ADA reports, 2007). Complementary to these campaigns for healthier and more nutritious food choices, several recent studies have also tried to develop and define the "nutrient density" of food to better communicate this message of balanced diet for

reducing obesity to the public (Drewnowski, 2005; Drewnowski, 2009). Contrary to the notion of nutrition density, "energy-dense" food has been empirically verified as nutrient-poor (Darmon et al., 2006), which infers its equivalence to "empty-calorie" food. Furthermore, some studies have examined the relationship between the nutritient levels and the quality of diet in American adults in support of a healthier dietary attitude towards the consumption of more nutrient-dense food in place of energy-dense food (Ledikwe et al., 2006).

From the above messages that target an improvement in diet quality and encourage a "more nutritious" pattern of food consumption in the long run, some studies have supported the positive effect of high consumption of fruits and vegetables on reducing obesity (Neumark-Sztainer et al., 1996; Kahn et al., 1997; Epstein et al., 2001). The analysis of market intervention by government in encouraging this positive effect and correcting the market failure of prevalent obesity has also been found in many studies (e.g., Cash, Sunding and Zilverman, 2005; Miljkovic, 2006; Schroeter, Lusk and Tyner 2008).

We now see a paradigm shift in agricultural policy settings from the state intervention level to a more liberalized market environment. This may be partially driven by the rising global obesity rate and the "non-communicable" diseases prevalently taking place in developing countries. Hawkes, Friel, Lobstein and Lang (2012) test several hypothesis to develop feasible policy interventions in helping reorient the consumer's fat- or sugar-dense diets towards healthier eating habits with more intake of fruits, vegetables, whole grains and nuts. Given the important finding in this study that the policy changes in more globalized agricultural market have impacted both the "healthy" and "unhealthy"

foods and ingredients, they recommended that more policy weight should be put on. This presents an alternative to the more traditional response of directly intervening in the production process to encourage consumers to make healthier food choices, fixing the substitution, distribution and marketing process throughout the food supply chains.

Public debates concerning the linkage between increased obesity rates in the United States and the farm subsidies are prevalent. Farm subsidies have also been regarded as the main contributor to current obesity epidemic by lowering the price of more energy-dense food (Nestle, 2002; Tilloston, 2004; Muller, Schoonover and Wallinga, 2007; Ludwig and Pollack 2009; Popkin, 2010), while other studies have made paramount efforts in identifying the impacts of agricultural policy on commodity prices from an opposite standpoint. The small cost share of agricultural commodities in food products, cross-country comparisons, (Senauer and Gemma, 2006; Miller and Coble, 2007) the less important effect of farm policies on certain ingredient prices (Beghin and Jensen, 2008), and the diminishing impact of agricultural subsidies on caloric consumption over time (Rickard et al., 2012) all speak for the rather weak or non-existent influence of agricultural policies on the growth in U.S. obesity rates. Cutler, Glaeser and Shapiro (2003) proposed and empirically tested several theories that attributed the rise in countrywide obesity to the increase in caloric intake. However, despite the abundant literature examining the relationships between agricultural policies and the rising obesity rates in the United States, efforts that attempt to explore the potential spill-over effects of export promotion programs on the price, consumption and calorie intake level of selected farm commodities are rarely invested.

2.5 Bridging the Gap: Trade Promotions and Dietary Intake

As a whole, respective efforts have been put in either thoroughly measuring the effects of U.S. trade promotions or in accurately capturing the proposed policy changes on domestic dietary choices in United States. Alston, Chalfant and Piggott (2000) attempted to incorporate the consumer welfare measure to complete the welfare economic analysis of promotional activities while they focus only on the domestic beef market in the United States. Work by Kinnucan and Cai (2010) has further pushed the frontier of promotion evaluations to investigate whether the USDA-operated promotion programs optimize the overall social welfare as the responses of domestic consumers to subsidy changes are considered.

Here I develop a bridge between economic evaluations of agricultural promotion programs and policy analyses that examine the impacts of consumer food choices and consequent health effects. I extend the line of this most updated research on promotion effectiveness to examine the market effects of changes in trade promotion expenditures on domestic market and consumers by incorporating consequent changes in prices, quantities and calorie intake across different food categories. Particularly for the horticultural product group composed of fruits and vegetables, higher consumption share of such "nutrient-dense" food is considered to help alleviate overweight phenomenon that has become increasingly common among American adults.

Similar to what had been done by Alston et al. (2009) that explores the linkage of policy changes on food choices, this study employs a equilibrium displacement model to capture the potential externality of U.S. export promotion efforts on domestic dietary choices and the relevant caloric impacts by considering both domestic and export markets, and two groups of agricultural commodities—horticultural and non-horticultural products.

III. Conceptual Framework for Examining Trade Promotions

3.1 Overview

The purpose of this chapter is to outline the basic economics of non-price export promotion in a partial equilibrium setting. Here we assume that the United States accounts for a sufficiently large portion of world trade to affect price, i.e., it is facing a downward-sloping excess demand, ED, curve. In the context of both domestic and export markets, consumption choices are composed of the following two food groups: horticultural (denoted with subscript h) and non-horticultural (denoted with subscript n) products. The change in government expenditures for export promotions on all the farm products would shift the export demand of horticultural and non-horticultural products either inward or outward, simultaneously, further imposing consequent market impacts on domestic consumers.

When government increases its promotional expenditures for agricultural products, the domestic market is affected in two ways. First, a subsidy-induced outward-shift in export demand raises the domestic market price with a corresponding decrease in quantities consumed at home. Second, when export subsidy increases, given that the extra export demand does not enlarge the overall budget for agricultural promotions, the domestic demand is reduced as funds are diverted from promotional efforts in the domestic market to capture the subsidy, known as a "cannibalization effect" (Kinnucan and Cai, 2010).

When government decreases its promotional expenditures for agricultural products, a subsidy-induced inward-shift in export demand first lowers domestic market price, and this is followed by a corresponding increase in domestic consumption. Moreover, the reduced export subsidy also enlarges the total budget for both government and industry to

reinvest its domestic promotional efforts on both horticultural and non-horticultural products. Thus, domestic demand rises in response to such subsidy-induced reallocation of advertising expenditures, identified here as a "subsidy-redirection effect".

Given a decrease in the export subsidy, Figure 3.1 illustrates the markets effects of an increase in government expenditure for export promotions in both domestic and foreign markets. Figure 3.2 presents the effects of the reduced government spending in agricultural trade promotions. In respect of corresponding market impacts, Figure 3.1 and 3.2 illustrates the role of "cannibalization effect" and "subsidy-redirection effect" in the domestic market imposed by the change in government expenditure for export promotions.

3.2 Increase in Government Expenditures for Agricultural Export Promotions— Role of Cannibalization Effect

Figure 3.1 illustrates the economics of U.S. non-price export promotions, from an increased-subsidy perspective, for agricultural products in both domestic and export market. To allow for a more general consideration, commodity C is used to denote "crops" and, for the purpose of expositions, includes horticultural and non-horticultural products. Likely Impacts induced by subsidy increase both in the absence of and in the presence of cannibalization effect are explored in the following.

In the absence of "Cannibalization Effect"

Panel A in Figure 3.1 shows the effect of an increase in government expenditures for export promotions when the cannibalization effect in domestic market is ignored. The excess demand in export market increases from ED_c to ED_c', causing the equilibrium market price to increase from P_c to P_c^0 and domestic consumption level to decrease from

Q_c to Q_c^0, assuming the increase in export subsidy has not impacted the domestic market, as it has shifted the export demand outward.

In the Presence of "Cannibalization Effect"

Panel B in Figure 3.1 shows the effect of an increase in government expenditure for export promotions when the cannibalization effect in domestic market is considered. In this case, the domestic demand shifts inward from D_c to D_c' as levy-constrained industry monies are diverted from domestic to foreign promotions to meet the cost-share requirement of government allocations for promotional efforts on the export of farm products. In response, the total supply for the foreign market has thus increased with an downward shift of excess supply from ES_c to ES_c'; thus now intersects with subsidy-induced ED_c' to generate a new equilibrium market price at P_c' and domestic quantities consumed at Q_c', respectively below the original market equilibrium level at P_c^0 and Q_c^0.

3.3 Decrease in Government Expenditures for Agricultural Export Promotions— Role of Reallocation Effect

Adopting similar logic that was used in previous section, here I characterize the economics of non-price promotions and the economy-wide effects of U.S. agricultural export promotions for both domestic and export markets from a decrease-promotion effort. To allow for a more general consideration in Figure 4, denotation C is still used to indicate "crops" and includes horticultural and non-horticultural products. Here I use H and N to indicate horticultural and non-horticultural markets, respectively. Likely Impacts induced by subsidy decrease both in the absence of and in the presence of reallocation effect are explored in the following.

In the Absence of "Reallocation" Effect

Panel A in Figure 3.2 shows the effect of a decrease in government expenditures for export promotions when the reallocation effect in the domestic market is ignored. The excess demand in the export market decreases from ED_c to ED_c', causing the equilibrium market price to decrease from P_c to P_c^0 and domestic consumption level to increase from Q_c to Q_c^0. In this analysis, I assume that the decrease in export subsidy has not impacted the domestic market, as it has shifted inward the export demand. The lower price confers a welfare gain to consumers equal to hatched area $P_c abP_c^0$ while a welfare loss to producers equal to the shaded area $P_c dcP_c^0$. With the shaded area exceeding the hatched area, there is an unambiguous gross national welfare loss equal to trapezoid $abcd$. Whether the net national welfare loss is negative or positive depends on the amount of the reduction in spending on the promotional efforts.

In the Presence of "Reallocation" Effect

In Figure 3.2 I also show the effect of a decrease in government expenditures for export promotions when the reallocation effect in domestic market is considered (see Panel B). In this case, the domestic demand shifts outward from D_c to D_c' as industry dollars are reallocated from foreign to domestic promotions in response to the reduced government funding for promotional efforts on the exports of farm products. Therefore, the total supply for foreign markets decreased with an upward shift of excess supply curve from ES_c to ES_c'. This intersects with the subsidy-induced ED_c' to generate a new equilibrium market price at P_c' and domestic quantities consumed at Q_c'. The original

market equilibrium level occurs at P_c^0 , Q_c^0 and takes place when the reallocation effect is not accounted for in the domestic market.

As it comes to welfare implications for non-price export promotions, for one thing, with a rather smaller price effect induced by the decreased subsidy taking place in Panel B, the producer welfare loss shrinks. Specifically, there is a bigger area $P_c dc P_c^0$ in Panel A than the area $P_c d'c'P_c'$ in Panel B. In comparison, ignoring the consequent impact on domestic market inappropriately allows for an overstatement of producer loss, represented by a quantifiable area $P_c'c'cP_c^0$.

In addition, the implication of a reduction in subsidies for export promotion will impact consumer welfare differently depending on whether promotion is persuasive, informative or it further induces the change in purchasing behavior (Tremblay and Tremblay, 1995). Maximal consumer impact results in the consumer welfare gain from subsidy-induced increase in domestic demand equals the area $P_c'a'b'e$ (summation of amount equal to rectangular $P_c'a'fe$ and to triangle $a'b'f$) in Panel B. In this case, the loss to society as a whole is ambiguous since there is no certain assertion that the area quantifying producer loss exceeds its counterpart quantifying consumer gain in Panel B.

IV. Methods and Quantitative Framework

4.1 Research Design

To quantify the multi-market model of supply and demand for horticultural and non-horticultural products presented in Section Three, a conceptual model is introduced next. Adopting the similar simulation approach employed by Alston, Norton and Pardey (1995), Alston et al. (2009) and Rickard (2012), the base model and its logarithmic differential form are developed with a full set of equations in terms of the proportional change, elasticity of supply, demand and promotions, and various promotional shares. Algebraic solutions for percentage change in price, quantities, and promotional expenditures, in response to the change in government funding for export promotions, are then derived. Furthermore, to parameterize the model, export demand for both horticultural and non-horticultural products are specified to estimate the price and promotional elasticities. In addition, other parameters are collected from existing data source provided by government and previous studies.

4.2 Conceptual Model

The following partial-equilibrium model is developed to quantify our multi-market model for two types of commodities. The main effects from potential changes in promotional expenditures as calculated based on information for several key parameters, such as promotional elasticities, demand elasticity and cross-price-elasticities in deriving price and quantity change while net farm value and the value of domestic consumption in deriving economic surplus levels. Supply and demand equations for each of the two categories of food are included in the following model where each demand is further disaggregated into the demand in both export and domestic market.

$$Q_d^h = H_d(P^h, P^n, A_d^h) \quad (1a)$$

$$Q_d^n = N_d(P^h, P^n, A_d^n) \quad (1b)$$

$$Q_x^h = H_x(P^h, \tilde{A}_x^h) \quad (1c)$$

$$Q_x^n = N_x(P^n, \tilde{A}_x^n) \quad (1d)$$

$$A_d^h + A_x^h = A_I^h \quad (1e)$$

$$A_d^n + A_x^n = A_I^n \quad (1f)$$

$$A_I^h = T \cdot Q_s^h \quad (1g)$$

$$A_I^n = T \cdot Q_s^n \quad (1h)$$

$$\tilde{A}_x^h = A_x^h + A_G^h \quad (1i)$$

$$\tilde{A}_x^n = A_x^n + A_G^n \quad (1j)$$

$$\tilde{A}_x^h = f(A_G^h) \quad (1k)$$

$$\tilde{A}_x^n = f(A_G^n) \quad (1l)$$

$$Q_s^h = H_s(P_s^h) \quad (1m)$$

$$Q_s^n = H_s(P_s^n) \quad (1n)$$

$$P_s^h = P^h - T^h \quad (1o)$$

$$P_s^n = P^n - T^n \quad (1p)$$

$$Q_s^h = Q_d^h + Q_x^h \quad (1q)$$

$$Q_s^n = Q_d^n + Q_x^n \quad (1r)$$

Upper-right subscripts h and n differentiate between horticultural and non-horticultural products and lower-right subscripts d and x between domestic and export market. Endogenous market-level variables include Q_d^h and Q_d^n which are the quantities consumed at the home market; Q_x^h and Q_x^n are the quantities exported to the foreign market; Q_s^h and Q_s^n are denoted as domestic production; P_s^h and P_s^n are market prices exclusive of the per unit marketing fee T^h and T^n, hereafter referred to as "supply price", while P^h and P^n indicate the "demand price" inclusive of marketing fee. For other endogenous variables characterizing promotion expenditures, A_I^h and A_I^n are funds

for promotion generated through marketing fee, T^h and T^n; A_d^h and A_d^n are the industry expenditures on domestic promotions; A_x^h and A_x^n are the expenditures for export market promotion exclusive of the subsidy; $\tilde{A}_x^h$ and $\tilde{A}_x^n$ are total expenditures for the export market promotion inclusive of the subsidy. Demand shifters include A_G^h and A_G^n which are export "subsidy" for horticultural and non-horticultural products, respectively.

The first four equations (1a), (1b), (1c) and (1d) describe the demand for horticultural and non-horticultural products in domestic and export market, respectively, where cross-price effects are considered only in the domestic market. Equations (1e) and (1f) show the industry promotional budget composed of expenditures for domestic and export promotions. Equations (1g) and (1h) show industry funding for promotions raised from marketing fees. Equations (1i), (1j), (1k) and (1l) indicate that total export promotional expenditures are composed of government funding and industry investment, and are exclusive of subsidy. Government expenditures for export promotions are a function of total promotional expenditures for agricultural exports inclusive of the subsidy. Equation (1n) and (1o) represent the supply equations for horticultural and non-horticultural products. The remaining equations, (1m), (1p), (1q), (1r) and (1s) identify the market-clearing conditions for market price, quantities consumers and total subsidy allocated between horticultural and non-horticultural products.

In this model, we relax the assumption of fixed domestic supply but otherwise maintain the same assumptions used in the graphical analysis in Chapter 3. The model here contains eighteen endogenous variables: 6 quantities, 4 prices, 8 advertising levels. Also, 5 exogenous variables are included: 2 marketing fees and 3 subsidy levels.

Demand for the industry's output can be increased with A_G^h and A_G^n from the enlarged total funds spent by the government on export promotion. Emphasis in the study is put on the effect of an increase in A_G, further spread between A_G^h and A_G^n, on food prices, domestic consumption, economic surplus, and caloric and nutrient-intake level given changes in export promotion subsidies.

4.3 Simulation Framework

Before converting the conceptual model to percentage changes, equation (1i) is substituted into (1e) to eliminate A_x^h and equation (1j) is substituted into (1f) to eliminate A_x^n. Then the logarithmic transformation of the model was developed to establish the following system of equations that consider percentage changes in selected variables.

From equation (2a) to (2s), the $d\ln$ variable indicate relative changes (e.g., $d\ln Q_d^h = dQ_d^h / Q_d^h$). These seventeen equations could be solved for following percentage changes in ten endogenous variables—four quantities consumed $(Q_d^h, Q_d^n, Q_x^h, Q_x^n)$, two quantities supplied (Q_s^h, Q_s^n), and four prices (P^h, P^n, P_s^h, P_s^n). These variables are functions of parameters representing the extent of exogenous variables shock at the market level in terms of promotion elasticity for two commodities given both domestic and export demand $(\alpha_d^h, \alpha_d^n, \alpha_x^h, \alpha_x^n)$, supply elasticity $(\varepsilon^h, \varepsilon^n)$, own-and cross-price elasticity $(\eta_d^{hh}, \eta_d^{nn}, \eta_d^{hn}, \eta_d^{nh}, \eta_x^h, \eta_x^n)$, share of domestic production of horticultural $(k_d^h = Q_d^h / Q_s^h; k_x^h = Q_x^h / Q_s^h)$ and non-horticultural products $(k_d^n = Q_d^n / Q_s^n; k_x^n = Q_x^n / Q_s^n)$

sold in the domestic and export market, and marketing fee expressed as the fraction of demand price $(\tau^h = T^h / P^h, \tau^n = T^n / P^n)$.

$$d\ln Q_d^h = \eta_d^{hh} d\ln P^h + \eta_d^{hn} d\ln P^n + \alpha_d^h d\ln A_d^h \quad (2a)$$

$$d\ln Q_d^n = \eta_d^{nn} d\ln P^n + \eta_d^{nh} d\ln P^h + \alpha_d^n d\ln A_d^n \quad (2b)$$

$$d\ln Q_x^h = \eta_x^h d\ln P^h + \alpha_x^h d\ln \tilde{A}_x^h \quad (2c)$$

$$d\ln Q_x^n = \eta_x^n d\ln P^n + \alpha_x^n d\ln \tilde{A}_x^n \quad (2d)$$

$$\theta_d^h d\ln A_d^h + \theta_x^h d\ln \tilde{A}_x^h = \theta_I^h d\ln A_I^h + \theta_G^h d\ln A_G^h \quad (2e)$$

$$\theta_d^n d\ln A_d^n + \theta_x^n d\ln \tilde{A}_x^n = \theta_I^n d\ln A_I^n + \theta_G^n d\ln A_G^n \quad (2f)$$

$$d\ln A_I^h = d\ln T^h + d\ln Q_s^h \quad (2g)$$

$$d\ln A_I^n = d\ln T^n + d\ln Q_s^n \quad (2h)$$

$$d\ln \tilde{A}_x^h = \varphi_x^h d\ln A_G^h \quad (2k)$$

$$d\ln \tilde{A}_x^n = \varphi_x^n d\ln A_G^n \quad (2l)$$

$$d\ln Q_s^h = \varepsilon^h d\ln P_s^h \quad (2m)$$

$$d\ln Q_s^n = \varepsilon^n d\ln P_s^n \quad (2n)$$

$$d\ln P_s^h = (1-\tau^h) d\ln P_s^h + \tau^h d\ln T \quad (2o)$$

$$d\ln P_s^n = (1-\tau^n) d\ln P_s^n + \tau^n d\ln T \quad (2p)$$

$$d\ln Q_s^h = k_d^h d\ln Q_d^h + k_x^h d\ln Q_x^h \quad (2q)$$

$$d\ln Q_s^n = k_d^n d\ln Q_d^n + k_x^n d\ln Q_x^n \quad (2r)$$

For share identities: $\theta_d^h = A_d^h / A^h; \theta_I^h = A_I^h / A^h; \theta_x^h = \tilde{A}_x^h / A^h; \theta_G^h = A_G^h / A^h$ represent the promotional share for horticultural products where $A^h = A_I^h + A_G^h$ is total promotional budgets for horticultural products. While $\theta_d^n = A_d^n / A^n; \theta_I^n = A_I^n / A^n; \theta_x^n = \tilde{A}_x^n / A^n; \theta_G^n = A_G^n / A^n$ is the promotional share for non-horticultural products where $A^n = A_I^n + A_G^n$ is the total promotional budget for non-horticultural products. The elasticity indicating the sensitivity of total spending on export

promotion for two commodities is represented by $\left(\varphi_x^h, \varphi_x^n\right)$; the respective funding level subsidized by the government is also known as the "budget-diversion" elasticity.

To determine the effect of change in promotion on the net price received by suppliers of horticultural and non-horticultural products, $d\ln T^h$ and $d\ln T^n$ are set equal to zero given the ignorable effect of marketing fee. Also, equation (2e), (2f), (2g), (2h), (2k), (2l) are deleted to treat expenditure for horticultural promotions $(A_I^h, A_d^h, \tilde{A}_x^h)$ and for non-horticultural promotions $(A_I^n, A_d^n, \tilde{A}_x^n)$, as temporarily exogenous.

Thus, solutions for percentage change in producer prices are as the following,

$$d\ln P_s^h = \left[\frac{\left(\varepsilon^n/(1-\tau^n) - k_d^n\eta_d^{nn} - k_x^n\eta_x^n\right)}{D\cdot(1-\tau^h)}\right]\cdot\left(k_d^h\alpha_d^h\right)\cdot d\ln A_d^h + \left[\frac{\left(\varepsilon^n/(1-\tau^n) - k_d^n\eta_d^{nn} - k_x^n\eta_x^n\right)}{D\cdot(1-\tau^h)}\right]\cdot\left(k_x^h\alpha_x^h\right)\cdot d\ln \tilde{A}_x^h$$
$$+\frac{\left(k_d^h\eta_d^{hn}\right)\left(k_d^n\alpha_d^n\right)}{D\cdot(1-\tau^h)}\cdot d\ln A_d^n + \frac{\left(k_d^h\eta_d^{hn}\right)\left(k_x^n\alpha_x^n\right)}{D\cdot(1-\tau^h)}\cdot d\ln \tilde{A}_x^n \quad (3a)$$

$$d\ln P_s^n = \left[\frac{\left(\varepsilon^h/(1-\tau^h) - k_d^h\eta_d^{hh} - k_x^h\eta_x^h\right)}{D\cdot(1-\tau^n)}\right]\cdot\left(k_d^n\alpha_d^n\right)\cdot d\ln A_d^n + \left[\frac{\left(\varepsilon^h/(1-\tau^h) - k_d^h\eta_d^{hh} - k_x^h\eta_x^h\right)}{D\cdot(1-\tau^n)}\right]\cdot\left(k_x^n\alpha_x^n\right)\cdot d\ln \tilde{A}_x^h$$
$$+\frac{\left(k_d^n\eta_d^{nh}\right)\left(k_d^h\alpha_d^h\right)}{D\cdot(1-\tau^n)}\cdot d\ln A_d^h + \frac{\left(k_d^n\eta_d^{nh}\right)\left(k_x^h\alpha_x^h\right)}{D\cdot(1-\tau^{nn})}\cdot d\ln \tilde{A}_x^h \quad (3b)$$

Where $D = \left(\varepsilon^h/(1-\tau^h) - k_d^h\eta_d^{hh} - k_x^h\eta_x^h\right)\cdot\left(\varepsilon^n/(1-\tau^n) - k_d^n\eta_d^{nn} - k_x^n\eta_x^n\right) - \left(k_d^h\eta_d^{hn}\right)\left(k_d^n\eta_d^{nh}\right)$

Substitution of these results into equations (2a), (2b), (2c), (2d) yield the corresponding changes in quantities. From above solution, export promotion's ability to either raise or lower the supply price of two food groups, in its algebraic form, is the function of the percentage changes in four promotional expenditure variables $(d\ln A_d^h, d\ln \tilde{A}_x^h, d\ln A_d^n, d\ln \tilde{A}_x^n)$. These are directly related to export (α_x^h, α_x^n) and

domestic (α_d^h, α_d^n) promotional elasticity, and domestic (k_d^h, k_d^n) and export (k_x^h, k_x^n) quantity shares, simultaneously in both horticultural and non-horticultural market. All the relevant definitions and baseline values for model parameters can be found in Table 4.1.

4.4 Subsidy-Induced Effect in Domestic Market

The Quantitative expression for the subsidy-induced effect in domestic market is known as the cannibalization effect in response to increased subsidy or the reallocation effect in response to decreased subsidy. These can be obtained for horticultural products, in the first place, by dividing equation (3a) through $d\ln A_G^h$ (assuming government export expenditures for non-horticultural promotions do not impact the level of overall and industry domestic expenditures for horticultural promotions, or no "cross-product" effects take place) with the replacement of equation (2k) to yield:

$$\frac{d\ln P_s^h}{d\ln A_G^h} = \left[\frac{\left(\varepsilon^n \big/ (1-\tau^n) \right) - k_d^n \eta_d^{nn} - k_x^n \eta_x^n}{D \cdot (1-\tau^h)} \right] \cdot \left[\left(k_d^h \alpha_d^h \right) \cdot \varphi_d^h + \left(k_x^h \alpha_x^h \right) \cdot \varphi_x^h \right] \tag{4a}$$

Second, the subsidy-induced effect in domestic non-horticultural products could be expressed by dividing (3b) through $d\ln A_G^n$ (assuming government export expenditures for horticultural promotions do not impact the level of overall and industry domestic expenditures for non-horticultural promotions) with the replacement of (2l) to yield:

$$\frac{d\ln P_s^n}{d\ln A_G^n} = \left[\frac{\left(\varepsilon^h \big/ (1-\tau^h) \right) - k_d^h \eta_d^{hh} - k_x^h \eta_x^h}{D \cdot (1-\tau^n)} \right] \cdot \left[\left(k_d^n \alpha_d^n \right) \cdot \varphi_d^n + \left(k_x^n \alpha_x^n \right) \cdot \varphi_x^n \right] \tag{4b}$$

In either case, φ_d^h and φ_d^n are employed to indicate "cannibalization elasticity" or "reallocation elasticity" (expected to be negative), based on the direction of change in government expenditures for export promotions on respective horticultural and non-horticultural products. At the same time the "budget-diversion" elasticities, φ_x^h and φ_x^n, are instead expected to be positive. The sign of equation (4a) and (4b) is ambiguous: depending upon the relative magnitude of the induced "inward-shift" in domestic demand (increase in government expenditure for export promotions resulting in a reduction in domestic demand as promotion funds are diverted to capture the subsidy constraints) or of induced "outward-shift" in domestic demand (decrease in government expenditure for export promotions resulting in a rise in domestic demand as promotion funds are reallocated for the purpose of expanding private investment in the domestic market). In this regard, the effect of any given change in subsidy on net producer price could be perverse.

To solve for the percentage change in supply price (in response to subsidy change), I need to develop quantitative expressions for these elasticity that characterize the sensitivity of domestic promotional expenditures to changes in subsidies for both horticultural and non-horticultural products. First rewrite budget equation for each food group as:

$$A_d^h = A_I^h + A_G^h - \tilde{A}_x^h \tag{5a}$$

$$A_d^n = A_I^n + A_G^n - \tilde{A}_x^n \tag{5b}$$

Then taking derivative of equation (5a) and (5b) yields:

$$\partial A_d^h / \partial A_G^h = \partial A_I^h / \partial A_G^h + 1 - \partial \tilde{A}_x^h / \partial A_G^h \tag{6a}$$

$$\partial A_d^n / \partial A_G^n = \partial A_I^n / \partial A_G^n + 1 - \partial \tilde{A}_x^n / \partial A_G^n \tag{6b}$$

The effect of change in subsidies applied to domestic market promotions for horticultural and non-horticultural products therefore depends on two opposing forces: "budget-expansion effect" as measured by $\partial A_I^h / \partial A_G^h$ and $\partial A_I^n / \partial A_G^n$, plus the "budget-diversion effect" measured by $\partial \tilde{A}_x^h / \partial A_G^h$ and $\partial \tilde{A}_x^n / \partial A_G^n$.

Converting equation (6a) to an elasticity form using equation (15) yields:

$$d\ln A_d^h / A\ln A_G^h = A_G^h / A_d^h + (A_I^h / A_d^h)\cdot d\ln A_I^h / d\ln A_G^h - (\tilde{A}_x^h / A_d^h) d\ln \tilde{A}_x^h / d\ln A_G^h, \quad (7a)$$
$$d\ln A_I^h / d\ln A_G^h = d\ln Q_s^h / d\ln A_G^h = \varepsilon^h (d\ln P_s^h / d\ln A_G^h)$$

The cannibalization or reallocation elasticity of horticultural products can be described as:

$$\varphi_d^h = \frac{\theta_G^h}{\theta_d^h} + \frac{\theta_I^h}{\theta_d^h}\varphi_I^h - \frac{\theta_x^h}{\theta_d^h}\varphi_x^h,\ \varphi_I^h = \varepsilon^h (d\ln P_s^h / d\ln A_G^h) \quad (8a)$$

Converting equation (6b) to an elasticity form with using equation (15)

$$d\ln A_d^n / A\ln A_G^n = A_G^n / A_d^n + (A_I^n / A_d^n)\cdot d\ln A_I^n / d\ln A_G^n - (\tilde{A}_x^n / A_d^n) d\ln \tilde{A}_x^n / d\ln A_G^n, \quad (7b)$$
$$d\ln A_I^h / d\ln A_G^h = d\ln Q_s^n / d\ln A_G^n = \varepsilon^n (d\ln P_s^n / d\ln A_G^n)$$

The cannibalization or reallocation elasticity of non-horticultural products can be described as:

$$\varphi_d^n = \frac{\theta_G^n}{\theta_d^n} + \frac{\theta_I^n}{\theta_d^n}\varphi_I^n - \frac{\theta_x^n}{\theta_d^n}\varphi_x^n,\ \varphi_I^n = \varepsilon^n (d\ln P_s^n / d\ln A_G^n) \quad (8b)$$

Thus, the cannibalization or reallocation elasticity, φ_d^h and φ_d^n, equals a positive constant plus a weighted average of budget-expansion, $(\varphi_I^h, \varphi_I^n)$, and budget-diversion $(\varphi_x^h, \varphi_x^n)$ elasticities. Also, the proportional change in producer price and the cannibalization/reallocation effects are the function of one another, thus equation (8a) and (8b) would have to be inserted into equations (4a) and (4b) as follows:

$$\frac{d\ln P_s^h}{d\ln A_G^h}=\frac{\left[\frac{\left(\varepsilon^n/(1-\tau^n)-k_d^n\eta_d^{nn}-k_x^n\eta_x^n\right)}{D\cdot(1-\tau^h)}\right]\cdot\left[\left(k_d^h\alpha_d^h\right)\cdot\left(\frac{\theta_G^h}{\theta_d^h}-\frac{\theta_x^h}{\theta_d^h}\cdot\varphi_x^h\right)+\left(k_x^h\alpha_x^h\right)\cdot\varphi_x^h\right]}{\left[1-\varepsilon^h\cdot\frac{\theta_I^h}{\theta_d^h}\cdot\left(k_d^h\alpha_d^h\right)\frac{\left(\varepsilon^n/(1-\tau^n)-k_d^n\eta_d^{nn}-k_x^n\eta_x^n\right)}{D\cdot(1-\tau^h)}\right]} \tag{9a}$$

$$\frac{d\ln P_s^n}{d\ln A_G^n}=\frac{\left[\frac{\left(\varepsilon^h/(1-\tau^h)-k_d^h\eta_d^{hh}-k_x^h\eta_x^h\right)}{D\cdot(1-\tau^n)}\right]\cdot\left[\left(k_d^n\alpha_d^n\right)\cdot\left(\frac{\theta_G^n}{\theta_d^n}-\frac{\theta_x^n}{\theta_d^n}\cdot\varphi_x^n\right)+\left(k_x^n\alpha_x^n\right)\cdot\varphi_x^n\right]}{\left[1-\varepsilon^n\cdot\frac{\theta_I^n}{\theta_d^n}\cdot\left(k_d^n\alpha_d^n\right)\frac{\left(\varepsilon^h/(1-\tau^h)-k_d^h\eta_d^{hh}-k_x^h\eta_x^h\right)}{D\cdot(1-\tau^n)}\right]} \tag{9b}$$

Given baseline values for promotional elasticity, demand elasticity, budget-diversion elasticity, budget share and quantities share, equation (9a) and (9b) are then employed to quantify the price effect for domestic horticultural and non-horticultural products.

4.5 Econometric Model—Estimation of Export Demand and Export Promotion

Two export demand models are specified to generate estimates for export demand elasticity and export promotional elasticity of horticultural and non-horticultural products. Available time-series data, from 1975 to 2004, contain export values (USDA, GATS), unit-value of horticultural and poultry products (USDA, GATS), real trade-weighted exchange rates for competitors' exports of horticultural and non-horticultural products and the export promotional expenditures for high-value agricultural products, denoted as HVP by Kinnucan and Cai (2010). Since HVP is composed of horticultural, non-horticultural, and other intermediate products, export promotional expenditures for horticultural and non-horticultural products can be approximated by multiplying the total promotional expenditures on HVP exports with the export share of horticultural and non-

horticultural products (dividing export values of horticultural and non-horticultural products by the values of total HVP exports), respectively. Following a similar empirical model specification employed by Kinnucan and Cai (2010), I estimate:

$$\ln(X_t^{US}/X_t^W) = \beta_0 + \beta_p \ln(P_t^{US}/DEFL_t) + \beta_{PS}\ln(P_t^C) + \beta_{XR}\ln(XR_t) + \beta_Y \ln(X_t^W/DEFL_t) + \beta_A \ln GW_t + \beta_T TREND_t + \beta_{LAG}\ln(X_{t-1}^{US}/X_{t-1}^W) + \mu_t \quad (10)$$

Where X_t^{US}/X_t^W is the dependent variable characterized by the foreign market-share of U.S. agricultural exports, where X_t^{US} is the nominal value of U.S. agricultural export in year t in U.S. dollars and X_t^W is the nominal value of world imports of agricultural products in year t in U.S. dollars; this replaces the real foreign income in order to convert the model into a conditional demand specification by (Phillips, 1990; Kinnucan and Cai, 2010). In the model, P_t^{US} is the unit value of U.S. bulk agricultural exports in year t in U.S. dollars, serving as a proxy for the U.S. price; $DEFL_t$ is the GNP deflator for the world less the United States; P_t^C is the stone index of real trade-weighted exchange rates that reflects the price of U.S. competitors' agricultural exports, serving as proxy for the substitute price; XR_t is a world U.S. agricultural trade-weighted real exchange rate; GW_t is the goodwill variable equal to $AD_t + \delta AD_{t-1} + \delta^2 AD_{t-2}$, in which $AD_t = \tilde{A}_{x,t} \cdot SDR_t / DEFL_t$ is the real U.S export promotion expenditures in year t and the retention parameter, δ, is set equal to 0.33 in equation (10), implying a contribution of less than 11% to the current stock of goodwill from the advertising expenditures older than two years. In addition, SDR_t is the special drawing rights, describing the values of U.S. dollars in relation to a market basket of five world currencies; this information is

provided by International Monetary Fund. A linear trend variable is indicated by $TREND_t$ and an error term by μ_t.

However, for the empirical export demand estimated in this study, instead of following conditional model approach by Kinnucan and Cai (2010) in specifying the dependent variable as the share of foreign income spend on U.S. exports, the real foreign income variable, represented by real per capita GDP for World less US (in US dollars), is instead employed on both the left-hand side and the right-hand side of the demand equation. In addition, I drop the trend variable. The goodwill variable is measured by the contribution of past advertising (traced back to three years) to the current stock of goodwill and adopts a retention parameter of 0.33. Specification of the export demand for horticultural and non-horticultural products is developed next. The empirical model used to estimate horticultural demand is:

$$\begin{aligned}\ln(X_t^h / X_t^{Wgdp}) &= \beta_0^h + \beta_P^h \ln(P_t^h / DEFL_t) + \beta_{PS}^h \ln(P_t^{C,h}) + \beta_{XR} \ln(XR_t) \\ &+ \beta_Y \ln(X_t^{Wgdp} / DEFL_t) + \beta_A^h \ln(GW_t^h) + \beta_{LAG}^h \ln(X_{t-1}^h / X_{t-1}^W) + \mu_t^h\end{aligned} \tag{10a}$$

The empirical model used to estimate non-horticultural export demand is:

$$\begin{aligned}\ln(X_t^n / X_t^{Wgdp}) &= \beta_0^n + \beta_P^n \ln(P_t^n / DEFL_t) + \beta_{PS}^n \ln(P_t^{C,n}) + \beta_{XR} \ln(XR_t) \\ &+ \beta_Y \ln(X_t^{Wgdp} / DEFL_t) + \beta_A^n \ln(GW_t^n) + \beta_{LAG}^n \ln(X_{t-1}^n / X_{t-1}^W) + \mu_t^n\end{aligned} \tag{10b}$$

In the above econometric specifications: (X_t^h, X_t^n) represents the nominal value of U.S. horticultural and non-horticultural exports in year t in U.S. dollars (USDA, GATS); X_t^{Wgdp} is the nominal per capita GDP for world less the United States in year t in U.S. dollars (Kinnucan and Cai, 2010); P_t^h is the unit value of U.S. horticultural exports in U.S. dollars per metric ton (USDA, GATS); P_t^n is the unit value of exports on U.S. poultry products, serving as a proxy for the price of U.S. non-horticultural products

(USDA, GATS); $P_t^{C,h}$ are real trade-weighted exchange rates for U.S. competitors' horticultural exports, serving as a proxy for the price of the substitute for horticultural products (USDA: ERS, Agricultural Exchange Rate Data Set); $P_t^{C,n}$ are real trade-weighted exchange rates for U.S. competitors' exports of high-value processed products, serving as a proxy for the price of the substitute for non-horticultural products (USDA: ERS, Agricultural Exchange Rate Data Set); (X_{t-1}^h / X_{t-1}^W) is the lagged dependent variable for the share of foreign income spent on U.S. horticultural exports; (X_{t-1}^n / X_{t-1}^W) is the lagged dependent variable for the share of foreign income spent on U.S. non-horticultural exports. The term $DEFL_t$ is the GNP deflator for the world less the United States in year t (Kinnucan and Cai, 2010); XR_t is a world U.S. agricultural trade-weighted real exchange rates (Kinnucan and Cai, 2010), included to test whether foreign buyer's response to exchange-rate movements differ from their response to price movements (Chambers and Just 1981); (μ_t^h, μ_t^n) are random disturbance terms in respective export demand equation.

The goodwill variable generated by the export promotion expenditures, allowing for the depreciation of advertising over time, in equation (10a) and (10b) follows the specification by Nerlove and Arrow (1962). In equation (10a), the goodwill variable for horticultural products is defined as $GW_t^h = AD_t^h + \delta AD_{t-1}^h + \delta^2 AD_{t-2}^h + \delta^3 AD_{t-3}^h$, where $AD_t^h = \tilde{A}_{x,t}^h \cdot SDR_t / DEFL_t$ is the real total U.S. promotion expenditures for horticultural exports in year t. While the goodwill variable for non-horticultural products is defined as $GW_t^n = AD_t^n + \delta AD_{t-1}^n + \delta^2 AD_{t-2}^n + \delta^3 AD_{t-3}^n$ in equation (10b), where

$AD_t^n = \tilde{A}_{x,t}^n \cdot SDR_t / DEFL_t$ is the real total U.S. promotion expenditures for non-horticultural exports. In this study the retention parameter, δ, is set to 0.33 for both product groups. Therefore, GW_t^h implies that the advertising expenditures on horticultural exports older than three years contribute less than 11% to the current stock of goodwill while GW_t^n implies that the advertising expenditures on non-horticultural exports older than three years contribute less than 11% to the current stock of goodwill.

Equation (10a) and (10b) are further labeled as Model A. One additional more restrictive model is also introduced to test the sensitivity of parameter estimates to economic hypothesis:

Model B: $\beta_Y^h = \beta_p^h = 0;\ \beta_Y^n = \beta_p^n = 0$

(homothetic preferences and unitary demand elasticity)

In testing the constrained Model B, Model A is treated as maintained hypothesis. The estimation procedure uses the annual data from 1975 to 2004. Three observations are lost because of the goodwill specification, the effective sample period thus ranges from 1978 to 2004.

Ordinary least squares is employed in the estimation of horticultural and non-horticultural export demand. Estimation results are summarized in Table 4.1; I find statistically significant coefficients for (with the correct sign) the key variables. A F-test turns out to not reject Model B for both products (Table 4.1, last row). Since Model A and Model B are statistically equivalently, following discussion will focus on rather simple specification.

In Model A and Model B, the estimated coefficients of lagged dependent variables are all significant for both products (t-ratio > 9 for horticultural exports; t-ratio > 4 for non-horticultural exports), rejecting the static specification in the two export demand estimations. In Model B, given the unitary demand elasticity constraints, market shares of horticultural and non-horticultural products are shown to be invariant to the U.S. price of horticultural and poultry products. The short-run own-price elasticities of both products are thus equal to -1. Dividing these coefficients by one minus the estimated coefficients of lagged dependent variables (0.6844 in horticultural export demand; 0.4346 in non-horticultural export demand) yields the long-run export demand elasticity of -3.584 for horticultural products and of -2.304 for non-horticultural products. Hence, both export demand for U.S. horticultural and non-horticultural products appears to be price elastic, falling within the estimates provided by Kinnucan and Cai (2010) of -3.57. The long-run export promotional elasticities, represented by the coefficient of goodwill variables, for both products are derived from dividing the short-run elasticity by one minus the estimated lagged dependent variables (0.273 for horticultural products; 0.105 for non-horticultural products).

Given the important role the coefficients of two key variables, own-price and goodwill, play in the subsequent simulation process, I further test whether any observation has a major impact on the magnitudes of key slope coefficients. Partial-regression leverage plots are therefore employed. Leverage plots for all the independent variables showed an influential data point in year 1980 for horticultural export demand estimations and another influential data point in year 1988 for non-horticultural export demand estimations. When these two observations are respectively dropped, the

coefficients for key variables become more significant and larger in absolute value for both products (see Table 4.2). In a constrained horticultural demand model, indicated by Model B, dropping the observation in 1980 leads to a slightly less elastic export demand of -3.46 and an export promotional elasticity of 0.282. In a constrained non-horticultural demand model, dropping the observation in 1988 results in the slightly less elastic export demand of -2.48 and an export promotional elasticity of 0.12. Therefore, the adjusted coefficients are employed in simulation model to better capture the responsiveness of consumers in foreign markets to market price and U.S. export promotions.

Compared with previous studies that examined the effect of USDA-sponsored non-price export promotion programs on export demand, the export promotional elasticity estimated here are reasonable. The estimated value for horticultural products is 0.272 and for non-horticultural products it is 0.106; these do not deviate far from the range of elasticities estimated by Kinnucan and Cai (2010). My estimates for export promotional elasticity of horticultural products are larger than the estimates obtained by Dwyer (1994) and the two reports by Global Insight (2007, 2010) while the estimate for export promotional elasticity of non-horticultural products are smaller than previous relevant studies. Implications from these estimates are that a 1% increase in export promotion expenditures is expected to increase the demand for horticultural products by 0.11% and for non-horticultural products by 0.27%.

In another estimation procedure, I attempt to derive the budget-diversion elasticity, $(\varphi_x^h, \varphi_x^n)$, by regressing the logarithm of total export promotion expenditures on the logarithm of government expenditure using annual data from 1975 to 2004 (Kinnucan and Cai, 2012) for horticultural products in equation (11a)

$$\ln \tilde{A}_{x,t}^h = \alpha_0^h + \alpha_G^h \ln(A_{G,t}^h) + \tau_t^h \qquad (11a)$$

and for non-horticultural products in equation (11b).

$$\ln \tilde{A}^n_{x,t} = \alpha^n_0 + \alpha^n_G \ln(A^n_{G,t}) + \tau^n_t \quad (11b)$$

Here $\hat{\alpha}^h_G$ is estimated to be 0.887 (with t-value of 29.32 and adj. R-squared of 0.967), serving as an estimate for the budget-diversion elasticity of horticultural product, φ^h_x. While $\hat{\alpha}^n_G$ is estimated to be 0.873 (with t-value of 27.83 and adj. R-squared of 0.964), serving as an estimate for the budget-diversion elasticity of non-horticultural product, φ^n_x.

4.6 Welfare Measure

Welfare effects induced by changes in government expenditures for export promotions on horticultural and non-horticultural products can be calculated as follows. Here we adopt the formula presented by Wohlgenant (1993), but also allow for a multi-market setting considering two types of food commodities. It also allows for potential impacts on domestic taxpayers, where the amount of change in taxpayer surplus is equivalently measured by the change in government expenditures for export promotions. When government increases its funding level with collected tax revenues, taxpayer surplus decreases while if subsidy is reduced, the national budget is thus enlarged.

Producer Surplus Measure

$$\Delta PS^h = P^h_s Q^h_s (d\ln P^h_s)(1 + 0.5 \cdot d\ln Q^h_s) \quad (12a)$$

$$\Delta PS^n = P^n_s Q^n_s (d\ln P^n_s)(1 + 0.5 \cdot d\ln Q^n_s) \quad (12b)$$

Consumer Surplus Measure

$$\Delta CS^h = P^h Q^h_d (\omega^h V^h_d - d\ln P^h)(1 + 0.5 \cdot d\ln Q^h_d) \quad (13a)$$

$$\Delta CS^n = P^n Q^n_d (\omega^n V^n_d - d\ln P^n)(1 + 0.5 \cdot d\ln Q^n_d) \quad (13b)$$

Taxpayer Surplus Measure

$$\begin{aligned}\Delta TS^h &= -(\Delta A_G^h + \Delta A_{G,d}^h) \\ &= -(\bar{A}_G^h \cdot d\ln A_G^h) - (\bar{A}_G \cdot d\ln A_G \cdot S^h)\end{aligned} \tag{14a}$$

$$\begin{aligned}\Delta TS^n &= -(\Delta A_G^n + \Delta A_{G,d}^n) \\ &= -(\bar{A}_G^n \cdot d\ln A_G^n) - \left(\bar{A}_G \cdot d\ln A_G \cdot (1 - S^h)\right)\end{aligned} \tag{14b}$$

Total Welfare Impact

$$\Delta NS^h = \Delta PS^h + \Delta CS^h + \Delta TS^h \tag{15a}$$

$$\Delta NS^n = \Delta PS^n + \Delta CS^n + \Delta TS^n \tag{15b}$$

In domestic horticultural and non-horticultural markets, above $(\Delta PS^h, \Delta PS^n)$, $(\Delta CS^h, \Delta CS^n)$, $(\Delta TS^h, \Delta TS^n)$ and $(\Delta NS^h, \Delta NS^n)$ are corresponding changes in domestic producer, consumer, taxpayer and social surplus associated with changes in government expenditures for export promotions. The net (of marketing fee) value of farm products in initial equilibrium before any external shock has shifted domestic demand is $(P_s^h Q_s^h, P_s^n Q_s^n)$; $(P^h Q_d^h, P^n Q_d^n)$ indicates domestic consumer expenditures on horticultural and non-horticultural products in initial equilibrium; $(d\ln P^h, d\ln P^n, d\ln P_s^h, d\ln P_s^n)$ are percentage changes in producer and market price while $(d\ln Q_d^h, d\ln Q_d^n, d\ln Q_s^h, d\ln Q_s^n)$ are percentage changes in domestic production and consumption level in response to changes in government expenditures for export promotions. The relative vertical shift in domestic demand curve caused by change in export subsidies is (V_d^h, V_d^n), where $V_d^h < 0$ and $V_d^n < 0$ implies subsidy increase while $V_d^h > 0$ and $V_d^n > 0$ implies subsidy decrease; and (ω^h, ω^n) serves as the weighting parameter.

Vertical shift parameters are obtained by solving equation (2a) and (2b) for $(d\ln P^h, d\ln P^n)$ with $d\ln Q_d^h$ & $d\ln Q_d^n$ set to zero to yield $d\hat{\ln} P^h = V_d^h$ and $d\hat{\ln} P^n = V_d^n$. Relative change in demand price holding domestic consumption is fixed: $V_d^h = \frac{\eta_d^{hn}\alpha_d^n d\ln A_d^n - \eta_d^{nn}\alpha_d^h d\ln A_d^h}{\eta_d^{nn}\eta_d^{hh} - \eta_d^{hn}\eta_d^{nh}}$ and $V_d^n = \frac{\eta_d^{hh}\alpha_d^n d\ln A_d^n - \eta_d^{nh}\alpha_d^h d\ln A_d^h}{\eta_d^{hn}\eta_d^{nh} - \eta_d^{nn}\eta_d^{hh}}$. Its absolute value, $|V_d^h|$ and $|V_d^n|$, measures the relative vertical distance between D_c and D_c' in Figure 4, Panel B, where subscript c represents both horticultural and non-horticultural products. I set $\omega^h = \omega^n = \omega = [0, 0.5, 1]$ in this study, in which the value of 1 in the consumer welfare measure proposed by Wohlgenant (1993) to examine the lower-bound, middle-bound and upper-bound level of impacts of advertising would have imposed on domestic consumers.

4.7 Model Calibration

Table 4.3 presents the baseline values and data sources for the simulation model parameters. Initial equilibrium values for price, quantity and promotion are set to their average annual average from 2000 to 2004. Budget share parameters for both products are derived from the available dataset of U.S. government expenditure for export promotion, total U.S. expenditures for export promotion and industry investments on promotions. Likewise, the quantity shares are derived from the data made available by government sources on average gross value of U.S. farm production for horticultural and non-horticultural products and respective average export values for these two food groups in the United States, in year 2000-04 (USDA, GATS). Given the nominal values of agricultural exports across different food groups, value of domestic consumption is then

derived by deducting export values from gross values of total farm production. Marketing fees for horticultural and non-horticultural products, serving as a fraction of demand price, were derived by dividing industry promotional dollars by total gross value of farm output across the two food categories so as to generate the net farm value of U.S. farm production.

Supply elasticity for both horticultural and non-horticultural products are set to 0.6. The export demand parameters for horticultural and non-horticultural products, (η_x^h, η_x^n) and (α_x^h, α_x^n) are estimated in this study. However, both own-and cross-price elasticity $(\eta_d^{hh}, \eta_d^{nn}, \eta_d^{hn} = \eta_d^{nh})$ for these two commodity groups are borrowed from published estimates in previous studies while promotional elasticities (α_d^h, α_d^n) are set within a reasonable range, consistent with earlier work (Richards, 1999; Kinnucan and Zheng, 2005).

Domestic promotion elasticity is assumed to lie between 0 and 0.1 for non-horticultural products. It is consistent with empirical estimates of domestic promotional spending on such commodities that constitute bulk and some processed HVP products such as dairy, beef, pork and cotton (Kinnucan and Zheng, 2005). These turn out to account for a major proportion of the non-horticultural product group categorized in this study. However, for horticultural products, a different interval between 0 and 0.2 is adopted. It is consistent with the estimate of domestic promotional elasticity for fresh fruits by Richards (1999). Moreover, the subsidy-induced effect on the domestic horticultural and non-horticultural markets, given a cannibalization effect or the reallocation effect in face of decrease in public funding level, is "turned off" by setting

$\alpha_d^h = 0$ in equation (4a) for horticultural products and by setting $\alpha_d^n = 0$ in equation (4b) for non-horticultural products.

In Table 4.4, I summarize the published domestic own-price and cross-price elasticity for horticultural products; Table 4.5, 4.6 and 4.7 summarize for non-horticultural products. For the purpose of this study, the own-price elasticity of meat or beef in domestic market (Richards et al., 2005; Andreyeva et al., 2008) is used to represent η_d^{nn} for non-horticultural products in our simulation model while the own-price elasticity of fresh fruits in domestic market (Huang and Lin, 2000; Rickard et al., 2012) is used to represent the η_d^{hh} for horticultural products.

Regarding cross-price elasticity, we use the apples as the representative of horticultural products, as it has received highest amount of government funding among horticultural products in its promotional efforts in foreign markets under MAP program in FY 2011, indicated by Table 1) and beef (representative of non-horticultural products as it has received highest amount of government funding among non-horticultural products in its promotional efforts in foreign markets under MAP program in FY 2011, indicated by Table 2) to identify the substitution effect between horticultural and non-horticultural commodities (Huang, 1986).

V. Results

5.1 Baseline Assumptions and an Outline of Simulation Scenarios

I set a 10% change in government expenditure for export promotions of agricultural products and apply baseline values of model parameters, from Table 4. Equation (9a) and (9b) generates the corresponding price changes and the percentage change in domestic consumption with the substitution of subsidy-induced price effect into equation (2a) and (2b). The next step uses simulated values for endogenous variables (market price, quantities consumed, and promotional expenditures) from the equilibrium displacement model to calculate welfare changes. Equations (12a)-(15b) are used to quantify the consequent welfare impact, in terms of surplus changes facing producer, consumer, taxpayer and society as a whole induced by the proposed changes in government funding on agricultural export promotions.

Next I develop a link between changes in export subsidy expenditures and both caloric and nutrient intake levels. To provide a quantitative examination of dietary impacts that changes in export subsidies would have imposed on domestic consumers, I first calculate the caloric and nutrient-intake level per capita per day contributed from major horticultural and non-horticultural food groups (summarized in Table 5.1). The proportional changes in domestic consumption are used to generate absolute changes in the yearly caloric-and nutrient-intake level per capita at home. Relative change (in percentage form) in the intake level of selected macro- and micro-nutrients per capita are also derived by dividing the absolute changes in yearly intake by average yearly intake level for respective nutrients, where the yearly nutrient-intake level is calculated by multiplying the daily intake level per capita of nutrients of U.S. food supply (USDA,

ERS: Food Availability Data System) by 365 days per year. Here I assume that 3500 calories equals 1 pounds (Hall and Jordan, 2008; Hall et al., 2011) to measure the associated weight changes.

Six assumptions on key parameter values are used here in the simulations. First, an inelastic supply curve for domestic horticultural and non-horticultural market in the long run is assumed of $\varepsilon^h = \varepsilon^n = 0.6$. Second, domestic demand for horticultural products, $\eta_d^{hh} = -0.72$, is assumed to be more elastic than for non-horticultural products, $\eta_d^{nn} = -0.447$. Third, various levels of promotional impacts on domestic consumer welfare are applied for both horticultural and non-horticultural promotions with equal weight of $\omega^h = \omega^n = \omega = [0,\ 0.5,\ 1]$. Fourth, symmetric cross-price elasticity of domestic demand for these two types of commodities is held for three product relationships, independent $(\eta_d^{hn} = \eta_d^{nh} = 0)$, substitution $(\eta_d^{hn} = \eta_d^{nh} > 0)$ and complementary $(\eta_d^{hn} = \eta_d^{nh} < 0)$. Fifth, the effect of changes in government expenditures for export promotions on domestic consumers, known as "cannibalization effect" induced by increase in export subsidy and a "reallocation effect" induced by decrease in export subsidy, could be turned off to emphasize the absence of such effects. This is done by setting domestic promotional elasticity of horticultural product equal to zero, $\alpha_d^h = 0$, in equation (4a) (Chapter 4.4) and by setting domestic promotional elasticity of non-horticultural product equal to zero, $\alpha_d^n = 0$, in equation (4b) (Chapter 4.4). That is, characterization of either cannibalization or reallocation effects, $(\varphi_d^h, \varphi_d^n)$, captures the sensitivity of domestic promotional expenditure to changes in government expenditures

for export promotions on horticultural and non-horticultural products. An assumption of assigning the values for both domestic promotional elasticity of these two commodity groups to zero would have thus muted such responsiveness.

The sixth assumption addresses the level of changes in government expenditures for export promotions. Generally, total government allocations on agricultural exports are composed of four types of promotional expenditures for various product groups as horticultural products, non-horticultural products, bulk products and non-food high-value products:

$$A_G = A_G^h + A_G^n + A_G^b + A_G^{nf} \tag{16}$$

Where A_G represent the government promotion expenditures for all the agricultural products, A_G^h for horticultural products, A_G^n for non-horticultural products, A_G^b for bulk products, and A_G^{nf} for non-food high-value products. Since this study focuses on the welfare and nutritional implications from agricultural export promotions, I only consider the major food groups of horticultural products (fresh and processed fruits & vegetables; tree nuts) and non-horticultural products (Meat, poultry and fish; dairy product and eggs; fats and oils; grain products; sugars and sweeteners; alcoholic and non-alcoholic beverages); bulk products (wheat; coarse grains; rice; soybeans; cotton; tobacco; pulses; peanuts) and other intermediate products (flour; feed and fodders; live animals; hides and skins; planting seeds) are accounted at this point to quantify their dietary contributions on caloric- and nutrient-intake level per capita per day. Thus, we combine the bulk and remaining agricultural products into other agricultural products, denoted as A_G^o, by inserting equation $A_G^o = A_G^b + A_G^{nf}$. Thus (16) could be rearranged into

$$A_G = A_G^h + A_G^n + A_G^o \tag{17}$$

Taking logarithmic differential yields:

$$d\ln A_G = \frac{A_G^h}{A_G} \cdot d\ln A_G^h + \frac{A_G^n}{A_G} \cdot d\ln A_G^n + \frac{A_G^o}{A_G} \cdot d\ln A_G^o \tag{18}$$

Average annual data from 2000-04 indicates that export promotion expenditures for high-value products was $79 million; more specific product-oriented support from government in foreign markets on horticultural promotions was $26 million and non-horticultural promotions was $36 million. Promotions for intermediate goods was $17 million and was derived by multiplying total support on high-value promotions with respective export value shares of horticultural, non-horticultural and intermediate products out of total high-value exports. Adding government expenditures on export promotions for bulk products of $52 million to the export subsidy on intermediate products of $17 million provides an approximate measure for promotional allocations on the export of other agricultural products from the public sector, total $69 million.

The Market Access Program covers most of the high-value products while Foreign Market Development Programs covers both the bulk and non-horticultural products, along with a significant subsidy share of other agricultural products at the level of 53%. To extend economic analysis to consider dietary perspective from changes in export subsidy for agricultural promotions overseas (mainly composed of MAP and FMD programs), baseline assumptions requiring certain level of changes in government allocations on the export promotions for both consumer-oriented products (horticultural and non-horticultural commodities) and non-consumer-oriented products (bulk and intermediate goods) are applied.

Assuming a proportional change in government's promotional expenditures for all agricultural exports at a 10% level (i.e. $d\ln A_G = \pm 10\%$) coupled with a smaller relative change in the expenditures for other agricultural exports at 1% level of $d\ln A_G^o = \pm 1\%$, applying values of respective funding shares of horticultural $\left(\frac{A_G^h}{A_G}\right)$, non-horticultural $\left(\frac{A_G^n}{A_G}\right)$ and other agricultural products $\left(\frac{A_G^o}{A_G}\right)$ into equation (18) generates corresponding variations in the level of public allocation for horticultural and non-horticultural promotions in export markets. The overall changes in the export subsidy for particular consumer-oriented products yields two extreme conditions. First as the total increase is spread over promotional expenditures for non horticultural exports only in the case of expanded government expenditures and second as the total decrease is spread over promotional expenditures for horticultural exports only in case of reduced government expenditures are examined in this study. Holding the level of export subsidy on total agricultural products constant at $d\ln A_G = 0$. I make these assumptions on the likely decrease in government expenditures for export promotions of other agricultural products. This include a lower-bound $\left(d\ln A_G^o = -1\%\right)$, middle-bound $\left(d\ln A_G^o = -5\%\right)$ and upper-bound $\left(d\ln A_G^o = -10\%\right)$ level, similarly, bring about corresponding changes in promotional allocation for horticultural and non-horticultural exports given the subsidy shares of different agricultural commodity groups.

Two tilted and three balanced conditions, called a "Seesaw Condition" as studied here, are thus introduced to characterize hypothetical scenarios from Table 5.2.1 to Table 5.9.3.

Toward Non-Horticultural –
Huge Part of the Increase in Government Promotional Expenditures for Agricultural Exports Contributed by Increase in Non-Horticultural Subsidies:

$$d\ln A_G = 10\% \;\&\; d\ln A_G^o = 1\%$$
$$\Rightarrow\; d\ln A_G^n = 35\%,\; d\ln A_G^h = 0$$

Toward Horticultural –
Huge Part of the Decrease in Government Promotional Expenditures for Agricultural Exports Contributed by Decrease in Horticultural Subsidies:

$$d\ln A_G = -10\% \;\&\; d\ln A_G^o = -1\%$$
$$\Rightarrow\; d\ln A_G^h = -47\%,\; d\ln A_G^n = 0$$

Balanced at Lower-Bound Level –
Holding Constant the Government Promotional Expenditures for Agricultural Exports, Applying a 1% Decrease in Subsidies for Non-Horticultural Products

$$d\ln A_G = 0 \;\&\; d\ln A_G^o = -1\%$$
$$\Rightarrow\; d\ln A_G^h = -8\%,\; d\ln A_G^n = 8\%$$

Balanced at Middle-Bound Level –
Holding Constant the Government Promotional Expenditures for Agricultural Exports, Applying a 5% Decrease in Subsidies for Non-Horticultural Products

$$d\ln A_G = 0 \;\&\; d\ln A_G^o = -5\%$$
$$\Rightarrow\; d\ln A_G^h = -38\%,\; d\ln A_G^n = 38\%$$

Balanced at Upper-Bound Level –
Holding Constant the Government Promotional Expenditures for Agricultural Exports, Allowing for a 10% Decrease in Subsidies for Non-Horticultural Products

$$d\ln A_G = 0 \;\&\; d\ln A_G^o = -10\%$$
$$\Rightarrow\; d\ln A_G^h = -76\%,\; d\ln A_G^n = 76\%$$

Applying above baseline assumptions on selected elasticities and on changes in subsidy for different food groups further develops several scenarios to be considered in simulation analysis. Scenario I employs "Toward Non-Horticultural" condition with a 10% increase in government expenditures for export promotions of U.S. farm products, for which the consequent market and nutritional outcomes are summarized in Table 5.2.1, 5.2.2 and 5.2.3. Scenario II, III, IV(a) and IV(b) employ "Toward Horticultural" condition emphasizing a 10% decrease in government expenditures for export promotions of U.S. farm products, for which the consequent market and nutritional impacts are presented in a similar set of tables, from Table 5.3.1 to 5.6.3. The last three scenarios of V, VI and VII respectively employ "Balanced at Lower-Bound Level", "Balanced at Middle-Bound Level" and "Balanced at Lower-Bound Level" condition, where a constant level of government expenditures for export promotions of U.S. agricultural products and consequent smaller, modest and larger changes in export subsidy on horticultural, non-horticultural and other agricultural products are applied. Information in Table 5.7, Table 5.8 and Table 5.9 summarize the relevant economic and health implications.

To characterize each scenario in a more specific way, the enlarged government budget induced by the decrease in export promotional expenditures are not redirected for domestic promotions in Scenario II and III. While the redirection of enlarged government budgets from export promotions to particular horticultural promotions in the domestic market is applied for Scenario IV(a) and IV(b). From the industry perspective, since the decrease in government promotion allocation for agricultural exports has increased industry budgets for promotional efforts with less required matching to export subsidy, such expanded private investment is not diverted into domestic promotions by industries

in Scenario II. Scenario III and IV assumes that industries reallocate their budget from foreign to domestic promotions. Facing the redirection of government expenditures for agricultural promotions from export market to domestic horticultural and non-horticultural markets, the new domestic subsidy in Scenario IV(a) and IV(b) meets the same matching criteria as the one required in receiving government allocations for export promotional efforts. Here the generic promotion under the MAP program (for most horticultural products) requires a minimum 10% match. Brand promotion under the MAP program and promotional efforts in FMD programs (for most non-horticultural products) require a dollar-for-dollar match. Two sub-scenarios are introduced as (a) and (b) under Scenario IV. For Scenario IV(a) I apply a 50% of the amount of redirected government expenditures targeting on domestic horticultural promotional activities and the other 50% targeting on domestic non-horticultural promotions. In Scenario IV(b), 90 % of the amount of redirected government subsidy is instead invested on domestic horticultural promotional activities while the remaining 10% is used for domestic non-horticultural promotions.

I denote domestic promotional elasticity of horticultural and non-horticultural products in various tables to summarize the caloric and nutritional impacts of changes in government expenditures for export promotions of agricultural products. I use None to represents no reallocation or no cannibalization; Es represents equal domestic promotional elasticity for horticultural and non-horticultural products at lower level, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.01, 0.01\right] = Es$; Nm represents the more elastic domestic promotions on non-horticultural products at medium level, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.015, 0.045\right] = Nm$; Em represents equal domestic promotional elasticity for both products at medium level,

$\left[\alpha_d^h, \alpha_d^n\right] = \left[0.03, 0.03\right] = Em$; Hm represents the more elastic domestic promotions on horticultural products at medium level, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.075, 0.06\right] = Hm$; El represents equal domestic promotional elasticity for both products at higher level, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.09, 0.09\right] = El$; Nl represents the more elastic domestic promotions on non-horticultural products at higher level, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.02, 0.15\right] = Nl$; and Hl represents the more elastic domestic promotions on horticultural products at higher level, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.2, 0.02\right] = Hl$.

5.2. Increase in Government Expenditures for Agricultural Export Promotions

This section explores the economic and nutritional implication of a 10% increase in government expenditure for export promotions of all agricultural products, coupled with 1% increase in promotional expenditures for exports of other agricultural products. To specifically examine one extreme case when government only increase the allocations for non-horticultural products out of the allocation for all the consumer-oriented food products, the "Leaning Toward Non-Horticultural" condition is applied in this section with the level of increase in promotional expenditures for non-horticultural exports set to 35%. This section examines various impacts induced by subsidy increment in Scenario I, for which the simulation results are summarized in Table 5.2.1, 5.2.2 and 5.2.3.

Table 5.2.1 shows that for non-horticultural products, in the absence of cannibalization effect, the demand price increases to the peak level while the domestic consumption decreases the least. When the cannibalization effect is taken into account, the level of price increase diminishes with higher consumers' responsiveness to domestic

promotions for non-horticultural products while the level of corresponding decreased quantities consumed at home augments when consumers are more sensitive to such promotions. As to the horticultural market, there's no change in the demand price of horticultural products since the external shock on its export market is suppressed by the assumption, $d\ln A_G^h = 0$. However, due to the product relationships between horticultural and non-horticultural products, domestic consumption of horticultural products increases when both products are substitutes for each other while it decreases when they are complements.

Subsidy-induced welfare impacts implied by changes in price and domestic consumption are presented in Table 5.2.1 and Table 5.2.2. Lower-, middle- and upper-bound levels that characterize vertical demand shifts in the domestic market are indicated when ω is set to 0, 0.5 and 1, respectively. Government's expenditure increments are discussed in quantifying surplus changes imposed on domestic consumer by the increase in subsidy. In the non-horticultural market, regardless of various means the welfare effects on domestic consumers associated with subsidy increment are measured. Producers always gain while consumers always lose. Focusing on the positive cross-price elasticity at 0.2 where a substitution effect is assumed and when the cannibalization effect is turned off, a 10% increase in subsidy on all the agricultural products, coupled with a 1% subsidy increase for other non-consumer-oriented products and a 35% subsidy increase for non-horticultural products, causes producer surplus to increase the most (up to $905 million) and consumer surplus to decrease the least ($687 million regardless of the impact level of domestic promotional efforts on consumers). Associated with a decrease in taxpayer surplus induced by such subsidy increment at $13 million, the social

welfare gain thus reaches $205 million as a whole. In a comparative framework when the cannibalization effect is recognized, the social welfare gain remains positive when domestic market promotions are assumed to have ignorable effects on consumers at $\omega = 0$ while such gains diminish with greater market response to domestic promotions for non-horticultural products. When domestic market promotions impose considerable effects on economic surplus received by consumers at the middle-bound level of ω at 0.5, the overall social welfare gain instead converts to a loss for the value of α_d^n greater than 0.045 coupled with α_d^h between 0.015 and 0.09, and such a loss amplifies with stronger responsiveness of domestic consumers to non-horticultural promotions. Increasing ω to 1.0, employed by Wohlgenant (1993) in measuring welfare change, intensifies both consumer and social welfare losses associated with given increases in subsidy, further underscoring the role of cannibalization effect. When the domestic promotional elasticity of both products are set to be equal at medium level, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.03, 0.03\right] = Em$, the social welfare loss of $125 million dollars is incurred at $\omega = 1$ where producer gain of $826 million is swamped by consumer loss of $938 million, compared to the social welfare gain of $31 million at $\omega = 0.5$. When consumers are assumed to be more responsive to domestic promotions for horticultural products than that for non-horticultural ones at medium level, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.075, 0.060\right] = Hm$, the social welfare loss incurred by imposing influential promotional impacts on consumers at $\omega = 1$ of $462 million more than doubled compared to its counterpart loss of $148 million at $\omega = 0.5$. In the horticultural market, there is no change in producer surplus and the change in consumer surplus at $\omega = 0$ due to the constant market price level resulted

from no increase in government promotional expenditures for horticultural exports. When observable impacts of promotional efforts on domestic consumers are accounted at $\omega = 0.5$ or $\omega = 1$, the social welfare gain is less than $40 million when two products are complements while such gain converts to a loss of less than $50 million when the two products are substitutes.

Table 5.2.2 and 5.2.3 presents the simulated quantified caloric and nutritional effects induced by such subsidy increment. The level of caloric-intake from the consumption of non-horticultural products decreases, associated with less than 200 calories change from the consumption of horticultural products, bringing about a reduction at overall caloric consumption level, regardless of the different product relationships. Assuming some substitution effects taking place between two commodity groups, the caloric-intake level reduces the least in the absence of the cannibalization effect while a larger decrease in caloric consumption is observed in the presence of the cannibalization effect. When the middle-bound level of domestic promotional elasticity is examined in the case of Nm, Em and Hm (where consumer responsiveness to domestic promotions for horticultural products is smaller, equal or greater than to domestic non-horticultural promotions) The level of reduction in caloric consumption ranges between 4000 to 5000 calories. This is accompanied by the decrease in the intake level of nutrients like fat (200 to 250 grams per capita per year) and sodium (800 to 1200 milligrams per capita per year). In spite of such encouraging caloric impacts and nutritional outcomes of certain nutrients, the reduction in yearly intake level of more health-sustaining nutrients as Fiber (10 to 15 grams per capita), Vitamin A (800 to 1100 micrograms per capita), Calcium (900 to 1220 milligrams per capita) and Iron (21 to 27 milligrams per capita) is

also observed. Corresponding relative changes in average daily intake level ranges between 0.12 to 0.16% for fiber, 0.23 to 0.30% for Vitamin A, 0.27 to 0.31% for Calcium, and 0.25 to 0.31% for Iron.

5.3 Decrease in Government Expenditures for Agricultural Export Promotions—Subsequent Reservation of Enlarged Promotional Budgets

This section examines the likely market, welfare and nutritional effects induced by a 10% decrease in government expenditures on export promotions for all agricultural products, coupled with 1% decrease in promotional allocations from government for the exports of other agricultural products. To specifically examine one extreme case when government only increase the allocations for horticultural products out of the allocation for all the consumer-oriented food products, the "Toward Horticultural" condition is applied in this section with the level of decrease in promotional expenditures for horticultural exports set at -47%. Here the baseline assumption is that the overall increased allocations from government, implied by the budget enlargement resulted from dampened public support for agricultural export promotions, are not redirected for domestic promotions on both horticultural and non-horticultural products. As a result, two scenarios are further introduced. One explores economic and health impacts of decreases in subsidy levels, primarily for horticultural promotions, in foreign markets assuming that industries intend not to redirect, similarly, their promotional budget from foreign to domestic market on horticultural products, categorized in Scenario II. The other considers the case when industries instead redirect their investment to boost the impacts of horticultural promotions in the home market, categorized in Scenario III.

Scenario II allows for a focus on positive cross-price elasticity of 0.2 that implies a substitution effect between horticultural and non-horticultural products. Table 5.3.1

shows that ignoring the reallocation effect results in a significant decrease in price and increase in domestic consumption of horticultural products. When reallocation effect is recognized, larger domestic promotional elasticity of horticultural products (than that of non-horticultural products), higher than 0.03, results in smaller decrease in price, smaller increase in consumption of horticultural products and smaller decrease in consumption of non-horticultural products. While smaller domestic promotional elasticity of horticultural products (less than 0.03) coupled with greater consumer responses to non-horticultural promotions in the home market instead results in a larger increase in consumption of horticultural products as well as a larger decrease in consumption of non-horticultural products, but by less than the market outcome observed in the absence of reallocation effect.

In the welfare analysis summarized by Table 5.3.1 and 5.3.2, when two products are substitute, consumers always gain in terms of economic surplus at the expense of domestic producers in the horticultural market, regardless of the values set for $\left[\alpha_d^h, \alpha_d^n\right]$ and of the level of promotional effects on consumers at $\omega = [0,\ 0.5,\ 1]$, resulting in an overall social welfare loss. Such surplus loss received by both producers and society as a whole dampens and such gain to consumer shrinks in the presence of a reallocation effect. When consumers are assumed to be equally responsive to domestic promotions for horticultural and non-horticultural products at the medium level, $\left[\alpha_d^h, \alpha_d^n\right] = [0.03, 0.03] = Em$, consumer welfare gains diminish from \$246 million to \$232 million as higher level of ω is applied. This results in increasing losses to overall social surplus from \$199 million to \$213 million, given producer welfare loss of \$457 million and taxpayer welfare gain of \$12 million. In another case when consumers are

assumed to be more responsive to domestic promotions for horticultural products than that for non-horticultural ones at medium level, $\left[\alpha_d^h, \alpha_d^n\right] = [0.075, 0.060] = Hm$, producer welfare lose $377 million while consumer gains $189 million when the middle-bound level of promotional impacts is assumed. This results in social welfare loss of $175 million, and this is less than the societal economic loss in the case when consumers are equally less sensitive to domestic promotions for both horticultural and non-horticultural products. When the value of ω increases from 0 to 1, consumer gains associated with subsidy decrement is dampened and the social welfare loss is intensified, therefore further emphasizing the importance of considering the reallocation effect in measuring subsidy-induced welfare impacts on domestic stakeholders. As for the non-horticultural market, in face of constant price level due to the suppressed external shock on non-horticultural exports as $d \ln A_G^n = 0$, producer welfare level and the consumer welfare level at $\omega = 0$ thus remain unchanged. While the consumer welfare gain converts to a loss when considerable impacts of domestic promotional efforts on consumers are assumed at the middle- and upper-bound level, resulting in an intensified social welfare loss ranging from $20 to $140 million when ω is set to 1.

Table 5.3.2 and 5.3.3 summarize the simulated caloric and nutritional outcomes. Assuming a substitution effect between two commodity groups brings about the reduction in caloric intake from the consumption of non-horticultural products and an increase from the consumption of horticultural products, resulting in an overall reduction in the caloric consumption. When the reallocation effect is ignored, there is a larger decrease in overall caloric consumption, larger decrease in fat-intake, and larger increase in the intake level of health-sustaining nutrients, than the counterpart cases with a reallocation effect. When

it is characterized by different values set for $\left[\alpha_d^h, \alpha_d^n\right]$, the results show the risk of overstating any encouraging caloric impacts that decrease in export subsidy for horticultural products would have contributed. With an emphasis on the middle-bound level of domestic promotional elasticity, indicated by Nm, Em, Hm, where consumers' responsiveness to domestic promotions for horticultural products is assumed to be weaker, equal and stronger than that for non-horticultural ones, the decrease in total caloric consumption ranges between 2500 and 3000 calories. Further nutritional outcome shows a decrease in Fat-intake (relative change between -0.26 to 0.32% per capita per day) and increases in the intake of Fiber (daily change between 0.36 to 0.53%), Vitamin A (between 0.08 to 0.15%) and Vitamin C (between 0.94 to 1.33%). However, for other important micronutrients, the subsidy-induced nutritional impacts on domestic consumers instead implies increased intake for Sodium (from 428 to 756 milligrams per year) and decrease yearly intake of Calcium (from 480 to 580 milligrams) and Iron (from 3 to 5 milligrams). This leads to somehow contradicting results against the successful reduction in overall domestic caloric consumption and the intake increment of certain health-sustaining nutrients.

When the diversion of the industry investment from foreign to domestic horticultural promotion is considered in Scenario III, Table 5.4.1 and 5.4.2 show that ignoring the reallocation effect results in the largest decrease in producer surplus of $529 million and smallest increase in consumer welfare level at $273 million. These effects are accompanied by a taxpayer welfare gain of $12 million, and an overall reduction in societal economic surplus of $243 million. When the reallocation effect is recognized in the presence of a substitution effect and the middle-bound level of consumers'

responsiveness to domestic promotions for both horticultural and non-horticultural products, consumer welfare gain (between $207 and $260 million) remains at the expense of producers (between $390 to $510 million), resulting in social welfare loss (between -$177 and -$230 million) when $\omega = 0$. As considerable impacts of domestic promotional efforts on consumer welfare are observed at $\omega = 0.5$, social welfare loss converts to a gain of $111 million when domestic consumers are more responsive to horticultural promotions than to non-horticultural promotions in the home market at medium level, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.075, 0.060\right]$. With upper-bound level of ω set at 1, the overall societal loss converts to a gain when domestic consumers respond both equivalently, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.03, 0.03\right]$, (societal gain of $10 million) and stronger, $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.075, 0.060\right]$, (societal gain of $400 million) to promotions for horticultural than to non-horticultural products. In comparison, reallocations of industry promotional funds from foreign to domestic markets, in response to the reduced export subsidy primarily on horticultural products, bring about larger increase in consumer welfare gain and smaller decrease in social welfare loss (even incurring a gain in certain value range of domestic promotional elasticity).

Table 5.4.2 and 5.4.3 summarize the simulated caloric and nutritional outcomes in Scenario III. Assuming a substitution effect between the two commodity groups, the overall caloric consumption and fat-intake reduces the most when the reallocation effect is ignored, thus bearing the risk of overstating the health benefit that a considerable decrease in export subsidy on horticultural products would have implied. Recognizing the reallocation effect brings about a decrease in total caloric-intake level ranging between

1000 to 2400 calories when consumers are both more responsive to domestic non-horticultural promotions than to promotions for horticultural products at medium, $Nm = \left[\alpha_d^h, \alpha_d^n\right] = [0.015, 0.045]$, and higher level, $Nl = \left[\alpha_d^h, \alpha_d^n\right] = [0.02, 0.15]$, and equally responsive to promotions on two commodity groups at lower, $Es = \left[\alpha_d^h, \alpha_d^n\right] = [0.01, 0.01]$, and medium level, $Em = \left[\alpha_d^h, \alpha_d^n\right] = [0.03, 0.03]$. Increases in caloric consumption by less than 3500 calories (converted into weight change in 1 pound) are also observed for 2121 calories when consumers are more responsive to domestic non-horticultural promotions at medium level of $Hm = \left[\alpha_d^h, \alpha_d^n\right] = [0.075, 0.060]$, and 3180 calories when consumers are equally responsive to promotions on two commodity groups at higher level of $El = \left[\alpha_d^h, \alpha_d^n\right] = [0.09, 0.09]$. To further examine the nutritional implications from the above cases that could be considered generating desirable subsidy-induced caloric outcomes in domestic market. In these cases, the reduced caloric consumption or the slight increase in caloric-intake level per capita per year is observed, intake level of Fat reduces, along with increased intake of Fiber, Vitamins and Iron. These results are consistent with the health implication from above caloric outcome; however, the increased intake level of Sodium contradicts previous encouraging caloric and nutritional results.

In comparison to the scenario where no reallocation of industry monies from export to domestic promotions is assumed, with similar focus on the middle-bound level of consumers' responsiveness to domestic promotions for both products at Nm, Em and Hm, in spite of smaller decreases (even an increase for Hm) in total caloric consumption,

larger increase in nutrient-intake level of Fiber, Vitamins, Calcium and Iron is observed. Specifically, when domestic consumers are more responsive to promotions for horticultural products at $Hm = \left[\alpha_d^h, \alpha_d^n\right] = \left[0.075, 0.06\right]$, caloric-intake level increases with 2121 calories when promotion-reallocation by industry takes place compared to a decrease of 2521 calories in the case of no reallocation effort is adopted by industry. From more of a nutritional perspective, the presence of industry promotion-reallocation results in larger increase in the yearly intake of Fiber (converted daily change of 1.89% per capita), Vitamin A (1.07%), Vitamin C (3.8%), Calcium (0.28%) and Iron (0.54%) than the relative change in the daily intake level per capita of Fiber (0.36%), Vitamin A (0.08%), Vitamin C (0.94%), Calcium (-0.14%) and Iron (-0.05%) in the absence of industry promotion-reallocation.

5.4 Decrease in Government Expenditures for Agricultural Export Promotions— Subsequent Redirection of Enlarged Promotional Budgets

This section examines the welfare and nutritional implications by applying the "Leaning Toward Horticultural" condition for a 47% decrease in government promotional expenditures on horticultural exports, accompanied by the redirection of subsidies from export promotions to domestic promotions for horticultural and non-horticultural products. Simulated results of a 50% redirection to domestic horticultural promotion denoted as Scenario IV(a), are summarized in Tables 5.5.1, 5.5.2 and 5.5.3; results from a 90% redirection, detailed in Scenario IV(b) are shown in Tables 5.6.1, 5.6.2, and 5.6.3.

Table 5.5.1, 5.6.1, 5.5.2 and 5.6.2, for both cases where different proportions of new domestic subsidy allocated on horticultural and non-horticultural products are

applied, the absence of reallocation effect brings about larger decrease in producer welfare loss, smaller increase in consumer welfare gain and consequent larger decrease in social surplus loss in the domestic horticultural market. These changes in economic surplus hold across domestic promotional elasticities of horticultural and non-horticultural products, regardless of different product relationships assumed. Therefore, ignoring the reallocation effect would understate the welfare impact on producers, consumers and the society as a whole.

Focusing the analysis on the substitution effect in the domestic horticultural market, when the reallocation effect is recognized, for both Scenario IV(a) and IV(b), stronger consumer responsiveness to domestic promotions for horticultural products results in greater consumer welfare gain and smaller social welfare loss (or even a welfare gain in certain circumstances) as ω equal to 0.5 or 1. When the promotional influence on domestic purchasing behavior is ignorable, a diminishing trend in consumer welfare gain is observed, thus resulting in larger social welfare loss than when ω is set equal to 0.5 or 1. The impact of promotional activities on economic surplus received by domestic consumers further underscores the important role that the reallocation effect has on the welfare results.

To be more specific, I also consider a ranges of promotional elasticities in the analysis. First consider one pair of elasticity values when consumers are equally responsive to domestic promotion for horticultural and non-horticultural products when $\left[\alpha_d^h, \alpha_d^n\right] = [0.03, 0.03] = Em$. In Scenario IV(a) with the same focus on substitution effect and on domestic horticultural markets, compared to the social welfare loss of \$67 million at $\omega = 0.5$, overall social welfare gain converts to a gain of \$88.59 million when ω

increases to 1. This leads to a producer welfare loss of $476.52 million, the consumer welfare gain of $559.44 million and the taxpayer welfare gain of $5.67 million. When a higher proportion of redirected subsidy on domestic horticultural promotions is assumed in Scenario IV(b), the overall social welfare gain converts to a gain of $146.61 million at $\omega = 1$. This is a result of producer welfare loss of $476.52 million, a consumer welfare gain of $622.7 million and the taxpayer welfare gain of $0.43 million. In short summary, for the comparison between scenarios, the redirection of government allocations to domestic promotional efforts results in higher social welfare gain than what would be otherwise observed in Scenario II and III. In addition, the more government dollars spent on domestic horticultural promotion, the higher overall economic surplus gain received by domestic horticultural market. The impact of promotion on consumer welfare also influences the consequent economic surplus received by consumers and the society as a whole. Similar welfare outcomes could be observed in Table 5.5.2 and 5.6.2 when consumers are more responsive to domestic promotions for horticultural products than for non-horticultural products when $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.075, 0.6\right] = Hm$. At $\omega = 1$, the social welfare gain is $766.76 million, which is more than twice the gain when ω is set equal to 0.5. When 50% of government dollars are redirected for domestic horticultural promotion, the social welfare gain is $608.91 million, which is nearly three times the gain at $\omega = 0.5$ when another assumption of 90% redirection is applied.

In Scenarios IV(a) and IV(b), when horticultural and non-horticultural products are substitutes and reallocation effect is recognized, the consumer welfare gain and social welfare gain are both greater than the counterparts in horticultural market. This result hinges on domestic promotion elasticities of horticultural and non-horticultural products

higher than 0.01. However, if the two products are complements, the consumer welfare gain converts to a loss, and there is a greater social welfare loss.

Extending the analysis from economic impacts to dietary impacts, Table 5.5.2 and 5.5.3 summarize the simulated nutritional outcomes for Scenario IV(a). Table 5.6.2 and 5.6.3 shows the results for Scenario IV(b).

Here we see an increase in domestic consumption of horticultural products and a decrease in consumption of non-horticultural products. This results in the increase in caloric consumption from horticultural products and a decrease from non-horticultural products. In the absence of any reallocation effect, total caloric-intake level reduces the most (a reduction of 3062 calories per capita per year) compared to the changes in caloric consumption when reallocation effect is recognized. In the presence of a reallocation effect, different levels of change in caloric-intake from two major food groups further contribute to the decrease in the yearly total caloric consumption per capita when $\alpha_d^h < \alpha_d^n$ and $\alpha_d^h = \alpha_d^n$ at lower level. We see the increase in the yearly intake-level when $\alpha_d^h > \alpha_d^n$ and $\alpha_d^h = \alpha_d^n$ at medium and higher level. In this regard, ignoring reallocation effect would have overstated the health benefits.

Next I further focus on the nutritional impact analysis on substitution effect implied by positive cross-price elasticity and the medium level of consumer responsiveness to domestic promotions for both products at Nm, Em and Hm. The reduction in caloric consumption level converts to an increase when consumers are equally responsive to both promotional efforts at $\left[\alpha_d^h, \alpha_d^n\right] = [0.03, 0.03] = Em$ and more responsive to domestic promotions for horticultural products when $\left[\alpha_d^h, \alpha_d^n\right] = [0.075, 0.06] = Hm$. In addition,

we see a larger increase in the intake level of Fiber, Vitamins, Calcium and Iron but smaller decrease in fat-intake and larger increase in sodium-intake level. In the comparison between scenarios, higher proportion of government dollars redirected towards the domestic promotions for horticultural products results in larger increase in the overall caloric consumption level at Em and Hm. It also brings about a greater decrease in caloric-intake level at Nm when a more elastic domestic promotions for non-horticultural products in assumed. These results also show a greater increase in the intake for Fiber, Vitamins, Calcium, Iron and Sodium and larger decrease in Fat-intake. Specifically, when consumers are equally responsive to domestic promotions for both commodity groups, when $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.03, 0.03\right] = Em$, greater caloric consumption level is observed in Scenario IV(b) than in Scenario IV(a). However, from a nutritional perspective, the caloric impacts are also accompanied by a larger increase in intake level of selected health-sustaining nutrients like Fiber (relative change of 1.47% per day per capita), Vitamin A (0.77%), Vitamin C (3.07%), Calcium (0.12%) and Iron (0.35%) given an assumed 90% redirection of government dollars on domestic horticultural promotions. This compares to the change in Fiber (1.32%), Vitamin A (0.69%), Vitamin C (2.76%), Calcium (0.10%) and Iron (0.30%) from a 50% redirection. Similar caloric and nutritional outcomes could also be observed in either the case when consumers are more responsive to domestic promotions for non-horticultural products when $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.015, 0.045\right] = Nm$ or when $\left[\alpha_d^h, \alpha_d^n\right] = \left[0.075, 0.06\right] = Hm$.

5.5 Constant Government Expenditures for Agricultural Export Promotions—Impacts on Allocations for Food and Non-Food Exports

Holding constant the level of government expenditures for export promotions of all agricultural products, this section examines the welfare and nutritional implications from the change in export subsidy for horticultural, non-horticultural and other agricultural products at three levels. At the lower level, a 1% decrease in government expenditures for export promotions of other agricultural products is assumed, and the results from equivalent proportional changes of 8% in opposite directions, for horticultural (decrease) and non-horticultural (increase) products of 8% (see Scenario V). Similarly, at the medium level, a 5% decrease in government expenditures for export promotions of other agricultural products is assumed, and results show equivalent proportional changes of 38% in Scenario VI. When a 10% decrease in government expenditures for export promotions of other agricultural products is assumed for the higher impact level, we see a 76% decrease in government dollars on horticultural export promotions while a 76% increase on non-horticultural export promotions (see Scenario VII).

As shown in Table 5.7.1, 5.7.2, 5.8.1, 5.8.2, 5.9.1 and 5.9.2, in the comparison within each scenario with a focus of analysis on the substitution effect, for the horticultural market, the absence of the reallocation effect on domestic market results in the greatest producer welfare loss and the least consumer welfare gain, and generate the greatest social welfare loss of $42 million at lower impact level, of $197 million at medium impact level, and of $387 million at higher impact level. In the non-horticultural market, ignoring the cannibalization effect instead brings about the greatest producer welfare gain and smaller consumer welfare loss (larger consumer welfare loss when promotional impacts on domestic consumer welfare are ignored. When the domestic

promotional elasticity changes to $\left[\alpha_d^h, \alpha_d^n\right] = [0.075, 0.06] = Hm$ and $\left[\alpha_d^h, \alpha_d^n\right] = [0.20, 0.02] = Hl$ social welfare surplus is $46 million at lower impact level, is $224 million at medium impact level, and is $457 million at higher impacts level. In the presence of the reallocation and cannibalization effect, and when there is a decrease in export subsidy (for horticultural products), consumer gains at the expense of producers in the domestic horticultural market. When there is an increase in export subsidy (for non-horticultural products), producer instead gains at the expense of the consumer in the domestic non-horticultural market. Only when consumers are more responsive to domestic promotions for horticultural products than for non-horticultural ones and with considerable impacts of domestic promotional efforts on consumer welfare level, both producer and consumer gain at the same time. This case generates greatest social welfare gain in the non-horticultural market, characterized in Scenario V, VI and VII, respectively. Again, ignoring the reallocation effect in domestic horticultural market would have overstated the overall social welfare loss. Ignoring the cannibalization effect in the domestic non-horticultural market would overstate the social welfare gain. Furthermore, increasing ω from 0 to 1 results in a smaller decrease in social surplus for the horticultural market while a smaller increase for the non-horticultural market. This implies that a higher level of promotional impacts on domestic consumers benefits the horticultural market while it reduces the economic gain (even converts to a loss) enjoyed by the society in non-horticultural market.

When allowing for the substitute assumption, when ω is set equal to 1, and when consumer responsiveness to domestic promotions for both horticultural and non-

horticultural products are set at medium level of $\left[\alpha_d^h, \alpha_d^n\right] = [0.03, 0.03] = Em$, we see a greater social welfare loss for large decreases in export subsidies for horticultural products and large increases in export subsidy for non-horticultural products. The decrease in economic surplus ranges between $6 million in the horticultural market and $13 million in the non-horticultural market at the lower impact level. They further range between $24 and $59 million at medium impact level, and between $36 and $105 million at higher impacts level. When we assume stronger consumer responsiveness to domestic promotions for horticultural products than for non-horticultural ones, we see greater social welfare gain. Here, the increase in economic surplus is $53 million in horticultural market and $11 million in non-horticultural market at lower impact level; it is $260 and $57 million at the medium impact level, and $541 and $126 million at the higher impact level. Larger changes in government expenditures for agricultural export promotions contribute to greater social welfare gain in horticultural market when consumers are more responsive to domestic horticultural promotions. There is greater social welfare loss in non-horticultural market when the domestic promotional elasticity of non-horticultural products is more elastic than that of the horticultural products.

The nutritional implications are respectively summarized in Tables 5.7.3, 5.8.3, and 5.9.3 for the Scenarios V, VI and VII. The absence of the reallocation effect in the horticultural market and the absence of the cannibalization effect in the non-horticultural market understate the health benefits of reduced caloric consumption per capita. When $\left[\alpha_d^h, \alpha_d^n\right] = [0.03, 0.03] = Em$, the larger level of change in government expenditures for export promotions of horticultural, non-horticultural and other agricultural products results in greater reduction in overall caloric-intake level. It also leads to a greater

decrease in Fat intake, and a greater increase in the intake level of Fiber and Vitamin C. However, it also lead to a greater increase in Sodium intake and a greater decrease in the intake of healthy nutrients like Vitamin A, Calcium and Iron. Furthermore, greater consumer responsiveness to domestic promotions for horticultural products leads to an increase in the intake of Vitamin A. The simulation results show that there is a trade-off observed between the reduction in caloric-intake per capita per year and changes in the intake of Calcium (decrease), Iron (decrease) and Sodium (increase). This outcome holds given that total government promotional expenditures for all agricultural exports are held constant coupled with lower, medium and higher levels of change in export subsidies for horticultural, non-horticultural, and other agricultural products.

VI. Conclusion and Discussion

6.1 Summary

This study employs an equilibrium displacement model (following Alston et al., 2009), developed in a two-market two-commodity framework, to explore the welfare and nutritional impacts of changes in government expenditures on export promotions for U.S. horticultural and non-horticultural products. Subsidy-induced effects on domestic markets are considered using a similar approach as Kinnucan and Cai (2010) to capture comprehensive implications from likely policy changes in agricultural trade promotions.

When government increases the promotional expenditures for non-horticultural exports, producers gain at the expense of consumers in the presence of a cannibalization effect in the domestic market. My results show that this would lead to a reduction in the overall caloric-intake level, accompanied by a reduction in the intake of selected health-sustaining nutrients. When cannibalization effect is ignored, there is the risk of overstating the social economic benefit and of understating the health benefits.

If the government decreases the promotional expenditures for horticultural exports, consumers gain at the expense of producers in the domestic market. Nutritional implications from such a change in export subsidy expenditure show mixed caloric outcomes for domestic consumers. These results depend upon whether the government decides to redirect funds on domestic promotional efforts, and on the proportions of redirected government expenditures spent on horticultural promotions in the domestic market. Reduced caloric consumption, a decrease in Fat-intake and an increase in Vitamin-intake are observed, regardless of various levels of consumer responsiveness to domestic promotions for horticultural and non-horticultural products, in the absence of subsidy redirection. Given that subsidy redirection takes place with a larger portion of

government dollars subsidizing domestic horticultural promotions, as domestic consumers become more sensitive to horticultural promotions we see an increase in overall caloric-intake level. We also see a smaller decrease in fat-intake and larger increases in the intake of selected minerals and vitamins with weaker consumer responsiveness to domestic promotional efforts. If the reallocation effect is ignored, economic surplus received by society as a whole would be understated and the health benefits would have been overstated. This also implies an understatement of nutritional benefits from the intake of selected healthy nutrients as well as an overstatement of the intake of less healthy nutrients.

When government expenditures for export promotions of all the agricultural exports are held constant, I also consider different changes in export subsidies applied to horticultural, non-horticultural and other agricultural products. For a decrease in promotional expenditures for other agricultural exports and additional promotion for the two primary agricultural commodity groups, consumers gain at the expense of producers in the domestic horticultural market. At the same time, producers gain at the expense of consumers in the non-horticultural market. Reduced caloric consumption is observed regardless of the level of consumer responsiveness to domestic promotional efforts. A larger decrease in total caloric-intake is induced by greater proportional changes in government promotion expenditures for horticultural and non-horticultural exports. Results show that there are mixed changes in the intake of selected healthy nutrients: We see an increased intake of Fiber and Vitamin C and decreased intake of Vitamin A, Calcium and Iron. Once again, ignoring the reallocation effect would understate the social economic benefits in the domestic horticultural market. Together, the health

benefits, in terms of the decrease in overall caloric-intake level, are understated in the absence of subsidy-induced effects on domestic demand.

Overall, this study attempts to broaden the economic perspective on the impacts of non-price export promotion programs. I carefully examine the caloric and nutritional implications for changes in government allocations on agricultural exports. Using a detailed simulation model, I found that raising export subsidies on non-horticultural products benefits domestic producers at the expense of consumers; cutting subsidies on horticultural products benefits domestic consumers at the expense of producers.

When facing export subsidy increases, domestic consumers are harmed, both for the rising price in the domestic market (induced by the outward-shift export demand) and for the diversion of industry dollars from domestic market promotions (induced by government expenditures for export promotions.) Overall, an increase in export subsidies reduces caloric consumption level in the domestic market. However, decreases in the intake of selected healthy nutrients are also observed. Given a decrease in export subsidy, domestic producers are harmed, both because that domestic price is lowered by the inward-shift in export demand and that industry dollars are reallocated for promotional efforts in the domestic market. The decrease in total caloric-intake is observed for domestic consumers, and it is accompanied by increases in the intake of selected healthy nutrients.

6.2 Policy Implication

Government allocations for Market Development Programs operated by USDA, like Market Access Program (MAP) and Foreign Market Development Programs (FMD), are designed to help maintain and develop foreign markets for U.S. farm products. They

have been subject to much controversy since 1996, with the claim that the public support of export promotions are actually promoting "corporate welfare". Critics argued that export assistance from the government should have been targeted at smaller and less export-experienced firms (U.S. GAO 1995, 1997). Another criticism maintains that there is no need for government assistance if private promotional investment is economically viable. For a public role in export promotion to be justifiable, there needs to be existence of market failures such as the positive externality resulted from foreign market promotions. In this case, competitor countries could free-ride on U.S. government programs, and the significantly lower economic returns to promotions in the absence of support are required. Some studies have suggested such market failures exist in the export promotion efforts for major horticultural products (Richards, Ispelen and Kagan, 1997; Richards and Patterson, 1998), yet questions remain on the appropriate level of government support in U.S agricultural trade promotions.

Government allocations to MAP and FMD programs in The Agriculture Reform, Food and Jobs Act of 2012 are $200 (Table 1.1.2) and $34.5 (Table 1.2) million, respectively. We also see a significant amount of public spending on export promotions allocated in 2004 and 2008 Farm Bill. However, policymakers and critics of Farm Bill spending have raised their worrying voices about promoting the corporate welfare and about replacing industry private investment with taxpayer dollars. In a benefit-cost analysis of such government support on agricultural trade promotions, Kinnucan and Cai (2010) concluded that USDA expenditures on non-price export promotion of farm products maybe too high, an opposite result to previous studies justifying the role of public supports in export promotions.

Here I Extend the research that focuses on economic impact of export promotions to consider the health implications for export promotion programs in domestic market This study attempts to provide a more comprehensive policy analysis to better understand two questions. First, whether the level of change in government support for export promotions is correcting market failures characterized by the under-promotion of domestic producers for their own products compared to the industry optimal level (Dwyer, 1994) Second, to evaluate domestic consumer welfare changes that might result from a subsidy-induced change in price and quantities of horticultural and non-horticultural products. Once the caloric and nutritional linkage is made to the likely changes in public allocations on agricultural export promotions, I expect that any decrease in export subsidies for horticultural products and the increase in export subsidy for non-horticultural products would together have considerable impacts on quantities consumed for both commodity groups. This further contributes to the reduced caloric consumption and increased intake of healthy nutrients. Dietary quality in domestic markets could also be expected to improve with rising consumption of fruits and vegetables (defined as horticultural crops in this study) and lowering consumption of more energy-dense food (broadly defined as non-horticultural crops in this analysis).

Instead of increasing or decreasing the total amount of export subsidy, a more complicated policy design could be developed to apply different subsidies to different food groups in order to encourage healthier consumption patterns at home. Additionally, the matching requirement for export subsidies serves as an economic incentive that could be employed to encourage producers to promote more efficiently. Currently, an export subsidy match varies by product and the type of advertising (e.g., generic or branded

promotion). Here I propose that the redirection of original match priorities to the requirement based on the type of agricultural products (under horticultural, non-horticultural or other agricultural product groups) promoted in foreign markets could bring about changes in industry promotions for specific products. Therefore, as domestic or export demand for horticultural and non-horticultural products are shifted, we better understand the quantities consumed and dietary patterns.

6.3 Ongoing Work

A two-market, two-commodity model is presented in this stud. However, a full consideration of nutritional impacts for changes in government expenditures for agricultural export promotions should consider the links between food products at the retail level and the raw agricultural materials in a multi-market setting. Wohlegnant (1989) provides a framework that could be extended here to account for the indirect impacts of export subsidies for bulk products on further process products sold in the retail stores.

Also, an aggregate measure of either horticultural or non-horticultural products composed of various agricultural commodities fails to precisely capture the exact changes in any one product. This may be balanced out with opposite changes for substitute goods under same categories (e.g., sweeteners and dairy products in the non-horticultural group). In this way, the product relationship between commodities under the same food groups should be considered as there are many substitutes or complements between horticultural and non-horticultural product groups.

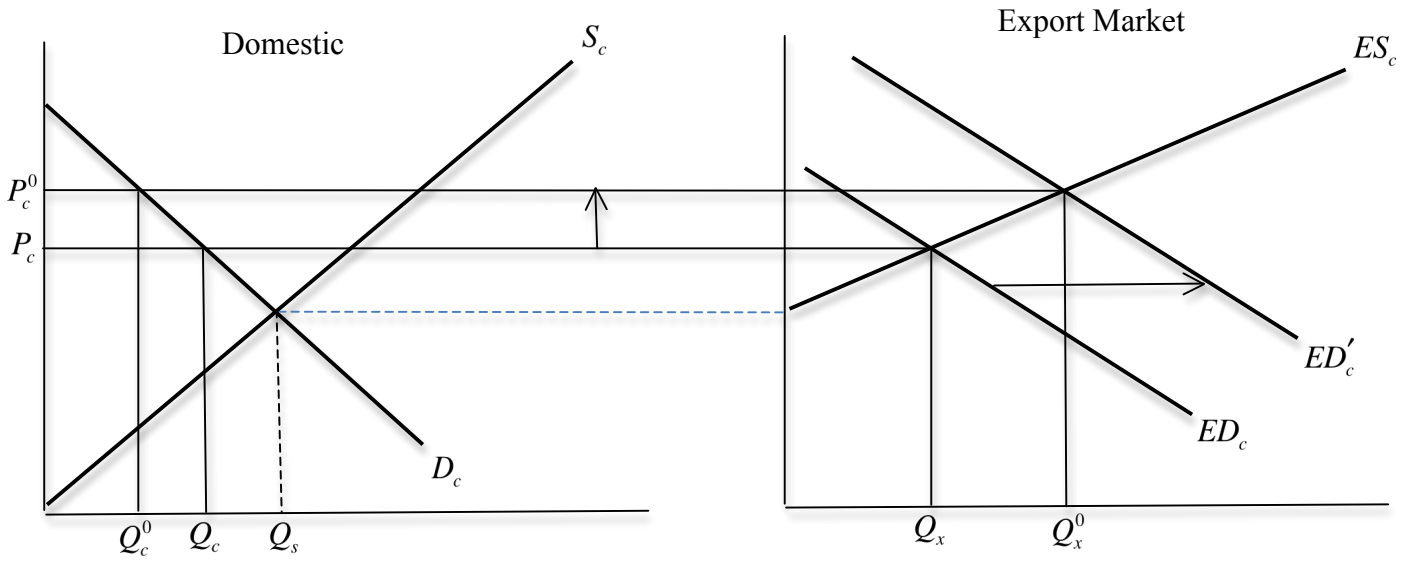
One way to address such concerns is to use a two-market, multi-product model to more fully explore economic and health impacts. This could include separate equations

of different food products at the retail level as well as farm commodities used as raw materials for retail foods. For this larger set of products, it would require relevant information on the demand responses as well as supply elasticities, promotional elasticities, export subsidy level, advertising shares, and competitors' expenditures (Alston, Freebairn, and James, 2001). It would lead to a more accurate measure of changes in price, domestic consumption and surplus levels from change in export subsidies, as well as the changes in consumption patterns and health conditions in the domestic market.

FIGURE

Panel A.

Without Cannibalization Effect



Panel B.

With Cannibalization Effect

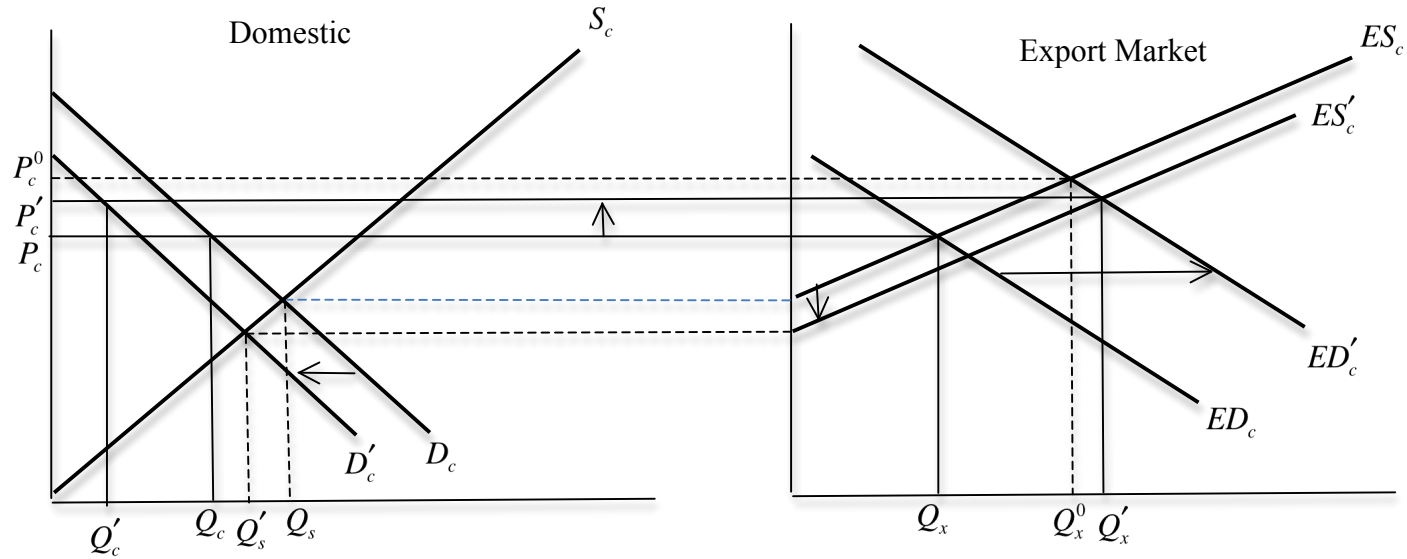
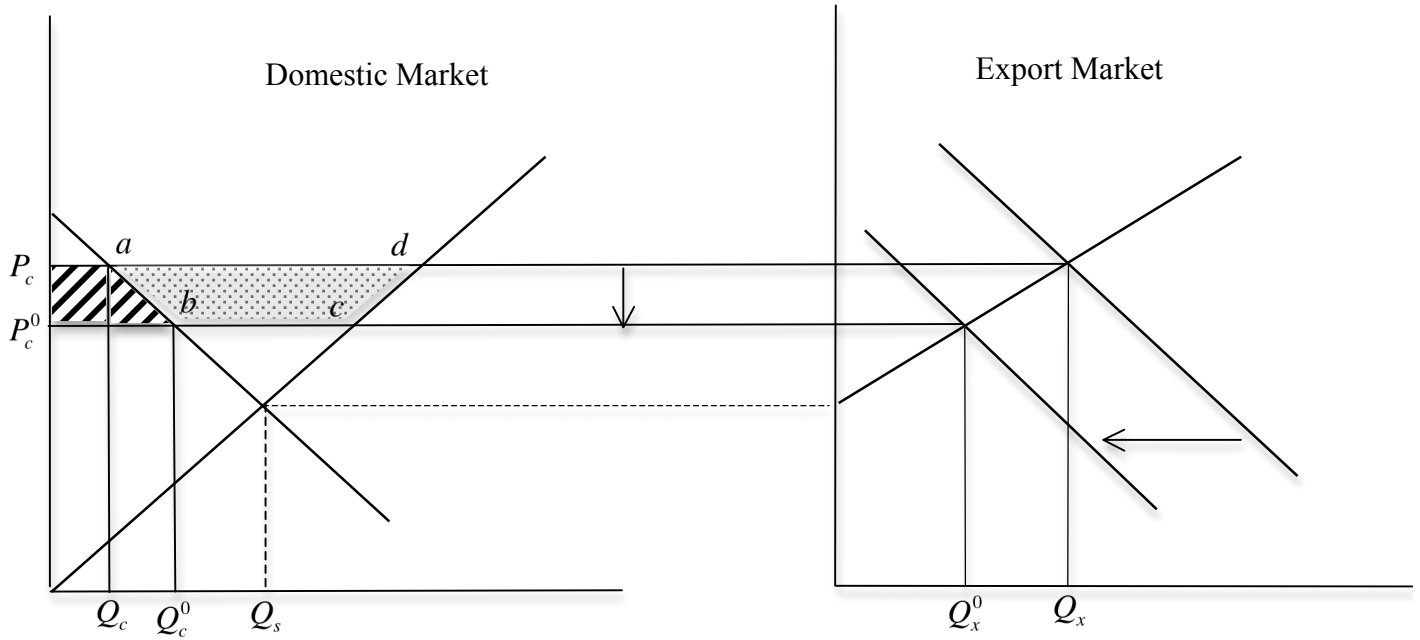


Figure 3.1 Economy-wide effects of nonprice export promotions—Increased-Subsidy Scenario

Panel A.

Without Reallocation Effect



Panel B.

With Reallocation Effect

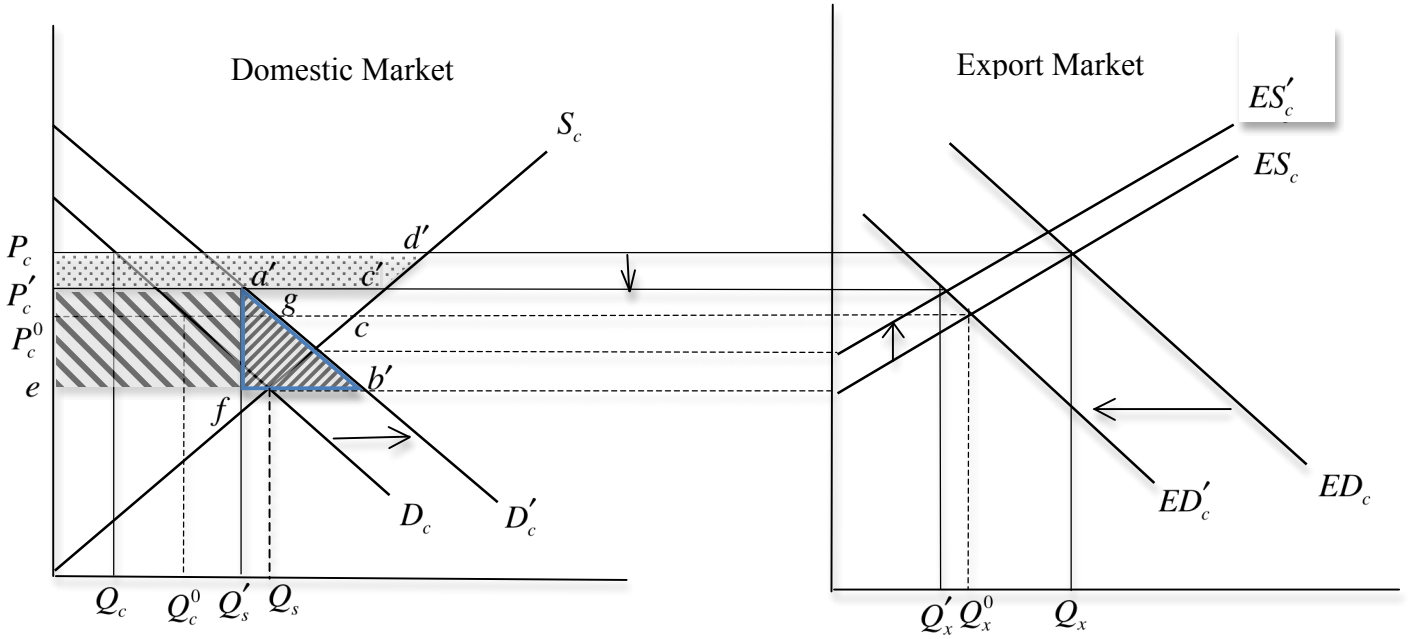


Figure 3.2 Economy-wide effects of nonprice export promotions—Decreased-Subsidy Scenario

TABLE

Table 1.1.1 FY 2011 Funding for Horticultural, Non-Horticultural and Other Agricultural Products under MAP

Market Access Program					
Horticultural Products		**Non-Horticultural Products**		**Other Agricultural and Forestry Products**	
Organizations	Allocations	Organization	Allocation	Organization	Allocation
Washington Apple Commission	$5,199,788	U.S. Meat Export Federation	$16,261,732	Cotton Council International	$20,234,954
Florida Department of Citrus	$4,937,966	Food Export Association of the Midwest USA	$10,919,428	American Hardwood Export Council, The	
National Potato Promotion Board	$4,870,824	Western United States Agricultural Trade Association	$10,859,171	Engineered Wood Association, Softwood Export Council,	
California Walnut Commission	$4,614,261	U.S. Grains Council	$8,621,582	Southern Forest Products Association	$8,569,725
Pear Bureau Northwest	$3,632,830	Food Export USA Northeast	$8,152,605		
California Table Grape Commission	$3,494,622	U.S. Wheat Associates	$6,798,051	Pet Food Institute	$1,601,375
California Prune Board	$3,339,658	Southern United States Trade Association	$5,831,384	U.S. Livestock Genetics Export, Inc.	$1,097,601
Sunkist Growers, Inc.	$3,107,359	Wine Institute	$5,585,230	Hop Growers of America	$177,301
Blue Diamond Growers/Almond Board of California	$3,079,916	USA Poultry and Egg Export Council	$5,461,208	American Biomass Trade Cooperative	$145,000
Raisin Administrative Committee	$2,677,594	U.S. Dairy Export Council	$4,529,746	U.S. Hide, Skin & Leather Association	$140,228
California Tree Fruit Agreement	$2,053,685	American Soybean Association	$4,465,558	American Seed Trade Association	$90,419
Cranberry Marketing Committee	$1,767,921	Alaska Seafood Marketing Institute	$4,326,996	National Hay Association	$32,445
Washington State Fruit Commission	$1,192,087	USA Rice Federation/U.S. Rice Producers Association	$3,758,042	Total Funding for Other non-food products under MAP	$32,089,048

Source: USDA, FAS: http://www.fas.usda.gov/info/webstories/map_042911.asp

Table 1.1.2 FY 2011 Funding for Horticultural and Non-Horticultural Products under MAP (cont'd)

Market Access Programs			
Horticultural Products		**Non-Horticultural Products**	
Organizations	Allocations	Organization	Allocation
California Agricultural Export Council	$993,079	National Association of State Departments of Agriculture	$2,750,562
California Strawberry Commission	$789,070	American Peanut Council	$2,414,321
Western Pistachio Association/Cal-Pure Pistachios Inc.	$770,497	National Confectioners Association	$1,685,845
California Cherry Advisory Board	$743,127	National Sunflower Association	$1,218,250
U.S. Apple Export Council	$685,480	U.S. Dry Bean Council	$1,150,793
California Fresh Tomato Growers/Florida Tomato Committee	$505,603	USA Dry Pea and Lentil Council	$1,122,955
Organic Trade Association	$435,293	Welch Foods, Inc.	$907,824
California Pear Advisory Board	$378,267	National Renderers Association	$831,676
California Cling Peach Board	$353,475	Northwest Wine Promotion Coalition	$805,130
Cherry Marketing Institute	$259,988	Intertribal Agriculture Council	$741,009
National Watermelon Promotion Board	$254,406	Brewers Association Inc.	$385,015
Ginseng Board of Wisconsin	$209,597	American Sheep Industry Association	$381,466
Georgia Pecan Growers	$200,000	New York Wine and Grape Foundation	$376,215
California Kiwifruit Commission	$184,268	The Catfish Institute	$335,605
Hawaii Papaya Industry Association	$173,027	The Popcorn Board	$319,607
California Asparagus Commission	$114,709	Distilled Spirits Council	$211,127
Texas Produce Export Association	$95,654		
Total Fundings for Horticultural Products under MAP	$51,114,051	Total Fundings for Non-Horticultural Products under MAP	$111,208,133
MAP reserve			$5,589,768
Total Available FY 2011 Fundings for Market Access Program			$200,000,000

Source: USDA, FAS: http://www.fas.usda.gov/info/webstories/map_042911.asp

Table 1.2 FY 2011 Funding for Non-Horticultural and Other Agricultural and Forestry Products under FMD

Foreign Market Development Programs			
Non-Horticultural products		**Other Agricultural and Forestry Products**	
Organizations	Allocation	Organization	Allocation
American Soybean Association	$6,648,054	Cotton Council International	$4,532,356
U.S. Wheat Associates	$5,033,535	American Hardwood Export Council, The	
U.S. Grains Council	$4,386,866	Engineered Wood Association, Softwood	
U.S. Meat Export Federation	$1,612,357	Export Council, Southern Forest	
USA Rice Federation	$1,457,865	Products Association	$2,796,545
USA Poultry and Egg Export Council	$1,262,021	U.S. Livestock Genetics Export, Inc.	$607,213
National Renderers Association	$837,791	American Seed Trade Association	$219,486
American Peanut Council	$628,631	Leather Industries of America	$135,224
U.S. Dairy Export Council	$595,464	U.S. Hide, Skin and Leather Association	$98,092
National Sunflower Association	$252,192	National Hay Association	$80,110
American Sheep Industry Association	$161,354	Mohair Council of America	$8,808
USA Dry Pea and Lentil Council	$157,319		
U.S. Dry Bean Council	$103,611		
North American Millers Association	$23,833		
Total Funding for Non-Horticultural Products under FMD	$23,160,893	Total Funding for Other non-food products under MAP	$8,477,834
FMD Reserve			$2,798,273
Total Available Funding for Foreign Market Development Program			**$34,500,000**

Source: USDA, FAS: http://www.fas.usda.gov/info/webstories/fmd_042911.asp

Table 4.1 Ordinary Least Squares estimates of Market-Share Equation for U.S. Horticultural and Non-Horticultural Exports

Variable/Statistic	Parameter in Horticultural Export Demand	Model A	Model B	Parameter in Horticultural Export Demand	Model A	Model B
Goodwill	β_A^h	0.056 (2.40)**	0.0763 (5.92)***	β_A^n	0.0523 (1.81)*	0.0457 (3.87)***
Own Price	β_P^h	-0.0054 (-0.23)	--	β_P^n	-0.168 (-1.84)*	--
Substitute Price	β_{PS}^h	-0.389 (-1.56)	-0.2205 (-1.20)	β_{PS}^n	-0.3563 (-2.33)**	-0.3356 (-3.39)***
Exchange Rate	β_{XR}	-0.151 (-0.40)	-0.3398 (-1.09)	β_{XR}	-0.4643 (-1.91)*	-0.2868 (-1.42)
Income	β_Y	0.3594 (1.03)	--	β_Y	-0.9488 (-1.27)	--
Lag. Dep. Variable	β_{LAG}^h	0.6844 (9.42)***	0.721 (12.73)***	β_{LAG}^n	0.4346 (4.03)***	0.5659 (6.9)***
Constant	β_0^h	-2.43 (-0.79)	0.526 (0.74)	β_0^n	9.6566 (1.48)	0.808 (1.37)
SE of Regression		0.0552	0.0540		0.0535	0.0559
Computed F-test for Model A vs. B			0.55			1.91
Significance level			0.5836			0.1735

Note: Model A refers to equation (10a) for horticultural products and equation (10b) for non-horticultural products.

Model B refers to alternative model as $\beta_Y^h = \beta_p^h = 0$ for horticultural products and as $\beta_Y^n = \beta_p^n = 0$ for non-horticultural products.
* indicates a 10% significance level; ** indicates a 5 % significance level; *** indicates a 1% significance level.

Table 4.2 Adjusted Ordinary Least Squares estimates of Market-Share Equation for U.S. Horticultural and Non-Horticultural Exports

Variable/Statistic	Parameter in Horticultural Export Demand	Model A	Model B	Parameter in Horticultural Export Demand	Model A	Model B
Goodwill	β_A^h	0.0818	0.0815	β_A^n	0.0742	0.0481
		(2.69)	(5.41)***		(2.63)**	(4.51)***
Own Price	β_P^h	-0.005	--	β_P^n	-0.146	--
		(-0.18)			(-1.63)	
Substitute Price	β_{PS}^h	-0.006	-0.0134	β_{PS}^n	-0.1949	-0.2753
		(-0.02)	(-0.06)		(-1.25)	(-2.99)***
Exchange Rate	β_{XR}	-0.6733	-0.6555	β_{XR}	-0.5831	-0.3705
		(-1.38)	(-1.81)*		(-2.6)**	(-2.04)*
Income	β_Y	-0.01265	--	β_Y	-1.145	--
		(-0.03)			(-1.64)	
Lag. Dep. Variable	β_{LAG}^h	0.7169	0.711	β_{LAG}^n	0.5323	0.5971
		(7.83)***	(10.86)***		(4.72)***	(7.89)***
Constant	β_0^h	1.1095	0.9235	β_0^n	11.0795	0.9952
		(0.27)	(1.11)		(1.81)*	(1.85)*
SE of Regression		0.06423	0.0612		0.04946	0.0508
Computed F-test for Model A vs. B			0.02			1.46
Significance level			0.9829			0.2578

Note: Model A refers to equation (10a) for horticultural products and equation (10b) for non-horticultural products.

Model B refers to alternative model as $\beta_Y^h = \beta_p^h = 0$ for horticultural products and as $\beta_Y^n = \beta_p^n = 0$ for non-horticultural products.
* indicates a 10% significance level; ** indicates a 5 % significance level; *** indicates a 1% significance level.

Table 4.3 Baseline Values for Model Calibration

Item	Definition	Value	Source
A_G^h	Government expenditure in export promotion for horticultural products (mil. dol.)	26	Kinnucan, 2010 & FAS, USDA
$\tilde{A}_x^h$	Total expenditure in export promotion for horticultural products (mil. dol.)	76	Kinnucan, 2010
A_d^h	Total expenditures in domestic market promotion for horticultural products (mil. dol.)	49	Kinnucan, 2010
$A_I^h = T^h Q_s^h$	Industry monies on promotion for horticultural products	99	Calculated
A^h	Total promotion expeditures for horticultural products= $A_G^h + A_I^h = A_d^h + \tilde{A}_x^h$	125	Calculated
θ_G^h	Government share on horticultural products = A_G^h / A^h	0.21	Calculated
θ_I^h	Industry share on horticultural products = A_I^h / A^h	0.79	Calculated
θ_d^h	Domestic promotion share on horticultural products = A_d^h / A^h	0.39	Calculated
θ_x^h	Export promotion share on horticultural products = $\tilde{A}_x^h / A^h$	0.61	Calculated
A_G^n	Government expenditure in export promotion for non-horticultural products (mil. dol.)	36	Kinnucan, 2010 & FAS, USDA
$\tilde{A}_x^n$	Total expenditure in export promotion for non-horticultural products (mil. dol.)	108	Kinnucan, 2010
A_d^n	Total expenditures in domestic market promotion for non- horticultural products (mil. dol.)	560	Kinnucan, 2010
$A_I^n = T^n Q_s^n$	Industry monies on promotion for non-horticultural products	632	Calculated
A^n	Total promotion expeditures for non-horticultural products= $A_G^n + A_I^n = A_d^n + \tilde{A}_x^n$	668	Calculated
θ_G^n	Government share on non-horticultural products = A_G^n / A^n	0.05	Calculated
θ_I^n	Industry share on non-horticultural products = A_I^n / A^n	0.95	Calculated
θ_d^n	Domestic promotion share on non-horticultural products = A_d^n / A^n	0.84	Calculated
θ_x^n	Export promotion share on non-horticultural products = $\tilde{A}_x^n / A^n$	0.16	Calculated
$P^h Q_s^h$	Gross farm value of U.S. production for horticultural products (mil. dol.)	24,636	ERS, USDA
$P_s^h Q_s^h$	Net farm value of U.S. production for non-horticultural products = $(P^h - T)Q_s^h$	24,537	Calculated
$P^h Q_x^h$	Value of U.S. farm exports for horticultural products (mil. dol.)	12,082	FAS, USDA
$P^h Q_d^h$	Value of domestic consumption on horticultural products (= $P^h Q_s^h - P^h Q_x^h$)	12,554	Calculated
τ^h	Industry marketing fee or "tax" for horticultural products = $\mathrm{TQ}_s^h / P^h Q_s^h$	0.004	Calculated

k_d^h	Domestic quantity share for horticultural products = $P^h Q_d^h / P^h Q_s^h$	0.51	Calculated
k_x^h	Export quantity share for horticultural products = $(1 - k_d^h)$	0.49	Calculated
$P^n Q_s^n$	Gross farm value of U.S. production for non-horticultural products (million $)	155,887	ERS, USDA
$P_s^n Q_s^n$	Net farm value of U.S. production for non-horticultural products = $(P^n - T)Q_s^n$	157,255	Calculated
$P^n Q_x^n$	Value of U.S. farm exports for non-horticultural products (million $)	37,603	FAS, USDA
$P^n Q_d^n$	Value of domestic consumption on non-horticultural products (= $P^n Q_s^n - P^n Q_x^n$)	120,284	Calculated
τ^n	Industry marketing fee or "tax" for non-horticultural products = $TQ_s^n / P^n Q_s^n$	0.004	Calculated
k_d^n	Domestic quantity share for non-horticultural products = $P^n Q_d^n / P^n Q_s^n$	0.76	Calculated
k_x^n	Export quantity share for non-horticultural products = $(1 - k_d^n)$	0.24	Calculated
ε^h	Domestic supply elasticity of horticultural products	0.6	Assumed for Parameterization
ε^n	Domestic supply elasticity of non-horticultural products	0.6	Assumed for Parameterization
η_d^{hh}	Domestic own-price elasticity of horticultural products	-0.72	Huang and Lin, 2000
η_x^h	Export demand elasticity of horticultural products	-3.46*	Estimated
η_d^{nn}	Domestic own-price elasticity of non-horticultural products	-0.447	Richards et al., 2005
η_x^n	Export demand elasticity of non-horticultural products	-2.48*	Estimated
$\eta_d^{hn} = \eta_d^{nh}$	Domestic cross-price elasticity for both horticultural products & non-horticultural products	0.2 -0.16	Huang, 1986 Richards et al., 2005
α_x^h	Export promotion elasticity of horticultural products	0.282*	Estimated
α_x^n	Export promotion elasticity of non-horticultural products	0.12*	Estimated
α_d^h	Domestic promotion elasticity of horticultural products	[0, 0.2]	Assumed for Parameterization
α_d^n	Domestic promotion elasticity of non-horticultural products	[0, 0.1]	Assumed for Parameterization
φ_x^h	Budget diversion elasticity for horticultural products	0.887	Estimated
φ_x^n	Budget diversion elasticity for non-horticultural products	0.873	Estimated

*Re-estimated export demand and promotional elasticity, allowing for adjustment of influential data points.

Table 4.4 Literatures on Own-Price & Cross-Price Elasticity of Demand for Horticultural Products

With Respect to Price	Fruits				Vegetables			
	1987~88 Huang and Lin, 2000	1970~99 Richards et al., 2005	1960~93 You et al., 1996	1938~07 Andreyeva et al, 2008	1987~88 Huang and Lin, 2000	1970~99 Richards et al., 2005	1960~93 You et al., 1996	1938~2007 Andreyeva et al, 2008
Grain	(cereal) -0.042	-0.1			(cereal) -0.043			
Meat: beef	-0.17				-0.095	-0.13	(flour) -0.0007	
Meat: pork	-0.02	-0.16	-0.083		-0.046			
Poultry	-0.023		(flour) -0.1		-0.049	-0.14	-0.17	
Egg	-0.022		-0.055		-0.012		0.035	
Dairy	-0.078	-0.25	-0.13		-0.035	-0.24	-0.05	
Fruits	**-0.72**	**-0.385**	**-0.4**	**-0.7**	-0.029	-0.1	0.14	
Veg.	-0.087	-0.18	0.17		**-0.72**	**-0.21**	**-0.034**	**-0.58**
Fish								
Sweets			0.082				0.11	
Fat	-0.024	-0.012	-0.007				-0.11	

With Respect to Price	Apple						Citrus	F&V
	1970~1992 Henneberry et al., 1999	1953~1983 Huang, 1986	1943~1973 Price and Mittelhammer, 1979	1951~1994 Richards et al., 1999	1990 Voorthuizen, 2001	1960~1993 You et al., 1996	1970~1992 Henneberry et al., 1999	1989~91;1994~96; 2000~01 Rickard et at, 2012
Grain		(flour) -0.14						(cereal) 0.18
Meat: beef		0.2						
Meat: pork		0.197						0.28
Poultry		(chicken) -0.05						
Egg		-0.3						-0.05
Dairy		(cheese) 0.15; (milk) -0.25						-0.05
Fruits	**-0.59**	**-0.2**	**-0.7**	**-0.24**	**-0.122**	**-0.165**	**-1.028**	
Veg.								**-0.63**
Fish		0.133						
Sweets		0.11						
Fat		-0.3						
Other Food				-0.31				-0.12

Table 4.5 Literatures on Own-Price & Cross-Price Elasticity of Demand for Non-Horticultural Products

With Respect to Price	Dairy				Egg		
	1970~99 Richards et al., 2005	1960~1993 You et al., 1996	1938~2007 Andreyeva et al., 2008	1989~91; 1994~96; 2000~01 Rickard et at, 2012	1987~88 Huang and Lin, 2000	1938~2007 Andreyeva et al, 2008	1989~91; 1994~96; 2000~01 Rickard et at, 2012
Grain	-0.097	(flour) 0.0067		(cereal) 0.13	(cereal) -0.096		(cereal) 0.23
Meat: beef					-0.1		
Meat: pork	-0.2	0.0047		0.02	-0.067		0.96
Poultry					-0.06		
Egg		-0.015		0.08	**-0.057**	**-0.27**	**-0.74**
Dairy	**-0.303**	**-0.19**	**-0.65**	**-0.94**	-0.092		0.66
Fruits	-0.086	-0.04	***Cheese: -0.44**		-0.068		
Veg.	-0.15	-0.02	***Milk: -0.59**	-0.07	-0.062		-0.48
Fish							
Fats		-0.035					
Sweetner		0.038					
Food other				0.24		-0.53	

With Respect to Price	Meat			Oil & Fats		Poultry		
	1970~99 Richards et al., 2005	1960~93 You et al., 1996	1989~91; 1994~96; 2000~01 Rickard et at, 2012	1987~88 Chung et al., 1998	1938~2007 Andreyeva et al, 2008	1976~1993 Bryant and Davis, 2001	1987~88 Huang and Lin, 2000	1956~1983 Wohlgenant, 1989
Grain	-0.058	0.0371	(cereal) 0.03				(cereal) -0.04	
Meat: beef							-0.06	0.1
Meat: pork	**-0.447**	**-0.44**	**-0.51**				-0.008	0.14
Poultry						**-0.17**	**-0.64**	**-0.42**
Egg		0.0137	0.05				-0.017	0.02
Dairy	-0.21	0.003	0.01				-0.03	0.01
Fruits	-0.048	0.0085					-0.0001	
Veg.		-0.029	0.14				-0.09	-0.01
Fish								
Fats		0.0129		**-0.1**	**-0.48**		-0.024	
Sweetner		-0.013						
Food other			-0.09					

Table 4.6 Literatures on Own-Price & Cross-Price Elasticity of Demand for Non-Horticultural Products (cont'd)

With Respect to Price	Poultry	Fish			Grain			
	1938~2007 Andreyeva et al, 2008	1967~1987 Moschini and Meilke, 1989	1967~1988 Alston and Chalfant, 1993	1987~88 Huang and Lin, 2000	1938~2007 Andreyeva et al, 2008	1970~1999 Richards et al., 2005	1938~2007 Andreyeva et al, 2008	1989~91; 1994~96; 2000~01 Rickard et at, 2012
Grain				(cereal) -0.12		**-0.25**	**(cereal) -0.6**	**(cereal) -0.98**
Meat: beef		-0.1	-0.21	-0.044				
Meat: pork				0.0018		-0.064		0.07
		(chicken)	(chicken)					
Poultry	**-0.68**	-0.03	-0.04	-0.11				
Egg				0.001				0.02
Dairy				-0.034		-0.09		0.11
Fruits				-0.069		-0.44		
Veg.				-0.023		-0.137		0.17
Fish		**-0.2**	**-0.23**	**-0.39**	**-0.5**			
Fats				-0.06				

With Respect to Price	Beef							
	1967~1987 Moschini and Meilke, 1989	1947~1983 Wohlgenant, 1985	1965~1981 Menkhaus et al., 1985	1947~1978 Moschini et al., 1994	1987~88 Huang and Lin, 2000	1979~1996 Hahn, 2001	1950~1985 Dahlgran, 1987	1976~1993 Bryant and Davis, 2001
Grain					(cereal) -0.06			
Meat: beef	**-1.05**	**-0.45**	**-1.063**	**-0.84**	**-0.354**	**-0.83**	**-0.66**	**-0.6**
Meat: pork	-0.08	0.15	-0.043	0.14	-0.037	-0.11	0.136	
	(chicken)		(chicken)			(chicken) -	(chicken)	
Poultry	-0.13	0.29	-0.015		-0.02	0.058	0.04	
Egg					-0.013			
Dairy					-0.07			
Fruits					-0.063			
Veg.					-0.067			
Fish	-0.14	-0.4			-0.0071			
Fats					-0.024			

Table 4.7 Literatures on Own-Price & Cross-Price Elasticity of Demand for Non-Horticultural Products (cont'd)

With Respect to Price	Beef			Pork	Sweets
	1955~1987 Brester and Wohlgenant, 1993	1967~1988 Alston and Chalfant, 1993	1938~2007 Andreyeva et al, 2008	1938~2007 Andreyeva et al, 2008	1938~2007 Andreyeva et al, 2008
Grain					
Meat: beef	**-0.45**	**-0.98**	**-0.75**		
Meat: pork	0.1	-0.12 (chicken)		**-0.72**	
Poultry		-0.03			
Egg					
Dairy					
Fruits					
Veg.					
Fish		-0.12			
Fats					
Sweets					**-0.34**

Table 5.1 Nutrient- and Caloric-Intake Level
Contributed from Horticultural and Non-Horticultural Products, per capita per day

	Horticultural Products	**Non-Horticultural Products**
Caloric Consumption (calories)	425	3471
Fats (g)	9.1	170.1
Fiber (g)	12.6	12.4
Vitamin A (mg)	315.4	764.6
Vitamin C (mg)	106.6	12.4
Calcium (mg)	134.8	834.2
Iron (mg)	4.7	18.7
Sodium (mg)	386.9	853.1

Source: Food Availability, USDA
Note: Caloric-Intake Level and Nutrient-Intake level use one-year data in 2004.

Table 5.2.1 Scenario I: Market and Welfare Effects (million US$) of a 10% Increase in Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Percentage change in demand price**	**Percentage change in domestic consumption**		**Change in producer surplus**	**Change in consumer surplus, w=0**	**Change in consumer surplus, w=0.5**		**Change in consumer surplus, w=1**	
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$d\ln P^n$	$d\ln Q_d^h$	$d\ln Q_d^n$	ΔPS^n	$\Delta CS^n_{\omega=0}$	$\Delta CS^h_{\omega=0.5}$	$\Delta CS^n_{\omega=0.5}$	$\Delta CS^h_{\omega=1}$	$\Delta CS^n_{\omega=1}$
0	0	0	0.0057	0.0000	-0.0025	901.69	-684.89	0.00	-684.89	0.00	-684.89
	0.010	0.010	0.0055	0.0000	-0.0028	875.48	-664.93	0.00	-710.07	0.00	-755.21
	0.015	0.045	0.0049	0.0000	-0.0037	782.38	-594.05	0.00	-799.49	0.00	-1004.93
	0.030	0.030	0.0052	0.0000	-0.0033	822.55	-624.62	0.00	-760.92	0.00	-897.21
	0.075	0.060	0.0047	0.0000	-0.0041	741.81	-563.17	0.00	-838.44	0.00	-1113.72
	0.090	0.090	0.0042	0.0000	-0.0050	659.41	-500.49	0.00	-917.51	0.00	-1334.54
	0.020	0.150	0.0031	0.0000	-0.0067	489.47	-371.30	0.00	-1080.47	0.00	-1789.64
	0.200	0.020	0.0054	0.0000	-0.0031	849.10	-644.84	0.00	-735.41	0.00	-825.98
0.2	0	0	0.0057	0.0011	-0.0026	905.11	-687.48	0.00	-687.48	0.00	-687.48
	0.010	0.010	0.0056	0.0011	-0.0028	878.81	-667.45	-1.50	-718.97	-2.99	-770.50
	0.015	0.045	0.0050	0.0010	-0.0037	785.39	-596.33	-6.81	-830.84	-13.63	-1065.35
	0.030	0.030	0.0052	0.0010	-0.0033	825.70	-627.01	-4.52	-782.58	-9.04	-938.16
	0.075	0.060	0.0047	0.0009	-0.0042	744.67	-565.34	-9.13	-879.57	-18.27	-1193.80
	0.090	0.090	0.0042	0.0008	-0.0050	661.99	-502.44	-13.84	-978.50	-27.68	-1454.55
	0.020	0.150	0.0031	0.0006	-0.0067	491.42	-372.78	-23.56	-1182.41	-47.12	-1992.03
	0.200	0.020	0.0054	0.0011	-0.0031	852.34	-647.30	-3.00	-750.67	-6.01	-854.05
-0.16	0	0	0.0057	-0.0009	-0.0026	903.87	-686.54	0.00	-686.54	0.00	-686.54
	0.010	0.010	0.0055	-0.0009	-0.0028	877.61	-666.54	1.14	-715.57	2.28	-764.59
	0.015	0.045	0.0050	-0.0008	-0.0037	784.30	-595.50	5.18	-818.65	10.37	-1041.79
	0.030	0.030	0.0052	-0.0008	-0.0033	824.56	-626.15	3.44	-774.18	6.88	-922.21
	0.075	0.060	0.0047	-0.0008	-0.0042	743.64	-564.56	6.95	-863.55	13.89	-1162.54
	0.090	0.090	0.0042	-0.0007	-0.0050	661.06	-501.73	10.53	-954.70	21.06	-1407.67
	0.020	0.150	0.0031	-0.0005	-0.0067	490.72	-372.25	17.92	-1142.58	35.84	-1912.92
	0.200	0.020	0.0054	-0.0009	-0.0031	851.18	-646.41	2.28	-744.78	4.57	-843.15

Note: % Change in price of H equals 0; Change in PS for H equals 0; Change in CS for H, $\omega = 0$, equals 0

Table 5.2.2 Scenario I: Welfare (million US$) and Caloric Effects of a 10% Increase in Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Change in social surplus, w=0**	**Change in social surplus, w=0.5**		**Change in social surplus, w=1**		**Change in caloric-intake per capita per year (calories)**			**Average weight change per year (lbs)**
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$\Delta NS^n_{\omega=0}$	$\Delta NS^h_{\omega=0.5}$	$\Delta NS^n_{\omega=0.5}$	$\Delta NS^h_{\omega=1}$	$\Delta NS^n_{\omega=1}$	**H**	**N**	**H+N**	
0	0	0	204.20	0.00	204.20	0.00	204.20	0	-3229	-3229	-0.92
	0.010	0.010	197.95	0.00	152.82	0.00	107.68	0	-3561	-3561	-1.02
	0.015	0.045	175.73	0.00	-29.71	0.00	-235.15	0	-4740	-4740	-1.35
	0.030	0.030	185.32	0.00	49.03	0.00	-87.26	0	-4231	-4231	-1.21
	0.075	0.060	166.04	0.00	-109.24	0.00	-384.51	0	-5254	-5254	-1.50
	0.090	0.090	146.32	0.00	-270.70	0.00	-687.73	0	-6299	-6299	-1.80
	0.020	0.150	105.56	0.00	-603.61	0.00	-1312.77	0	-8454	-8454	-2.42
	0.200	0.020	191.66	0.00	101.09	0.00	10.53	0	-3895	-3895	-1.11
0.2	0	0	205.03	0.00	205.03	0.00	205.03	178	-3241	-3063	-0.88
	0.010	0.010	198.76	-1.50	147.24	-2.99	95.72	172	-3572	-3400	-0.97
	0.015	0.045	176.46	-6.81	-58.05	-13.63	-292.56	154	-4750	-4596	-1.31
	0.030	0.030	186.09	-4.52	30.51	-9.04	-125.06	162	-4242	-4080	-1.17
	0.075	0.060	166.73	-9.13	-147.50	-18.27	-461.73	146	-5264	-5118	-1.46
	0.090	0.090	146.95	-13.84	-329.11	-27.68	-805.17	130	-6307	-6177	-1.76
	0.020	0.150	106.04	-23.56	-703.59	-47.12	-1513.21	96	-8459	-8363	-2.39
	0.200	0.020	192.45	-3.00	89.07	-6.01	-14.31	167	-3906	-3739	-1.07
-0.16	0	0	204.73	0.00	204.73	0.00	204.73	-142	-3236	-3378	-0.97
	0.010	0.010	198.47	1.14	149.44	2.28	100.42	-138	-3568	-3706	-1.06
	0.015	0.045	176.20	5.18	-46.94	10.37	-270.08	-123	-4747	-4870	-1.39
	0.030	0.030	185.81	3.44	37.78	6.88	-110.25	-129	-4238	-4368	-1.25
	0.075	0.060	166.48	6.95	-132.51	13.89	-431.51	-117	-5260	-5377	-1.54
	0.090	0.090	146.72	10.53	-306.25	21.06	-759.22	-104	-6304	-6408	-1.83
	0.020	0.150	105.87	17.92	-664.47	35.84	-1434.80	-77	-8457	-8535	-2.44
	0.200	0.020	192.16	2.28	93.80	4.57	-4.57	-134	-3902	-4036	-1.15

Note: Change in TS for H equals 0, for N equals $-12.6 million; Change in NS for H, $\omega = 0$, equals 0

Table 5.2.3 Scenario I: Caloric and Nutritional Effects of a 10% Increase in Government Promotional Expenditures for Agricultural Exports

Product Relation -ships	Response level to domestic promotions for H & N	Change in caloric-intake	**Absolute changes in yearly intake level & Relative change in daily intake level (average 2000-04) of selected macronutrients and micronutrients**													
			Fat (g)	%	Fiber (g)	%	Vit. A (mg)	%	Vit. C (mg)	%	Calcium (mg)	%	Iron (mg)	%	Sodium (mg)	%
Ind.	None	-3229	-158.2	-0.24	-11.5	-0.13	-711.2	-0.21	-11.5	-0.03	-776.0	-0.22	-17.4	-0.20	-793.5	-0.18
	Es	-3561	-174.5	-0.27	-12.7	-0.14	-784.3	-0.23	-12.7	-0.03	-855.7	-0.24	-19.2	-0.22	-875.1	-0.19
	Nm	-4740	-232.3	-0.36	-16.9	-0.19	-1044.2	-0.30	-16.9	-0.04	-1139.2	-0.32	-25.5	-0.30	-1165.0	-0.26
	Em	-4231	-207.4	-0.32	-15.1	-0.17	-932.1	-0.27	-15.1	-0.04	-1016.9	-0.29	-22.8	-0.27	-1040.0	-0.23
	Hm	-5254	-257.5	-0.40	-18.8	-0.21	-1157.5	-0.33	-18.8	-0.05	-1262.8	-0.36	-28.3	-0.33	-1291.4	-0.29
	El	-6299	-308.7	-0.47	-22.5	-0.25	-1387.5	-0.40	-22.5	-0.06	-1513.8	-0.43	-33.9	-0.40	-1548.1	-0.34
	Nl	-8454	-414.3	-0.64	-30.2	-0.34	-1862.3	-0.54	-30.2	-0.07	-2031.8	-0.57	-45.5	-0.53	-2077.8	-0.46
	Hl	-3895	-190.9	-0.29	-13.9	-0.15	-858.0	-0.25	-13.9	-0.03	-936.1	-0.26	-21.0	-0.24	-957.3	-0.21
Sub.	None	-3063	-155.0	-0.24	-6.3	-0.07	-582.1	-0.17	33.0	0.08	-722.6	-0.20	-15.5	-0.18	-634.9	-0.14
	Es	-3400	-171.4	-0.26	-7.7	-0.09	-659.0	-0.19	30.5	0.07	-803.9	-0.23	-17.3	-0.20	-721.1	-0.16
	Nm	-4596	-229.5	-0.35	-12.4	-0.14	-932.0	-0.27	21.7	0.05	-1092.8	-0.31	-23.9	-0.28	-1027.2	-0.23
	Em	-4080	-204.4	-0.31	-10.4	-0.12	-814.2	-0.23	25.5	0.06	-968.1	-0.27	-21.1	-0.25	-895.1	-0.20
	Hm	-5118	-254.8	-0.39	-14.5	-0.16	-1051.1	-0.30	17.8	0.04	-1218.7	-0.34	-26.7	-0.31	-1160.7	-0.26
	El	-6177	-306.3	-0.47	-18.7	-0.21	-1292.9	-0.37	10.1	0.02	-1474.5	-0.42	-32.5	-0.38	-1431.8	-0.32
	Nl	-8363	-412.5	-0.63	-27.4	-0.30	-1791.9	-0.52	-6.0	-0.01	-2002.5	-0.56	-44.5	-0.52	-1991.3	-0.44
	Hl	-3739	-187.8	-0.29	-9.0	-0.10	-736.3	-0.21	28.0	0.07	-885.7	-0.25	-19.2	-0.22	-807.8	-0.18
Com.	None	-3378	-161.6	-0.25	-15.8	-0.18	-818.2	-0.24	-47.1	-0.12	-822.8	-0.23	-19.0	-0.22	-924.6	-0.21
	Es	-3706	-177.8	-0.27	-16.8	-0.19	-888.2	-0.26	-47.3	-0.12	-901.2	-0.25	-20.7	-0.24	-1002.3	-0.22
	Nm	-4870	-235.2	-0.36	-20.6	-0.23	-1137.0	-0.33	-47.8	-0.12	-1179.8	-0.33	-26.9	-0.31	-1278.7	-0.28
	Em	-4368	-210.5	-0.32	-19.0	-0.21	-1029.6	-0.30	-47.6	-0.12	-1059.6	-0.30	-24.3	-0.28	-1159.5	-0.26
	Hm	-5377	-260.3	-0.40	-22.3	-0.25	-1245.4	-0.36	-48.1	-0.12	-1301.3	-0.37	-29.6	-0.35	-1399.2	-0.31
	El	-6408	-311.2	-0.48	-25.6	-0.29	-1465.7	-0.42	-48.6	-0.12	-1548.0	-0.44	-35.1	-0.41	-1643.9	-0.36
	Nl	-8535	-416.1	-0.64	-32.5	-0.36	-1920.2	-0.55	-49.5	-0.12	-2057.1	-0.58	-46.4	-0.54	-2148.8	-0.48
	Hl	-4036	-194.1	-0.30	-17.9	-0.20	-958.7	-0.28	-47.4	-0.12	-980.1	-0.28	-22.5	-0.26	-1080.6	-0.24

Table 5.3.1 Scenario II: Market and Welfare Effects (million US$) of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Percentage change in demand price**	**Percentage change in domestic consumption**		**Change in producer surplus**	**Change in consumer surplus, w=0**	**Change in consumer surplus, w=0.5**		**Change in consumer surplus, w=1**	
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$d\ln P^h$	$d\ln Q_d^h$	$d\ln Q_d^n$	ΔPS^h	$\Delta CS^h_{\omega=0}$	$\Delta CS^h_{\omega=0.5}$	$\Delta CS^n_{\omega=0.5}$	$\Delta CS^h_{\omega=1}$	$\Delta CS^n_{\omega=1}$
0	0	0	-0.0215	0.0155	0.0000	-507.39	272.37	272.37	0.00	272.37	0.00
	0.010	0.010	-0.0208	0.0147	0.0000	-490.08	263.26	261.03	0.00	258.80	0.00
	0.015	0.045	-0.0205	0.0144	0.0000	-481.38	258.70	255.41	0.00	252.12	0.00
	0.030	0.030	-0.0194	0.0132	0.0000	-455.17	244.95	238.72	0.00	232.49	0.00
	0.075	0.060	-0.0161	0.0101	0.0000	-375.32	203.23	190.31	0.00	177.39	0.00
	0.090	0.090	-0.0150	0.0092	0.0000	-348.29	189.16	174.73	0.00	160.30	0.00
	0.020	0.150	-0.0201	0.0140	0.0000	-472.67	254.12	249.81	0.00	245.51	0.00
	0.200	0.020	-0.0066	0.0032	0.0000	-143.41	83.34	69.21	0.00	55.09	0.00
0.2	0	0	-0.0216	0.0156	-0.0043	-509.37	273.41	273.41	0.00	273.41	0.00
	0.010	0.010	-0.0209	0.0148	-0.0042	-492.00	264.27	261.71	-10.86	259.15	-21.72
	0.015	0.045	-0.0205	0.0144	-0.0041	-483.27	259.69	255.92	-16.01	252.15	-32.02
	0.030	0.030	-0.0195	0.0133	-0.0039	-456.97	245.89	238.75	-30.34	231.61	-60.68
	0.075	0.060	-0.0162	0.0102	-0.0032	-376.83	204.01	189.21	-63.05	174.40	-126.10
	0.090	0.090	-0.0151	0.0092	-0.0030	-349.70	189.89	173.35	-70.47	156.82	-140.93
	0.020	0.150	-0.0202	0.0140	-0.0040	-474.53	255.09	250.16	-20.97	245.22	-41.95
	0.200	0.020	-0.0067	0.0032	-0.0013	-144.05	83.67	67.48	-69.26	51.28	-138.53
-0.16	0	0	-0.0216	0.0155	0.0035	-508.66	273.04	273.04	0.00	273.04	0.00
	0.010	0.010	-0.0209	0.0148	0.0033	-491.30	263.91	261.48	8.29	259.05	16.57
	0.015	0.045	-0.0205	0.0144	0.0033	-482.59	259.33	255.75	12.21	252.17	24.43
	0.030	0.030	-0.0194	0.0133	0.0031	-456.32	245.55	238.76	23.14	231.98	46.28
	0.075	0.060	-0.0161	0.0101	0.0026	-376.29	203.73	189.66	48.06	175.59	96.12
	0.090	0.090	-0.0150	0.0092	0.0024	-349.19	189.63	173.91	53.70	158.20	107.41
	0.020	0.150	-0.0202	0.0140	0.0032	-473.86	254.74	250.05	16.00	245.36	32.00
	0.200	0.020	-0.0066	0.0032	0.0011	-143.82	83.55	68.17	52.71	52.78	105.41

Note: % Change in price of N equals 0; Change in PS for N equals 0; Change in CS for N, $\omega = 0$, equals 0

Table 5.3.2 Scenario II: Welfare (million US$) and Caloric Effects of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Change in social surplus, w=0**	**Change in social surplus, w=0.5**		**Change in social surplus, w=1**		**Change in caloric-intake per capita per year (calories)**			**Average weight change per year (lbs)**
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$\Delta NS^h_{\omega=0}$	$\Delta NS^h_{\omega=0.5}$	$\Delta NS^n_{\omega=0.5}$	$\Delta NS^h_{\omega=1}$	$\Delta NS^n_{\omega=1}$	**H**	**N**	**H+N**	
0	0	0	-222.80	-222.80	0.00	-222.80	0.00	2405	0	2405	0.69
	0.010	0.010	-214.59	-216.82	0.00	-219.05	0.00	2286	0	2286	0.65
	0.015	0.045	-210.47	-213.75	0.00	-217.04	0.00	2227	0	2227	0.64
	0.030	0.030	-198.01	-204.23	0.00	-210.46	0.00	2055	0	2055	0.59
	0.075	0.060	-159.87	-172.79	0.00	-185.71	0.00	1570	0	1570	0.45
	0.090	0.090	-146.91	-161.33	0.00	-175.76	0.00	1420	0	1420	0.41
	0.020	0.150	-206.33	-210.63	0.00	-214.94	0.00	2169	0	2169	0.62
	0.200	0.020	-47.85	-61.97	0.00	-76.10	0.00	489	0	489	0.14
0.2	0	0	-223.74	-223.74	0.00	-223.74	0.00	2414	-5476	-3062	-0.87
	0.010	0.010	-215.51	-218.06	-10.86	-220.62	-21.72	2294	-5295	-3000	-0.86
	0.015	0.045	-211.37	-215.14	-16.01	-218.91	-32.02	2236	-5204	-2968	-0.85
	0.030	0.030	-198.87	-206.00	-30.34	-213.14	-60.68	2063	-4930	-2867	-0.82
	0.075	0.060	-160.60	-175.41	-63.05	-190.21	-126.10	1576	-4097	-2521	-0.72
	0.090	0.090	-147.59	-164.13	-70.47	-180.66	-140.93	1425	-3815	-2390	-0.68
	0.020	0.150	-207.21	-212.15	-20.97	-217.09	-41.95	2177	-5113	-2935	-0.84
	0.200	0.020	-48.16	-64.36	-69.26	-80.55	-138.53	491	-1686	-1195	-0.34
-0.16	0	0	-223.40	-223.40	0.00	-223.40	0.00	2410	4375	6785	1.94
	0.010	0.010	-215.18	-217.61	8.29	-220.04	16.57	2291	4230	6521	1.86
	0.015	0.045	-211.04	-214.62	12.21	-218.20	24.43	2232	4157	6390	1.83
	0.030	0.030	-198.56	-205.34	23.14	-212.12	46.28	2060	3939	5998	1.71
	0.075	0.060	-160.34	-174.41	48.06	-188.47	96.12	1574	3273	4847	1.38
	0.090	0.090	-147.34	-163.06	53.70	-178.77	107.41	1423	3048	4471	1.28
	0.020	0.150	-206.89	-211.58	16.00	-216.27	32.00	2174	4085	6259	1.79
	0.200	0.020	-48.05	-63.43	52.71	-78.82	105.41	491	1347	1838	0.53

Note: Change in TS for N equals 0, for H equals $12.22 million; Change in NS for N, $\omega = 0$, equals 0

Table 5.3.3 Scenario II: Caloric and Nutritional Effects of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Product relation-ships	Response level to Domestic Promotions for H & N	Change in caloric-intake	**Absolute changes in yearly intake level & Relative change in daily intake level (average 2000-04) of selected macronutrients and micronutrients**													
			Fat (g)	%	Fiber (g)	%	Vit. A (mg)	%	Vit. C (mg)	%	Calcium (mg)	%	Iron (mg)	%	Sodium (mg)	%
Ind.	None	2405	51.5	0.08	71.3	0.79	1784.5	0.51	603.1	1.48	762.7	0.21	26.6	0.31	2189.0	0.49
	Es	2286	48.9	0.08	67.8	0.75	1696.2	0.49	573.3	1.41	725.0	0.20	25.3	0.29	2080.8	0.46
	Nm	2227	47.7	0.07	66.0	0.74	1652.7	0.48	558.6	1.37	706.4	0.20	24.6	0.29	2027.4	0.45
	Em	2055	44.0	0.07	60.9	0.68	1524.9	0.44	515.4	1.27	651.7	0.18	22.7	0.26	1870.6	0.42
	Hm	1570	33.6	0.05	46.6	0.52	1165.3	0.34	393.9	0.97	498.1	0.14	17.4	0.20	1429.5	0.32
	El	1420	30.4	0.05	42.1	0.47	1053.6	0.30	356.1	0.88	450.3	0.13	15.7	0.18	1292.4	0.29
	Nl	2169	46.4	0.07	64.3	0.72	1609.7	0.46	544.1	1.34	688.0	0.19	24.0	0.28	1974.6	0.44
	Hl	489	10.5	0.02	14.5	0.16	363.2	0.10	122.7	0.30	155.2	0.04	5.4	0.06	445.5	0.10
Sub.	None	-3062	-216.7	-0.33	52.0	0.58	585.0	0.17	585.8	1.44	-550.4	-0.16	-2.8	-0.03	851.5	0.19
	Es	-3000	-210.3	-0.32	49.1	0.55	536.3	0.15	556.6	1.37	-544.8	-0.15	-3.2	-0.04	787.3	0.17
	Nm	-2968	-207.2	-0.32	47.7	0.53	512.7	0.15	542.1	1.33	-541.6	-0.15	-3.3	-0.04	756.1	0.17
	Em	-2867	-197.4	-0.30	43.5	0.48	444.7	0.13	499.7	1.23	-530.6	-0.15	-3.8	-0.04	666.0	0.15
	Hm	-2521	-167.0	-0.26	32.1	0.36	267.4	0.08	380.7	0.94	-484.6	-0.14	-4.6	-0.05	428.1	0.10
	El	-2390	-156.4	-0.24	28.6	0.32	217.2	0.06	343.8	0.85	-464.9	-0.13	-4.8	-0.06	359.7	0.08
	Nl	-2935	-203.9	-0.31	46.3	0.52	489.6	0.14	527.9	1.30	-538.2	-0.15	-3.5	-0.04	725.5	0.16
	Hl	-1195	-72.1	-0.11	8.5	0.10	-6.8	0.00	117.2	0.29	-249.4	-0.07	-3.7	-0.04	32.8	0.01
Com.	None	6785	266.0	0.41	87.1	0.97	2752.5	0.79	620.2	1.53	1815.9	0.51	50.2	0.59	3269.5	0.73
	Es	6521	256.4	0.39	83.0	0.92	2632.1	0.76	589.8	1.45	1743.3	0.49	48.1	0.56	3125.4	0.69
	Nm	6390	251.5	0.39	81.0	0.90	2572.6	0.74	574.8	1.41	1707.3	0.48	47.1	0.55	3054.1	0.68
	Em	5998	237.1	0.36	75.1	0.84	2396.2	0.69	530.7	1.31	1599.9	0.45	44.0	0.51	2843.2	0.63
	Hm	4847	194.1	0.30	58.4	0.65	1889.2	0.54	406.5	1.00	1285.9	0.36	35.0	0.41	2237.4	0.50
	El	4471	179.8	0.28	53.1	0.59	1727.6	0.50	367.9	0.90	1183.9	0.33	32.2	0.37	2044.7	0.45
	Nl	6259	246.7	0.38	79.1	0.88	2513.4	0.72	560.0	1.38	1671.3	0.47	46.1	0.54	2983.3	0.66
	Hl	1838	76.5	0.12	19.4	0.22	660.8	0.19	127.9	0.31	479.3	0.14	12.7	0.15	777.7	0.17

Table 5.4.1 Scenario III: Market and Welfare Effects (million US$) of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Percentage change in demand price**	**Percentage change in domestic consumption**		**Change in producer surplus**	**Change in consumer surplus, w=0**	**Change in consumer surplus, w=0.5**		**Change in consumer surplus, w=1**	
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$d\ln P^h$	$d\ln Q_d^h$	$d\ln Q_d^n$	ΔPS^h	$\Delta CS^h_{\omega=0}$	$\Delta CS^h_{\omega=0.5}$	$\Delta CS^n_{\omega=0.5}$	$\Delta CS^h_{\omega=1}$	$\Delta CS^n_{\omega=1}$
0	0	0	-0.0215	0.0155	0.0000	-526.94	272.37	272.37	0.00	272.37	0.00
	0.010	0.010	-0.0208	0.0187	0.0000	-509.63	263.78	296.66	0.00	329.53	0.00
	0.015	0.045	-0.0205	0.0203	0.0000	-500.93	259.47	308.87	0.00	358.28	0.00
	0.030	0.030	-0.0194	0.0252	0.0000	-474.72	246.40	345.80	0.00	445.21	0.00
	0.075	0.060	-0.0161	0.0400	0.0000	-394.87	206.25	459.24	0.00	712.23	0.00
	0.090	0.090	-0.0150	0.0451	0.0000	-367.84	192.54	497.96	0.00	803.38	0.00
	0.020	0.150	-0.0201	0.0220	0.0000	-492.22	255.13	321.14	0.00	387.14	0.00
	0.200	0.020	-0.0066	0.0830	0.0000	-162.96	86.66	796.49	0.00	1506.33	0.00
0.2	0	0	-0.0216	0.0156	-0.0043	-528.92	273.41	273.41	0.00	273.41	0.00
	0.010	0.010	-0.0209	0.0188	-0.0042	-511.55	264.79	302.32	159.06	339.85	318.12
	0.015	0.045	-0.0205	0.0204	-0.0041	-502.82	260.46	316.86	238.88	373.27	477.76
	0.030	0.030	-0.0195	0.0253	-0.0039	-476.52	247.35	360.83	479.50	474.32	959.00
	0.075	0.060	-0.0162	0.0401	-0.0032	-396.38	207.05	495.89	1211.97	784.74	2423.94
	0.090	0.090	-0.0151	0.0451	-0.0030	-369.25	193.29	541.99	1459.73	890.70	2919.45
	0.020	0.150	-0.0202	0.0220	-0.0040	-494.08	256.10	331.46	318.89	406.82	637.79
	0.200	0.020	-0.0067	0.0830	-0.0013	-163.60	87.00	897.52	3334.03	1708.04	6668.06
-0.16	0	0	-0.0216	0.0155	0.0035	-528.21	273.04	273.04	0.00	273.04	0.00
	0.010	0.010	-0.0209	0.0188	0.0033	-510.85	264.43	300.14	-121.53	335.85	-243.06
	0.015	0.045	-0.0205	0.0204	0.0033	-502.14	260.10	313.77	-182.51	367.44	-365.01
	0.030	0.030	-0.0194	0.0252	0.0031	-475.87	247.01	354.98	-366.27	462.96	-732.53
	0.075	0.060	-0.0161	0.0401	0.0026	-395.84	206.76	481.58	-925.20	756.40	-1850.40
	0.090	0.090	-0.0150	0.0451	0.0024	-368.74	193.02	524.79	-1114.11	856.57	-2228.21
	0.020	0.150	-0.0202	0.0220	0.0032	-493.41	255.75	327.45	-243.62	399.15	-487.24
	0.200	0.020	-0.0066	0.0830	0.0011	-163.37	86.88	858.02	-2540.69	1629.16	-5081.37

Note: % Change in price of N equals 0; Change in PS for N equals 0; Change in CS for N, $\omega = 0$, equals 0

Table 5.4.2 Scenario III: Welfare (million US$) and Caloric Effects of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Change in social surplus, w=0**	**Change in social surplus, w=0.5**		**Change in social surplus, w=1**		**Change in caloric-intake per capita per year (calories)**			**Average weight change per year (lbs)**
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$\Delta NS_{\omega=0}^h$	$\Delta NS_{\omega=0.5}^h$	$\Delta NS_{\omega=0.5}^n$	$\Delta NS_{\omega=1}^h$	$\Delta NS_{\omega=1}^n$	**H**	**N**	**H+N**	
0	0	0	-242.35	-242.35	0.00	-242.35	0.00	2405	0	2405	0.69
	0.010	0.010	-233.62	-200.75	0.00	-167.87	0.00	2905	0	2905	0.83
	0.015	0.045	-229.25	-179.84	0.00	-130.43	0.00	3155	0	3155	0.90
	0.030	0.030	-216.10	-116.70	0.00	-17.30	0.00	3912	0	3912	1.12
	0.075	0.060	-176.40	76.59	0.00	329.58	0.00	6212	0	6212	1.77
	0.090	0.090	-163.08	142.34	0.00	447.76	0.00	6990	0	6990	2.00
	0.020	0.150	-224.87	-158.86	0.00	-92.86	0.00	3407	0	3407	0.97
	0.200	0.020	-64.08	645.76	0.00	1355.59	0.00	12868	0	12868	3.68
0.2	0	0	-243.29	-243.29	0.00	-243.29	0.00	2414	-5476	-3062	-0.87
	0.010	0.010	-234.53	-197.00	159.06	-159.47	318.12	2913	-5295	-2381	-0.68
	0.015	0.045	-230.15	-173.74	238.88	-117.33	477.76	3164	-5204	-2040	-0.58
	0.030	0.030	-216.95	-103.47	479.50	10.02	959.00	3919	-4930	-1011	-0.29
	0.075	0.060	-177.11	111.73	1211.97	400.58	2423.94	6218	-4097	2121	0.61
	0.090	0.090	-163.75	184.96	1459.73	533.67	2919.45	6995	-3815	3180	0.91
	0.020	0.150	-225.75	-150.40	318.89	-75.04	637.79	3415	-5113	-1698	-0.49
	0.200	0.020	-64.38	746.14	3334.03	1556.65	6668.06	12870	-1686	11184	3.20
-0.16	0	0	-242.95	-242.95	0.00	-242.95	0.00	2410	4375	6785	1.94
	0.010	0.010	-234.20	-198.49	-121.53	-162.79	-243.06	2910	4230	7140	2.04
	0.015	0.045	-229.82	-176.15	-182.51	-122.48	-365.01	3161	4157	7318	2.09
	0.030	0.030	-216.65	-108.67	-366.27	-0.69	-732.53	3917	3939	7855	2.24
	0.075	0.060	-176.86	97.97	-925.20	372.79	-1850.40	6216	3273	9489	2.71
	0.090	0.090	-163.50	168.27	-1114.11	500.05	-2228.21	6993	3048	10041	2.87
	0.020	0.150	-225.43	-153.73	-243.62	-82.03	-487.24	3412	4085	7497	2.14
	0.200	0.020	-64.27	706.87	-2540.69	1478.01	-5081.37	12869	1347	14216	4.06

Note: Change in TS for N equals 0, for H equals $12.22 million; Change in NS for N, $\omega = 0$, equals 0

Table 5.4.3 Scenario III: Caloric and Nutritional Effects of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Product relation-ships	Response Level to Domestic Promotions for H & N	Change in caloric-intake	**Absolute changes in yearly intake level & Relative change in daily intake level (average 2000-04) of selected macronutrients and micronutrients**													
			Fat (g)	%	Fiber (g)	%	Vit. A (mg)	%	Vit. C (mg)	%	Calcium (mg)	%	Iron (mg)	%	Sodium (mg)	%
Ind.	None	2405	51.5	0.08	71.3	0.79	1784.5	0.51	603.1	1.48	762.7	0.21	26.6	0.31	2189.0	0.49
	Es	2905	62.2	0.10	86.1	0.96	2155.5	0.62	728.5	1.79	921.3	0.26	32.1	0.37	2644.2	0.59
	Nm	3155	67.6	0.10	93.5	1.04	2341.7	0.68	791.5	1.95	1000.8	0.28	34.9	0.41	2872.6	0.64
	Em	3912	83.8	0.13	116.0	1.29	2902.8	0.84	981.1	2.41	1240.7	0.35	43.3	0.50	3560.9	0.79
	Hm	6212	133.0	0.20	184.2	2.05	4610.2	1.33	1558.2	3.83	1970.4	0.56	68.7	0.80	5655.3	1.26
	El	6990	149.7	0.23	207.2	2.31	5187.4	1.50	1753.3	4.31	2217.1	0.62	77.3	0.90	6363.4	1.41
	Nl	3407	72.9	0.11	101.0	1.12	2528.3	0.73	854.5	2.10	1080.6	0.30	37.7	0.44	3101.5	0.69
	Hl	12868	275.5	0.42	381.5	4.25	9549.4	2.75	3227.5	7.94	4081.4	1.15	142.3	1.66	11714.2	2.60
Sub.	None	-3062	-216.7	-0.33	52.0	0.58	585.0	0.17	585.8	1.44	-550.4	-0.16	-2.8	-0.03	851.5	0.19
	Es	-2381	-197.1	-0.30	67.5	0.75	995.6	0.29	711.8	1.75	-348.5	-0.10	3.7	0.04	1350.8	0.30
	Nm	-2040	-187.3	-0.29	75.2	0.84	1201.7	0.35	775.0	1.91	-247.1	-0.07	7.0	0.08	1601.3	0.36
	Em	-1011	-157.7	-0.24	98.6	1.10	1822.7	0.53	965.5	2.37	58.3	0.02	16.8	0.20	2356.3	0.52
	Hm	2121	-67.6	-0.10	169.7	1.89	3712.2	1.07	1545.0	3.80	987.7	0.28	46.7	0.54	4653.9	1.03
	El	3180	-37.2	-0.06	193.8	2.16	4351.1	1.25	1741.0	4.28	1301.9	0.37	56.8	0.66	5430.7	1.21
	Nl	-1698	-177.4	-0.27	83.0	0.92	1408.2	0.41	838.3	2.06	-145.6	-0.04	10.2	0.12	1852.4	0.41
	Hl	11184	192.9	0.30	375.5	4.18	9179.4	2.65	3222.0	7.92	3676.7	1.04	133.2	1.55	11301.6	2.51
Com.	None	6785	266.0	0.41	87.1	0.97	2752.5	0.79	620.2	1.53	1815.9	0.51	50.2	0.59	3269.5	0.73
	Es	7140	269.6	0.41	101.4	1.13	3091.4	0.89	745.0	1.83	1939.6	0.55	55.0	0.64	3688.9	0.82
	Nm	7318	271.4	0.42	108.6	1.21	3261.5	0.94	807.7	1.99	2001.7	0.56	57.4	0.67	3899.3	0.87
	Em	7855	276.9	0.42	130.2	1.45	3774.2	1.09	996.4	2.45	2188.8	0.62	64.5	0.75	4533.5	1.01
	Hm	9489	293.5	0.45	196.0	2.18	5334.0	1.54	1570.8	3.86	2758.2	0.78	86.4	1.01	6463.2	1.43
	El	10041	299.1	0.46	218.2	2.43	5861.4	1.69	1765.0	4.34	2950.7	0.83	93.8	1.09	7115.6	1.58
	Nl	7497	273.2	0.42	115.8	1.29	3432.0	0.99	870.4	2.14	2063.9	0.58	59.7	0.70	4110.2	0.91
	Hl	14216	341.6	0.52	386.3	4.30	9847.0	2.84	3232.7	7.95	4405.5	1.24	149.6	1.74	12046.4	2.67

Table 5.5.1 Scenario IV(a): Market and Welfare Effects (million US$) of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Percentage change in demand price**	**Percentage change in domestic consumption**		**Change in producer surplus**	**Change in consumer surplus, w=0**	**Change in consumer surplus, w=0.5**		**Change in consumer surplus, w=1**	
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$d\ln P^h$	$d\ln Q_d^h$	$d\ln Q_d^n$	ΔPS^h	$\Delta CS^h_{\omega=0}$	$\Delta CS^h_{\omega=0.5}$	$\Delta CS^n_{\omega=0.5}$	$\Delta CS^h_{\omega=1}$	$\Delta CS^n_{\omega=1}$
0	0	0	-0.0215	0.0155	0.0000	-526.94	272.37	272.37	0.00	272.37	0.00
	0.010	0.010	-0.0208	0.0201	0.0001	-509.63	263.96	308.63	15.74	353.29	31.48
	0.015	0.045	-0.0205	0.0223	0.0005	-500.93	259.72	326.86	70.84	393.99	141.67
	0.030	0.030	-0.0194	0.0292	0.0004	-474.72	246.89	381.96	47.22	517.03	94.44
	0.075	0.060	-0.0161	0.0501	0.0007	-394.87	207.26	551.09	94.46	894.92	188.91
	0.090	0.090	-0.0150	0.0571	0.0011	-367.84	193.67	608.77	141.71	1023.86	283.42
	0.020	0.150	-0.0201	0.0246	0.0018	-492.22	255.47	345.15	236.26	434.84	472.53
	0.200	0.020	-0.0066	0.1097	0.0002	-162.96	87.77	1052.57	31.48	2017.38	62.96
0.2	0	0	-0.0216	0.0156	-0.0043	-528.92	273.41	273.41	0.00	273.41	0.00
	0.010	0.010	-0.0209	0.0201	-0.0041	-511.55	264.97	316.49	233.94	368.01	467.88
	0.015	0.045	-0.0205	0.0224	-0.0036	-502.82	260.72	339.73	405.09	418.75	810.18
	0.030	0.030	-0.0195	0.0293	-0.0035	-476.52	247.84	403.64	704.25	559.44	1408.49
	0.075	0.060	-0.0162	0.0501	-0.0025	-396.38	208.07	603.84	1747.41	999.62	3494.82
	0.090	0.090	-0.0151	0.0571	-0.0020	-369.25	194.42	673.19	2135.01	1151.97	4270.03
	0.020	0.150	-0.0202	0.0247	-0.0023	-494.08	256.44	366.76	702.39	477.07	1404.79
	0.200	0.020	-0.0067	0.1097	-0.0011	-163.60	88.12	1190.89	4510.70	2293.66	9021.40
-0.16	0	0	-0.0216	0.0155	0.0035	-528.21	273.04	273.04	0.00	273.04	0.00
	0.010	0.010	-0.0209	0.0201	0.0035	-510.85	264.60	312.72	-147.91	360.84	-295.82
	0.015	0.045	-0.0205	0.0224	0.0038	-502.14	260.36	331.48	-170.73	402.60	-341.45
	0.030	0.030	-0.0194	0.0293	0.0035	-475.87	247.50	393.02	-445.44	538.54	-890.88
	0.075	0.060	-0.0161	0.0501	0.0033	-395.84	207.78	578.85	-1148.96	949.91	-2297.93
	0.090	0.090	-0.0150	0.0571	0.0035	-368.74	194.15	641.41	-1352.02	1088.67	-2704.03
	0.020	0.150	-0.0202	0.0247	0.0050	-493.41	256.09	347.50	-73.80	438.91	-147.59
	0.200	0.020	-0.0066	0.1097	0.0013	-163.37	87.99	1135.30	-3375.75	2182.60	-6751.50

Note: % Change in price of N equals 0; Change in PS for N equals 0; Change in CS for N, $\omega = 0$, equals 0

Table 5.5.2 Scenario IV(a): Welfare (million US$) and Caloric Effects of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Change in social surplus, w=0**	**Change in social surplus, w=0.5**		**Change in social surplus, w=1**		**Change in caloric-intake per capita per year (calories)**			**Average weight change per year (lbs)**
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$\Delta NS^h_{\omega=0}$	$\Delta NS^h_{\omega=0.5}$	$\Delta NS^n_{\omega=0.5}$	$\Delta NS^h_{\omega=1}$	$\Delta NS^n_{\omega=1}$	**H**	**N**	**H+N**	
0	0	0	-248.90	-248.90	-6.55	-248.90	-6.55	2405	0	2405	0.69
	0.010	0.010	-240.00	-195.33	9.19	-150.66	24.93	3112	148	3260	0.93
	0.015	0.045	-235.54	-168.41	64.29	-101.27	135.12	3466	667	4133	1.18
	0.030	0.030	-222.16	-87.09	40.67	47.98	87.89	4534	445	4978	1.42
	0.075	0.060	-181.94	161.89	87.91	505.72	182.36	7767	889	8656	2.47
	0.090	0.090	-168.50	246.60	135.16	661.69	276.87	8856	1334	10190	2.91
	0.020	0.150	-231.08	-141.39	229.71	-51.71	465.98	3822	2223	6044	1.73
	0.200	0.020	-69.52	895.29	24.93	1860.09	56.41	17015	296	17311	4.95
0.2	0	0	-249.84	-249.84	-6.55	-249.84	-6.55	2414	-5476	-3062	-0.87
	0.010	0.010	-240.91	-189.38	227.39	-137.86	461.33	3121	-5147	-2026	-0.58
	0.015	0.045	-236.44	-157.42	398.54	-78.40	803.63	3475	-4537	-1062	-0.30
	0.030	0.030	-223.01	-67.21	697.70	88.59	1401.94	4541	-4485	56	0.02
	0.075	0.060	-182.65	213.13	1740.86	608.91	3488.27	7773	-3208	4566	1.30
	0.090	0.090	-169.16	309.61	2128.46	788.39	4263.48	8862	-2481	6380	1.82
	0.020	0.150	-231.96	-121.65	695.84	-11.34	1398.24	3830	-2890	940	0.27
	0.200	0.020	-69.81	1032.96	4504.15	2135.73	9014.85	17017	-1390	15627	4.46
-0.16	0	0	-249.50	-249.50	-6.55	-249.50	-6.55	2410	4375	6785	1.94
	0.010	0.010	-240.58	-192.46	-154.46	-144.34	-302.37	3117	4378	7496	2.14
	0.015	0.045	-236.11	-164.99	-177.28	-93.87	-348.00	3472	4824	8296	2.37
	0.030	0.030	-222.71	-77.19	-451.99	68.34	-897.43	4539	4383	8922	2.55
	0.075	0.060	-182.39	188.68	-1155.51	559.75	-2304.48	7771	4162	11933	3.41
	0.090	0.090	-168.92	278.34	-1358.57	725.60	-2710.58	8860	4382	13241	3.78
	0.020	0.150	-231.65	-140.24	-80.35	-48.83	-154.14	3827	6307	10134	2.90
	0.200	0.020	-69.71	977.60	-3382.30	2024.90	-6758.05	17016	1643	18660	5.33

Note: Change in TS for N equals -$6.55 million, for H equals $5.67 million; Change in NS for N, $\omega = 0$, equals -$6.55 million

Table 5.5.3 Scenario IV(a): Caloric and Nutritional Effects of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Product relation -ships	Response Level to Domestic Promotions for H & N	Change in caloric-intake	**Absolute changes in yearly intake level & Relative change in daily intake level (average 2000-04) of selected macronutrients and micronutrients**													
			Fat (g)	%	Fiber (g)	%	Vit. A (mg)	%	Vit. C (mg)	%	Calcium (mg)	%	Iron (mg)	%	Sodium (mg)	%
Ind.	None	2405	51.5	0.08	71.3	0.79	1784.5	0.51	603.1	1.48	762.7	0.21	26.6	0.31	2189.0	0.49
	Es	3260	73.9	0.11	92.8	1.03	2342.1	0.68	781.1	1.92	1022.6	0.29	35.2	0.41	2869.4	0.64
	Nm	4133	106.9	0.16	105.2	1.17	2719.4	0.78	871.9	2.14	1259.7	0.36	41.9	0.49	3319.6	0.74
	Em	4978	118.9	0.18	136.0	1.51	3462.4	1.00	1138.7	2.80	1544.8	0.44	52.5	0.61	4236.5	0.94
	Hm	8656	209.9	0.32	233.5	2.60	5960.2	1.72	1951.4	4.80	2677.3	0.75	90.7	1.06	7289.6	1.62
	El	10190	255.0	0.39	267.3	2.98	6866.1	1.98	2226.1	5.47	3129.5	0.88	105.1	1.23	8390.1	1.86
	Nl	6044	190.8	0.29	121.2	1.35	3325.7	0.96	966.5	2.38	1746.3	0.49	54.2	0.63	4025.3	0.89
	Hl	17311	378.8	0.58	505.5	5.63	12692.4	3.66	4268.8	10.50	5468.0	1.54	189.8	2.21	15562.5	3.46
Sub.	None	-3062	-216.7	-0.33	52.0	0.58	585.0	0.17	585.8	1.44	-550.4	-0.16	-2.8	-0.03	851.5	0.19
	Es	-2026	-185.4	-0.28	74.1	0.83	1182.2	0.34	764.3	1.88	-247.1	-0.07	6.8	0.08	1575.9	0.35
	Nm	-1062	-147.9	-0.23	86.8	0.97	1579.4	0.46	855.4	2.10	11.8	0.00	14.0	0.16	2048.3	0.45
	Em	56	-122.6	-0.19	118.6	1.32	2382.2	0.69	1123.1	2.76	362.4	0.10	26.1	0.30	3031.9	0.67
	Hm	4566	9.2	0.01	219.0	2.44	5062.2	1.46	1938.3	4.77	1694.6	0.48	68.7	0.80	6288.2	1.40
	El	6380	68.1	0.10	253.9	2.83	6029.8	1.74	2213.9	5.44	2214.3	0.62	84.6	0.99	7457.4	1.66
	Nl	940	-59.6	-0.09	103.2	1.15	2205.6	0.64	950.3	2.34	520.2	0.15	26.8	0.31	2776.2	0.62
	Hl	15627	296.3	0.45	499.5	5.56	12322.4	3.55	4263.3	10.48	5063.4	1.43	180.7	2.11	15149.8	3.36
Com.	None	6785	266.0	0.41	87.1	0.97	2752.5	0.79	620.2	1.53	1815.9	0.51	50.2	0.59	3269.5	0.73
	Es	7496	281.3	0.43	108.1	1.20	3278.0	0.95	797.6	1.96	2041.0	0.58	58.1	0.68	3914.1	0.87
	Nm	8296	310.8	0.48	120.2	1.34	3639.2	1.05	888.1	2.18	2260.6	0.64	64.4	0.75	4346.3	0.96
	Em	8922	312.0	0.48	150.2	1.67	4333.8	1.25	1154.1	2.84	2493.0	0.70	73.8	0.86	5209.1	1.16
	Hm	11933	370.4	0.57	245.3	2.73	6684.0	1.93	1964.1	4.83	3465.1	0.98	108.4	1.26	8097.5	1.80
	El	13241	404.4	0.62	278.3	3.10	7540.1	2.17	2237.9	5.50	3863.1	1.09	121.6	1.42	9142.4	2.03
	Nl	10134	391.0	0.60	136.0	1.51	4229.4	1.22	982.4	2.42	2729.7	0.77	76.3	0.89	5034.1	1.12
	Hl	18660	444.9	0.68	510.4	5.68	12990.0	3.75	4273.9	10.51	5792.1	1.63	197.0	2.30	15894.7	3.53

Table 5.6.1 Scenario IV(b): Market and Welfare Effects (million US$) of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Percentage change in demand price**	**Percentage change in domestic consumption**		**Change in producer surplus**	**Change in consumer surplus, w=0**	**Change in consumer surplus, w=0.5**		**Change in consumer surplus, w=1**	
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$d\ln P^h$	$d\ln Q_d^h$	$d\ln Q_d^n$	ΔPS^h	$\Delta CS^h_{\omega=0}$	$\Delta CS^h_{\omega=0.5}$	$\Delta CS^n_{\omega=0.5}$	$\Delta CS^h_{\omega=1}$	$\Delta CS^n_{\omega=1}$
0	0	0	-0.0215	0.0155	0.0000	-526.94	272.37	272.37	0.00	272.37	0.00
	0.010	0.010	-0.0208	0.0211	0.0000	-509.63	264.10	318.21	3.15	372.32	6.29
	0.015	0.045	-0.0205	0.0240	0.0001	-500.93	259.93	341.27	14.16	422.60	28.33
	0.030	0.030	-0.0194	0.0324	0.0001	-474.72	247.28	410.99	9.44	574.69	18.89
	0.075	0.060	-0.0161	0.0581	0.0001	-394.87	208.08	625.20	18.89	1042.32	37.77
	0.090	0.090	-0.0150	0.0667	0.0002	-367.84	194.58	698.32	28.33	1202.06	56.66
	0.020	0.150	-0.0201	0.0268	0.0004	-492.22	255.74	364.41	47.22	473.09	94.44
	0.200	0.020	-0.0066	0.1311	0.0000	-162.96	88.66	1261.92	6.29	2435.19	12.59
0.2	0	0	-0.0216	0.0156	-0.0043	-528.92	273.41	273.41	0.00	273.41	0.00
	0.010	0.010	-0.0209	0.0212	-0.0042	-511.55	265.11	327.00	265.13	388.88	530.25
	0.015	0.045	-0.0205	0.0240	-0.0040	-502.82	260.92	354.27	408.76	447.61	817.52
	0.030	0.030	-0.0195	0.0325	-0.0038	-476.52	248.23	435.46	797.76	622.70	1595.51
	0.075	0.060	-0.0162	0.0581	-0.0031	-396.38	208.88	685.80	2002.56	1162.72	4005.12
	0.090	0.090	-0.0151	0.0668	-0.0028	-369.25	195.33	771.48	2415.09	1347.63	4830.18
	0.020	0.150	-0.0202	0.0268	-0.0037	-494.08	256.71	382.39	577.76	508.06	1155.52
	0.200	0.020	-0.0067	0.1311	-0.0013	-163.60	89.01	1428.95	5393.75	2768.89	10787.49
-0.16	0	0	-0.0216	0.0155	0.0035	-528.21	273.04	273.04	0.00	273.04	0.00
	0.010	0.010	-0.0209	0.0212	0.0034	-510.85	264.74	323.45	-196.40	382.15	-392.79
	0.015	0.045	-0.0205	0.0240	0.0034	-502.14	260.56	348.56	-284.54	436.56	-569.07
	0.030	0.030	-0.0194	0.0325	0.0032	-475.87	247.89	425.48	-590.85	603.08	-1181.70
	0.075	0.060	-0.0161	0.0581	0.0027	-395.84	208.59	661.24	-1491.70	1113.89	-2983.40
	0.090	0.090	-0.0150	0.0667	0.0026	-368.74	195.06	741.56	-1787.75	1288.06	-3575.49
	0.020	0.150	-0.0202	0.0268	0.0036	-493.41	256.36	373.22	-348.87	490.07	-697.75
	0.200	0.020	-0.0066	0.1311	0.0011	-163.37	88.89	1363.33	-4097.92	2637.78	-8195.85

Note: % Change in price of N equals 0; Change in PS for N equals 0; Change in CS for N, $\omega = 0$, equals 0

Table 5.6.2 Scenario IV(b): Welfare (million US$) and Caloric Effects of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Change in social surplus, w=0**	**Change in social surplus, w=0.5**		**Change in social surplus, w=1**		**Change in caloric-intake per capita per year (calories)**			**Average weight change per year (lbs)**
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$\Delta NS^h_{\omega=0}$	$\Delta NS^h_{\omega=0.5}$	$\Delta NS^n_{\omega=0.5}$	$\Delta NS^h_{\omega=1}$	$\Delta NS^n_{\omega=1}$	**H**	**N**	**H+N**	
0	0	0	-254.14	-254.14	-1.31	-254.14	-1.31	2405	0	2405	0.69
	0.010	0.010	-245.10	-190.98	1.84	-136.87	4.98	3278	30	3307	0.94
	0.015	0.045	-240.57	-159.24	12.85	-77.90	27.02	3715	133	3849	1.10
	0.030	0.030	-227.01	-63.31	8.13	100.40	17.58	5031	89	5120	1.46
	0.075	0.060	-186.36	230.76	17.58	647.88	36.46	9012	178	9189	2.63
	0.090	0.090	-172.83	330.91	27.02	834.65	55.35	10349	267	10616	3.03
	0.020	0.150	-236.05	-127.37	45.91	-18.70	93.13	4153	445	4598	1.31
	0.200	0.020	-73.87	1099.40	4.98	2272.66	11.28	20333	59	20392	5.83
0.2	0	0	-255.08	-255.08	-1.31	-255.08	-1.31	2414	-5476	-3062	-0.87
	0.010	0.010	-246.01	-184.12	263.82	-122.23	528.94	3286	-5265	-1979	-0.57
	0.015	0.045	-241.47	-148.13	407.45	-54.78	816.21	3724	-5070	-1347	-0.38
	0.030	0.030	-227.86	-40.63	796.45	146.61	1594.20	5039	-4841	198	0.06
	0.075	0.060	-187.07	289.85	2001.25	766.76	4003.81	9018	-3919	5099	1.46
	0.090	0.090	-173.49	402.66	2413.78	978.81	4828.87	10355	-3548	6806	1.94
	0.020	0.150	-236.93	-111.26	576.45	14.41	1154.21	4162	-4668	-507	-0.14
	0.200	0.020	-74.16	1265.78	5392.44	2605.72	10786.18	20335	-1627	18708	5.35
-0.16	0	0	-254.74	-254.74	-1.31	-254.74	-1.31	2410	4375	6785	1.94
	0.010	0.010	-245.68	-186.98	-197.71	-128.27	-394.10	3283	4260	7543	2.16
	0.015	0.045	-241.15	-153.15	-285.85	-65.15	-570.38	3721	4291	8011	2.29
	0.030	0.030	-227.56	-49.96	-592.16	127.64	-1183.01	5036	4028	9064	2.59
	0.075	0.060	-186.82	265.83	-1493.01	718.49	-2984.71	9015	3451	12466	3.56
	0.090	0.090	-173.25	373.25	-1789.06	919.75	-3576.80	10353	3315	13667	3.90
	0.020	0.150	-236.62	-119.76	-350.18	-2.90	-699.06	4159	4529	8688	2.48
	0.200	0.020	-74.05	1200.39	-4099.23	2474.84	-8197.16	20334	1406	21740	6.21

Note: Change in TS for N equals -$1.31 million, for H equals 0.43 million; Change in NS for N, $\omega = 0$, equals -1.31 million

Table 5.6.3 Scenario IV(b): Caloric and Nutritional Effects of a 10% Decrease in Government Promotional Expenditures for Agricultural Exports

Product relation -ships	Response Level to Domestic Promotions for H & N	Change in caloric-intake	**Absolute changes in yearly intake level & Relative change in daily intake level (average 2000-04) of selected macronutrients and micronutrients**													
			Fat (g)	%	Fiber (g)	%	Vit. A (mg)	%	Vit. C (mg)	%	Calcium (mg)	%	Iron (mg)	%	Sodium (mg)	%
Ind.	None	2405	51.5	0.08	71.3	0.79	1784.5	0.51	603.1	1.48	762.7	0.21	26.6	0.31	2189.0	0.49
	Es	3307	71.6	0.11	97.3	1.08	2439.1	0.70	822.3	2.02	1046.8	0.30	36.4	0.42	2991.3	0.66
	Nm	3849	86.1	0.13	110.6	1.23	2786.6	0.80	932.4	2.29	1210.5	0.34	41.8	0.49	3415.0	0.76
	Em	5120	112.1	0.17	149.5	1.66	3753.4	1.08	1262.3	3.10	1617.2	0.46	56.1	0.65	4602.1	1.02
	Hm	9189	201.7	0.31	267.8	2.98	6726.8	1.94	2260.9	5.56	2901.0	0.82	100.6	1.17	8247.4	1.83
	El	10616	234.7	0.36	307.8	3.43	7739.1	2.23	2596.8	6.39	3346.6	0.94	115.9	1.35	9487.0	2.11
	Nl	4598	110.7	0.17	124.7	1.39	3180.2	0.92	1043.4	2.57	1424.2	0.40	48.3	0.56	3890.3	0.86
	Hl	20392	438.3	0.67	603.0	6.72	15102.4	4.36	5100.1	12.54	6463.3	1.82	225.2	2.63	18524.6	4.11
Sub.	None	-3062	-216.7	-0.33	52.0	0.58	585.0	0.17	585.8	1.44	-550.4	-0.16	-2.8	-0.03	851.5	0.19
	Es	-1979	-187.7	-0.29	78.6	0.88	1279.2	0.37	805.5	1.98	-223.0	-0.06	8.0	0.09	1697.8	0.38
	Nm	-1347	-168.8	-0.26	92.3	1.03	1646.5	0.47	915.9	2.25	-37.5	-0.01	13.9	0.16	2143.7	0.48
	Em	198	-129.3	-0.20	132.1	1.47	2673.2	0.77	1246.6	3.07	434.8	0.12	29.6	0.35	3397.6	0.75
	Hm	5099	1.0	0.00	253.3	2.82	5828.8	1.68	2247.8	5.53	1918.3	0.54	78.6	0.92	7246.0	1.61
	El	6806	47.8	0.07	294.3	3.28	6902.8	1.99	2584.5	6.36	2431.5	0.69	95.4	1.11	8554.3	1.90
	Nl	-507	-139.7	-0.21	106.7	1.19	2060.1	0.59	1027.2	2.53	198.0	0.06	20.9	0.24	2641.2	0.59
	Hl	18708	355.7	0.55	597.1	6.65	14732.4	4.25	5094.6	12.53	6058.7	1.71	216.1	2.52	18111.9	4.02
Comp.	None	6785	266.0	0.41	87.1	0.97	2752.5	0.79	620.2	1.53	1815.9	0.51	50.2	0.59	3269.5	0.73
	Es	7543	279.1	0.43	112.6	1.25	3375.0	0.97	838.8	2.06	2065.1	0.58	59.3	0.69	4036.0	0.90
	Nm	8011	289.9	0.44	125.6	1.40	3706.4	1.07	948.6	2.33	2211.3	0.62	64.3	0.75	4441.8	0.99
	Em	9064	305.2	0.47	163.7	1.82	4624.7	1.33	1277.6	3.14	2565.4	0.72	77.4	0.90	5574.7	1.24
	Hm	12466	362.1	0.56	279.6	3.11	7450.6	2.15	2273.6	5.59	3688.8	1.04	118.3	1.38	9055.3	2.01
	El	13667	384.1	0.59	318.8	3.55	8413.1	2.43	2608.6	6.42	4080.3	1.15	132.3	1.54	10239.3	2.27
	Nl	8688	311.0	0.48	139.5	1.55	4083.9	1.18	1059.3	2.61	2407.6	0.68	70.4	0.82	4899.0	1.09
	Hl	21740	504.3	0.77	607.9	6.77	15400.0	4.44	5105.3	12.56	6787.4	1.91	232.4	2.71	18856.7	4.19

Table 5.7.1 Scenario V: Market and Welfare Effects (million US$) of Constant Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Percentage change in demand price**		**Percentage change in domestic consumption**		**Change in producer surplus**		**Change in consumer surplus, w=0**		**Change in consumer surplus, w=0.5**		**Change in consumer surplus, w=1**	
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$d\ln P^h$	$d\ln P^n$	$d\ln Q_d^h$	$d\ln Q_d^n$	ΔPS^h	ΔPS^n	$\Delta CS^h_{\omega=0}$	$\Delta CS^n_{\omega=0}$	$\Delta CS^h_{\omega=0.5}$	$\Delta CS^n_{\omega=0.5}$	$\Delta CS^h_{\omega=1}$	$\Delta CS^n_{\omega=1}$
0	0	0	-0.0037	0.0013	0.0026	-0.0006	-90	206	46	-157	46	-157	46	-157
	0.010	0.010	-0.0035	0.0013	0.0032	-0.0008	-87	200	45	-152	50	-184	56	-216
	0.015	0.045	-0.0035	0.0011	0.0035	-0.0016	-86	179	44	-136	52	-280	60	-424
	0.030	0.030	-0.0033	0.0012	0.0043	-0.0012	-81	188	42	-143	58	-239	75	-335
	0.075	0.060	-0.0027	0.0011	0.0068	-0.0019	-67	169	35	-129	77	-321	119	-514
	0.090	0.090	-0.0026	0.0010	0.0077	-0.0026	-63	151	32	-115	83	-404	134	-694
	0.020	0.150	-0.0034	0.0007	0.0037	-0.0039	-84	112	43	-85	54	-572	65	-1058
	0.200	0.020	-0.0011	0.0012	0.0141	-0.0010	-28	194	14	-148	131	-211	248	-275
0.2	0	0	-0.0037	0.0013	0.0029	-0.0013	-91	207	46	-157	46	-157	46	-157
	0.010	0.010	-0.0036	0.0013	0.0035	-0.0015	-88	201	45	-153	50	-162	55	-171
	0.015	0.045	-0.0035	0.0011	0.0037	-0.0023	-86	179	44	-136	49	-260	53	-384
	0.030	0.030	-0.0033	0.0012	0.0045	-0.0019	-82	189	42	-143	58	-171	74	-199
	0.075	0.060	-0.0028	0.0011	0.0070	-0.0025	-68	170	35	-129	77	-143	119	-156
	0.090	0.090	-0.0026	0.0010	0.0079	-0.0031	-63	151	32	-115	81	-197	130	-280
	0.020	0.150	-0.0034	0.0007	0.0039	-0.0046	-85	112	43	-85	40	-587	36	-1088
	0.200	0.020	-0.0011	0.0012	0.0144	-0.0013	-28	195	14	-148	146	347	277	841
-0.16	0	0	-0.0037	0.0013	0.0024	0.0000	-90	206	46	-157	46	-157	46	-157
	0.010	0.010	-0.0036	0.0013	0.0030	-0.0002	-87	200	45	-153	51	-208	58	-263
	0.015	0.045	-0.0035	0.0011	0.0033	-0.0010	-86	179	44	-136	57	-324	69	-511
	0.030	0.030	-0.0033	0.0012	0.0041	-0.0007	-81	188	42	-143	62	-310	83	-476
	0.075	0.060	-0.0027	0.0011	0.0066	-0.0015	-68	170	35	-129	85	-496	136	-862
	0.090	0.090	-0.0026	0.0010	0.0075	-0.0022	-63	151	32	-115	95	-619	158	-1123
	0.020	0.150	-0.0034	0.0007	0.0036	-0.0034	-84	112	43	-85	68	-655	92	-1226
	0.200	0.020	-0.0011	0.0012	0.0139	-0.0008	-28	194	14	-148	143	-649	271	-1151

Table 5.7.2 Scenario V: Welfare (million US$) and Caloric Effects of Constant Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Change in social surplus, w=0**		**Change in social surplus, w=0.5**		**Change in social surplus, w=1**		**Change in caloric-intake per capita per year (calories)**			**Average weight change per year (lbs)**
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$\Delta NS_{\omega=0}^h$	$\Delta NS_{\omega=0}^n$	$\Delta NS_{\omega=0.5}^h$	$\Delta NS_{\omega=0.5}^n$	$\Delta NS_{\omega=1}^h$	$\Delta NS_{\omega=1}^n$	**H**	**N**	**H+N**	
0	0	0	-42	46	-42	46	-42	46	409	-738	-329	-0.09
	0.010	0.010	-41	45	-35	13	-29	-19	494	-1017	-523	-0.15
	0.015	0.045	-40	40	-31	-104	-23	-248	537	-1998	-1461	-0.42
	0.030	0.030	-38	42	-21	-54	-4	-150	666	-1577	-911	-0.26
	0.075	0.060	-31	38	11	-155	54	-347	1057	-2421	-1364	-0.39
	0.090	0.090	-29	33	22	-257	73	-546	1190	-3272	-2082	-0.59
	0.020	0.150	-39	24	-28	-463	-17	-949	580	-4993	-4413	-1.26
	0.200	0.020	-11	43	105	-20	222	-84	2190	-1297	894	0.26
0.2	0	0	-42	46	-42	46	-42	46	451	-1673	-1221	-0.35
	0.010	0.010	-41	45	-35	36	-30	27	535	-1921	-1386	-0.40
	0.015	0.045	-40	40	-35	-84	-31	-207	574	-2886	-2313	-0.66
	0.030	0.030	-38	42	-22	14	-6	-13	704	-2418	-1714	-0.49
	0.075	0.060	-31	38	11	24	53	11	1092	-3121	-2029	-0.58
	0.090	0.090	-29	33	20	-49	69	-131	1220	-3923	-2703	-0.77
	0.020	0.150	-39	24	-43	-477	-46	-978	603	-5864	-5261	-1.50
	0.200	0.020	-11	44	120	538	251	1033	2229	-1586	643	0.18
-0.16	0	0	-42	46	-42	46	-42	46	378	5	383	0.11
	0.010	0.010	-41	45	-34	-10	-27	-66	464	-299	165	0.05
	0.015	0.045	-40	40	-27	-148	-15	-335	510	-1292	-782	-0.22
	0.030	0.030	-38	42	-17	-124	4	-291	637	-908	-271	-0.08
	0.075	0.060	-31	38	20	-329	71	-695	1031	-1866	-834	-0.24
	0.090	0.090	-29	33	34	-471	97	-975	1167	-2755	-1588	-0.45
	0.020	0.150	-39	24	-15	-546	10	-1116	563	-4298	-3735	-1.07
	0.200	0.020	-11	44	117	-458	246	-959	2160	-1069	1091	0.31

Note: Change in TS for H equals $2.08 million, for N equals -$2.88 million

Table 5.7.3 Scenario V: Caloric and Nutritional Effects of Constant Government Promotional Expenditures for Agricultural Exports

Product relation-ships	Response Level to Domestic Promotions for H & N	Change in caloric-intake	**Absolute changes in yearly intake level & Relative change in daily intake level (average 2000-04) of selected macronutrients and micronutrients**													
			Fat (g)	%	Fiber (g)	%	Vit. A (mg)	%	Vit. C (mg)	%	Calcium (mg)	%	Iron (mg)	%	Sodium (mg)	%
Ind.	None	-329	-27.4	-0.04	9.5	0.11	141.2	0.04	100.0	0.25	-47.5	-0.01	0.6	0.01	191.2	0.04
	Es	-523	-39.2	-0.06	11.0	0.12	142.9	0.04	120.4	0.30	-87.6	-0.02	0.0	0.00	200.1	0.04
	Nm	-1461	-86.4	-0.13	8.8	0.10	-41.6	-0.01	127.6	0.31	-309.9	-0.09	-4.8	-0.06	-2.2	0.00
	Em	-911	-63.0	-0.10	14.1	0.16	146.8	0.04	161.4	0.40	-167.8	-0.05	-1.1	-0.01	218.6	0.05
	Hm	-1364	-96.0	-0.15	22.7	0.25	251.3	0.07	256.6	0.63	-246.6	-0.07	-1.4	-0.02	367.5	0.08
	El	-2082	-134.9	-0.21	23.6	0.26	162.2	0.05	286.7	0.71	-409.0	-0.12	-4.5	-0.05	278.9	0.06
	Nl	-4413	-232.3	-0.36	-0.6	-0.01	-669.5	-0.19	127.6	0.31	-1016.0	-0.29	-20.5	-0.24	-699.2	-0.16
	Hl	894	-16.6	-0.03	60.3	0.67	1339.8	0.39	544.7	1.34	383.1	0.11	17.2	0.20	1675.3	0.37
Sub.	None	-1221	-72.3	-0.11	7.4	0.08	-33.5	-0.01	107.3	0.26	-258.9	-0.07	-4.0	-0.05	-0.2	0.00
	Es	-1386	-82.7	-0.13	9.0	0.10	-25.9	-0.01	127.4	0.31	-291.9	-0.08	-4.4	-0.05	15.2	0.00
	Nm	-2313	-129.2	-0.20	6.7	0.07	-210.0	-0.06	133.6	0.33	-511.7	-0.14	-9.2	-0.11	-187.1	-0.04
	Em	-1714	-103.4	-0.16	12.2	0.14	-10.1	0.00	168.0	0.41	-357.9	-0.10	-5.2	-0.06	46.7	0.01
	Hm	-2029	-129.6	-0.20	21.2	0.24	122.8	0.04	262.7	0.65	-403.7	-0.11	-4.7	-0.06	226.9	0.05
	El	-2703	-166.1	-0.25	22.2	0.25	41.4	0.01	292.1	0.72	-555.8	-0.16	-7.6	-0.09	146.7	0.03
	Nl	-5261	-274.5	-0.42	-3.1	-0.03	-844.0	-0.24	130.4	0.32	-1218.0	-0.34	-24.9	-0.29	-892.0	-0.20
	Hl	643	-30.0	-0.05	60.4	0.67	1304.7	0.38	553.4	1.36	325.7	0.09	16.1	0.19	1639.2	0.36
Com.	None	383	8.3	0.01	11.2	0.12	281.5	0.08	94.8	0.23	121.0	0.03	4.2	0.05	345.2	0.08
	Es	165	-4.7	-0.01	12.7	0.14	278.5	0.08	115.3	0.28	75.4	0.02	3.5	0.04	348.9	0.08
	Nm	-782	-52.4	-0.08	10.5	0.12	93.8	0.03	123.3	0.30	-148.8	-0.04	-1.3	-0.02	146.6	0.03
	Em	-271	-30.9	-0.05	15.6	0.17	272.8	0.08	156.5	0.39	-16.1	0.00	2.2	0.03	356.8	0.08
	Hm	-834	-69.3	-0.11	23.9	0.27	354.4	0.10	252.0	0.62	-121.3	-0.03	1.4	0.02	480.4	0.11
	El	-1588	-110.0	-0.17	24.7	0.28	259.0	0.07	282.8	0.70	-292.0	-0.08	-1.9	-0.02	385.1	0.09
	Nl	-3735	-198.6	-0.30	1.3	0.01	-528.9	-0.15	125.9	0.31	-854.4	-0.24	-16.9	-0.20	-543.7	-0.12
	Hl	1091	-6.1	-0.01	60.2	0.67	1367.5	2.10	537.9	1.32	428.2	0.12	18.1	0.21	1703.6	0.38

Table 5.8.1 Scenario VI: Market and Welfare Effects (million US$) of Constant Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Percentage change in demand price**		**Percentage change in domestic consumption**		**Change in producer surplus**		**Change in consumer surplus, w=0**		**Change in consumer surplus, w=0.5**		**Change in consumer surplus, w=1**	
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$d\ln P^h$	$d\ln P^n$	$d\ln Q_d^h$	$d\ln Q_d^n$	ΔPS^h	ΔPS^n	$\Delta CS^h_{\omega=0}$	$\Delta CS^n_{\omega=0}$	$\Delta CS^h_{\omega=0.5}$	$\Delta CS^n_{\omega=0.5}$	$\Delta CS^h_{\omega=1}$	$\Delta CS^n_{\omega=1}$
0	0	0	-0.0174	0.0062	0.0125	-0.0028	-427	979	220	-744	220	-744	220	-744
	0.010	0.010	-0.0168	0.0060	0.0151	-0.0038	-413	951	213	-722	239	-873	266	-1024
	0.015	0.045	-0.0165	0.0054	0.0164	-0.0075	-405	850	209	-644	249	-1326	289	-2009
	0.030	0.030	-0.0157	0.0056	0.0204	-0.0059	-384	893	199	-677	279	-1132	359	-1586
	0.075	0.060	-0.0130	0.0051	0.0324	-0.0091	-320	805	166	-610	370	-1521	574	-2432
	0.090	0.090	-0.0121	0.0045	0.0364	-0.0123	-298	716	155	-541	401	-1911	647	-3281
	0.020	0.150	-0.0163	0.0034	0.0178	-0.0187	-398	531	206	-401	259	-2695	312	-4990
	0.200	0.020	-0.0054	0.0058	0.0671	-0.0049	-132	922	70	-699	639	-1002	1209	-1305
0.2	0	0	-0.0175	0.0062	0.0138	-0.0063	-428	983	221	-745	221	-745	221	-745
	0.010	0.010	-0.0169	0.0060	0.0164	-0.0072	-414	954	214	-723	239	-767	264	-811
	0.015	0.045	-0.0166	0.0054	0.0176	-0.0108	-407	853	210	-645	233	-1230	256	-1816
	0.030	0.030	-0.0157	0.0057	0.0216	-0.0091	-386	897	200	-679	276	-810	352	-941
	0.075	0.060	-0.0131	0.0051	0.0334	-0.0117	-321	809	167	-611	369	-674	571	-738
	0.090	0.090	-0.0122	0.0045	0.0374	-0.0147	-299	719	156	-543	390	-932	624	-1321
	0.020	0.150	-0.0163	0.0034	0.0185	-0.0220	-400	534	207	-402	190	-2762	174	-5122
	0.200	0.020	-0.0054	0.0059	0.0682	-0.0059	-132	926	70	-702	710	1642	1350	3986
-0.16	0	0	-0.0174	0.0062	0.0116	0.0000	-428	981	220	-746	220	-746	220	-746
	0.010	0.010	-0.0169	0.0060	0.0142	-0.0011	-414	953	213	-724	246	-987	279	-1249
	0.015	0.045	-0.0166	0.0054	0.0156	-0.0048	-406	852	210	-646	270	-1535	331	-2425
	0.030	0.030	-0.0157	0.0057	0.0195	-0.0034	-385	895	199	-680	298	-1469	396	-2259
	0.075	0.060	-0.0131	0.0051	0.0316	-0.0070	-320	807	166	-612	411	-2347	656	-4082
	0.090	0.090	-0.0122	0.0045	0.0357	-0.0103	-298	718	155	-543	458	-2928	760	-5312
	0.020	0.150	-0.0163	0.0034	0.0172	-0.0161	-399	533	206	-402	323	-3093	440	-5785
	0.200	0.020	-0.0054	0.0058	0.0661	-0.0040	-132	924	70	-701	696	-3079	1322	-5457

Table 5.8.2 Scenario VI: Welfare (million US$) and Caloric Effects of Constant Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Change in social surplus, w=0**		**Change in social surplus, w=0.5**		**Change in social surplus, w=1**		**Change in caloric-intake per capita per year (calories)**			**Average weight change per year (lbs)**
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$\Delta NS_{\omega=0}^h$	$\Delta NS_{\omega=0}^n$	$\Delta NS_{\omega=0.5}^h$	$\Delta NS_{\omega=0.5}^n$	$\Delta NS_{\omega=1}^h$	$\Delta NS_{\omega=1}^n$	**H**	**N**	**H+N**	
0	0	0	-197	222	-197	222	-197	222	1944	-3505	-1561	-0.45
	0.010	0.010	-190	215	-163	64	-137	-87	2348	-4830	-2482	-0.71
	0.015	0.045	-186	192	-146	-490	-106	-1173	2551	-9492	-6941	-1.98
	0.030	0.030	-176	202	-95	-252	-15	-707	3163	-7490	-4327	-1.24
	0.075	0.060	-144	182	60	-729	264	-1640	5023	-11502	-6479	-1.85
	0.090	0.090	-133	161	113	-1209	359	-2579	5651	-15543	-9891	-2.83
	0.020	0.150	-183	117	-129	-2178	-76	-4472	2755	-23716	-20961	-5.99
	0.200	0.020	-52	209	517	-94	1087	-397	10404	-6158	4245	1.21
0.2	0	0	-197	224	-197	224	-197	224	2144	-7946	-5802	-1.66
	0.010	0.010	-190	218	-165	174	-140	130	2543	-9124	-6581	-1.88
	0.015	0.045	-187	194	-164	-391	-142	-977	2725	-13710	-10985	-3.14
	0.030	0.030	-176	204	-100	73	-24	-59	3345	-11487	-8142	-2.33
	0.075	0.060	-144	183	58	120	260	57	5186	-14824	-9638	-2.75
	0.090	0.090	-133	162	101	-227	336	-615	5797	-18636	-12839	-3.67
	0.020	0.150	-183	118	-200	-2242	-216	-4602	2866	-27855	-24989	-7.14
	0.200	0.020	-53	210	588	2554	1228	4898	10587	-7534	3053	0.87
-0.16	0	0	-197	221	-197	221	-197	221	1795	23	1818	0.52
	0.010	0.010	-190	215	-158	-48	-125	-310	2203	-1419	785	0.22
	0.015	0.045	-187	192	-126	-697	-65	-1587	2422	-6138	-3716	-1.06
	0.030	0.030	-176	202	-78	-588	21	-1377	3026	-4313	-1286	-0.37
	0.075	0.060	-144	182	101	-1553	345	-3288	4899	-8862	-3963	-1.13
	0.090	0.090	-133	161	169	-2224	472	-4608	5542	-13084	-7542	-2.15
	0.020	0.150	-183	117	-67	-2574	50	-5265	2675	-20417	-17742	-5.07
	0.200	0.020	-53	209	574	-2169	1200	-4547	10260	-5077	5183	1.48

Note: Change in TS for H equals $9.88 million, for N equals -$13.68 million.

Table 5.8.3 Scenario VI: Caloric and Nutritional Effects of Constant Government Promotional Expenditures for Agricultural Exports

Product Relation -ships	Response level to domestic promotions for H & N	Change in caloric-intake	**Absolute changes in yearly intake level & Relative change in daily intake level (average 2000-04) of selected macronutrients and micronutrients**													
			Fat (g)	%	Fiber (g)	%	Vit. A (mg)	%	Vit. C (mg)	%	Calcium (mg)	%	Iron (mg)	%	Sodium (mg)	%
Ind.	None	-1561	-130.2	-0.20	45.1	0.50	670.6	0.19	475.1	1.17	-225.8	-0.06	2.6	0.03	908.3	0.20
	Es	-2482	-186.4	-0.29	52.4	0.58	678.7	0.20	571.8	1.41	-416.1	-0.12	-0.1	0.00	950.6	0.21
	Nm	-6941	-410.5	-0.63	41.7	0.46	-197.7	-0.06	606.0	1.49	-1472.1	-0.41	-22.9	-0.27	-10.5	0.00
	Em	-4327	-299.3	-0.46	67.0	0.75	697.2	0.20	766.5	1.89	-796.9	-0.22	-5.4	-0.06	1038.3	0.23
	Hm	-6479	-456.1	-0.70	107.8	1.20	1193.7	0.34	1218.7	3.00	-1171.2	-0.33	-6.4	-0.07	1745.4	0.39
	El	-9891	-640.7	-0.98	112.0	1.25	770.2	0.22	1362.0	3.35	-1943.0	-0.55	-21.2	-0.25	1324.7	0.29
	Nl	-20961	-1103.2	-1.69	-3.1	-0.03	-3180.0	-0.92	606.2	1.49	-4826.0	-1.36	-97.3	-1.13	-3321.2	-0.74
	Hl	4245	-79.0	-0.12	286.4	3.19	6364.2	1.84	2587.5	6.36	1819.7	0.51	81.9	0.95	7957.4	1.77
Sub.	None	-5802	-343.5	-0.53	35.2	0.39	-159.0	-0.05	509.4	1.25	-1229.6	-0.35	-19.1	-0.22	-0.9	0.00
	Es	-6581	-392.7	-0.60	42.8	0.48	-123.0	-0.04	605.1	1.49	-1386.3	-0.39	-21.0	-0.25	72.2	0.02
	Nm	-10985	-613.5	-0.94	31.8	0.35	-997.6	-0.29	634.6	1.56	-2430.6	-0.69	-43.7	-0.51	-888.7	-0.20
	Em	-8142	-491.3	-0.75	58.1	0.65	-48.2	-0.01	797.9	1.96	-1699.9	-0.48	-24.9	-0.29	221.6	0.05
	Hm	-9638	-615.4	-0.94	100.8	1.12	583.3	0.17	1247.9	3.07	-1917.8	-0.54	-22.5	-0.26	1077.8	0.24
	El	-12839	-789.1	-1.21	105.3	1.17	196.9	0.06	1387.4	3.41	-2640.2	-0.74	-36.3	-0.42	697.0	0.15
	Nl	-24989	-1303.7	-2.00	-14.5	-0.16	-4009.1	-1.16	619.3	1.52	-5785.5	-1.63	-118.4	-1.38	-4237.1	-0.94
	Hl	3053	-142.5	-0.22	287.0	3.20	6197.1	1.79	2628.5	6.46	1547.3	0.44	76.5	0.89	7786.1	1.73
Com.	None	1818	39.6	0.06	53.3	0.59	1337.1	0.39	450.3	1.11	574.8	0.16	20.0	0.23	1639.6	0.36
	Es	785	-22.3	-0.03	60.3	0.67	1322.7	0.38	547.6	1.35	357.9	0.10	16.7	0.19	1657.2	0.37
	Nm	-3716	-248.9	-0.38	49.9	0.56	445.3	0.13	585.5	1.44	-706.9	-0.20	-6.3	-0.07	696.3	0.15
	Em	-1286	-146.5	-0.22	74.3	0.83	1295.7	0.37	743.6	1.83	-76.7	-0.02	10.2	0.12	1694.9	0.38
	Hm	-3963	-329.4	-0.51	113.6	1.26	1683.5	0.49	1197.1	2.94	-576.0	-0.16	6.4	0.08	2281.7	0.51
	El	-7542	-522.5	-0.80	117.6	1.31	1230.4	0.35	1343.2	3.30	-1386.9	-0.39	-9.2	-0.11	1829.0	0.41
	Nl	-17742	-943.3	-1.45	6.4	0.07	-2512.2	-0.72	598.0	1.47	-4058.3	-1.14	-80.4	-0.94	-2582.7	-0.57
	Hl	5183	-29.1	-0.04	286.0	3.19	6495.5	1.87	2555.2	6.28	2033.9	0.57	86.1	1.00	8092.1	1.80

Table 5.9.1 Scenario VII: Market and Welfare Effects (million US$) of Constant Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Percentage change in demand price**		**Percentage change in domestic consumption**		**Change in producer surplus**		**Change in consumer surplus, w=0**		**Change in consumer surplus, w=0.5**		**Change in consumer surplus, w=1**	
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$d\ln P^h$	$d\ln P^n$	$d\ln Q_d^h$	$d\ln Q_d^n$	ΔPS^h	ΔPS^n	$\Delta CS^h_{\omega=0}$	$\Delta CS^n_{\omega=0}$	$\Delta CS^h_{\omega=0.5}$	$\Delta CS^n_{\omega=0.5}$	$\Delta CS^h_{\omega=1}$	$\Delta CS^n_{\omega=1}$
0	0	0	-0.0348	0.0124	0.0251	-0.0055	-849	1962	443	-1485	443	-1485	443	-1485
	0.010	0.010	-0.0337	0.0120	0.0303	-0.0076	-821	1905	429	-1440	482	-1742	536	-2044
	0.015	0.045	-0.0331	0.0107	0.0329	-0.0150	-807	1702	422	-1283	503	-2642	583	-4002
	0.030	0.030	-0.0313	0.0113	0.0408	-0.0118	-765	1789	401	-1351	563	-2257	725	-3163
	0.075	0.060	-0.0260	0.0102	0.0648	-0.0182	-637	1613	338	-1214	752	-3028	1166	-4842
	0.090	0.090	-0.0243	0.0091	0.0729	-0.0245	-593	1434	316	-1076	816	-3799	1317	-6522
	0.020	0.150	-0.0325	0.0067	0.0355	-0.0374	-793	1064	415	-794	523	-5340	630	-9886
	0.200	0.020	-0.0107	0.0117	0.1341	-0.0097	-263	1847	144	-1396	1320	-1999	2496	-2603
0.2	0	0	-0.0349	0.0124	0.0276	-0.0125	-852	1969	445	-1485	445	-1485	445	-1485
	0.010	0.010	-0.0338	0.0121	0.0328	-0.0144	-824	1912	431	-1441	482	-1529	533	-1616
	0.015	0.045	-0.0332	0.0108	0.0351	-0.0216	-810	1708	424	-1283	470	-2448	516	-3612
	0.030	0.030	-0.0315	0.0113	0.0431	-0.0181	-768	1796	403	-1351	558	-1613	712	-1874
	0.075	0.060	-0.0261	0.0102	0.0669	-0.0234	-639	1620	339	-1216	750	-1341	1160	-1466
	0.090	0.090	-0.0243	0.0091	0.0747	-0.0294	-595	1440	317	-1078	794	-1850	1272	-2621
	0.020	0.150	-0.0326	0.0068	0.0369	-0.0440	-796	1068	417	-794	384	-5462	350	-10130
	0.200	0.020	-0.0108	0.0117	0.1365	-0.0119	-264	1854	144	-1399	1467	3275	2790	7949
-0.16	0	0	-0.0349	0.0124	0.0231	0.0000	-851	1967	443	-1493	443	-1493	443	-1493
	0.010	0.010	-0.0337	0.0120	0.0284	-0.0022	-823	1909	430	-1448	495	-1973	561	-2497
	0.015	0.045	-0.0332	0.0108	0.0312	-0.0097	-809	1706	423	-1289	545	-3063	667	-4838
	0.030	0.030	-0.0314	0.0113	0.0390	-0.0068	-767	1794	402	-1357	601	-2933	801	-4509
	0.075	0.060	-0.0261	0.0102	0.0632	-0.0140	-638	1617	338	-1220	835	-4678	1332	-8136
	0.090	0.090	-0.0243	0.0091	0.0714	-0.0207	-595	1438	316	-1081	931	-5825	1547	-10570
	0.020	0.150	-0.0326	0.0067	0.0345	-0.0322	-795	1067	416	-798	652	-6137	887	-11475
	0.200	0.020	-0.0107	0.0117	0.1323	-0.0080	-264	1852	144	-1400	1437	-6146	2729	-10893

Table 5.9.2 Scenario VII: Welfare (million US$) and Caloric Effects of Constant Government Promotional Expenditures for Agricultural Exports

Cross-price elasticity	**Domestic Promotion Elasticity**		**Change in social surplus, w=0**		**Change in social surplus, w=0.5**		**Change in social surplus, w=1**		**Change in caloric-intake per capita per year (calories)**			**Average weight change per year (lbs)**
$\eta_d^{hn} = \eta_d^{nh}$	α_d^h	α_d^n	$\Delta NS_{\omega=0}^h$	$\Delta NS_{\omega=0}^n$	$\Delta NS_{\omega=0.5}^h$	$\Delta NS_{\omega=0.5}^n$	$\Delta NS_{\omega=1}^h$	$\Delta NS_{\omega=1}^n$	**H**	**N**	**H+N**	
0	0	0	-386	450	-386	450	-386	450	3888	-7011	-3123	-0.89
	0.010	0.010	-372	437	-319	135	-265	-167	4697	-9661	-4964	-1.42
	0.015	0.045	-365	392	-285	-968	-204	-2328	5102	-18984	-13882	-3.97
	0.030	0.030	-344	411	-182	-495	-20	-1401	6325	-14979	-8654	-2.47
	0.075	0.060	-279	372	135	-1442	549	-3256	10045	-23004	-12958	-3.70
	0.090	0.090	-258	330	243	-2392	743	-5115	11303	-31086	-19783	-5.65
	0.020	0.150	-358	243	-250	-4303	-143	-8849	5509	-47431	-41922	-11.98
	0.200	0.020	-100	424	1076	-180	2252	-783	20807	-12317	8491	2.43
0.2	0	0	-387	457	-387	457	-387	457	4289	-15892	-11603	-3.32
	0.010	0.010	-373	444	-322	356	-271	269	5085	-18248	-13163	-3.76
	0.015	0.045	-366	398	-320	-767	-274	-1931	5451	-27420	-21970	-6.28
	0.030	0.030	-344	417	-190	156	-36	-105	6690	-22974	-16285	-4.65
	0.075	0.060	-280	377	131	251	541	126	10372	-29648	-19276	-5.51
	0.090	0.090	-259	335	219	-437	696	-1209	11594	-37272	-25678	-7.34
	0.020	0.150	-359	247	-392	-4421	-426	-9090	5732	-55710	-49978	-14.28
	0.200	0.020	-100	428	1223	5102	2546	9776	21174	-15068	6106	1.74
-0.16	0	0	-388	447	-388	447	-388	447	3590	46	3636	1.04
	0.010	0.010	-373	434	-308	-91	-242	-615	4407	-2837	1570	0.45
	0.015	0.045	-366	389	-244	-1385	-122	-3159	4844	-12275	-7432	-2.12
	0.030	0.030	-345	409	-146	-1167	54	-2743	6052	-8625	-2573	-0.74
	0.075	0.060	-280	370	217	-3088	714	-6546	9798	-17724	-7926	-2.26
	0.090	0.090	-259	329	357	-4415	972	-9160	11083	-26168	-15085	-4.31
	0.020	0.150	-359	241	-124	-5097	112	-10436	5350	-40833	-35483	-10.14
	0.200	0.020	-100	424	1192	-4322	2485	-9068	20519	-10154	10365	2.96

Note: Change in TS for H equals $19.76 million, for N equals -$27.36 million

Table 5.9.3 Scenario VII: Caloric and Nutritional Effects of Constant Government Promotional Expenditures for Agricultural Exports

Product relation-ships	Response level to domestic promotions for H & N	Change in caloric-intake	**Absolute changes in yearly intake level & Relative change in daily intake level (average 2000-04) of selected macronutrients and micronutrients**													
			Fat (g)	% (-)	Fiber (g)	%	Vit. A (mg)	%	Vit. C (mg)	%	Calcium (mg)	%	Iron (mg)	%	Sodium (mg)	%
Ind.	None	-3123	-260	-0.40	90.2	1.00	1341	0.39	950	2.34	-452	-0.13	5.2	0.06	1817	0.40
	Es	-4964	-373	-0.57	104.7	1.17	1357	0.39	1144	2.81	-832	-0.23	-0.1	0.00	1901	0.42
	Nm	-13882	-821	-1.26	83.5	0.93	-395	-0.11	1212	2.98	-2944	-0.83	-45.9	-0.53	-21	0.00
	Em	-8654	-599	-0.92	134.0	1.49	1394	0.40	1533	3.77	-1594	-0.45	-10.8	-0.13	2077	0.46
	Hm	-12958	-912	-1.40	215.6	2.40	2387	0.69	2437	5.99	-2342	-0.66	-12.8	-0.15	3491	0.78
	El	-19783	-1281	-1.97	224.0	2.50	1540	0.44	2724	6.70	-3886	-1.10	-42.5	-0.50	2649	0.59
	Nl	-41922	-2206	-3.38	-6.1	-0.07	-6360	-1.83	1212	2.98	-9652	-2.72	-194.6	-2.27	-6642	-1.47
	Hl	8491	-158	-0.24	572.9	6.38	12728	3.67	5175	12.73	3639	1.03	163.7	1.91	15915	3.53
Sub.	None	-11603	-687	-1.05	70.4	0.78	-318	-0.09	1019	2.51	-2459	-0.69	-38.2	-0.45	-2	0.00
	Es	-13163	-785	-1.20	85.6	0.95	-246	-0.07	1210	2.98	-2773	-0.78	-42.1	-0.49	144	0.03
	Nm	-21970	-1227	-1.88	63.6	0.71	-1995	-0.58	1269	3.12	-4861	-1.37	-87.4	-1.02	-1777	-0.39
	Em	-16285	-983	-1.51	116.3	1.29	-96	-0.03	1596	3.92	-3400	-0.96	-49.8	-0.58	443	0.10
	Hm	-19276	-1231	-1.89	201.6	2.25	1167	0.34	2496	6.14	-3836	-1.08	-45.0	-0.52	2156	0.48
	El	-25678	-1578	-2.42	210.6	2.35	394	0.11	2775	6.82	-5280	-1.49	-72.6	-0.85	1394	0.31
	Nl	-49978	-2607	-4.00	-29.1	-0.32	-8018	-2.31	1239	3.05	-11571	-3.26	-236.7	-2.76	-8474	-1.88
	Hl	6106	-285	-0.44	573.9	6.39	12394	3.57	5257	12.93	3095	0.87	153.0	1.78	15572	3.46
Com.	None	3636	79	0.12	106.6	1.19	2674	0.77	901	2.21	1150	0.32	39.9	0.47	3279	0.73
	Es	1570	-45	-0.07	120.5	1.34	2645	0.76	1095	2.69	716	0.20	33.4	0.39	3314	0.74
	Nm	-7432	-498	-0.76	99.8	1.11	891	0.26	1171	2.88	-1414	-0.40	-12.6	-0.15	1393	0.31
	Em	-2573	-293	-0.45	148.6	1.66	2591	0.75	1487	3.66	-153	-0.04	20.5	0.24	3390	0.75
	Hm	-7926	-659	-1.01	227.2	2.53	3367	0.97	2394	5.89	-1152	-0.32	12.9	0.15	4563	1.01
	El	-15085	-1045	-1.60	235.1	2.62	2461	0.71	2686	6.61	-2774	-0.78	-18.4	-0.21	3658	0.81
	Nl	-35483	-1887	-2.89	12.7	0.14	-5024	-1.45	1196	2.94	-8117	-2.29	-160.8	-1.87	-5165	-1.15
	Hl	10365	-58	-0.09	572.1	6.37	12991	3.75	5110	12.57	4068	1.15	172.2	2.01	16184	3.59

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