Staff Papers Series

Staff Paper P90-24

March 1990

Marketing Costs and Efficiency for Agricultural Products: Some Conceptual Issues in Analysis and Measurement

by

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Introduction

Food costs, trade relationships, the negotiations under the GATT, and impacts of new trade relationships are influenced by the competitiveness of both the food producing and food marketing sectors of individual countries. However, much of the research and analysis on food costs within countries, competitiveness and changes in trade policies is focused on the farm sector--farm prices, volume of farm production, production costs and changes in imports or exports in farm equivalent units. This research tendency, therefore, often excludes consideration of some major determinants of the international competitiveness of the food and agricultural sectors of the trading partners, that is, the costs and efficiency of the food and agricultural marketing systems within countries. The fact that food marketing costs for most developed countries are far in excess of the farm food input costs in total consumer food costs clearly emphasizes the importance of food marketing.

Making meaningful international comparisons of economic efficiency of food marketing systems requires definitions of economic efficiency and techniques for measuring efficiency. The purpose of this paper is to review some of the concepts of efficiency and its measurement and to illustrate how inefficiencies impact on various participants in markets. Some concepts of efficiency will be reviewed. A model to evaluate incidence of food marketing inefficiency will be developed. A procedure to measure marketing costs of different systems will be described. Any comparison of food marketing efficiency between countries is further complicated by differences in marketing institutions, currency, units, product differences, etc. Some of these problems will be reviewed.

Concepts of economic efficiency and its measurement

Pure theory of economic efficiency

Much of the basis for evaluating economic efficiency has its origins in the work of Vilfredo Pareto.[2] The basic thesis is that an economy is efficient if no change in the economy can be made whereby an individual can be made better off without reducing the welfare of another individual. Subsequent work has refined the conditions of Pareto optimality. Colman and Young have summarized conditions as follows:[3]

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[1]This paper was prepared for a workshop on marketing efficiency and measurement for the Agricultural Policy Conference, Landbrukspolitisk Forskingsprogram, Noregs Landbruksvitskaplege Forskingsrad, Bergland Hotell, Norway, November 23-24, 1989.

[2]Pareto, Vilfredo, **Cours d'Economie Politique**, 1897.

[3]Colman, David and Trevor Young, **Principles of Agricultural Economics, Markets and Prices in Less Developed Countries**, Cambridge University Press, Cambridge, 1989, pp. 198-206.

1. Exchange efficiency

This condition requires that a bundle of goods and services can not be redistributed to improve the utility of one individual without reducing the utility of others. More formally, this requires that the marginal rates of substitution between any two goods and or services equals their price ratios and exhausts income. With an indifference curve approach, this occurs where the budget constraint which is determined by the prices of the goods and income is tangent to the highest attainable indifference curve.

2. Production efficiency

This condition exists when factors of production can not be reallocated in any way that increase output of one good without reducing output of other goods. More formally, this situation exists when the marginal rates of substitution for all of inputs in production of a given output are equal to the inverse of their price ratios. Furthermore the rates of substitution for any pair of inputs must be equal for all firms and all products.

3. The top level condition

This condition requires that the exchange and production efficiency conditions hold simultaneously. It also requires that prices are determined in a competitive market, any pair of product prices equals their marginal rates of substitution for each consumer and, the economy is on the production possibility frontier.

X-efficiency

Harvey Leibenstein has proposed a special type of economic efficiency or inefficiency that may be associated with monopoly.[4] The essential proposition is that monopoly results in efficiency losses in addition to allocative losses associated with the output and input prices of the monopoly. These losses occur, (1) because the monopolist is not subject to competitive pressures that force it to achieve minimum operating costs, and (2) because it may incur substantial additional costs to maintain or increase its monopoly position. These latter losses are termed X-inefficiency.

The potential for and existence or X-inefficiency may be quite large for countries that extensively regulate sectors of their economy or provide monopoly rights to the certain market participants. For example, in the U.S., the federal milk marketing order program involves qualifying milk shipments by milk plants. Some firms may be required to make milk shipments to metropolitan milk markets even though the milk is not needed in the market to meet regulatory requirements. The milk is then transported back to supply areas to manufacturing milk plants for processing. The Norwegian milk marketing program grants a monopoly to the dairy cooperative in handling all milk that is produced in the country. The system may lack incentives to close and merge inefficient plants. Norway also requires equal dairy product prices throughout the milk producing regions of the country. Consequently, one may expect a non-optimum location of milk production and excess costs of milk transportation.

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[4]Leibenstein, Harvey, "Allocative Efficiency vs, X-Efficiency," **American Economic Review**, Vol 56, June 1966, pp. 392-415.

Measurement of Marketing Efficiency

As Rauser et. al. note, literature on measurement of economic efficiency in markets provides numerous methodological approaches, but they are often poorly defined and unrelated to one another.[5] They state that the evaluation of food marketing efficiency has usually taken one of two directions: (1) analysis of sub-systems such as processing plants, assembly systems or transportation systems and (2) analysis of organizational structure, institutions, or policy constraints under which the marketing system operates.

The sub-system approach is more tractable in terms of measurement. Efficiency of the system is frequently evaluated in terms of operating costs for the system. Comparisons of standardized accounting costs of operation, synthetic engineering of plants or marketing systems with newest technologies, or linear programming and other optimizing approaches are used in these analyses. Studies of food marketing margins, (farm-retail price spreads) fall into this group. Margins are commonly used to provide some insight into food marketing efficiency and changes in efficiency.

Analysis of organization and institutional constraints has often been focused on the departures of the market structure from the competitive norm. The objective is to identify and measure the extent of market imperfections such as the number and distribution of firms sizes, the degree of product differentiation, the level of information. Attempts to measure the efficiency of the system include such market performance measures as prices relative to costs, excess capacity, adoption of new technology, and product differentiation costs.

The extent of inefficiency in agricultural markets may be measured by deviations of prices from those of a defined competitive market, by input-output ratios, by the excess of unit operating costs over a specified minimum, or by per unit marketing margins (the farm-retail price spread) for a given product relative to a pre-determined reference or norm.

The costs to society from the inefficiency are commonly termed net welfare losses and are measured in terms of consumer surplus and producer surplus. Consumer surplus is defined as the area below the demand curve and above the market price. Producer surplus is defined as the area above the supply curve and below the market price. The sum of these two areas is maximized when a market is operating at a competitively determined price and output. Departures from the competitive equilibrium reduce this area, the value of this reduction being a measure of net social loss.

Incidence of inefficiencies in agricultural markets

Economists are well aware that markets rarely, if ever, approach the optimum with respect to economic efficiency. As noted above, the inefficiency may be caused by monopolistic characteristics of the market, government interventions that cause resources to be allocated inefficiently or external-

[5]Rausser, Gordon C., Jeffery M. Perloff, and Pinhus Zusman, "The Food Marketing System: The Relevance of Economic Efficiency Measures," **Economic Efficiency in Agricultural Food Marketing**, edited by Richard Kilmer and Walter Armbruster, Iowa State University Press, Ames, Iowa, 1987, pp. 3.

ities that are beyond the control of the marketing firms, or dynamic market changes that prevent an adjustment to an economic optimum. Even if one is unwilling to accept that the concept of economic efficiency is adequate or sufficiently complete to guide policy makers or a society in organizing and using its resources, the methods or tools of economic efficiency are useful for assessing how various participants and economic variables are influenced.

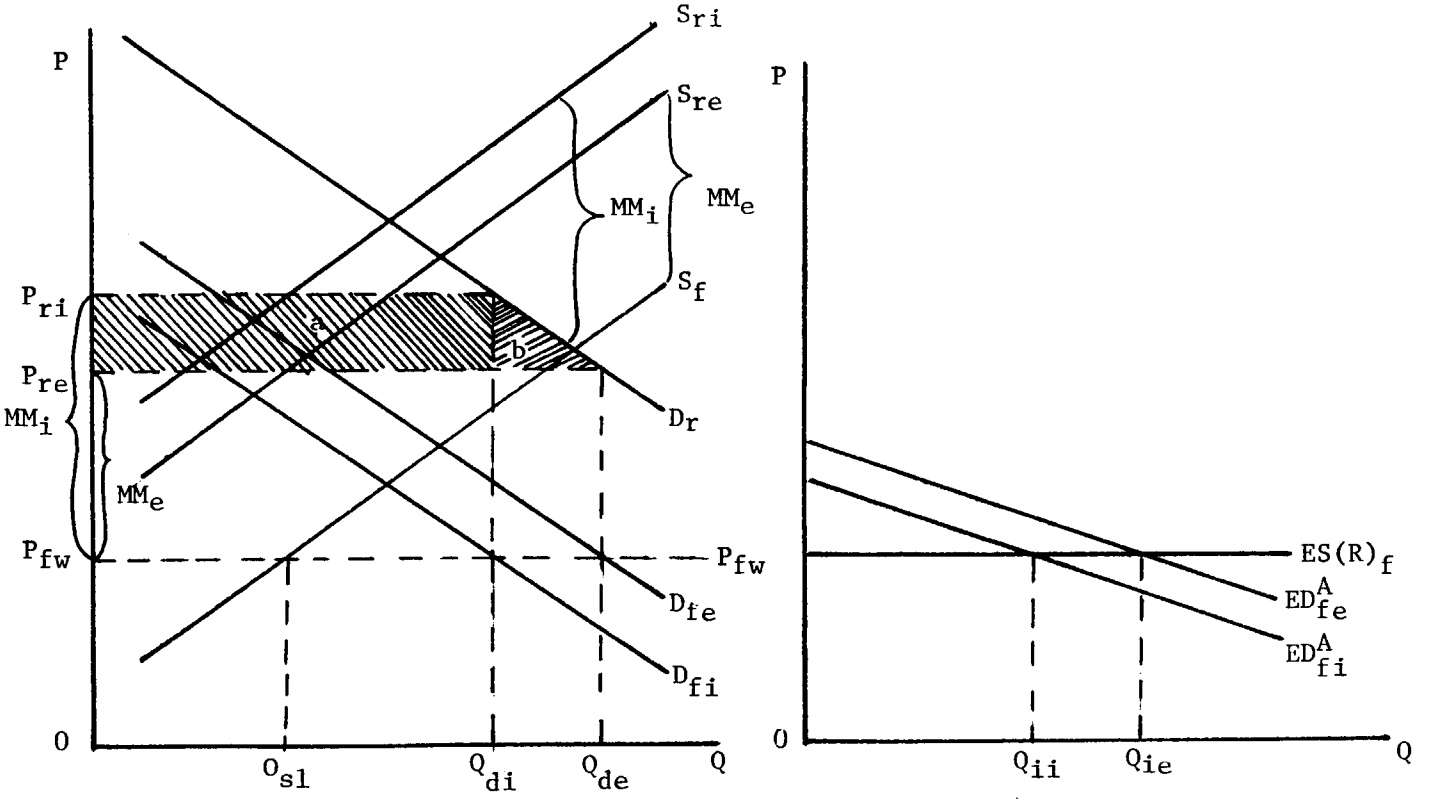
For agricultural markets, we are often interested in the impacts of marketing inefficiencies on final consumer prices, on farm prices, on levels of production and consumption, on exports or imports. To provide some insights into these impacts, lets examine how departures from an 'operationally efficient market' will affect consumers of food products, producers, and the trade sector for a food product under several scenarios. The model for the analysis is a combination of a simple marketing margin model and a trade model.

The model used is quite simple with comparisons of market equilibriums for an efficiently and inefficiently operating system. We assume that market sector inefficiency is fully reflected in its costs as measured by food marketing margins. To simplify the illustration and the discussion, assume also that the marketing margins are a constant absolute amount regardless of level of industry output. Assume there are no interventions in the trade sector (duties, quotas, export subsidies, etc.) and that the farm and retail quantity units are equivalent. This latter assumption can also be interpreted to imply that the transformation from farm units to retail (final product) units is constant for all quantities of farm product and the period of analysis is sufficient so that stocks are not a consideration. The scenarios that are examined below are for (1) a net importer of an unprocessed farm product, (2) a net importer of a processed (final consumer) food product, (3) a net exporter of an unprocessed farm product, and (4) a net exporter of a processed (final consumer) food product.

Impacts on net importers of an unprocessed farm product

Many countries produce only part of their domestic needs for some agricultural products. The remainder is imported either in unprocessed or in final product form. To consider impacts of marketing ineffeciency, first consider the situation where excess domestic demand of Country A for good X is met by imports, but it imports the basic farm product with all processing and marketing functions except original farm assembly and international transport being provided in the importing country. Wheat for flour and bread and oilseeds for edible oils are such examples. To simplify the discussion, it will be assumed that the country represents a small country case for imports. This means that the country can not affect the international price at which the product is imported, i.e. the excess supply of the rest of the world is completely elastic. This situation is illustrated in Figure 1. Panel (a) of this figure illustrates the retail demand, D_r, and farm demands for the product. When marketing system is operationally efficient with a constant marketing margin of MM_e, the farm level demand is, D_{fe}. When the marketing system is operationally inefficient with a constant marketing margin of, MM_i, the farm level demand is, D_{fi}.

Figure 1. Domestic and Trade Effects of Marketing Inefficiency for Net Importer of an Unprocessed (primary) Farm Product



For the small country net importer situation, the excess supply of the rest of the world is infinitely elastic at the externally determined world price. For imports of the primary farm product, this is represented by $ES(R)_f$ in panel (b) of Figure 1. The excess demand of country A with an operationally efficient marketing sector is determined by the horizontal distances between the farm level supply, S_f, and the farm level demand, D_{fe} for each price below the autarky farm price for country A. This is plotted in panel (b) as $ED_f^A{}_e$. For the inefficient marketing system, excess demand of country A is, $ED_f^A{}_i$, which is determined by the horizontal distances between the farm supply, S_f, and farm level demand for the inefficient marketing system, D_{fi}.

The equilibrium imports if country A has an efficient food marketing system, Q_{ie}, is determined at the intersection of the excess demand of A, $ED_f^A{}_e$, and the excess supply of the rest of the world, $ES(R)_f$ in panel (b) of Figure 1. The domestic farm price is determined at the world farm price, P_{fw}. At this price, country A farmers produce quantity, Q_{s1}, but processors of product X demand quantity, Q_{de}. The difference is provided by imports. With a constant marketing margin of MM_e, equilibrium retail price is $P_{re}=P_{fw}+MM_e$. At this price, final consumers also demand quantity, Q_{de}.

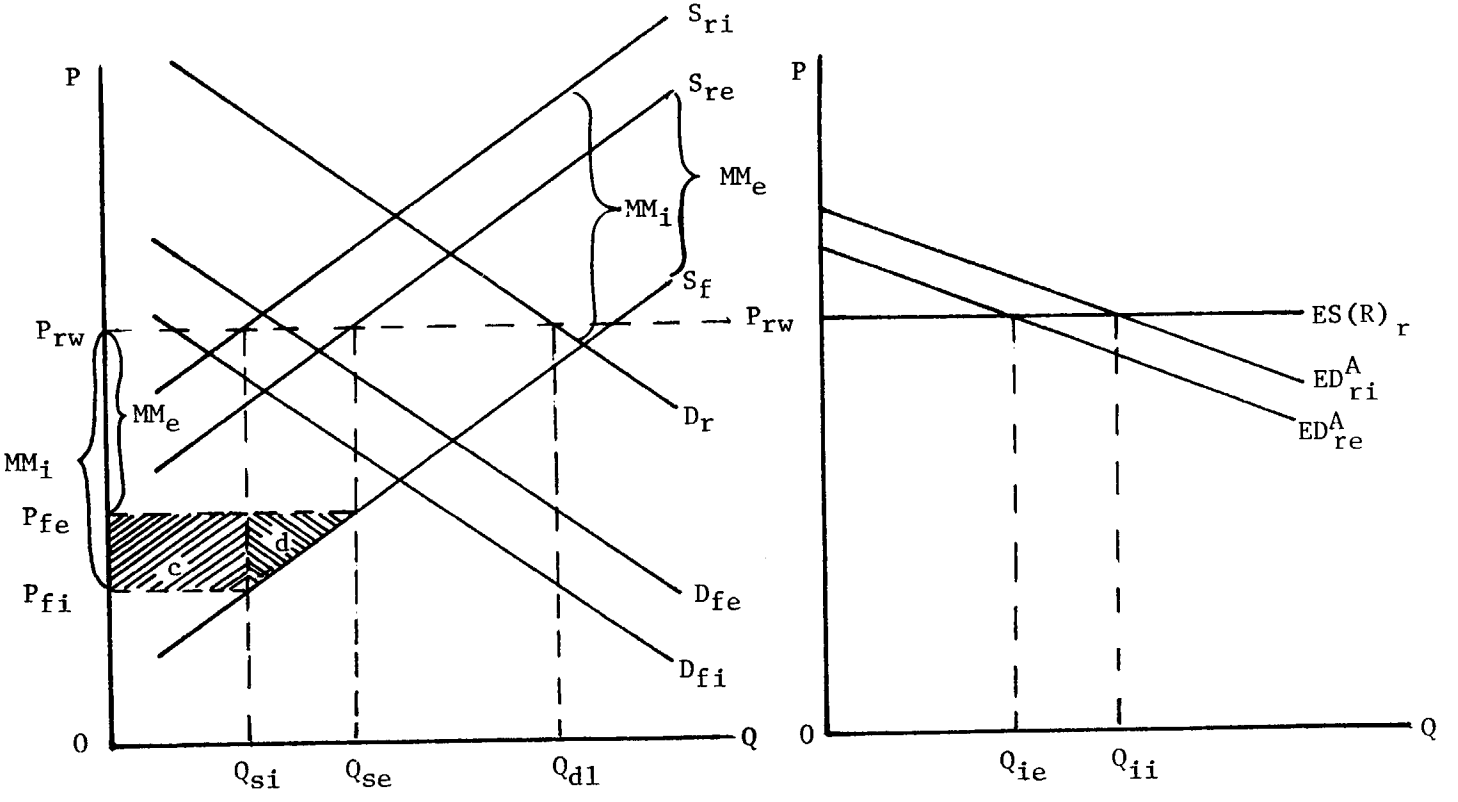
The equilibrium imports if country A has an inefficient food marketing system is determined by the intersection of the excess supply curve of rest of the world, $ES(R)_f$, and the excess demand of country A when it has an inefficient food marketing system, $ED_f^A{}_i$. Imports decline to quantity, Q_{ii}. Being a small country situation, world price remains at P_{fw}. At this price, domestic farm production of X is unchanged from above at Q_{s1}. However, marketing firms now demand only quantity, Q_{di}. This quantity still exceeds domestic production, but imports fall to Q_{ii}. The final retail price rises now to $P_{ri}=P_{fw}+MM_i$. The full cost of marketing inefficiency has been transferred to consumers. They respond by reducing consumption to Q_{di}.

In summary, food marketing inefficiency for a country that is a net importer of unprocessed farm products leads to reduced imports. For the small country situation, domestic farm production is unaffected, but retail prices rise by the full cost of the inefficiency. Domestic consumption is reduced. The net social cost to country A in terms of lost consumer surplus is the cross-hatched areas in panel (a) of Figure 1. Part of this social loss, area b, is the standard deadweight loss to the society. Area a is increased food cost that otherwise would be spent on other goods and services. For a large country situation, the excess supply of the rest of the world will be upward sloping. Consequently, the inefficiency will also impact on domestic producers in addition to consumers.

Impacts on a net importer of a final consumer food product

The impacts of food marketing inefficiency for a net importer of processed final consumer products is illustrated in Figure 2. A country that imports refined sugar, or dairy products (cheese and butter) or processed meats may be in this situation. Here again, we assume constant marketing margins of MM_e if the marketing system is operationally efficient and MM_i if the marketing system is operationally inefficient, panel (a). The relevant excess supply of the rest of the world, $ES(R)_r$, is constructed for the final consumer product. For the small country situation, it infinitely elastic at the world price, P_{rw}, in

Figure 2. Domestic and Trade Effects of Marketing Inefficiency for a Net Importer of a Processed Farm Product



panel (b) of Figure 2. Excess demand for product X by country A specifies the quantities by which retail demand exceeds retail supply at respective price levels below the autarky retail price of country A. For an efficient food marketing system with constant marketing costs of MM_e, retail supply is S_{re} in panel (a) of Figure 1, and excess demand is $ED_r^A{}_e$. For an inefficienct food system with constant marketing costs of MM_i, retail supply is S_{ri} in panel (a) and excess demand is $ED_r^A{}_i$ in panel (b).

The equilibrium world price of the finished food product is exogenously determined in the small country situation, P_{rw} in this example. With an efficient food marketing system, equilibrium imports, Q_{ie}, are determined at the intersection of excess retail (processed product) supply, $ES(R)_r$, and excess retail demand, $ED_r^A{}_e$, in Figure 2, panel (b). Final consumer demand is quantity, Q_{d1} at the equilibrium retail price. Domestic marketing firms of the final product supply quantity, Q_{se}, at P_{rw} and demand an equivalent quantity of the farm product from domestic farmers. Country A's farmers receive a price of $P_{fe}=P_{rw}-MM_e$ and supply the quantity Q_{se}. The difference between domestic demand of Q_{d1} and domestic supply of Q_{se} of the consumer product is equal to the import quantity.

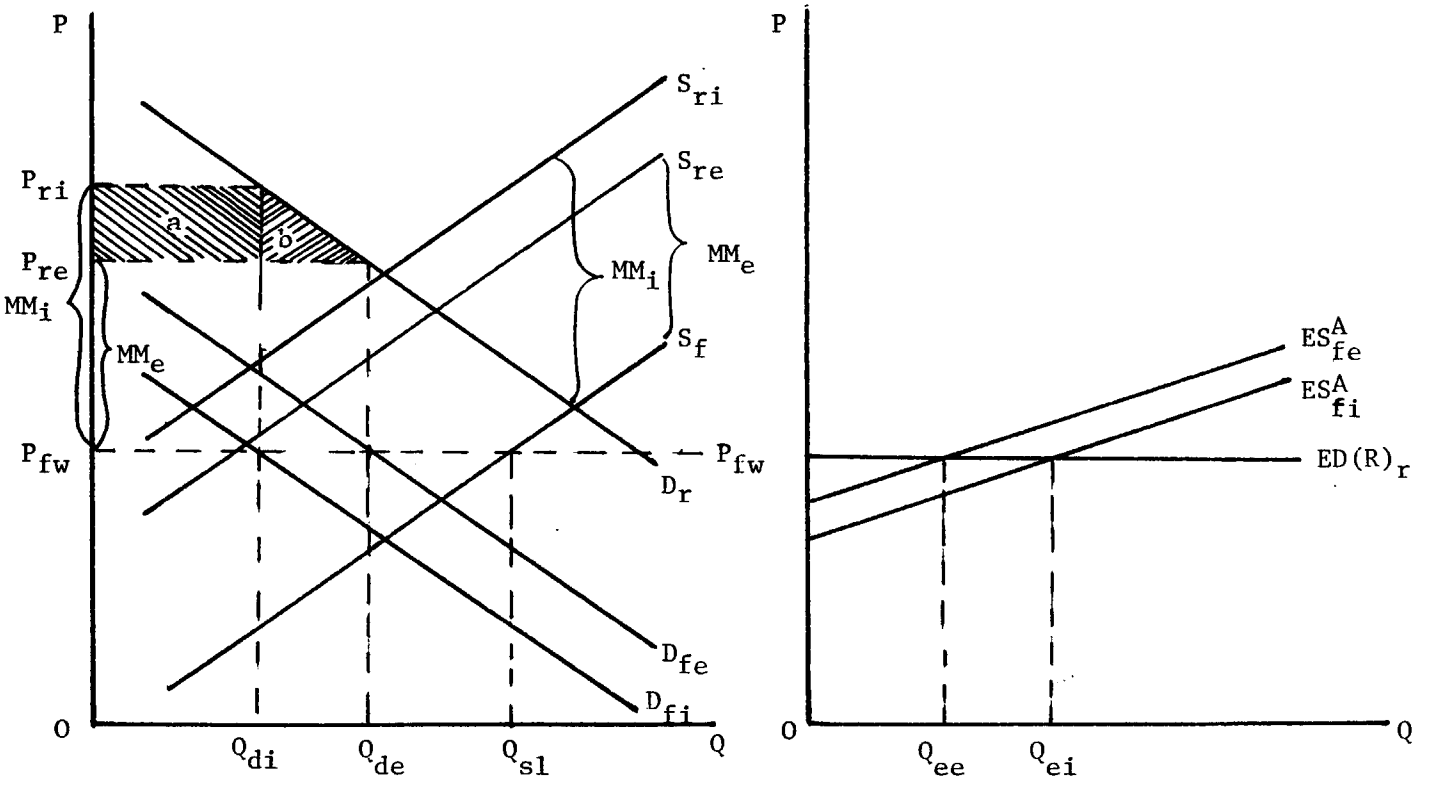
Inefficiency in the food marketing system shifts the retail supply curve upward, to S_{ri} in Figure 2, panel (a). Consequently, the excess demand for the final product is shifted to $ED_r^A{}_i$. Marketing inefficiency results in a new equilibrium in the trade sector. Imports increase to quantity, Q_{ii}. For the small country case, retail (processed) product prices are unaffected. Domestic consumers continue to demand quantity Q_{d1} because retail price is still fixed at the world price of P_{rw}. However, the domestic food marketing firms now supply only quantity Q_{si} at that price. With a fixed marketing margin they pay farmer producers a price of $P_{fi}=P_{rw}-MM_i$ for the farm equivalent quantity, Q_{si}. The increased difference between domestic demand and the reduced domestic production of good X are provided by the increase in imports. The full cost of the marketing inefficiency has been transferred to farmer producers of good X in a reduced farm price. They respond by reducing production.

In summary, food marketing inefficiencies for a net importer of a finished consumer food product lead to an increased quantity of imports--as opposed to reduced imports when the primary farm product is imported. Domestic consumers are unaffected by the food marketing inefficiency. All costs of marketing inefficiency are born by producers of the primary product. The social welfare costs to the economy in country A is a loss in producer surplus equal to the cross-hatched areas in panel (a) of Figure 2. Part c of the cross-hatched area represents a transfer from producers to the marketing sector to pay for the cost of inefficiency in that sector. Area d of the cross-hatched areas is a deadweight efficiency loss to the domestic economy. The social welfare loss of the inefficiency is primarily born by the producers when the food imports are finished products.

Impacts on net exporters of an unprocessed farm products

Now let us examine the impacts of food marketing inefficiency for the a country which is a net exporter of food products. First, consider the country which exports an unprocessed, primary, farm product. A grain and oilseed exporting country would be an example. The domestic supply and demand relationships at farm and retail levels of the market are illustrated in Figure 3, panel (a) and are

Figure 3. Domestic and Trade Effects of Marketing Inefficiency for a Net Exporter of a Unprocessed (primary) Farm Product



derived as for the preceding examples. It is assumed again that marketing costs for the efficient food marketing system and the inefficient system are constant regardless of quantity of marketings, MM_e and MM_i respectively in Figure 3.

The excess supply curves for both efficient and inefficient food marketing systems in panel (b) are derived as follows. Excess supply for a country is the amount by which domestic farm level supply exceeds domestic farm level demand at each price level above the autarky farm level price of Country A, i.e. the horizontal distances between the domestic supply curve and the domestic demand curve. These differences are plotted in panel (b) of Figure 3, $ES_f^A{}_e$ when the food marketing system is operationally efficient and $ES_f^A{}_i$ when the food marketing system is operationally inefficient. The excess demand of the rest of the world, $ED(R)_f$ is for the small country situation. Because the country is an exporter of the unprocessed farm product, the trade sector represents the farm level of the market and is fixed at a world price of Pf_w.

Equilibrium without government intervention in the market when the food marketing system is operationally efficient is determined in the trade sector at the intersection of excess supply, $ES_f^A{}_e$ and $ED(R)_f$ for and export quantity of Q_{ee}. The domestic market price at farm with no government intervention is the world market price, P_{fw}. At this price, country A's farmers produce and sell quantity, Q_{s1}, of the primary farm product. Domestic food marketing firms demand quantity, Q_{de}, for domestic sales. The remaining supply, $Q_{s1}-Q_{de}=Q_{ee}$ is exported. With a per unit cost of marketing in the domestic market, MM_e, the domestic retail price to consumers for final product is $P_{re}=P_{fw}+MM_e$. At this price, domestic consumers demand quantity, Q_{de}, equivalent to the domestic farm sales of the product.

Food marketing inefficiency shifts the derived retail supply curve upward and the derived farm level demand curve downward by the monetary costs of the inefficiency, to S_{ri} and D_{fi} respectively in panel (a) of Figure 3. Because of the shift in the farm level excess demand curve, the excess supply curve of country A is shifted to $ES_f^A{}_i$. The inefficiency leads to an increase in the equilibrium level of exports, to Q_{ei}. Because country A is a small country with respect to the world market, world price is unchanged and the domestic price at the farm level of the market remains unchanged at P_{fw}. Domestic producers continue to supply quantity, Q_{s1}, at that price. However, the inefficient food marketing system now only demands quantity, Q_{di}, at this price. The reduced difference between domestic supply and demand equals the increase in exports, $Q_{ei}-Q_{ee}=Q_{s1}-Q_{di}$. The equilibrium retail price with the higher costs of marketing inefficiency is $P_{ri}=P_{fw}+MM_i$. Consumers reduce quantity demanded to the equivalent of the farm level quantity, Q_{di}.

Inefficiency in the food marketing sector for a net exporter of a primary farm product leads to an increase in exports of the farm product. It does not affect the domestic farm sector in the small country situation. However, it leads to higher consumer prices and reduced domestic consumption. The full cost of the marketing inefficiency is born by domestic consumers. The total social welfare loss from the inefficiency is a loss in consumer surplus illustrated by the cross-hatched areas in panel (a) of Figure 3. It includes the cost of the inefficiency in food marketing, area a, plus the deadweight loss of consumer surplus, area b.

Impacts on net exporters of final consumer food products

The incidence of costs of food marketing inefficiency for net exporters of finished consumer products is quite different from that of exporters of primary farm products. Finished products, as noted above, would include such foods as cheese, butter, canned fruits and vegetables, and processed meats. Figure 4 represents this situation. In panel (a), the retail demand and farm level supply for good X represents the primary relationships for consumers and producers as for the examples above. Given a constant marketing margin of MM_e for an efficient food marketing system, the derived farm level demand of D_{fe} and retail level supply of S_{re}. Given the a constant marketing margin of MM_i for inefficient system, we obtain the relevant farm level demand of D_{fi} and retail level supply of S_{ri}.

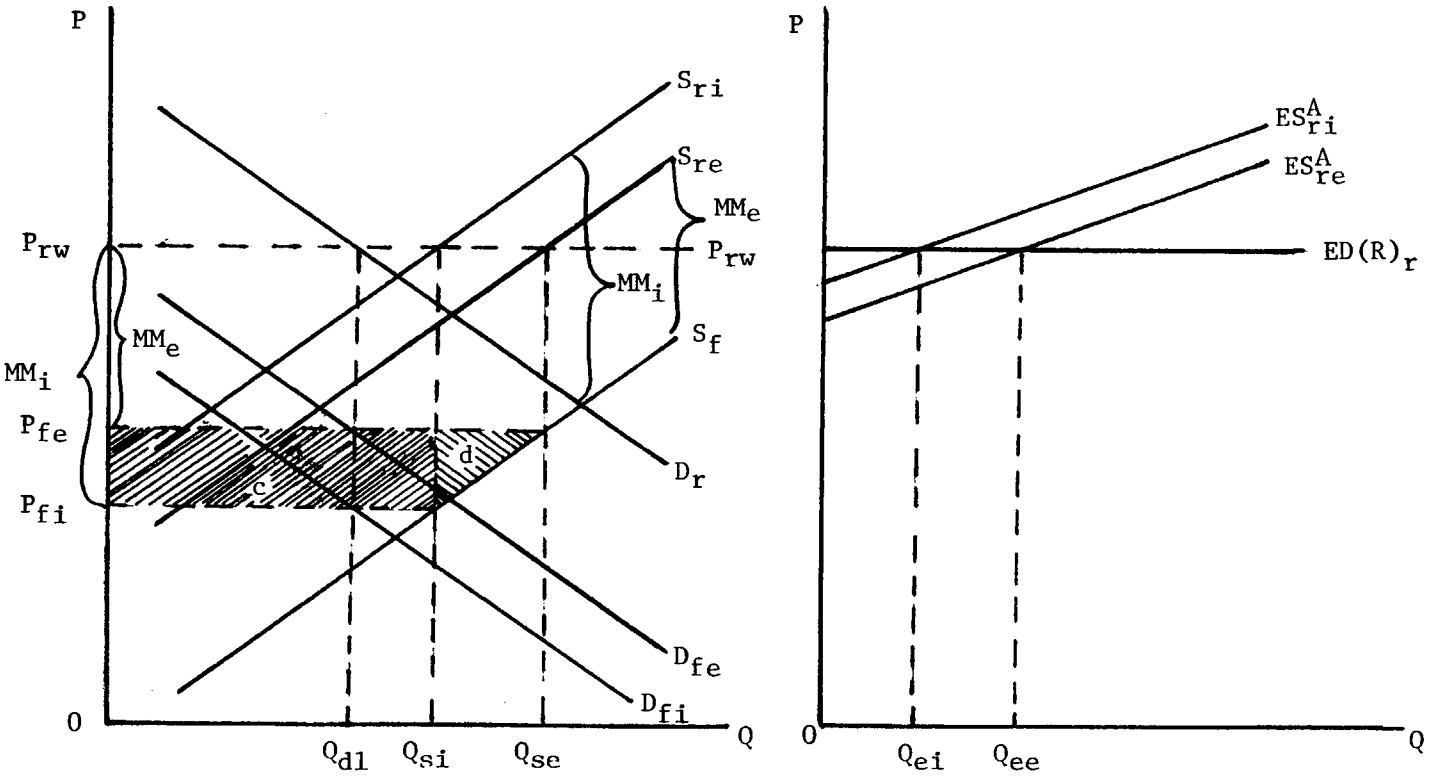
The trade sector for finished food products for a small country case exporter is represented in panel (b) of Figure 4. Excess demand of the rest of the world, $ED(R)_r$, is infinitely elastic as with the preceding example, but it now for the retail (finished) good market, rather than for the farm level. The relevant excess supply of country A is also for the retail (finished) good level of the market. It is the horizontal difference between the retail supply and the retail level demand for each possible retail price above the autarky retail price for Country A. These curves are $ES_r^A{}_e$ with an efficient marketing system and $ES_r^A{}_i$ for an inefficient system, panel (b) of Figure 4.

Equilibrium in the trade sector with an efficient food marketing system occurs at the intersection of excess supply, $ES_r^A{}_e$, and rest of the world demand, $ED(R)_r$, for an export quantity of Q_{ee}. The world price of the finished food product is exogenously determined at P_{rw} for the small country case. Without government import or export controls the domestic retail price is also P_{rw}. Given the domestic retail price of P_{rw}, domestic consumers demand quantity of Q_{d1} of good X. The food marketing system supplies quantity Q_{se} units of the finished product, X, with quantity Q_{d1} sold to domestic consumers and the remainder, $Q_{se}-Q_{d1}=Q_{ee}$, being exported. The price paid by the marketing firms to producers of the farm product is $P_{fe}=P_{rw}-MM_e$. At this retail price, the farm sector supplies quantity Q_{se} to the food marketing sector.

Now suppose that inefficiencies in the food marketing sector increase marketing costs to MM_i. This shifts the derived farm level demand curve for X downward, from D_{fe} to D_{fi} in Figure 4. The derived retail supply curve for X is shifted upward from S_{re} to S_{ri}. The excess supply of country A for the finished product is, consequently shifted upward to position, $ES_r^A{}_i$, panel (b) of Figure 4. Domestic and trade sector equilibrium now occurs at a reduced level of exports, Q_{ei}. Being a small country exporter, the world price and domestic price for the finished product is unchanged at P_{rw}. Domestic consumers continue to demand quantity Q_{d1} at this price. However, given the new supply curve for the domestic food marketing sector, total domestic production of good X is reduced by $Q_{se}-Q_{si}$ which is equal to the reduction in exports, $Q_{ee}-Q_{ei}$. Domestic food marketing firms pay producers a price of $P_{fi}=P_{rw}-MM_i$ for the farm input used in the finished food product. At this price, producers are willing to supply a quantity, Q_{si}, which is equivalent to the retail quantity.

For the small exporting country case for finished or final consumer products, marketing inefficiency leads to reduced exports, the opposite of the export impact for exporters of the unprocessed

Figure 4. Domestic and Trade Effects of Marketing Inefficiency for a Net Exproter of a Finished (Processed) Farm Product



farm product. It also causes a reduction of the farm price and domestic production declines. Final consumer prices are unaffected. The net social welfare loss to the country is a loss in consumer surplus, its value represented by the cross-hatched areas in Figure 4. Area c of this loss is the increase in marketing costs which is completely transferred to the domestic farm sector. Area d is a deadweight efficiency loss, the amount by which the lost production in domestic agriculture exceeds the its marginal costs of production. All of the welfare losses in this situation are born by producers.

Summary of domestic and trade effects of marketing inefficiency

The effects of food marketing inefficiency depend on whether a country is a net exporter or a net importer and whether the export is an unprocessed farm product or a finished food product. For the small country situations the following table indicates some of the significant impacts:

Table 1. Impacts of food marketing inefficiency on selected economic variables for alternative import or export conditions, small country case.

	Impact of marketing inefficiency for:			
	Importers of Unprocessed farm product	Importers of Processed farm product	Exporter of Unprocessed farm product	Exporter of Processed farm product
Variable				
Retail food price	+	nc	+	nc
Farm food price	nc	-	nc	-
Domestic consumption	-	nc	-	nc
Domestic production	nc	-	nc	-
Imports	-	+		
Exports			+	-
Consumer surplus	-	nc	-	nc
Producer surplus	nc	-	nc	-

nc=no change

The examples illustrate only a few of the possible market situations. More complicated situations exist. Nevertheless, the consequences can easily be assessed by use of the preceding models. For example, for the large country importer, the excess supply of the rest of the world is upward sloping.

For the large country exporter, the excess demand of the rest of the world is downward sloping. This will cause price changes at both market levels regardless of whether the product is an unprocessed farm product or a finished consumer product. Also, marketing inefficiencies will lead to losses in both producer and consumer surplus. Actual costs and adjustments due to inefficiency can be calculated given prices, quantities and demand and supply elasticities.

Marketing margins are not likely to be constant for most market situations, but the assumption simplifies the model and exposition and eliminates complications caused by producer surplus changes in the marketing sector. The assumption of constant absolute marketing margins may also provide approximations to market impacts for many empirical analyses.

The level of the marketing system at which the food product is exported or imported may differ from the above examples. The final finished product is rarely imported directly by the consumers. Imports may be in semi-processed forms, soybean oil for example. Conversely, exports are rarely exported directly to consumers of other countries. Nevertheless, these examples are useful to understand how various food marketing participants may be affected.

An Approach to International Comparisons of Food Marketing Efficiency

Conceptualizing the Marketing Margin

The per unit marketing margin (MM) for a retail food product with a constant conversion factor (k) for the farm product into retail units can be specified as follows:

$$MM = P_r - kP_f$$

where P_r is per unit retail price and
P_f is per unit farm price.

This measure is often quite adequate to measure marketing margins (costs) within countries for a given food commodity. It can be used to develop times series of margins and to describe changes through time or to compare margins for different regions or markets within the country.

Comparisons of marketing margins for single food products between countries is likely to be very misleading in terms of relative food marketing costs or food marketing efficiency. This is because individual food margins are influenced by many factors other than costs of the marketing inputs. Some of these factors are common to many international economic comparisons, some factors are unique to food marketing systems and marketing institutions. There is the question of the degree of vertical and horizontal integration in the food marketing system. In other words, the structure and organization of the food marketing system and the marketing practices followed within it may differ from country to country for each of the major food sub-sectors (e.g., dairy, poultry, pork, beef, fruits and vegetables). Organizational differences may cause the marketing system of one country to be more or less efficient than another. However, pricing practices for individual products that are followed by the firms and the

cost allocation processes within the firms may lead to quite different margins for individual products between countries, but similar costs for the entire commodity group. Suppose, for example, that the dairy processing sector in country A is highly specialized, e.g. beverage milk is processed and distributed by one group of processors, cheese is processed and distributed by another, butter and nonfat dry milk by another. In country B, all products are processed by each dairy processing firm or by a single producer cooperative. The firms in country A must, over the long-run, cover all costs of marketing each product, including a normal profit in order to continue marketing of each product. Country B firms can cross subsidize the individual products within the firm. For the entire bundle of products, the firm(s) must cover all costs of operation plus the normal return on investment if it is not being subsidized by government, but some individual products may not be covering costs while others are contributing more than costs of marketing.

An approach to partially avoid the cross subsidization problem for integrated marketing systems is to calculate the marketing margin for a standardized bundle of retail products produced from the basic farm product. Although, the utilization of the farm product (milk, for example) in the final consumer products is likely to differ from one country to another, cross country comparisons for sub-sectors are likely to be more meaningful than single food product comparisons. Øyvind Hoveid has recently utilized such an approach to compare costs of dairy marketing in several countries.[6] The following is a simplified version of his margin model. Let X_j be a vector of the quantities of retail consumer products produced in country j from quantity Q_{fj} of the basic farm product in country j. The retail products may be jointly produced from the basic farm product as beef products from cattle or independently produced products as canned or frozen vegetables from peas, or both joint and independent products such as butter and nonfat milk or cheese and beverage milk from milk. Let P_j be a vector of the retail prices of each of the consumer products and F_f be the per unit farm price of farm product f. Let $MM_{fj}(X_j)$ be the marketing costs for farm product f that are used in producing retail products X_j. If we assume that all of the consumer products produced from Q_{fj} are sold at retail for household consumption, $MM_{fj}(X_j)$ is the total farm to retail marketing costs for the given farm product. For a vector of consumer products produced from Q_f in country A as follows:

$$X_A = (X_{1A}, X_{2A}, X_{3A}),$$

the total marketing costs, MM_{fA}, for the farm product in country A can be specified as follows:

$$(1) \qquad MM_{fA}(X_A) = (P_{1A}X_{1A} + P_{2A}X_{2A} + P_{3A}X_{3A}) - F_{fA}Q_{fA}.$$

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[6]Hoveid, Øyvind, "Efficiency of Dairy Industries, Comparisons on a National Level between Denmark, Norway, Sweden and Switzerland," Paper presented at the 21st EAAE Seminar, Integration and Cooperation in the Agrofood Industry, Kiev, USSR, 1989.

For country B the total marketing margin would be defined as follows:

$$(2) \qquad MM_{fB}(X_B) = (P_{1B}X_{1B} + P_{2B}X_{2B} + P_{3B}X_{3B}) - F_{fB}Q_{fB}.$$

To make country comparisons of marketing costs, a standardized marketing bundle is necessary. For this, one can calculate the marketing costs of the X_A bundle of foods in terms of the B country costs or the X_B bundle of foods in terms of the A country costs. In the former case:

$$(3) \qquad MM_{fB}(X_A) = (P_{1B}X_{1A} + P_{2B}X_{2A} + P_{3B}X_{3A}) - F_{fB}Q_{fA}.$$

Thus equation (1) provides a measure of the A country marketing cost of the country A bundle and (3) is the B country marketing cost of the A country bundle. Or, the cost of the B country bundle can be calculated at the A country marketing costs as follows:

$$(4) \qquad MM_{fA}(X_B) = (P_{1A}X_{1B} + P_{2A}X_{2B} + P_{3A}X_{3B}) - F_{fB}Q_{fB}$$

and compared with the marketing cost calculated with equation (2). The ratios of Equations (1) to (3) or (2) to (4) provide indexes of relative efficiency, or marketing costs, between any pair of countries. As Hoveid notes, the two ratios correspond to the duality between the Laspeyres and Paasche index formulas.[7]

The preceding model requires additional refinements to reflect the unique characteristics of a given commodity group or farm product. For the dairy industry, Hoveid makes adjustments for milk composition (quality) that impacts on product yields and price discrimination for producer milk according to final use (products) from the milk.

Data Selection and Standardization

The data used for computing marketing margins for country comparisons require several choices that are likely to impact on the results. They are:

1. Selection of time period for comparisons. Margins may vary seasonally and because of differences in crop conditions among countries and general conditions of the economy within each country. These differences may be partially mitigated by using annual average prices to avoid the need to deal with seasonal differences and several years to avoid differences that may be created by variations in crop conditions and aggregate demand differences.
2. Market levels for computations. Market margins can be calculated for several different combinations of market levels, farm-food processor,food processor-wholesale, wholesale-retail,

[7]Hoveid, Øyvind, op. cit. p. 7.

farm-retail, and other levels where market levels can be identified and prices calculated. However, the specific marketing functions that are performed for these alternative market levels may differ from country to country. Food processors may perform the wholesale function in country A and not in country B. To avoid this problem for inter-country comparisons, margin measures for the entire marketing system for the product, from farmer to buyer at retail, would seem to be most appropriate--that is, the marketing costs for foods consumed in the home.

3. Selection of appropriate exchange rates. When actual monetary values of marketing margins are computed, margin values will change as exchange rates change for the monetary units used for calculations. The problem may be partially overcome by computing margins in standard currency unit for a several year period. The effects of short term changes in currency exchange rates will be partially eliminated.

4. Conversion rates from farm to final food products. If adequate quantity and price data are available for farm production and final products from the farm product, the analyst need not be concerned with conversion from farm to retail products. However, if complete data are unavailable, particularly for final products, one may need to estimate quantities of production. Product conversion factors and quantity units need to be considered. Since the metric system is most common for quantity and weight measurement, the metric system should be used for any comparisons that are tied to quantities or volumes. Conversions of retail quantity units to farm equivalents may not be standard for all countries in the analysis. For comparability, standard farm to retail conversions must be used.

Margins vs. Costs

The calculated margins for any country will be influenced by several factors other than marketing input prices and efficiency differences, even after allowing for the preceding factors. This includes government activities, regulations, and other institutions that increase or reduce the apparent marketing margins that are reflected in market prices. The researcher needs to identify these factors and to adjust the apparent calculated margins so that actual prices (or costs) of providing marketing services are reflected. These adjustments include:[8]

a. Producer subsidies or taxes (assessments) that are part of government price support or stabilization programs. In some countries, these are paid or assessed directly on producers. Thus, there should be no impact on marketing margins. In other situations, they are channeled through the marketing agents. In Norway, for example, part of the government subsidy on

[8]Based partially on a list developed by Øyvind Hoveid, Kostnadskompensasjon og Kostnader i Meieribruket, Forskningsmelding B.007.89, Norsk Institutt for Landbruksøkonomisk Forskning, Oslo, Norge, 1989, p. 164.

producer milk price is paid by the dairy cooperatives, which are reimbursed by the government for this payment.

b. Subsidized marketing functions. Governments sometime subsidize the costs of certain marketing functions. In the United States, storage costs are incurred by the Commodity Credit Corporation for dairy products purchased for price support and subsequently sold back to commercial users. Commercial markets avoid this cost of marketing. In Norway, the government subsidizes marketing firms for interregional transport costs for several farm commodities to equalize producer prices throughout the country.

c. Special fees, taxes on marketing firms, and value-added taxes. Governments sometimes impose special charges on marketing firms to fund general government activities or for specific programs such as costs of farm price support or subsidy programs. General taxes, such as the 'value-added taxes' (VAT) of the EC and other European countries are included in the retail prices of all goods. Norway, for example, has a 20 percent VAT.

d. Costs of handling surplus commodities that have been generated by minimum price programs. The commercial food marketing firms may be charged with the responsibility of processing, storing, and disposition in secondary markets of products that cannot be sold in domestic food at the specified target price support levels. If not all of these costs are reimbursed by the government, they add to the operating costs of the marketing firms. For comparison between countries, these costs should be deducted from costs of domestic commercial food marketing.

e. Excess returns from marketing of imported food products. Domestic food marketing firms are frequently importers of foods that are both imported and produced domestically. If the domestic price of such food or raw food product is supported above the world price level and domestic marketing firms are handling both the domestically produced and imported products, excess returns may be generated on the imported products. These excess returns are an offset to other costs of marketing.

f. Subsidized costs of marketing facilities. To generate employment and economic activity in rural areas, governments may be providing loans at reduced costs or free land and facilities for food marketing firms. These subsidies reduce the marketing margins required by the marketing enterprises, but, nevertheless, are a cost of marketing.

g. Profits or payments from other activities unrelated to the specific food product or food group. This is in addition to the cross-subsidization or cost allocation for the included products as described above. It may be quite difficult for multi-product enterprises to identify cross-product

subsidization. In fact, the firms themselves are often unable to accurately allocate all costs and returns for each of the individual products or product groups.

If Y is a vector of the adjustments described in (a) through (g) above, then the adjusted marketing margin, $MM'_{fJ}(X_J)$ for country A is:

(5) $$MM'_{fA}(X_A) = (P_{1A}X_{1A} + P_{2A}X_{2A} + P_{3A}X_{3A}) - F_{fA}Q_{fA} + Y.$$

This latter equation would provide an estimation of food sub-sector marketing costs that would permit meaningful comparisons between countries. It should be appropriate for such sub-sectors as beef, dairy, pork, or poultry. It may also be applicable to measuring costs for fruits and vegetables for a standardized basket of fruits or vegetables that are marketed in the fresh form.

Conclusions

This paper has examined several issues relative to the measurement and comparison of food marketing margins between countries. First, some of the standard concepts of economic efficiency were examined. A major conclusion is that total economic efficiency for an economy can be defined, but direct measurement of efficiency would be an extremely complicated process. Consequently, partial analysis of economic efficiency is the usual approach.

Second, several variations of a model were developed which illustrated how inefficiency in food marketing sectors impacted on consumers, the farm producing sector, and the trade sector of an economy. These indicate some very divergent impacts of inefficiencies in food marketing. It was shown that the incidence of inefficiency depends on whether the country is a net importer or a next exporter of the product and whether the import or export was in the form of the unprocessed farm product or a final consumer product. Social welfare losses in terms of producer and consumer surplus were identified. Given supply and demand elasticities and prices and quantities for a market, the social welfare losses can be calculated.

Third, an approach to compute marketing margins for sub-sectors that can provide meaningful comparisons between countries was developed. It is designed to overcome problems of industry structure and institutions that could significantly influence marketing costs for individual foods.