Analysis of Marketing Margins in Eco-Labeled Products

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ANALYSIS OF MARKETING MARGINS IN ECO-LABELED PRODUCTS

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Abstract

This article aims to explain the marketing margins in the eco-labeled products market in Thailand and the Philippines. It focuses on labeled organic agricultural commodities that are commonly exported especially in Europe, which has demand for this type of products. Understanding the interplay of economic variables influencing marketing margins in the eco-labeled market as compared to its conventional counterpart is relevant in understanding how this growing niche market works. The analytical framework developed by Gardner (1975) was used in the analysis to provide a basic understanding of how marketing margins behave. Econometric results show that changes in demand rather than the changes in supply explain most of the variations in margins particularly in labeled commodities. Contrary to what was expected, the coefficients of marketing costs and their significance are generally higher in conventional commodities than in labeled commodities.

Keywords: Marketing margins, price spread, organic products, eco-labeling
JEL: Q12, Q13, M31, L11

1. Introduction

Marketing margin is an equilibrium entity that is a function of the difference between equilibrium retail and farm prices (Wohlgenant, 2001), or between export and farm prices as in this study's context. Marketing margins provide neither a measure of farmers' well-being nor of marketing firms' performance. However, they give an indication of the performance of a particular industry (Tomek and Robinson, 1990), or an indication of the market's structure and efficiency. For instance, Gordon and Hazledine (1996) have argued and shown in their study that the form of the market power is likely to manifest in larger marketing margins than would otherwise be the case. This poster paper aims to explain the marketing margins in the eco-labeled products market in Thailand and the Philippines. It focuses on labeled agricultural commodities that are commonly exported especially in Europe, which has a demand for this type of products. Understanding the interplay of economic variables influencing marketing margins in the eco-labeled market as compared to its conventional counterpart is relevant in understanding how this growing niche market works. In this poster paper, we attempt to answer the following questions:

(i) How have marketing margins for eco-labeled products changed over time vis-à-vis other relevant economic variables?
(ii) What explains or accounts for the difference in marketing margins for eco-labeled and conventional products?
(iii) What are the future implications of growth in the market?

2. Literature Review

There have been no studies regarding the marketing margins of eco-labeled products because the development of the eco-labeled product market is a relatively recent phenomenon and there is limited availability of official data. On the other hand, quite a number of studies had been undertaken to investigate the retail-farm price spread for the conventional products. Most of these were studies in the US, e.g. Reed *et al.* (2002), Richards *et al.* (1996), Holloway and Hertel (1996), Parker and Zilberman

(1993), Schroeter and Azzam (1991), Kinnucan and Forker (1987), and Wohlgenant and Mullen (1987). In fact, in the US, retail-farm price spreads for individual foods are regularly computed and published as measures of marketing costs.

The study by Gardner (1975) provided a basic framework for analysing marketing margins. It defined the major sources of variation in the retail-farm price spread, i.e., shifts in the retail food demand, in the farm product supply, or in the supply of marketing services. Similarly, Heien (1977) came up with an analysis of farm-retail margin (in percentage difference) that related margin with farm output and the ratio of retail price and marketing costs. Using the Cobb-Douglas production function, his analysis showed that an increase in the marketing costs and in the level of farm output reduces the percentage marketing margin.

Wohlgenant (2001) reviewed the studies on marketing margins and the development of empirical models. Aside from the variables that come in when using a structural model that looks at the farm, retail, and input market equilibria, he also discussed other possible explanatory variables that had been included in studies that used reduced-form models instead of a complete structural model.[1] From the studies he reviewed, the primary factors that were commonly included in the analysis of reduced-form models were retail price, demand shifters like population and income, and marketing input costs.

In addition to the aforementioned variables, there are also a number of other relevant variables that can influence the size of marketing margins. These have been shown in a number of studies that looked at the impact of other marketing shifters, e.g. price risk (Schroeter and Azzam, 1991; Brorsen *et al.*, 1985), product quality (Parker and Zilberman, 1993), and market power (Holloway and Hertel, 1996; Schroeter and Azzam, 1991).

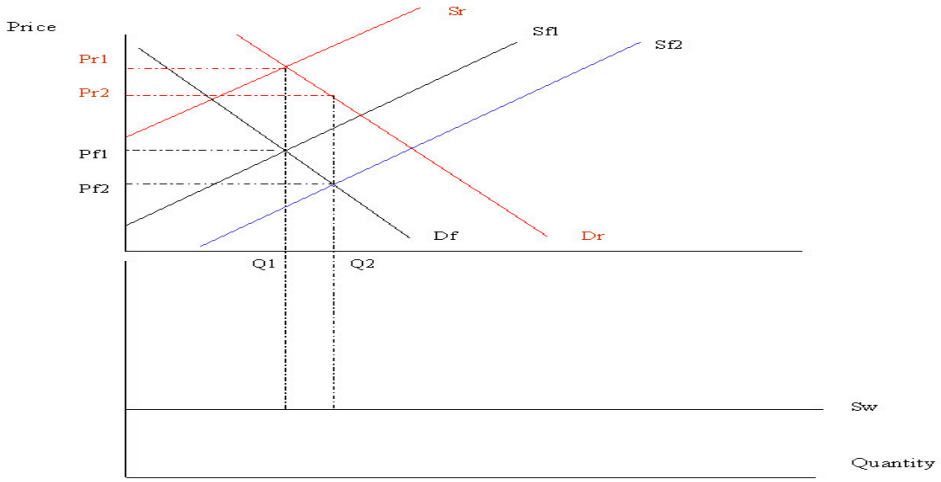
The analysis of marketing margins has to consider the interaction of all these variables as may be relevant for a particular commodity being analysed. For example, Richards *et al.* (1996) applied a marketing margin model that expanded the relative price spread model of Wohlgenant and Mullen (1987) to include a number of other relevant factors (i.e., market share as proxy variable for market departure from perfect competition, trend for quality and technological changes over time, and price risk); it was found that all of them were, with the exception of a risk variable, significant in explaining the price spread. It should be noted that Wohlgenant's analysis provided an explanation of the expected relationship between marketing margins and these variables, as well as explanations on discrepancies among past studies. He showed, for example, that with an assumption of fixed input proportions,[2] marketing margins and quantity have a positive relationship. However, empirical evidence from the studies of Buse and Brandow (1960), Waugh (1964), George and King (1971), and Tomek and Robinson (1990) nonetheless showed a negative relationship, which is consistent with the assumption of variable input proportions.

3. Analytical Methods and Data Used

The analytical framework developed by Gardner (1975) provides a basic understanding of how marketing margins behave. The framework involves an analysis of demand and supply relationships for both farm and retail sectors under general competitive conditions. It shows how the farm-retail price spread or marketing margins change when retail food demand, farm product supply, or the supply of marketing services shifts. In general, the change in marketing margins would depend on the elasticity of the supply of marketing services, and the elasticity of substitution between farm and marketing inputs that are used to produce the final product. For instance, in the case of a perfectly elastic supply of marketing services under fixed-proportions technology, i.e. zero substitution between farm inputs and marketing services, marketing margins would remain constant as the quantity of farm product supply changes (Figure 1). The same result is expected for any change in quantity demanded.

[1] These reduced-form models are one-equation models that are obtained or deduced either from economic theories, from empirical analysis, or both.

[2] As noted by Tomek and Robinson, the fixed-proportions assumption implies that the elasticity of substitution between farm and the marketing inputs is zero.

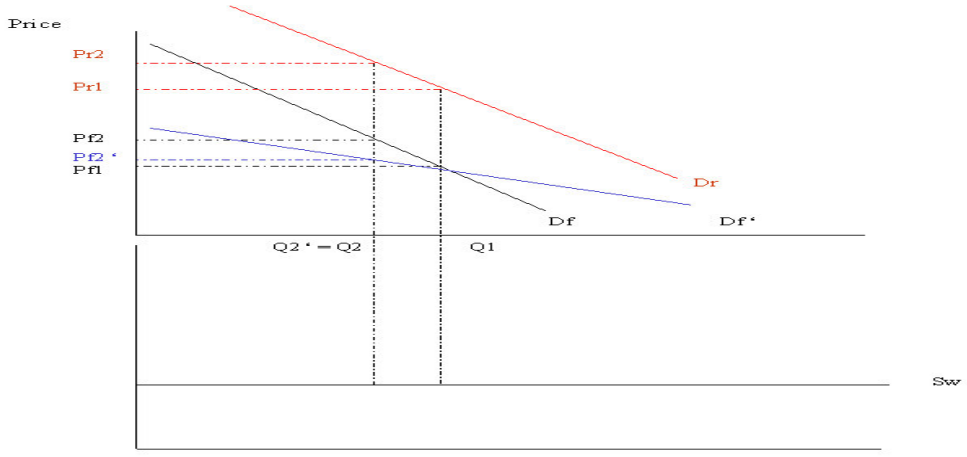


Source: Own illustration.

Note: **P** and **Q** denote price and quantity, respectively, at levels **f** and **r**, or farm and retail, respectively. **S** and **D** refer to supply and demand, while **w** refers to marketing inputs.

Figure 1. Effect of a Shift in the Supply of Farm Products on Marketing Margins (Under the Assumptions of Perfectly Elastic Supply of Marketing Services and Fixed-Input Proportions)

For a less elastic or upward-sloping supply function for marketing input, i.e. to represent the need to use proportionally larger amounts of marketing inputs to process an increased level of farm output,[3] the following results may be expected: (i) a rightward shift in food demand will increase the retail-farm price ratio, (ii) a rightward shift in the supply of farm products will increase the retail-farm price ratio, and (iii) a rightward shift in the supply of marketing inputs will decrease the retail-farm price ratio.



Source: Wohlgenant and Heidacher (1989).

Note: **P** and **Q** denote price and quantity, respectively, at levels **f** and **r**, or farm and retail, respectively. **S** and **D** refer to supply and demand, while **w** refers to marketing inputs. Df', Pf2' and Qf2' refer to demand, price and quantity under variable input proportions.

Figure 2. Effect of a Shift in the Supply of Farm Products on Marketing Margins (Under the Assumptions of a Perfectly Elastic Supply of Marketing Services and Variable Input Proportions)

[3] Or, as Tomek and Robinson (1990) put it, if the supply of marketing services has a positive slope, then the price of such services would increase as demand increase.

On the other hand, allowing for variable input proportion provides a different set of results, depending on the assumption on the elasticity of substitution between farm and marketing inputs.[4] Figure 2 shows the effect of change in the supply of the farm products on prices and marketing margins given a perfectly elastic supply of marketing services. Instead of a positive relationship as implied under fixed proportions and upward sloping supply of marketing services, Figure 2 shows a negative relationship between the change in farm product supply and marketing margins. In particular, a leftward shift in the supply of farm product raises the farm price to Pf2. In this case where it is possible to substitute marketing inputs for farm inputs, e.g. investing on facilities that reduce losses from postharvest and wastage during processing, the farm demand curve could shift from Df to Df' and farm price declines from Pf2 to Pf2'.

3.1 Structural Model

In general, there are two ways to empirically estimate the impacts of the shifts in consumer demand, farm product supply, and marketing input supply on marketing margins. One is through a rigorous analysis of the structural model; and the other, through estimation of reduced-form equations.

Based on Wohlgenant (2001), an empirical analysis of determinants of marketing margins should be first and foremost an economic analysis of determinants of retail and farm prices for a given commodity. Moreover, it should consider marketing margins as equilibrium quantities. In this regard, a specification of a structural model would be useful for its empirical analysis. As noted by Wohlgenant and Mullen (1987), since shifts in both demand and supply can cause the output and the retail price to change, a complete analysis of price spread or marketing margin is only possible through an analysis of the complete set of market-behavior equations. However, on the basis of data constraints, a number of analyses on marketing margins used reduced-form models.

The following structural model, as identified by Wohlgenant (2001), shows a marketing margin model derived from the analysis of the market equilibrium. In particular, it summarizes the relationships of relevant endogenous and exogenous variables through the specification of supply and demand at the farm and retail market levels, as follows:[5]

(1)	$Q_{fd} = D_f(P_f, P_r, W, T)$	*Farm Input Demand*
(2)	$Q_{fs} = \overline{Q}_{fs}$	*Farm Input Supply*[83]
(3)	$Q_{rd} = D_r(P_r, Z)$	*Retail Demand*
(4)	$Q_{rs} = S_r(P_r, P_f, W, T)$	*Retail Supply*
(5)	$I_d = D_i(P_r, P_f, W, T)$	*Marketing Input Demand*
(6)	W is exogenous	*Marketing Input Supply*
(7)	$Q_{rd} = Q_{rs} = Q_r$	*Retail Market Equilibrium*
(8)	$Q_{fd} = Q_{fs} = Q_f$	*Farm Market Equilibrium*
(9)	$I_d = I_s$	*Marketing Input Market Clearing*

where P_r = retail price;
P_f = farm price;

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[4] Graphical illustrations are hard put in reflecting accurate results in changes in prices. As Gardner (1975) noted, a mathematical model would best allow the treatment of this case, particularly when the elasticity of the supply of marketing services is also greater than zero.

[5] This econometric analysis is based on structural equations, e.g for the farm and retail demand and supply:

(i) $Q_{fd} = \alpha_1 + \beta_1 P_f + \delta_1 P_r + \phi_i W_i + \eta_i T_i + \mu_1$

(ii) $Q_{fs} = \alpha_2 + \beta_2 P_f + \gamma_i C_i + \mu_2$

(iii) $Q_{rd} = \alpha_3 + \delta_2 P_r + \lambda_i Z_i + \mu_3$

(iv) $Q_{rs} = \alpha_4 + \beta_3 P_f + \delta_3 P_r + \phi_i W_i + \eta_i T_i + \mu_4$. Equation (ii) provides a general relationship between supply, and output and input prices that is consistent with the general economic theory, but without specifying the time horizon. Since it is frequently the case that supply of the farm input can be viewed as a function of lagged rather than the current period prices, quantity supplied can therefore be assumed to be econometrically predetermined with respect to the current period farm price (Wohlgenant, 2001). Thus, Q_{fs}, as it appears in equation (26), is considered as given in the current period.

M = marketing margin, equal to $P_r - P_f$;
Q_f = quantity of the farm input;
Q_r = quantity of the retail product;
I = quantity of marketing inputs;
Z = retail demand shifters (include price effects of related goods, changes in income, population and taste) ;
W = marketing input prices; and
T = other exogenous marketing sector shifters (such as time lag in supply and demand, risk, technological change, quality and seasonality, etc.).

Given a unique equilibrium, marketing margins can be determined for specific values of exogenous and endogenous variables. With marketing margin equation in the form,

(10) $M = P_r - P_f (Q_f/Q_r)$[6]

and given Equations (1) to (10), partially-reduced form equations yield the following relationships for an econometric estimation of the retail-to-farm price linkage:

(11) $P_r = P_r (Z, W, T, Q_f)$
(12) $P_f = P_f (Z, W, T, Q_f)$
(13) $M = M (Z, W, T, Q_f)$.

This approach was undertaken in the classical margin studies by Fox (1951) and Waugh (1964) who estimated partially-reduced-form equations of farm and retail prices as linear or log-linear functions of farm production quantity and income, representing changes in Z and W.

The comparative static analysis of marketing margins derived using the above market-clearing equations shows the marketing margin behavior with respect to the changes in Z, W, T, and Q_f.[7] For example, under the assumption of variable input proportion, a relationship between M and Z is predicted to be positive, while M and Q_f would have a negative relationship. The latter confirms the graphical illustration in Figure 2.

3.2 Reduced-form Marketing Margin Models

As noted by Wohlgenant and Mullen (1987), since shifts in both demand and supply can cause the output and the retail price to change, a complete analysis of price spread or marketing margin is only possible through an analysis of the complete set of market-behavior equations. However, on the basis of data constraints, a number of analyses on marketing margins used reduced-form models. In Wohlgenant's (2001) empirical model, for instance, Equation (13) was used to estimate marketing margins.

In addition to this model, there are four other marketing margin models, based on Wohlgenant (2001) and Lyon and Thompson (1993), which can be used alternatively as reduced-form models. These are:

(14)	$M = f (P_r, W, T)$	*Mark-up Model*
(15)	$M = f (P_r, P_r Q_f, W, T)$	*Relative Price Spread Model*
(16)	$M = f (Q_f, W, T)$	*Marketing Cost Model*
(17)	$M = f (P_f, E_t[P_{f\,t+1}], W, T)$	*Rational Expectations Model*

[6] It should be noted that the marketing margin is intended to measure the per-product unit costs of assembling, processing, and distributing foods from the farm. Allowing the input-output ratio (Q_f/Q_x) to change represents an efficient utilization of marketing inputs (Reed and Clark, 1998).

[7] The detailed algebraic formulations illustrating these relationships had been fully worked out by Wohlgenant (2001).

where $E_t[P_{f\,t+1}]$ = expected value of farm price at time t+1. All other symbols are identical to those explained in section 5.3.1.1.

Although the models vary on how prices are linked, in general, retail-farm linkage models are based on the theory of derived demand wherein demand for retail products generates derived demand for farm products. Thus, the retail price of the commodity will reflect the farm price and the cost of marketing the commodity from the farm to the retail level.

While the choice of the model(s) had to depend on the significance of the estimation results, the econometric estimations made in this study did not include the mark-up, the marketing cost, and the relative expectations models. This decision was based on theoretical grounds. Lyon and Thompson (1993) had shown that the reduced-form models, particularly Equations (14) to (16), have varying importance in explaining marketing margins depending on spatial and temporal aggregation of data.[8] However, the justification for the specification of the mark-up model is primarily empirical (Wohlgenant and Heidacher, 1989). The other models have strong theoretical bases and, thus, render themselves potential alternative marketing margin models.

As for the rational expectations model, its assumption on the influence of cost of inventories in price determination is considered irrelevant in the case of eco-labeled commodities given currently low production of these products. In addition, the proposal that the current and past values of farm price affect retail price is also not relevant for the eco-labeled products since prices, both at the farm and consumer levels, are still bilaterally negotiated. Also, rational expectations model is specified for the short term but the data used in this study were on annual basis.

The choice for the reduced-form model derived from the structural model (Equation 13) and the relative price spread model (Equation 15) is consistent with the conceptual framework put forth by Gardner (1975). Gardner's framework discussed in section 5.3.1 emphasized the relevance of marketing costs, farm supply, and consumer demand in the determination of price spread. These factors are all represented in the two models. In Equation (13), Z represents the consumer demand factor. In the relative price spread model, the quantity of output and the retail price are the avenues through which the shifts in retail demand and supply are manifested (Wohlgenant and Mullen, 1987). The marketing cost model shown in section 5.3.1.2 as an alternative way of obtaining the relative price spread model will not be estimated, too. As this model is expected to be generally significant given specific data on various marketing inputs and costs, this is unlikely to be the case for eco-labeled markets where official data and statistics are still lacking.

In general, the relative price spread model is expected to perform well considering the results of previous studies of Wohlgenant and Mullen (1987), Marsh (1991), Lyon and Thompson (1993), and Richards *et al.* (1996). However, it should be pointed out at this point that there might be econometric constraints in estimating this model due to the appearance of an endogenous variable like retail price on the right-hand side of the equation. This issue has rarely been questioned in the literature. In this study, attempts were undertaken to address the issue but nevertheless raises some caveats in the interpretation of the results. There are two ideas to partly address this issue: one is a conceptual clarification and the other is an estimation technique. With respect to the latter, it should be noted that the dependent variable, marketing margin, is not just a difference between retail and farm prices. It also includes the conversion factor in adjusting the quantities. The use of instrumental variable and a two-stage least squares estimation technique may directly but still partly address this issue. In particular, retail price is included in the margin equation as an instrument, i.e. estimating it first using its reduced form in Equation (11). Sarg test was employed to determine whether the instrumental variable used is valid (Gujarati, 2003). Based on the results, the econometric estimation of the relative

[8] In particular, using price data on milk consumed in three cities in the US, the study showed that the mark-up model is valid at all levels of temporal aggregation, i.e. monthly, quarterly, and semi-annual levels. With spatially-aggregated data, the relative price spread and the marketing cost models are preferred at the monthly and semi-annual levels, respectively. The mark-up model at the monthly level did not perform well with spatially-aggregated data. As Lyon and Thompson (1993) argued, this result is an artifact of fixed proportions marketing technology that is assumed in this model, and which also generally characterizes the marketing technology in individual markets. They also noted that with spatial aggregation where some level of substitution between inputs is allowed, marketing margins would depend on quantity marketed. In this case, the relative price spread model explains the marketing margins well.

price model may not be reliable in view of the implicit correlation between the dependent variable and one of the independent variables, export price. Though the latter was used as an instrumental variable, results of the Sargan test employed to verify the validity of the instrument cast a doubt that the instrument used is uncorrelated with the error term. In this regard, the general reduced-form model was used in this study to explain the variations in the marketing margins in both eco-labeled and conventional commodity markets.

3.3 Extension of Marketing Margins Analysis from the Usual Retail-Farm Price Margins to Export-Farm Price Margins

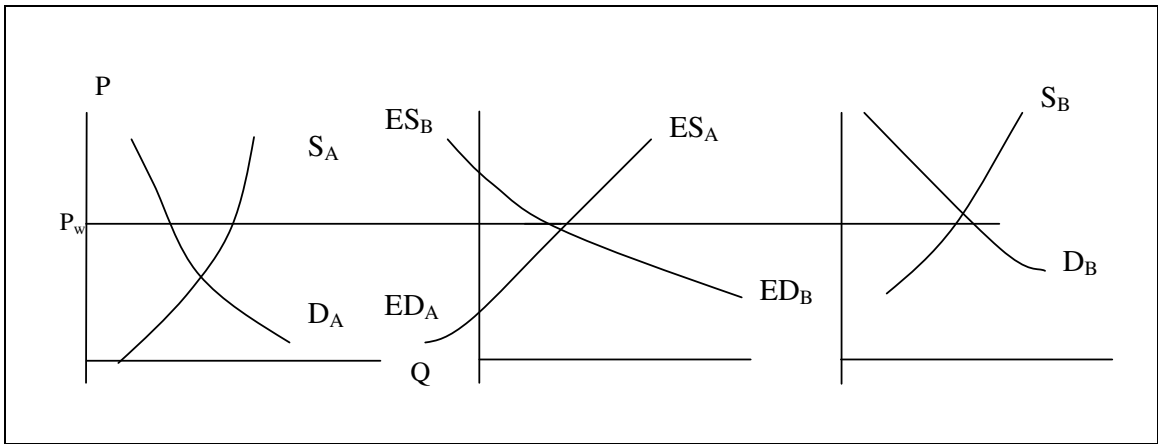
In this study, the analysis of marketing margins, which typically refers to the retail-farm price spread, was extended to the export-farm price spread.[9] This seems more appropriate because developing countries are primarily producing eco-labeled products for exports.

The existing literature has analyzed determinants of marketing margins using structural specifications that involve farm and retail markets. The model specifications used in this study are based on the same structural specifications and derived reduced-form equations. Considering the Law of One Price, or the tendency of prices to equalize across freely trading nations (Houck, 1986), the use of the parallel specifications can be justified as the law's assumption of free transfer costs. The fixed exchange ratio of 1:1 implies that when these assumptions are relaxed, the difference in the world price and the domestic price can be explained by exchange rates, transportation costs, and other relevant marketing costs.

In particular, given the demand and supply conditions in any exporting (A) and importing (B) countries, say for a particular commodity, the Law of One Price arrives at an equilibrium price (Figure 3) such that the world price (P_w) equals the price in country B (P_B) which, in turn, is equal to the price in country A (P_A) times the exchange rate (Krugman and Obstfeld, 2000):

(18) $$P_w = P_B = e_{B/A} * P_A$$

In Equation (18) $e_{B/A}$ is the exchange rate of the currency in country B relative to that of A.



Source: Houck (1986), p. 36.

Figure 3. Law of One Price: Two-Nation Trading Regime

Meanwhile, relaxing the assumption of free transfer costs, it is shown in Figure 4 that,

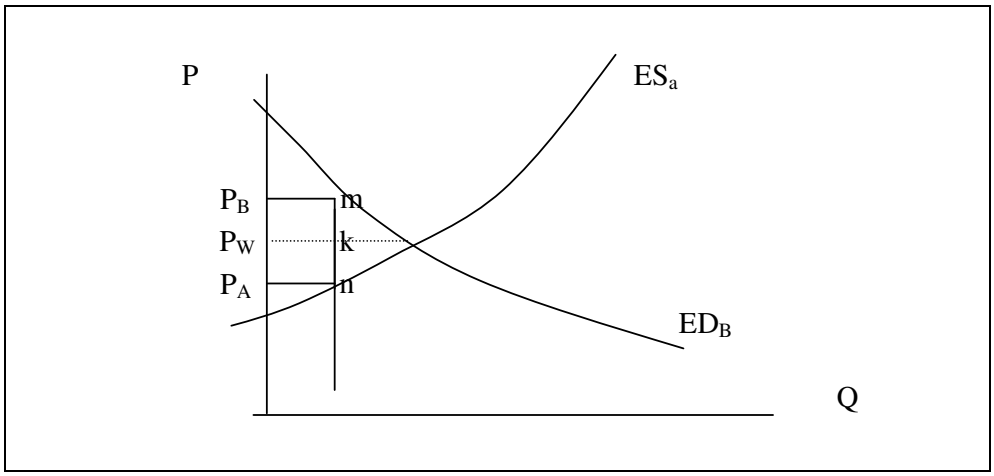
(19) $$P_w = P_{B1} - mk$$

[9] Ahmed and Rustagi (1987) also considered in their analyses of marketing margins the export prices for foreign consumers as the other end of the market levels analyzed.

(20) $P_w = P_A + kn$

where $P_{B1} = e_{B/A} * P_{A,}$ and
mk and kn = transportation and other relevant marketing costs;
measured along *mkn* in Figure 4.

Tomek and Robinson (1990) pointed out that spatial relationships are determined largely by transfer costs between regions provided competitive conditions prevail, and that the principles that determine the spatial price difference within a country apply equally well to international prices.



Source: Houck (1986), p. 37.

Figure 4. Law of One Price with Transfer Costs

3.4 Model Specifications

The determinants of marketing margins in eco-labeled and conventional markets of a given commodity are expected to differ significantly considering the complexities that exist in each market, especially in the conventional market, where there are some preferential trade agreements, trade barriers, and market power, among others. These factors may violate the basic assumption of perfect competition in the marketing margin models discussed above. Based on available information, while the Philippines and Thailand are major exporters of the commodities considered in the study, there are no indications of market power particularly in the conventional markets in both countries.[10]

Thus, assuming competitive markets for both conventional and eco-labeled products, the following hypotheses were formulated for the study:

(i) Marketing costs account for higher marketing margins in eco-labeled markets than in their conventional counterparts. This difference is not so much due to conventional marketing cost items (e.g. labor, shipping, and other usual marketing cost), but rather to entry costs into eco-labeled marketing. Thus, the inclusion of marketing costs, e.g. the classical indicators like wages and fuel costs, in the regressions should yield a comparable magnitude and significance of the impact on the variation of marketing margins in both eco-labeled and conventional products.

[10] In the 1970s and 1980s, when Thailand imposed an export tax on rice, the issue of degree of power that Thailand could command in the world market became central in the policy debate. Ahmed and Rustagi (1987), however, pointed out that Thailand had no strong market power as countries could give countervailing response by establishing policy measures to expand domestic production and reduce dependencies on imports. The effect of this response had been evident in the declining market share of Thailand from the 1950s to the 1980s. Importing countries had reduced imports by increasing production, which, in turn, was facilitated in the late 1960s with the emergence of high-yielding rice varieties.

(ii) Consumer demand and farm supply are significant determinants of marketing margins, but the elasticity of marketing margins relative to changes in these variables is lower in eco-labeled products than in conventional products. This is in consideration of the fact that the exports of eco-labeled products are mainly handled by NGOs, which greatly ensure that their producers are able to get larger benefits than the conventional producers by participating in the production of eco-labeled crops.

These hypotheses emphasize on the relevance of marketing costs, farm supply, and consumer demand in explaining the marketing margin behavior. The following are the specifications of the econometric model used, corresponding to Equation 13:

$$M = \alpha + \beta_1 GDPCAP + \beta_2 FARMPRODN + \beta_3 IC + \beta_4 T + \varepsilon \quad (21)$$

The variables included in the estimation are defined in Table 1 together with their expected signs. In summary, demand shift variables like consumer income are positively-related to marketing margins under the assumption of variable input proportion.[11] As for the quantity marketed, a negative relationship is expected. The comparative statics showed indeterminate signs for marketing input prices, and for marketing sector shifter, e.g. technological change, time lag in supply and demand, etc. While the former primarily depends on the elasticity of substitution between farm and marketing inputs, the latter may have to depend on what factors are actually included in the model. Nevertheless, based on previous studies, e.g. Wohlgenant and Mullen (1987), Marsh (1991), Lyon and Thompson (1993), and Richards *et al.* (1996), marketing costs are generally positively related to marketing margins. With regard to the marketing sector shifter, T, this study will use a time factor to represent technical change in general. The sign is indeterminate at this point.

Table 1. Definition of Variables Used in Marketing Margin Model Estimation

VARIABLE	DESCRIPTION	EXPECTED SIGN/RELATIONSHIP WITH MARKETING MARGINS
Dependent	Marketing Margin (expressed as absolute price difference, i.e., FOBPRICE - FARMPRICE)[a]	
Predictor		
GDPCAP	Consumer/importer income	+
FARMPRODN	Farm Input Supply	-
IC	Average marketing cost/index (includes wages and fuel costs only)	+
T	Time trend	Indeterminate

[a] To compare prices, the processed or final product price equivalent of the raw product price was first estimated based on some conversion factor/milling efficiency.
[b] The sign for this interaction term is based on the empirical evidence of Wohlgenant and Mullen (1987).

[11] The expected signs in Table 1 are based on the assumption of variable input proportions which the model consider.

Both primary and secondary data were utilized in the analysis. Data for organic products were obtained from exporting companies and interviews with key persons involved in organic trade. Organizations from countries that import organic products, such as GEPA in Germany and CLARO Fair Trade in Switzerland, were also requested for data and information, specifically on export prices.

4. Results and Discussion

Based on Table 2, a comparison of the marketing margins or the price spreads in conventional and eco-labeled markets of the commodities under study can be summarized as follows:

(i) The levels of margins are higher in eco-labeled commodities than the conventional counterparts.

(ii) Over the period when eco-labeled commodities have been produced and exported, there had been a pronounced declining trend (deterministic trend) in the marketing margins of the Philippine commodities, but a positive trend for Thailand rice. On the other hand, the trends in the conventional commodities have been generally stochastic, though the values of the average growth rates (Table 2) indicate a positive trend for bananas and negative trends for sugar and rice.

(iii) In general, the variability of marketing margins around the trend, as measured by a instability index,[12] is higher in conventional commodities than the eco-labeled counterparts, except for sugar. Among the eco-labeled commodities, the volatility of marketing margins in rice is lower than those of sugar and bananas.

Table 0. Levels, Trends and Fluctuations in Marketing Margins[a] Eco-labeled (Eco) and Conventional (Conv) Commodities

	Philippine Bananas		Philippine Sugar		Thailand Rice	
	Eco	***Conv***	***Eco***	***Conv***	***Eco***	***Conv***
1. Level [b] (US$/MT)	731.4	27.4	759.5	123.7	450.9	68.5
2. Growth [c] (in %)	-5.2	43.9	-6.5	-0.2	2.4	-0.1
3. Instability [d] (in %)	18.4	33.5	13.5	7.4	10.3	26.2

Source: Own computations.

[b] Average levels of marketing margins measured over a period comparable for both conventional and eco-labeled commodities, i.e., 1992-2003 for Philippine bananas; 1993-2003 for Philippine sugar; and 1995-2003 in Thailand rice.

[c] Measures the trend in marketing margins using average growth rate during the specified period in footnote b.

[d] Measures the fluctuations around the trend of the marketing margins over the same period as in footnote b.

[12] Instead of using coefficient of variation (CV) to describe the fluctuations or instabilities in time series data, Cuddy and Della Valle (1978) proposed the use of a trend-corrected CV measure, i.e. through the instability index (I). As noted by Herrmann (1985), the uncorrected CV in the presence of strong trends in the time series tends to be higher than in the presence of weak trends because the early and late values of a variable will deviate much stronger from the mean value. For a linear time series model, the instability index, I, is computed as $I = CV\sqrt{(1-R_a)^2}$, where R_a^2 is the adjusted coefficient of determination obtained from the linear model of the dependent variable on time. In this way, instabilities are computed as coefficients around the trend, rather than around the mean (Herrmann, 1985).

The decreasing trends in the marketing margins or the narrowing gap between the export and farm prices in the eco-labeled markets for bananas and sugar may be attributed to an increasing efficiency in the utilization of marketing services due to better technology or perhaps economies of scale. That is, a decreasing cost per unit both in production and marketing translates to lower farm and export prices. In addition, the decline in prices could also indicate that although demand for eco-labeled products has been increasing and expected to continue its growth in the medium term, the current supply for these particular commodities may be more than sufficient to meet the demand. Eco-labeled rice and conventional bananas are exceptions. While the increase in production of eco-labeled rice has resulted in lower farm prices, export prices are still increasing despite the generally declining marketing costs except for fuel costs, which have been increasing in the last few years.

While the trend in marketing margins in eco-labeled rice could be a basis to argue for a higher demand than supply, this argument would hold only at the export market level but not at the farm level. Meanwhile, the increasing trend in the marketing margins in conventional bananas may be explained with respect to the marketing arrangement of this product. Note that in general, farm prices usually follow the trend in export prices or vice versa. However, the trend in conventional banana farm prices exhibits a different pattern, which at this point may only be hypothesized to be due to more long-term and stable price contracts between growers and exporting companies. Note that this arrangement is very common in Philippine banana production.

The relatively low instability of marketing margins (Table 2) in eco-labeled commodities may be due to the way prices are determined in their market. In particular, there is a possibility for negotiation of price not only between exporters and importers but also between exporters and farmers. Depending on how economic conditions would alter costs and revenues for the stakeholders, prices may be fixed for a few years in order to ensure income, at least on the farmers' side. Indeed, based on data, there is relatively less instability in farm prices for eco-labeled products than their conventional counterparts. In contrast, the trend in the marketing margins for conventional products exhibits more instability. Except maybe for sugar, which is a highly protected market, the instabilities in conventional prices may reflect a more market-oriented price determination—a process that determines price levels based on the interplay of relevant economic variables. It is also noted that in the eco-labeled commodities, the changes in marketing margins follow the movement in export prices, which may indicate a relatively strong influence of demand shifter variables on changes in marketing margins compared to changes in primary supply. Theoretically, the differences in marketing margins between conventional and eco-labeled products, although largely attributed to marketing costs, are also influenced by a number of other factors. Existing literature has indicated the effects of non-conventional factors such as market power, price risk and uncertainty, quality of products, and seasonality, among others. Using the reduced-form model that was derived from a structural model, the regressions for each commodity under eco-labeled and conventional markets provided relevant insights on the factors affecting marketing margins in the eco-labeled market.

The results[13] of the estimation of the marketing margin model by linear regression show that the relative price model consistently provided higher R-squared values, i.e. 0.71 or higher in all cases. The general marketing margin model that was estimated, though simple in structure, provides interesting information with regard to the impact on marketing margins of the primary explanatory factors, which include: (i) consumer demand through the income variable GDPCAP, (ii) farm supply, and (ii) marketing costs. The regression results (Table 3) generally gave the expected signs for the variables. Consumer income came out significantly, at either the five or ten percent confidence level, in most commodities except for conventional sugar. It was also noted that the marketing margins in eco-labeled commodities are relatively more elastic with respect to consumer income than the conventional commodities. This means that the increased demand due to increase in income drives the price ratio of export and farm prices of eco-labeled commodities higher than it would raise the price ratio in the conventional market.[14] Intuitively, this is possible considering that it is more difficult for the supply of eco-labeled commodities to respond to changes in demand given the requirements for producing these commodities. In the best case, a substitution of marketing inputs for farm inputs may be undertaken to increase output supply. This would raise consumer prices more than farm prices, thereby resulting in

[13] The estimations were done after tests for stationarity, and transforming the data that are non-stationary.
[14] If it is a decrease in demand, then the opposite holds true.

higher marketing margins. The case of the eco-labeled bananas is an exception given the negative coefficient for consumer income. However, as Gardner (1975) argued, this is also possible especially if the supply of marketing inputs is more elastic than the supply of farm inputs. Under this condition, prices of marketing inputs do not increase steeply with the increase in demand for these inputs, thereby allowing substitution between the two inputs marketing and keeping the ratio of export and farm prices down. In the marketing margin model for conventional sugar, the coefficient of consumer income is also negative, but is statistically non-significant.

As regards marketing costs, its relevance in explaining the variation in marketing margins may be lower in terms of magnitude when compared to the consumer demand, but relatively high in terms of statistical significance. However, contrary to what was hypothesized, the coefficients of marketing costs and their significance are generally higher in conventional commodities than in eco-labeled commodities. It has been hypothesized that the magnitude of the impact of marketing costs (which in this study is only represented by average wage and fuel costs) on the variation of marketing margins in eco-labeled commodities would at least be comparable with that in conventional commodities. This is because it is expected that high marketing costs in eco-labeled commodities are complemented by other costs relevant to complying to the requirements for eco-labeled commodities like certification and inspection costs, quality control, packaging, etc., which cannot be included in the regression. The results, however, show that marketing cost is not a very significant explanatory variable for the variation in marketing margins in eco-labeled commodities. Given an odd finding that costs are a negative or insignificant variable, it may be argued that in the case of eco-labeled commodities, wages and fuel costs may be poor proxies for costs of marketing. Fuel costs and wages are typically economy-wide measures, whereas the corresponding prices of those inputs in the particular marketing margin may be different. More appropriate data would likely be industry-specific measures of costs. Furthermore and as already recognized, there are other costs that are not included in the cost indicator that affect margins, thereby resulting in an omitted-variable problem.

Table 3. Regressions on Marketing Margins Using the General Reduced-Form Model for Eco-labeled and Conventional Commodities

	Philippine Bananas		**Philippine Sugar**		**Thailand Rice**	
	Conv	***Eco***	***Conv***	***Eco***	***Conv***	***Eco***
GDPCAP	3.42	-13.67	-0.90	3.77	0.62	1.53
	(2.62)**	(2.98)**	(0.55)	(1.62)*	(1.84)*	(3.26)**
FARMPRODN	-0.41	-0.04	-1.47	-0.59	-0.07	0.53
	(0.76)	(0.24)	(2.05)*	(2.64)***	(0.08)	(4.71)***
IC	0.87	1.13	0.85	-0.75	0.63	0.31
	(3.14)***	(1.97)*	(3.29)***	(0.81)	(2.20)**	(2.49)*
T		0.58		-0.25		
		(1.38)		(2.25)**		
Constant	-10.55	62.88	15.22	-12.02	-0.13	-6.03
	(2.78)**	(3.17)**	(1.55)	(0.88)	(0.64)	(3.95)*
Observations	23	11	23	11	23	8
Adj. R-squared	0.37	0.86	0.66	0.90	0.37	0.92
Durbin-Watson	2.16	2.28	2.14	2.46	2.11	1.62

Source: Own computations.

Notes: | t | statistics in parentheses; coefficients expressed as elasticities.

Significance levels: * (α=0.10), ** (α=0.05), ***(α=0.01).

Among the eco-labeled commodities, the Philippine banana and sugar sectors provide higher levels of marketing margins. This reflects higher marketing costs for the Philippine eco-labeled commodities relative to that for Thailand. On the other hand, eco-labeled rice exhibited an increasing trend in marketing margins that runs counter to the expectation. A closer look at the changes in prices would reveal lower transmission (Table 4) of changes in the export prices to the farm prices. In the case of rice, this transmission is even not statistically significant. Some valuable inferences can be derived from this result. In particular, the marketing costs in the eco-labeled market are expected to decline with increasing quantity supplied/marketed as fixed costs of certification and inspection decrease per unit. Aside from this cost, the conventional costs of marketing eco-labeled products are not expected to differ strongly from those of conventional prices. Given the trend in marketing margins in Thai rice, there may be a need for future research to look at the possible existence of market power.

Table 4. Elasticities[a] of Farm Price with Respect to FOB Price

	Conventional	Eco-Labeled
Bananas	0.83**	0.47*
	(0.90)[b]	(0.95)
	[1.74]	[1.69]
Sugar	0.46	0.51*
	(0.91)	(0.97)
	[1.94]	[2.15]
Rice	0.94***	0.86
	(0.96)	(0.84)
	[2.37]	[1.80]

Source: Own computations.

Notes: Significance levels: * (α=0.10), ** (α=0.05), ***(α=0.01).

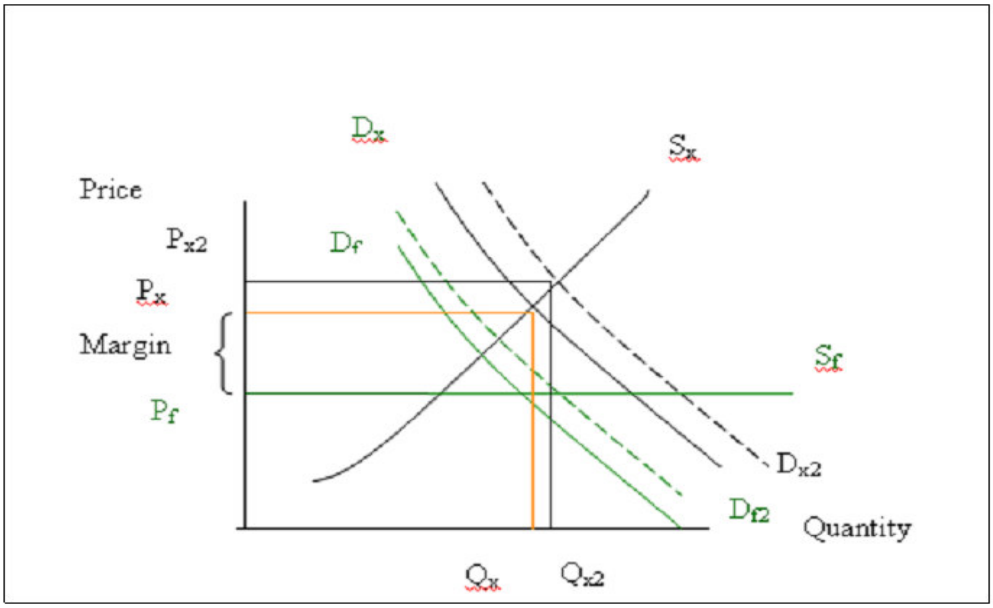
[a] The elasticities of price transmission are obtained by estimating a long-run backward price transmission model, i.e. ln(FARMPRICE) = a + b·ln(FOBPRICE) + c·TIME.

[b] Values in parenthesis are the adjusted coefficients of determination (Adj. R-squared); Durbin-Watson statistics, in brackets.

The eco-labeled rice market provides a unique case whereby prices at the farm level decline, while export prices are increasing. Based on interviews, the price of paddy rice received by farmers has been fixed at a certain level.[15] Given this scenario, the marketing margins can be said, more or less, to be biased against the farmers. That is, while the export market price can be derived from the usual demand and supply interactions, the farm price has been under some sort of control so that supply at the farm level effectively becomes perfectly elastic at some fixed price (Figure 5). Against this backdrop, the observed increasing trend in the marketing margins resulting from an increased export price may be due to: (i) increased demand, holding marketing cost constant, that can not be met by supply; or (ii) a pure increase in marketing cost. In the first case, the producers are insulated from the gains due to higher prices, and in the second case, they are insulated from the effects of higher costs.

[15] In real terms, there are slight fluctuations and a declining trend because of changes in the exchange rate. Note that even if the elasticity of price transmission is high in eco-labeled rice, this result is nonetheless statistically non-significant.

Notwithstanding these propositions, the extent or magnitude of impacts arising from relevant economic variables, i.e. consumer demand, farm supply, and marketing inputs cost, on the variations in marketing margins was estimated and will be further discussed in the next section.



Source: Own illustration.

Figure 5. Incidence of Marketing Margins in the Eco-labeled Rice Market, Thailand

Although there is limited availability of data, further inferences regarding the structure of the eco-labeled market can be made on the basis of the regression results concerning the importance of costs including demand and supply shifts on the size of marketing margins. Based on both the trend in prices vis-à-vis marketing margins and the results of the regression, there seems to be no market orientation with regard to price determination for eco-labeled rice at the farm level in Thailand. This is evident in the increasing export prices juxtaposed with declining farm prices, and in the very low transmission elasticity from the export price to the farm price. The fact that farm prices are not allowed to move consistently with export prices, which reflect the changes in consumer demand, raises an issue on pricing efficiency. Assuming increasing marketing costs, this strategy may have been designed to insulate the farmers from income instability. However, using the argument of economies of scale, the increasing marketing costs could be counteracted by increasing production and exports of eco-labeled products. Indeed, this argument can only be supported by a more accurate measure of marketing costs, which in this study can only be estimated based on available data, and inferring from the behaviour of marketing margins with respect to the shifts in consumer demand and supply of farm and marketing inputs.

Overall, eco-labeled markets may not be considered as normal competitive markets in that: (i) there are not many producers and buyers so that each side has a way of influencing price instead of it being determined solely by aggregate supply and demand; (ii) the product offered is highly differentiated; and (iii) to some extent, the costs involved in the production process serve as barriers to entry. On the other hand, the tendency towards imperfect competition is tempered by the fact that marketing of eco-labeled products had initially progressed with the assistance from NGOs. Although the resulting price stability may be beneficial to ensure a stable supply of eco-labeled products, the farmers may have been unable to derive optimal benefits from a highly expanding eco-labeled market with this kind of pricing arrangement.

REFERENCES

1. Ahmed, R. and N. Rustagi. 1987. Marketing and Price Incentives in African and Asian Countries: A Comparison. In *Agricultural Marketing Strategy and Pricing Policy. A World Bank (WB) Symposium.* Elz, D. (ed.): 104-118. Washington D.C., USA: World Bank.
2. Brorsen, B.W., Chavas, J., Grant, W. R., and L. D. Schnake. 1985. Marketing Margins and price Uncertainty: The Case of U.S. Wheat Market. *American Journal of Agricultural Economics* 67: 521-528.
3. Buse, R.C. and G.E. Brandow. 1960. The Relationship of Volume, Prices and Costs to Marketing Margins for Farm Foods. *Journal of Farm Economics* 42: 362-370.
4. Cuddy, J.D.A and P.A. Valle. 1978. Measuring the Instability of Time Series Data. *Oxford Bulletin of Economics and Statistics* 40: 79-85.
5. Elitzak, H. 1996. Food Cost Review. *Agricultural Economics Report* 729. Washington D.C., USA: United States Department of Agriculture.
6. Fox, K.A. 1951. Factors Affecting Farm Income, Farm Prices and Food Consumption. *Agricultural Economics Research* 3: 65-82.
7. Gardner, B.L. 1975. The Farm-Retail Price Spread in a Competitive Food Industry. *American Journal of Agricultural Economics* 85: 235-242.
8. George, P.S. and G.A. King. 1971. Consumer Demand for Food Commodities in the United States with Projections for 1980. Gianini Foundation Monograph No. 26. Berkeley, USA: University of California.
9. Goodwin, B.K. and D.C. Harper. 2000. Price Transmission, Threshold Behavior and Asymmetric Adjustment in the U.S.: Pork Sector. *Journal of Agricultural and Applied Economics* 32: 543-553.
10. Gordon, D.V. and T. Hazledine. 1996. Modelling Farm-Retail price Linkage for Eight Agricultural Commodities: A technical report for the Agriculture and Agri-Food Canada. http://dsp-psd.communication.gc.ca/Collection/A21-49-1996-1E.pdf. Accessed in April 2004.
11. Gujarati, D. N. 2003. *Basic Econometrics* (4th ed.). New York, USA: McGraw-Hill.
12. Heien, D. M. 1977. Price Determination Process for Agricultural Sector Models. *American Journal of Agricultural Economics* 59: 126-132.
13. Herrmann, R. 1985. *Statistical Bases for Market Analyses*, *2nd ed.* (in German). Kiel, Germany: Institute for Agricultural Policy and Marketing, Kiel University.
14. Herrmann, R. 1997. Agricultural Policies, Macroeconomic Policies and Producer Price Incentives in Developing Countries: Cross-Country Results for Major Crops. *The Journal of Developing Areas* 31: 203-220.
15. Holloway, G.J. and T. Hertel. 1996. Explaining the Causal Relationship Between farm and Retail Prices. In *Agricultural Markets: Mechanisms, Failures and Regulations.* Martimort, D. (ed.): 241-272. Amsterdam, The Netherlands: Elsevier.
16. Houck, J.P. 1986. *Elements of Agricultural Trade Policies.* New York, USA: Macmillan Publishing Co.
17. Kinnucan, H.W. and O.D. Forker. 1987. Asymmetry in Farm-Retail Price Transmission for Major Dairy Products. *American Journal of Agricultural Economics* 69: 285-291.
18. Kmenta, J. 1997. *Elements of Econometrics, 2nd ed.* Michigan, USA: Macmillan.
19. Krugman, P. and M. Obstfeld. 2000. *International Economics: Theory and Policy*, 5th ed. New York, USA: Pearson Addison Wesley.
20. Lyon, C.C. and G.D. Thompson. 1993. Temporal and Spatial Aggregation: Alternative Marketing Margin Models. *American Journal of Agricultural Economics* 75: 523-536.
21. Marsh, J.M. 1991. Derived Demand Elasticities: Marketing Margins Methods vs Inverse Demand Model for Choice Beef. *Western Journal of Agricultural Economics* 16: 382-391.
22. Parker, D. and D. Zilberman. 1993. Hedonic Estimation of Quality Factors Affecting the Farm-Retail Margin. *American Journal of Agricultural Economics* 75: 458-466.
23. Reed, A.J. and J. S. Clark. 1998. Non-farm Input Prices, Price Margins and Consumer Food Prices. USDA Technical Bulletin 1867. Washington, D.C., USA: United States Department of Agriculture (USDA).
24. Reed, A.J., Elitzak, H., and M.K. Wohlgenant. 2002. Retail-Farm Price Margins and Consumer Product Diversity. Electronic Report for the Economic Research Service, USDA, http://www.ers.usda.gov/Publications/tb1899/. Accessed in March 2004.
25. Richards, T. J., Ispelen, P.V., and A. Kagan. 1996. Forecasting Retail-Farm Margins for Fresh Tomatoes. Arizona State University East: NFAPP 01/1996, http://www.eas.asu.edu/~nfapp/discus/marg796.doc). Accessed in March 2004.
26. Schroeter, J. R. and A. Azzam. 1991. Marketing Margins, Market Power and Price Uncertainty. *American Journal of Agricultural Economics* 70: 158-162.
27. Thomsen, F.L. 1936. *Agricultural Prices.* New York, USA: McGraw-Hill Book Company, Inc.
28. Tomek, W.G. and K.L. Robinson. 1990. *Agricultural Product Prices*, 3rd ed. New York, USA: Cornell University.
29. Waugh, F.V. 1964. Demand and Price Analysis. USDA Technical Bulletin No 1316. Washington, D.C., USA: United States Department of Agriculture (USDA).
30. Wohlgenant, M.K. 1985. Competitive Storage, Rational Expectations and Short-run Food Price Determination. *American Journal of Agricultural Economics* 67: 739-748.
31. Wohlgenant, M.K. 2001. Marketing Margins: Empirical Analysis. In *Handbook of Agricultural Economics* Vol. 1B. B. Gardner and G. Rausser (eds.): 933-970. Amsterdam, The Netherlands: Elsevier Science B.V.
32. Wohlgenant, M.K and R.C. 1989. Retail to Farm Linkage for a Complete Demand System of Food Commodities. USDA Technical Bulletin 1775. Washington, D.C., USA: United States Department of Agriculture (USDA).
33. Wohlgenant, M.K. and J.D. Mullen. 1987. Modelling the Farm-Retail Price Spread for Beef. *Western Journal of Agricultural Economics* 12: 119-125.