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SHORT RUN FLUCTUATIONS OF RETAIL MARGINS: VEGETABLES IN THE NETHERLANDS[1]

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I. INTRODUCTION

Marketing margins of agricultural products evoke the interest of agricultural producers, especially because farmers suspect wholesale and retail trade as taking large profits at the cost of their income. This suspicion, sometimes more emotionally ladden than economically calculated, has therefore stimulated many investigations in the problem area of the farmers' share in the consumers' dollar.

The present study has a more limited purpose, namely, to examine the size and structure of retail margins and their influence on the demand, with respect to short run changes mainly, for some horticultural products in the Netherlands.

Since the determination of retail margins is identical with the process of price formation at retail level, firstly some hypotheses on short-run price formation will be presented and substantiated by evidence from the vast literature in this field.

In view of the characteristics of retail trade of vegetables in the Netherlands – which direct price policies of the retailers – from amongst the relevant hypotheses mentioned, a choice will be made to fit the empirical evidence.

Having presented a hypothesis, the retail margins of some vegetables will be analysed on the basis of data for the retail market in Amsterdam.

An important aspect of short run changes in the retail margins is their impact on the difference between the price elasticity at retail and wholesale level. Therefore finally, a general expression for this difference will be derived and applied to the results obtained from the data of the Amsterdam market.

[1] The author wishes to express his appreciation to Mr. M.A. Klumperbeek for his computational assistance.

2. Some hypotheses on margin determination in retailing

In order to discuss the margin policy systematically, the following schema of factors determining margins is proposed:

Margin per unit of product

I	II	III
Costs of delivered services	Considerations of price policy	Sales tax
1.	2.	
Total services per unit of product	Costs per unit of services	
a.	b.	c.
Prices of production factors in service delivery	Production function of service delivery	Rate of employment of the servicing apparatus

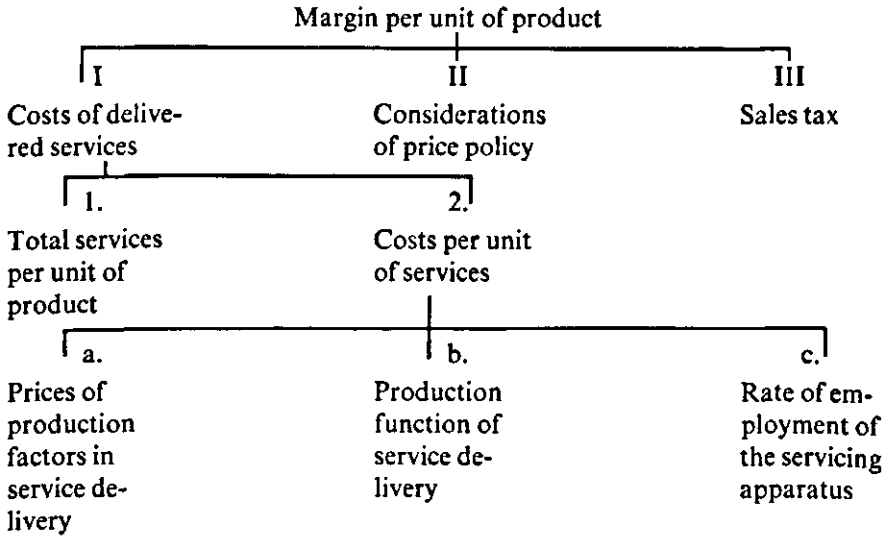
Some of the components in the above schema will change in the long run. only. Others have mixed character and fluctuate both in the long and short run. So it seems that the components under I and III, with the exception of the rate of employment of the service apparatus (I. 2. c.), have more or less a long run character. Especially price policy and the rate of employment (components II and I. 2. c.) will, besides their long run influence, have a great influence on the short run fluctuations of the margins. Certainly the price of the production factor labour may show fluctuations in short run – overwork at higher salaries – but they seem of minor importance especially in a family-run retailshop as happens to be the case in many types of retailing in the Netherlands and all the more in retailing fruits and vegetables. Since this study is limited to the short run behaviour of margins i.e., their monthly and weekly variations, attention will be focused mainly on price policy and the rate of employment of the servicing apparatus.

The way these factors influence the margins depends largely on the market structure. A market structure characterising pure competition is hard to imagine in retailing. But in a market with homogeneous products and many small competitive retailshops – similair to pure competition situation – the changes in cost are the major factor responsible for the short-run fluctuations in margins. The way of adapting margins to changing cost depends on the question in how far price determination at retail level is directed bij marginal costs.[1] Leaving

[1] For reference to this problem see for instance: L.E. Preston (1962), M. Michel (1961, pp. 159-220).

ERRATUM

The schema on page 2 schould be read as follows:



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aside this point of controversy, it seems nevertheless that short run increases in food sales – especially of the non processed ones – will mostly go together with lower prices both at retail and wholesale levels. Taking into account the fact that the buying price is the largest cost component of the retailer, a drop of buying prices will overshadow the possible increase in marginal costs of service delivery with increasing sales.[1] This is all the more true since costs of service delivery are to a great extent fixed costs. So under these assumptions, with larger sales, average costs per unit of sales as well as marginal costs are decreasing and a decreasing margin is the most probable.

However, the assumption of pure competition does not bear much relevance in retailing. In fact the retailshop often has, within a geographical area and a certain price range, a monopolistic feature which besides cost considerations, gives some room for an independent price policy.

Such a price policy in retailing has many dimensions. So, for instance, price changes will affect the demand for the product of regular customers. They may attract or keep away potential customers. Further they will have an impact on the sales of other products too. Is is clear that according to the type of food retailing – e.g. special versus multiproduct shops – the importance of these aspects of price-manipulations and their way of influencing margins will differ substantially. The following hypotheses about the effect of these aspects on margins are proposed:

2.1. *The retailer wants to stabilise prices* for the convenience of the costumer, who does not like to be confronted with often changing prices. Thus this system implies that the margin will fluctuate inversely to the purchasing price of the retailer. Since this margin behaviour brings about a great fluctuation in the income from a particular product, it seems acceptable to the retailer only if he can compensate his diminishing returns, say from product A bij increasing returns from product B. This margin behaviour is therefore plausible in case some opportunity for income compensation exists between different products at the same time or alternatively between the same and/or different products at different time.

That this behaviour is the most probable course in supported by quite a few authors. For instance SCHMITT (1959, p. 142, p. 157), in reviewing a vast amount of research on marketing margins in the United States, concludes that margins fluctuate in short run often inversely to producers' prices. The same view can be found in a U.S.D.A. marketing report.[2]

2.2. *A possible margin policy to maximise income* in short run seems to be to take as large a margin as competition in the market permits. So it might be that in shortage situations and with simultaneously higher prices the danger of left over will be

[1] According to HALL, KNAPP and WINSTEN, (1961, p. 26) gross margins in grocery retail trade in the U.S. (1948) and Great Britain (1950), were 18.8% and 15.3%. Mulder (1961) established for the Netherlands a retail margin for non durables of 18.2% over the period 1950–1958.

[2] 'Retailers usually change prices no oftener than once a week, except for special sales within the week. Also, retailers generally believe that consumers prefer a relatively stable price situation rather than one in which prices are constantly changing by small amounts'. Agricultural Marketing Service U.S.D.A. (1957, p. 13).

small, hence an incentive to increase margins and vice versa. A modification of such procedure on the basis of arguments in the long run might be to mitigate the increase of margins with high prices, in order to prevent the demand to shift to other shops or other products.

VAN DE WOESTIJNE (1962) and PRESTON (1962) have shown under certain assumptions that relative markup may lead to profit maximization by the retailer. Both authors show that the value of this maximising relative markup is determined by the price elasticity of demand.

2.3. *Yet another possibility is* that the retailer might choose a margin which stabilises the income of the retailer.

2.3.1. *If this is pursued for every product*, increasing margins go together with increasing prices. So this may lead to the same short run margin behaviour as the arguments under 2.2. suggest. This position among others is stressed by ALLEN (1961).

2.3.2. *The retailer does not make a margin policy for one product only*, but for a group of products. For this group of products he will try to stabilise this income which may contain an erratic behaviour of the margins of separate products. This overall margin policy in food retailing is stressed very much in the literature.[1]

To what extent the foregoing arguments will produce flexible margins in short run is hard to say. The general opinion is that margins remain rather stable because, as KOHLS (1961, p. 107) puts it:

a) 'Many of the costs of performing a particular marketing function are related to the physical volume handled rather than the dollar value of that volume.'

b) 'The relative degree of competition or monopoly control in the marketing structure also has a bearing on inflexible margins'.

Thus it will be clear that margin behaviour does not conform to general rules. A closer investigation of the marketing process of the product under consideration will be needed to formulate a hypothesis.

3. SOME CHARACTERISTICS OF THE RETAIL TRADE OF VEGETABLES IN THE NETHERLANDS AND THEIR IMPLICATIONS ON MARGIN BEHAVIOUR

3.1. *The retailshop*

Retailing fruits and vegetables in the Netherlands is up till now a specialised type of undertaking. In 1963 there were 14,107 establishments in this branch; that is to say, 1.17 shop per 1000 inhabitants.[2] There is an increasing tendency to sell vegetables in supermarkets, and the number of specialised establishments is decreasing – 1950: 16,928, 1960: 15,492, 1963: 14,107 –.[3] Yet this development is of minor importance. Most retailers have a small truck and serve many of their customers at their doorstep. There are even retailers who do not have a

[1] 'Retailers, wholesalers, and other multiproduct marketing firms tend to look upon their entire organisation as a unit.' Agricultural Marketing Service U.S.D.A. (1957, p. 11).

[2] Source: *Centraal Registratiekantoor Detailhandel en Ambacht.*

[3] Source: *ibid.*

shop at all and limit their operations completely to selling bij truck. This way of serving customers provides an opportunity for an independent price policy within a limited area and price range.

Retailshops selling fruits and vegetables are to a very large extent family run units in the Netherlands. In a study on the cost structure of a sample of 92 retailshops of fruits and vegetables in 1957 and 1958 it appeared that, in a gross margin of 17.7% and 18.7%, about 9.6% and 10.2% were profits and family income, and the remaining part covered mainly fixed costs like depreciation, interest, rents and transport.[1] Therefore, the large changes in the physical volume of sales for many fresh vegetables will have a great impact on fixed costs per unit of sale, which makes it worthwhile to verify as to what extent changes in physical volume influence margins.

3.2. *Product.*

Besides the influence of the character of retailunit, the type of product sold is also very important in margin determination.

In this context the most important characteristic of fresh vegetables is their perishability. Since perishability prevents storage, there is no need to introduce lagged variables to explain margins. However, a more crucial aspect of perishability is that, because of large fluctuations in supply, it will create a great instability in wholesale prices. Therefore, the retailer will need simple rules to adapt margins to the ever changing market situation. Perishability might also bring about a need to adjust margins to the seasonally varying chances of waste.

The foregoing aspects of retailing fresh vegetables suggest that the wholesale price will act as a lever for margin orientation. Since higher wholesale prices go together mostly with smaller physical turnover, the desire to stabilise income might lead to a positive correlation between margin and wholesale price. Income stabilisation seems to be a more desirable objective because of the large proportion of fixed cost in service delivery. This large ratio of fixed costs stresses also the need for a fixed share in the margin. On the basis of these arguments it is most probable that the margins of fresh vegetables will be semi-fixed, which can be described by a linear function of the wholesale price. Such functions are estimated for fresh vegetables among others by ALLEN (1961) and LENZ (1959).

It seems obvious that a semi-fixed margin will make sense only in case the demand is price elastic. If demand is price inelastic a fixed margin will be preferred. Volume of sales or other non-price factors might be of greater relevance under those conditions. Most vegetables seem significantly price elastic because of the great opportunities for substitution and frequent fluctuations in prices, which make the buyer price conscious. The situation of fixed margins, therefore, will be of relevance for only a few types of fresh vegetables.

Having indicated the nature of relevant factors, in this study, the next section will be devoted to the analysis of their bearing on different kinds of vegetables and, on the basis of other aspects of trade in fresh vegetables some modifications will be made.

[1] Source: Economisch Instituut voor de Middenstand (1959, p. 11).

4. The analysis of retail margins of some important vegetables in the retail market of Amsterdam

On the basis of data on prices in the wholesale and retail markets at Amsterdam the size of retail margins of many vegetables could be established.[1] Thus, from the monthly data of the period 1960-'62, by estimating the retail margin of all fresh vegetables as a function of wholesale price, the following regression equation was derived:

$$(1) \quad x_1 = 0.182\, x_2 + 11.777 \quad (\pm\ 0.0156)$$

x_1 = margin in gld/100 kg[2]
x_2 = wholesale price in gld/100 kg
$r^2 = 0.81$
$\bar{x}_1 = 21.57$ gld/100 kg

It can be seen that there exists a semi-fixed margin for vegetables. If the constant of equation (1) could be interpreted as the minimum margin, it implies that the fixed part of the margin is $(11.78/21.57) \times 100\% = 52.7\%$ of the average margin. However, this could be a very conservative estimate. Taking the lowest value of margins observed in this series (19 ct/kg) as the lower limit, the fixed component will amount to $(19.00/21.57) \times 100\% = 80.8\%$ of the average margin. So the fixed part will lie somewhere between 50 and 80 percent of the total value of the margin. The margin elasticity being the relative change of margin as a consequence of a 1% change in the wholesale price, is 0.47 at the average value of wholesale price and margin over the period under consideration.

Since fresh vegetables are comprised of many different types, an analysis of each type separately is necessary to verify some of the hypotheses presented in section 3. Therefore data concerning the following vegetables were used: lettuce, endive, tomato and cucumber (being the major vegetables in the period March to September) and witloof, Brussels sprouts, red cabbage and carrots (being important vegetables in the winter season). This choice made it possible to verify the extent to which a difference exists in margin behaviour between the summer and winter periods.

Table 1. Absolute and Relative Margins of Some Vegetables in the Amsterdam Retail Market over the period 1957–1961[3]
(On the Basis of Weekly Observations)

Summer Vegetables

	Endive		Lettuce		Cucumber		Tomato	
	absolute	%	absolute	%	absolute	%	absolute	%
1957	12.45	35.40	4.35	32.80	7.96	29.50	20.78	26.60
1958	13.32	38.20	4.71	36.00	7.30	30.40	22.08	32.50
1959	14.88	41.90	5.28	37.10	7.96	29.30	21.96	33.10
1960	15.95	35.20	5.80	39.80	7.02	27.30	22.33	30.10
1961	17.72	44.40	5.71	43.70	7.73	29.30	24.34	31.20

[1] Source: Non-published data of the *Produktschap voor Groenten en Fruit*.
[2] 1 U.S. Dollar = 3.65 Dutch guilders (gld.).
[3] Figures in gld/100 kg, and for Cucumber and Lettuce in gld/100 units.

Winter Vegetables[1]

	Witloof		Brussels Sprouts		Red Cabbage		Carrot	
	absolute	%	absolute	%	absolute		absolute	%
1957–'58.	17.00	23.80	14.90	25.60	14.60	23.80	14.80	49.50
1958–'59.	18.40	31.10	15.80	31.00	14.40	82.10	16.20	68.00
1959–'60.	22.40	32.90	20.30	31.20	16.50	46.10	18.40	45.60
1960–'61.	21.70	27.30	21.00	38.20	17.20	129.20	17.80	60.50

[1] Data of 1957 refer to the period September 1957 – April 1958, etc. Source: Non-Published Data of the 'Produktschap voor Groenten en Fruit'.

The size of the margin both in absolute and relative (to wholesale price) values has been determined (table 1). It appears that substantial differences exist between the margins both with regards to different products and years. It may be noticed that the relative markup of most vegetables lies between 30 and 40% of the wholesale price; however, this figure is substantially higher for carrots and red cabbage.

In order to stabilize income in the short run the variability of the overall margin of a group of vegetables must be much lower than the variability of margins for different vegetables, taken separately. As may be seen in table 2, the

TABLE 2. Standard Deviations of the Margins of some Vegetables in the Amsterdam Retail Market as a Percentage of the Mean (On the Basis of Weekly Observations)

Summer Vegetables

	Endive	Lettuce	Cucumber	Tomato	Total
1957	24.7	41.8	62.6	60.9	33.4
1958	18.0	35.0	57.4	59.2	23.1
1959	17.2	46.5	45.6	54.8	25.0
1960	19.1	47.5	46.4	45.1	19.6
1961	31.0	30.3	37.5	57.3	25.8

Winter Vegetables[1]

	Witloof	Brussels Sprouts	Red Cabbage	Carrots	Total
1957–'58.	36.4	49.2	25.3	20.1	27.7
1958–'59.	38.6	61.1	27.7	12.8	36.3
1959–'60.	66.6	54.6	34.4	28.3	43.9
1960–'61.	28.2	48.6	15.6	18.7	24.9

[1] Data of 1957 refer to the period September 1957 – April 1958, etc. Source: Non-Published Data of the 'Produktschap voor Groenten en Fruit'.

standard deviations of the margins in percentage of the mean are indeed much larger for individual vegetables; this holds true particularly in the case of summer vegetables. But, this does not prove the validity of such a compensating behaviour. Actually the contrary will be more probable since the correlation coëffi-

cients between the margins are all positive, in case they are statistically different from zero.[1]

After these preliminary investigations, the margins were estimated from monthly data as a function of a) wholesale price, b) physical volume sold and c) a time factor. The factor physical volume was introduced since it influences the rate of employment and so fixed costs of service delivery per unit of sales. Since the analysis is based on monthly data over the years 1957–1961, one needs the factor time to take care of long run changes in the margins. The results of this estimation are presented in table 3.

TABLE 3. Estimates of the Margin as a Function of Wholesale Price, Physical Volume of Sales and a Trend for some Vegetables in the Amsterdam Retail Market over the Period 1957–1961 (On the Basis of Monthly Data)
($m=\alpha_0+\alpha_1 p+\alpha_2 v+\alpha_3 t$, m=margin in gld/100 kg and for Cucumber and Lettuce in gld/100 units, p=wholesale price in gld/100 kg; for Lettuce and Cucumber gld/100 units, v=physical volume of sales in 100 kg, t=trend)

	Endive	Lettuce	Cucumber	Tomato
α_0	7.59901	2.23869	4.49584	13.422
α_1	0.10066	0.14589	0.16888	0.21600
	(±0.01558)	(±0.02090)	(±0.01888)	±0.03706)
α_2	0.000111	–0.00000184	–0.00005068	–0.00126
	(±0.000288	(±0.00000034)	(±0.0000445)	(±0.00078
α_3	0.88029	0.33278	–0.24119	0.04265)
	(±0.00681)	(0.05682)	(±0.12908)	(±0.71432)
R^2	0.715	0.779	0.826	0.886

	Witloof	Brussels Sprouts	Red Cabbage	Carrot
α_0	1.03666	3.33378	13.04815	11.02047
α_1	0.16706	0.14941	0.04353	0.04838
	(±0.06354)	(±0.03697)	(±0.00845)	(±0.03182)
α_2	0.00070	0.000071	–0.00030	0.00077
	(±0.00063)	(±0.00029)	(±0.00093)	(±0.00130)
α_3	1.17299	2.34379	0.85832	1.02235
	(±0.58507)	(±0.32128)	(0.00844)	(±0.26656)
R^2	0.609	0.774	0.482	0.533

Source: Non-Published Data of the 'Produktschap voor Groenten en Fruit'.

a) Firstly, it appears that the estimated function presents a fair explanation of the variation of margins except for carrots and red cabbage. It can be seen from table 3 that the wholesale price has a statistically significant influence

[1] The estimates of the statistically significant correlation coefficients (at the 5% level) are: r (Cucumber-Tomato)= 0.80, r (Tomato-Endive)= 0.53, r (Brussels Sprouts-Witloof)= 0.64, r (Brussels Sprouts-Carrots)= 0.62, r (Brussels Sprouts-Red Cabbage)= 0.75, r (Carrot-Red cabbage)= 0.59. These estimates are based on monthly data of margins over the period 1957–1961.

on the margin again excepting red cabbage and carrots. The values of the regression coefficients imply that the reaction of the margin on changes in wholesale price is rahter modest and of about the same size. They fit in well in our conclusion about all vegetables taken together [equation (1)]. Semi-fixed margins as established here will provide some income stabilisation since, with increasing wholesale prices, the increase in margins will compensate a decline in income as a consequence of smaller physical turnover. The income-stabilising effect of this semi-fixed margin, however, seems rather limited because of the modest reaction of margins on changes in wholesale prices.

b) Changes in physical volume did not contribute much to the variations in the margin. However, one should keep in mind that changes in physical volume often move inversely to changes in prices, so that their influence on margins is not completely separable.

c) While the trend of the margin appears to be statistically significant for all winter vegetables, this is true only in the case of two summer vegetables in this study (see table 3). This more pronounced trend of margins suggests a greater need for adjustments to the increasing cost of service delivery for winter vegetables compared with summer vegetables.

In order to establish the fixed part of the margin, the trend, being the long run development of margins, must be added to the constant of the estimated function (table 3). It can be seen in table 4 that the fixed part is a very high propor-

TABLE 4. The Constant of the Functions describing the Margin (Table 3) and the Lowest Margin both in Absolute Value and in Percentage of the Average Margin[1]

	Endive	Lettuce	Cucumber	Tomato	Witloof	Brussels Sprouts	Red Cabbage	Carrot
1. Constant[2]	10.24	3.24	3.77	13.55	3.97	9.19	15.19	13.58
2. Lowest	9.84	3.42	4.87	14.00	12.48	12.50	13.12	13.36
3. Av. Margin	14.12	5.07	8.10	29.47	19.59	18.09	15.63	16.64
4. 1 : 3	0.725	0.639	0.465	0.460	0.203	0.508	0.972	0.816
5. 2 : 3	0.697	0.674	0.601	0.475	0.637	0.691	0.839	0.803

[1] Margins are measured in gld/100 kg or gld/100 units.
[2] The constant is corrected for long run changes by adding the value of the trend (see table 3).

tion of the average margin in the case of carrots and red cabbage, which confirms the fixed character of their margins. But, because of large price variations, the fixed part is a rather small proportion of the margin for tomatoes. The proportion of the fixed part in the margin for other vegetables is found to be situated between these two extremes.

One might question in how far the estimates derived on the basis of monthly data have any meaning for the margin behaviour during periods lesser than a month. An estimation of the same function (see table 3), on the basis of weekly

data established an influence of the wholesale price of about the same size as determined in the monthly analysis.[1] This similarity, which is particularly pronounced in the case of tomatoes makes clear the fact that the margin behaviour of retailers is consistent also within weeks. The influence of the volume of sales was not statistically significant, as was concluded on the basis of monthly data too.

Lagged wholesale prices would in the case of less perishable vegetables influence margins as, for example, is observed in studies on margins of less perishable food.[2]) This hypothesis was tested for cucumber on the basis of weekly data, but negative results were obtained. In order to see as to what extent the chances of waste have an impact on margins, temperature, as an additional variable was introduced. However, no significant influence of temperature could be established either.

5. The impact of the size and structure of margins on the difference of price elasticities at wholesale and retail levels

Having analysed the margins it is interesting to establish their influence on the difference between the price elasticity of demand at wholesale and retail level. It is well known that the price elasticity of demand at retail level is mostly larger than at wholesale level.[3] However, for our purpose a more general relationship between the two elasticities will be derived. Suppose the following model:

(2) $q_w = f(p_w, x_1 \ldots . x_n)$
(3) $q_r = g(p_r, z_1 \ldots . z_n)$
(4) $q_r = q_w - S - W$
(5) $p_r = p_w + M$
(6) $S = \Theta\, q_w$
(7) $W = \gamma\, q_w$

q_w = demand at wholesale level
q_r = demand at retail level
p_w = wholesale price
p_r = retail price
$x_1 \ldots x_n$ } non price factors
$z_1 \ldots z_n$ } influencing demand
S = stocks at retail
W = waste at retail
M = margin

$$\text{Defining } \varepsilon = \frac{\delta q_w}{\delta p_w} \cdot \frac{p_w}{q_w} \text{ and } \eta = \frac{\delta q_r}{\delta p_r} \cdot \frac{p_r}{q_r};$$

[1] In estimating the function of Retail Margin on the basis of weekly data for the period 1957–1961, the following ranges of statistically significant regression coefficients of the wholesale price of different products were established:
Endive: 0.077 – 0.146, Cucumber: 0.114 – 0.201, Lettuce: 0.080 – 0.157, Tomato: 0.188 – 0.195, Witloof: 0.110 – 0.185, Brussels Sprouts: 0.102 – 0.127.

[2] See for instance W.A. Fuller, G.W. Ladd (1961).

[3] G. Kuznets (1953), Agricultural Marketing Service U.S.D.A. (1958, p. 203).

$$(8)\ \eta_i = \frac{\delta(q_w - S - W)}{\delta(p_w + M)} \cdot \frac{(p_w + M)}{q_w - S - W} = \frac{(1 - \Theta - \gamma)\,\delta q_w}{\delta(p_w + M)} \cdot \frac{p_w + M}{(1 - \Theta - \gamma)\,q_w} =$$

$$\frac{\delta q_w}{\delta(p_w + M)} \cdot \frac{(p_w + M)}{q_w} = \frac{\delta q_w}{\delta p_w} \cdot \frac{\delta p_w}{\delta(p_w + M)} \cdot \frac{(p_w + M)}{q_w} =$$

$$= \varepsilon \frac{\delta p_w}{\delta(p_w + M)} \cdot \frac{p_w + M}{p_w} = \varepsilon \frac{p_w + M}{p_w \left(1 + \frac{\delta M}{\delta p_w}\right)}$$

$$(9)\ \eta = \varepsilon \frac{\left(1 + \frac{M}{p_w}\right)}{\left(1 + \frac{\delta M}{\delta p_w}\right)}$$

Having established a function, $M = f(p_w \ldots .)$, the relationship between η_i and ε can be determined. A general formulation of the margin is:

$$(10)\ M = M_o + \alpha\, p_w{}^{\beta}.$$

$(11)\ M_o = f(r_1 \ldots . r_n)$ $\quad r_1 \ldots r_n$: other factors than wholesale price influencing margins.

$$(12)\ \eta_i = \varepsilon \frac{\left(1 + \frac{M}{p_w}\right)}{(1 + \alpha\beta\, p_w{}^{\beta-1})} = \varepsilon \left(\frac{p_w + M}{p_w + \beta(M - M_o)}\right)$$

TABLE 5. Price Elasticiteies at Retail Level as Percentages of the Price Elasticities at Wholesale Level for Minimum and Maximum Margins in the Amsterdam Retail Market over the Period 1957–1961[1].

	Endive	Lettuce	Cucumber	Tomato	Witloof	Brussels Sprouts	Red Cabbage	Carrot
1. For Minimum Margin	146	117	115	115	108	110	170	141
2. For Maximum Margin	118	118	109	107	106	120	160	143

[1] Minimum and maximum margins are weighted averages over the four lowest and four highest margins.

From the analysis in Section 4, the value of $\delta M/\delta p_w$ in (9) is easy to establish. On the basis of the estimates, as presented in table 3, the difference between η and ε for the maximum and minimum values of the retail margin M was established (table 5). These results show that the differences between η and ε are substantial for red cabbage and carrots, but are small for the other vegetables The reader, however, must be aware of the fact that these differences are based on retail margins and not on the total margin, which includes the wholesale margin too. Figures on the total margin were not available. However, it seems that, in using total margins as against retail margins only, the difference between η and ε will increase since M/p will become larger and $\delta M/\delta p$ probably not.

6. Final remark

Formula (9) shows that the difference between η and ε will increase when margins become more fixed. In case margins are completely fixed and do not react at all to changes in wholesale prices, the relation will become $\eta = \varepsilon\,(1 + M/p_w)$. The results of table 4, particularly those of carrots and red cabbage, suggest an increasingly fixed margin, with respect to wholesale price when the demand elasticity of these products diminishes. Therefore, since the demand of many argicultural products has an increasing tendency to become inelastic, the difference between η and ε will become greater in the markets of agricultural products. Apparently this will be mitigated in case M_o might decrease because of improved efficiency in wholesaling, processing and retailing. Taking into consideration the increasing demand for services, such a decrease of M_o seems doubtful, but this point is an aspect of long run character which is beyond the scope of this study.

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