Pricing in the agri-food sector

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NMa

MANAGEMENT SUMMARY

The Netherlands Competition Authority (NMa) considered it important to investigate the pricing of eight basic foods to obtain a better insight into how the food supply chain functions in the agri-food sector in the Netherlands. The investigation was carried out in response to frequent assertions that supermarkets get a relatively high profit margin at the expense of producers, i.e. farmers and market gardeners.

This investigation started by examining the selling price, costs and margins in the different links in the supply chain for these foods. This was followed by examination of the development of the selling price and margin from 2005 to year-end 2008. There was also an examination of whether one of the links in the supply chain had obtained a market position that enabled it to improve its margin through a unilateral price increase. The final matter examined was how the degree of concentration at supermarket level influenced the development of the purchasing and selling prices of supermarkets.

To answer the questions in this investigation, LEI and NMa gathered purchasing and selling prices for fruits and vegetables. LEI gathered the prices at producer level based on its own price statistics. The NMa requested purchasing and selling prices and cost data from cooperatives, wholesalers, the bread and flour industry and supermarket chains. Additionally, a research agency supplied sales and turnover information on sales to consumers in Dutch supermarkets.

On the strength of the collected data, it is possible to draw the following conclusions.

Firstly, the prices in the agri-food sector in the 2005-2008 period increased sharply for all links in the supply chain. This price development was strongest at producer level.

Secondly, the investigation showed that no indications exist that the supermarket is dominant in pricing in the agri-food sector. Supermarkets are not generally able to improve their margins permanently as price increases at consumer level are accompanied by price increases at the wholesaler.

However, it was established that the supermarket price is a multiple of the price at producer level. For the most part this is due to costs incurred at the wholesaler. Additionally, this large price difference between producer and supermarket does not always mean that the supermarket gets the highest margin as a percentage of the selling price in relation to the producer and wholesaler.

Internationally, too, prices in the agri-food sector have increased sharply. Compared with the European average, however, Dutch consumer prices for food products have risen less than elsewhere in Europe. The Dutch price increases have not always resulted in an improvement of margins in the different links in the supply chain.

Contents

Figures in report

Tables in report

I. INTRODUCTION

A. Background to investigation

The NMa has prioritised the agri-food sector among other things because various links in the agri-food market[1] (particularly the processing industry and supermarkets) are highly concentrated with relatively few players. This is not usually the case in other links (such as primary producers). Numerous mergers and takeovers in this sector have further reduced the number of players in the different links of the supply chain. This market structure increases the risk of companies agreeing practices with each other with regard to prices and quantities, partly on account of the relatively homogenous nature of the products.

Civil society organisations and representatives of the agri-food sector have stated in the media that they believe that the food chain (or parts thereof) is working deficiently. These comments usually assert a skewed relationship between the price that producers receive for certain products and the price that consumers must pay for the products in the supermarket. [2]

Over the past years the NMa has received various tips, signals and complaints about alleged abuse of power by supermarkets. These notifications came from growers and traders and concern such matters as the behaviour of supermarkets.

The NMa considered it important to investigate the pricing of a number of basic foods to obtain a better insight into the functioning of the food chain in the Netherlands and to establish to what extent indications exist as to whether the notifications are justified.

The European Parliament recently indicated the need for a publicly accessible European database containing food purchasing and selling prices. [3] The objective is to identify the parties in the supply chain that get the highest margins. A majority in the European Parliament is of the opinion that the major supermarket chains currently earn most, at the expense of farmers and consumers.

B. Objective of investigation

The objective of the investigation was to obtain an insight into pricing throughout the supply chain for a number of basic foods. An explanation (or possible explanation) needs to be given for the existence of relatively large differences in prices charged between the different links in a supply chain.

The central questions that this report examines are:
1. How did the selling prices of the different links in the supply chain develop nationally and internationally in the 2005-2008 period?
2. How high are the selling prices in the different links in the supply chain?
3. How high are the margins in the different links in the supply chain?
4. How did the margins of the different links in the supply chain develop in the 2005-2008 period?

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[1] The term market is not used in this document in a competition law sense. Therefore, there is not a relevant market demarcated within the meaning of competition law.

[2] See for example the article headed 'Supers woekeren met groente en fruit' in Consumentengids of November 2008.

[3] See for example http://www.ad.nl/economie/3106214/Onderzoek_naar_voedselprijs.html.

5. How are the selling prices in a certain link in the supply chain influenced by the selling prices of other links in the supply chain?

6. What influence does the increased concentration at supermarket level have on the development of the purchasing and selling prices of supermarkets?

C.   Evaluation framework NMa

The NMa's statutory duties include enforcing the Competition Act of the Netherlands. The Act prohibits cartels, prohibits abuse of a dominant market position and provides for supervision over concentrations by scrutinising mergers and takeovers. Brief information is provided below about the prohibitions of cartels and abuses of a dominant market position.

The prohibition of cartels is laid down in Section 6 of the Competition Act. A cartel is defined as competing companies agreeing prices, dividing up the market and jointly determining the production volumes. Other practices between market players that remove the normal uncertainty regarding the conduct of competitors may also violate Section 6, since such arrangements can reduce incentives for companies to work efficiently and innovatively and often lead to higher prices for consumers.

Section 24 of the Competition Act prohibits companies from abusing a dominant position in the market. A company is deemed to have a dominant position if it can act largely independent of competitors, customers or suppliers. Having a dominant market position is not in itself prohibited, but it is not allowed to misuse a dominant position. Possible forms of abuse of a dominant market position include tie-in sales, unreasonable conditions, misuse of purchasing power and charging of excessive prices.

Besides its 'normal' duties mentioned above, the NMa has a possibility to conduct sectoral studies. A sectoral study means an investigation into the functioning of a sector or one or more of its constituent markets, outside the framework of handling concrete cases concerning violation of the cartel prohibition, the prohibition of abusing a dominant market position and the maintaining of supervision over concentrations.

D.   Working method

In order to evaluate pricing in the examined supply chains properly, the NMa started an economic investigation in 2008 into relationships between individual and groups of producers, wholesalers and supermarkets. For the purposes of this investigation the NMa instructed research agency LEI Wageningen UR ('LEI') to write a report based on in-depth interviews with wholesalers and supermarkets. In addition, an econometric analysis was made of the price and cost data gathered by the NMa. The purpose of the interviews was to identify the purchasing and selling processes. By means of these interviews the NMa sought to obtain a more comprehensive picture of the problems that occur in the sector. There were eight interviews with wholesalers and six with purchasing managers involved in supermarket agri-food.

The NMa further asked Erasmus University Rotterdam to give its views on the econometric analysis conducted by LEI.

The NMa exercised its authority to gather cost and price data for the examined products from important wholesalers and the relatively large supermarkets (and their purchasing organisations). The approached companies were selected based on knowledge within NMa and LEI of the agri-food sector.

The agri-food sector has an array of products. It was therefore decided to confine the investigation to eight products. The following criteria were applied to select products:

- as many homogenous products as possible to ensure that the investigation did not become too complex and that properly validated pricing pronouncements could ultimately be made within a reasonable period of time;
- as many products as possible with the largest price increases at consumer level;
- as many products as possible that have attracted public attention due to suspected market forces problems;
- a certain degree of variation in the totality of products.

As each product often has different varieties[4], a standard product was defined for all products in a certain category (i.e. the most popular variety). The most popular variety is a standard quality product sold relatively frequently compared with other varieties of the product. The stated criteria were applied to select 'the most popular variety' shown in Table 1.

Tabel 1: Choice of most popular variety per product

Product	Most popular variety
Consumer potatoes	Bildstar
Apples	Elstar
Bread	Whole loaf (brown, wholemeal and white bread, 800 grams)
Eggs	Free range eggs (brown, class M)
Cucumbers	Cucumbers (40+)
Bell peppers	Red (70+)
Onions	Seed Onions (a net of 500 grams)
Onions, sliced	Package of 1.000 grams

The NMa drew conclusions concerning pricing in the agri-food sector based on the gathered data, interviews with wholesalers and supermarkets and the econometric study conducted by LEI. This report sets out the outcomes and conclusions. For a comprehensive description of the working method and the outcomes of the LEI study references are made to the underlying public version of the report of LEI. [5]

E.   Structure

This report has the following structure. Chapter II describes the links in the relevant supply chains of the agri-food sector. Based on these market descriptions, NMa provides a greater insight into the relationships between producers, wholesalers and supermarkets (and their cooperation arrangements). Chapter III subsequently outlines the theoretical framework within which this investigation takes place. Chapter IV analyses pricing in the agri-food sector as a basis for answering the six questions in the investigation. The report ends with a conclusion in chapter V.

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[4] The consumer potatoes category includes the Bildstar, Ottena, Irene, Nicola, Bintje and Eigenheimer varieties.

[5] See F. Bunte et al, *Prijsvorming van voedingsproducten*, LEI Wageiningen UR No. 09-074, November 2009.

II.   MARKET DESCRIPTIONS

A.   Introduction

This chapter describes the supply chains of the examined products link by link. For every link an overview is provided of the most important features of the examined supply chains. Attention is devoted to such matters as the number of links in the supply chains, the degree of concentration in a certain link and the added value of a certain link. For a detailed description of the characteristics of each supply chain reference is made to the public version of the LEI report.

B.   General

Roughly speaking, there are three links in the examined supply chains of the agri-food sector. They are production, wholesale/intermediary trade and retail trade (see figure 1). The supply chains for bread and onions have a number of additional links. In the case of bread, there is first the production and wholesaling of wheat, flour and meal before the production of bread starts. In the potatoes, vegetables and fruit group ('PVF'; in this instance bell peppers, cucumbers, onions, potatoes and apples) processing also occurs before the supply chain in the case of onions (i.e. the slicing onions). In the wholesale/intermediary trade it is possible to make a distinction between on the one hand companies that do their own purchasing and distribution and on the other companies that use specialised service providers for distribution and/or processing.

Figuur 1: **Overview of players in the agri-food sector**
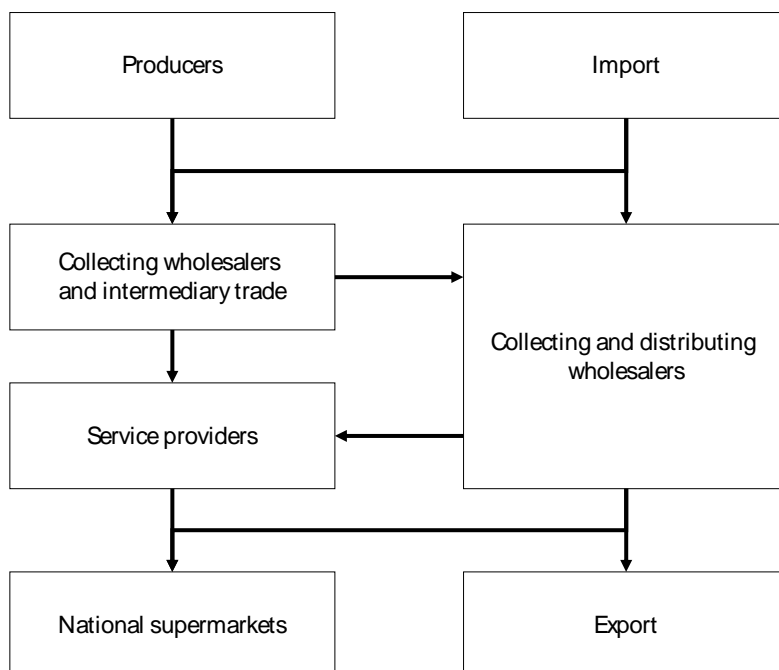
The PVF product group is seasonal. There are several months when it is not generally profitable for producers to produce. Factors that play a role include the temperature and the limited number of daylight hours. To meet domestic demand in this period the wholesalers and intermediary traders obtain products

from other countries.

Trading in the examined products additionally is also highly international. There are relatively large volumes of imports and/or exports of a majority of the examined products. The bread supply chain, for example, is characterised by a relatively large degree of imports of wheat. Most bread consumed in the Netherlands is produced using foreign wheat. A relatively large amount is exported within the PVF group. Most peppers and cucumbers grown in the Netherlands are sold in other countries.

C.   Producers

Two similarities are noticeable between the examined supply chains at producer level. Firstly, this link has a large number of companies compared with links lower in the supply chain. The producer level usually has the highest added value compared with links lower in the supply chain.[6] Compared with wholesalers and supermarkets the producers add most value to a certain product. An exception is the bread supply chain where most value is created within the bread industry.[7] The table below shows the market structure of the examined products at producer level.

Tabel 2: **Economic significance of the production link in the chain (2008)**

Product	Number of producers	Turnover value (mln. euro)	Added value (mln. euro)
Wheat	13.000	200	50
Potatoes	7.000	280	100
Onions	3.500	100	25
Cucumbers	250	250	100
Bell peppers	350	425	175
Apples	1.600	110	55
Eggs	1.250	325	75

At this level the 'potato' product consists both of consumer potatoes for sale in supermarkets and potatoes destined for the processing industry. Source: LEI report.

It should be noted that within the PVF product group many producers are affiliated to associations like Pamosa and SunQuality and/or (cooperative) sales organisations such as the Greenery and Agrico. Consequently, the offering at producer level is generally bundled and then sold via these associations and sales organisations.[8] The affiliated growers receive payout prices based on the expected or actual revenues of the growers' associations and sales organisations. In view of the foregoing the market share of the four largest companies (C4 ratio) at producer level (less than 10%) is not a good indicator of the degree of concentration. By way of illustration table 3 shows for the cucumber and bell pepper supply chains the difference between the C4 ratio of individual growers on the one hand and growers' associations on the other.

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[6] Added value as used in this report is equivalent to the wage bill and the profit; the remuneration for the production factors of labour, capital and land. In other words, it is the income that the examined supply chains generate for the Netherlands.

7 This industry processes the ground flour and meal into bread and other similar products.

[8] Various growers' associations and/or sales organisations are currently endeavouring to intensify cooperation by establishing associations of producer organisations (APOs). An example is the recently established and GMO-approved organisation called Kompany.

Tabel 3: Difference in C4-ratio between individual growers and growers associations (2008)

Product	Quantity	C_4-ratio
Cucumbers (individual growers)	250	5%
Cucumbers (growers' associations)	8	65%
Bell peppers (individual growers)	350	5%
Bell peppers (growers' associations)	19	50%

Source: LEI report

D. Wholesalers

The wholesale level lies between producers and supermarkets. This level is characterised by numerous intermediary traders, i.e. wholesalers that buy and sell at other wholesalers. The most important activities for the wholesale/intermediary trade are collecting products from the various primary producers and distributing a total package of products to a relatively small number of large customers. Depending on the type of company and type of product, the products are on the one hand sold and distributed directly to the supermarkets, and on the other sold to service providers who perform such activities as packaging, cutting, processing and distributing. There are often mutual deliveries between wholesale companies. Besides the 'classical' wholesale companies this level includes the aforementioned sales organisations of producers.

Wholesalers in the Netherlands deliver their products mainly to supermarket formats (and their purchasing organisations) in the Netherlands. Table 4 shows that approximately three-quarters of the PVF products are sold via the supermarkets[9]. In the case of bread this is approximately two-thirds (table 5). To a lesser extent the wholesalers deliver to parties like independent supermarkets, greengrocers, bakers and confectioners. Wholesalers additionally export to other countries.

Tabel 4: Shares of sales channels for fresh PVF in the Netherlands (2007)

Sales channel	Total PVF	Fresh potatoes	Vegetables	Fresh fruit
Supermarkets	74%	75%	82%	69%
Greengrocers	11%	9%	8%	14%
Mobile traders	10%	7%	5%	13%
Non-retail trade	4%	9%	3%	3%
Other shops	2%	1%	2%	2%
Total	100%	100%	100%	100 %

Source: Central Industry Board for Retail Trade (HBD), Spending and Market Shares.

Tabel 5: Shares of sales channels for bread (and bread products) and biscuit in the Netherlands (2007)

Sales channel	Bread (and bread products) and biscuit
Supermarkets	65%
Bakers and confectioners	29%
Mobile traders	2%
Other shops	3%
Total	100%

[9] See for example http://www.hbd.nl/pages/37/AGF-Groentenzaken.html.

Source: Central Industry Board for Retail Trade (HBD), Spending and Market Shares.

Wholesalers appear to be strongly concentrated for a majority of the examined products. The C4 ratio is between 50% for potatoes and approximately 90% for apples (see table 6). Given the data in table 3, there is no reason to suppose that the C4 ratio at wholesaler level for cucumbers and bell peppers is any different. The supply chain for onions, with a C4 ratio of 35%, is an exception to the above picture.

Compared with the production link, the added value of wholesalers is significantly less, with the exception of the supply chain for bread. Nevertheless, the wholesalers do fulfil an important role in packing the products, quality control and often product development and promotional activities. The table below provides an overview of the market structure of the examined products at wholesaler level.

Tabel 6: Economic significance of wholesale link for the examined products (2008)

Product	Number of wholesalers	C_4-ratio	Turnover value (mln. euro)	Added value (mln. euro)
Bread (wholesale)	100	60-70%	n.a.	n.a.
Bread (millers)	10	> 90%	575	100
Bread (bread industry)	2.500	> 60%	750	300
Potatoes	205	50%	425	30
Onions	n.a.	35%	175	15
Cucumbers	90	n.a.	330	25
Bell peppers	90	n.a.	625	45
Apples	10	85-95%	450	30
Eggs	100	60-65%	450	25

The 'potato' product consists at this level both of consumer potatoes intended for sale in supermarkets and potatoes destined for the processing industry: Source: LEI report, edited by NMa.

E.   Supermarkets

The supermarket is the final link in the supply chain. For the purposes of this report a supermarket is defined as Dutch supermarket formats with 100 or more employees in total. In the Netherlands there are 50 supermarket formats that fall into this category. The method of purchasing differs according to the supermarket format involved. There are supermarket formats that independently purchase their products, such as Aldi and Super de Boer, while others, often smaller formats, buy through purchasing organisations, like Superunie.[10] The supermarket link is highly concentrated; see table 7.

Tabel 7: Shares of supermarket sales in the Netherlands in total (including examined products) (2008)

	Sales
Albert Heijn	29,5%
C1000	14,3%
Aldi	8,9%
Super de Boer	7,9%
Superunie members	34,4%
Others	5,6%

[10] Superunie currently has 16 members. They are Boni Supermarkten, MCD, CoopCodis, Deen, DekaMarkt, Dirk van de Broek, Jumbo, Hoogvliet, Jan Linders, Nettorama, Piesz, Sanders, Sligro, Spar, Sperwer and Vormar.

Source: LEI report

The supermarket link also has a high C4 ratio for the examined products. For all examined products, the C4 ratio is between 61% and 77%. The added value for these products is limited compared with the links higher in the supply chain. As a supermarket sells a lot of other products in addition to the examined products within the product group, the added value over the entire product group may be higher.[11] The table below provides an overview of the market structure of the examined products with regard to supermarkets.

Tabel 8: Economic significance of the supermarket link for the examined products (2008)

Product	Number of supermarkets	C_4-ratio	Turnover value (mln. euro)	Added value (mln. euro)
Bread	50	64%	750	175
Potatoes	50	68%	180	40
Onions	50	69%	40	10
Cucumbers	50	72%	65	10
Bell peppers	50	61%	45	10
Apples	50	75%	140	30
Eggs	50	66%	165	30

Source: LEI report

F.   Conclusion

It may be concluded based on the foregoing that for a majority of the examined products the wholesaler and supermarket links exhibit a great degree of concentration. At producer level, there appears to be a relatively low degree of concentration at first sight. However, the agri-food sector is characterised by a large number of growers' associations and sales organisations to which many producers sell their products through a bundling of their offerings. The producers add the most value to the majority of examined products compared with wholesalers and supermarkets.

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[11] The PVF product group includes not only the examined products (potatoes, apples, cucumbers, peppers and onions) but also items like pears and carrots.

III. THEORETICAL FRAMEWORK

Price is one of the most important competition parameters in a market. The price is the mechanism that balances supply and demand. If there is too much supply, the price will fall and demand will rise and vice versa. There are naturally other competition parameters that also play a role, such as quality, location/availability, incentives for investments and innovation. However, all of these competition parameters are price-related. People will generally be willing to pay a higher price for better quality or willing to travel farther afield if the (perceived) transport costs merit the price difference between the supplier nearby and the one farther away. This chapter outlines a theoretical framework by way of an introduction to the econometric analyses in the chapter that follows. Section A deals with the structure-conduct-performance approach. Section B examines asymmetric price adjustment.

A. Structure-conduct-performance

In a competitive situation the price is established through supply and demand. The outcome will be determined partly by characteristics of the market structure, both on the supply side and on the demand side. In the structure-conduct-performance approach (SCP) these characteristics come to the fore. The SCP model says that the degree to which a supply chain produces prosperity for the consumer - or in other words performs - depends on the conduct of the companies involved in the supply chain. This conduct in turn depends on the market structure, i.e. on the factors that determine the competitiveness of the market. The market structure stems from basic conditions such as technology and economies of scale. If the technology of a certain industry is such that the average production costs go down as the production volume goes up, the industry will evolve towards a more concentrated market, possibly resulting in an oligopoly or even a monopoly.

The components of the SCP model in the economic field of industrial organisation are: [12]
- basic conditions: consumer demand, production, plasticity of demand, technology, substitutes, basic goods, seasonal patterns, unions, pace of growth, sustainability of products, place, grouping of orders, economies of scale, purchasing methods and economies of scope;
- structure: number of buyers and sellers, access obstacles for new entrants, product differentiation, vertical integration, diversification, market power;
- conduct: advertising, research and development, price behaviour, investment in factories, legal tactics, product choice, interaction, concentration;
- performance: price, producer efficiency, allocative efficiency, capital, product quality, technical advances, profit;
- government action: regulation, competition policy, access obstacles, taxes and allowances, stimulation of investments, promotion of employment opportunities, macroeconomic policy.

The SCP model looks mainly at the competition outcome of one link in the supply chain. Based on the characteristics of the supply side and of the demand side, a certain price will be established.

In a supply chain, however, there are several markets. In the agri-food sector, for example, we see among other things the market between producers and wholesalers on the one hand and between wholesalers and

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[12] See Scherer, F.M. (1980), Industrial Market Structure and Economic Performance, Rand McNally, Chicago, IL.

supermarkets on the other. These two markets are dependent upon each other.[13] The consumer is willing (given his preferences, given the offering, etc.) to pay a certain price for an item like a cucumber. To produce the cucumber and deliver it to the consumer, it is necessary to incur certain costs. The cucumber grower must purchase articles like cucumber plants, water and fertilisers and requires a certain payment for labour and use of the greenhouse. The wholesaler incurs costs to sort, pack and transport the cucumbers and requires payment for labour and use of buildings. The supermarket incurs marketing costs and requires payment for labour and the used shelf space. The above and possibly other unnamed but relevant costs together add up to the cost price necessary to deliver cucumbers to the consumer. Section IV.B provides an insight into the cost price structure of the examined products.

If perfect competition exists in all links of a supply chain, none of the parties will be able to make an excess profit, or in other words the company receives a price equal to the costs incurred. These will include labour costs and a payment for making capital available. In this case, the price that the consumer pays is equal to the sum of the marginal costs of the players in the different links of the supply chain.

However, if market power exists in the supply chain, it will result in a certain degree of excess profit in the supply chain. When excess profit occurs, companies achieve a margin on top of the costs that they have incurred. The link with the most market power will be able to seize the largest part of the excess profit. So vertically there is competition for the margin between the different links in the supply chain. Section IV.D shows how the margins of the links in the examined supply chains are distributed. Below there are three clarifying examples.

Say concentration occurs at a supermarket level (e.g. due to a merger or organic growth of one supermarket at the expense of a competitor). This increased concentration will reinforce the negotiating position of the supermarket in relation to the wholesaler (larger volumes, economies of scale, etc.). Let us say that the wholesaler has a certain degree of market power resulting in a positive margin. In the negotiations between supermarket and wholesaler, the supermarket will demand part of this margin of the wholesaler. After all, the supermarket's strong negotiating position leads to a lower purchasing price and thus a lower selling price for the wholesaler. If consumer demand does not change (i.e. the same selling prices in relation to the consumer), the increased concentration will lead to a bigger margin for the supermarket. The margin for the wholesaler will decrease.

If the offering on the production side is disappointing due to a poor harvest (too little sun, low temperatures, lots of rain) and only limited imports are possible, the producer will have a stronger negotiating position than the wholesaler. After all, there is a constant demand for the product and the supply is limited. This means that the margin for the producer will be relatively high, or in other words its selling price will be (well) above the costs. Subsequently, the wholesaler will ask supermarkets for a higher price, because the purchasing costs of the wholesaler are higher. The supermarket also has higher purchasing costs and this will knock on into its selling price to the consumer. Due to the higher consumer price, a number of consumers will stop buying products (because the market price is higher than what they are willing to pay). Demand will decrease until a new equilibrium price is established.

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[13] See for example Steiner, R.L. (2008), Vertical competition, horizontal competition, and market power. The Anti-Trust Bulletin, vol 53 (2), pp. 251-270.

Say that Dutch consumers have a greatly increased demand for tomatoes, for example because the media report that Dutch tomatoes are very healthy. Supermarkets will notice the bigger demand and will attempt to get the consumer to pay a higher price and will try to increase supply. In this latter case, supermarkets will endeavour to purchase more Dutch tomatoes from the wholesaler. However, they will have to pay a higher price for them. The wholesaler will attempt to purchase more Dutch tomatoes or to limit exports. The producers will notice this bigger demand for Dutch tomatoes and will then ask a higher price. Therefore, the producers will also benefit from the increased demand for Dutch tomatoes. The demand for tomatoes at the producer and wholesaler levels is after all a derivative of the demand for tomatoes at consumer level.

When determining its selling price for a certain product, every profit-maximising company will generally make allowance for the purchasing prices of the relevant input factors. A baker purchases items like meal and flour to produce bread. The purchasing prices of meal and flour will then influence the selling price of the bread produced by the baker. The relationship between purchasing and selling prices for a certain product in a specific link in the supply chain can be explained in three ways. Firstly, it is possible that the purchasing price will be raised by a fixed amount, or an absolute price mark-up. This price mark-up must make good the less directly allocable costs (like management, automation, finance, etc.). An absolute price mark-up of, say, €0.30 means that an (average) purchasing price of €1 will lead to a selling price of €1.30 and an average purchasing price of €2 will lead to a selling price of €2.30. Secondly, a possibility exists that the purchasing price will be raised by a fixed percentage, or a percentage price mark-up. A percentage price mark-up of, say, 40% means that an (average) purchasing price of €1 will lead to a selling price of €1.40. A purchasing price of €2 leads in this case to a selling price of €2.80. With a percentage price mark-up, there is a possibility of asymmetric price adjustment (see below). Thirdly, the purchasing price can be determined autonomously to a large extent. In contrast with the foregoing, the company will then make very little allowance for the purchasing price when determining the selling price. The section below explains this in greater detail.

B.   Asymmetric price adjustment

In the examined supply chains, the purchase of raw materials (cucumbers, onions, etc.) will consist for the larger part of the total directly allocable costs of the wholesaler and the supermarket. This cost item is also by far the most volatile over time. The other costs (labour, capital, interest) will generally be far more constant over time. Therefore, a strong relationship (long term) may be expected to exist between the purchasing price and the selling price of a certain link in a supply chain. Changes to the purchasing price will ultimately result in similar changes to the selling price. In the economic literature, however, a number of examples can be found as to why this price adjustment does not need to be perfect and why asymmetry may occur.[14] Asymmetric price adjustment is mainly about the difference in adjustments between price increases and price decreases.

Two aspects typify asymmetric price adjustment. The first concerns the speed of the price adjustment. A higher purchase price can be passed on sooner in the selling price than a reduction of the purchasing price, for example. A situation may also occur where a higher purchasing price is charged on more slowly than a lower purchasing price. This form of asymmetric price adjustment leads to a temporary transfer of margin between the selling company and the purchasing company (see figure 2).

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[14] See Meyer, J and S von Cramon-Taubadel (2004), Asymmetric and price transmission: A survey, Journal of Agricultural Economics, vol 55 (3), pp. 581-611, and Zeng, S.D.J, Miller, Z. Wang, and S. Kai (2008), Meta-evidence price transformation in US agricultural markets, Journal of the Faculty of Agriculture, Kyushu University, vol. 53 (1), pp. 349-356.

Figuur 2: Speed of a price adjustment
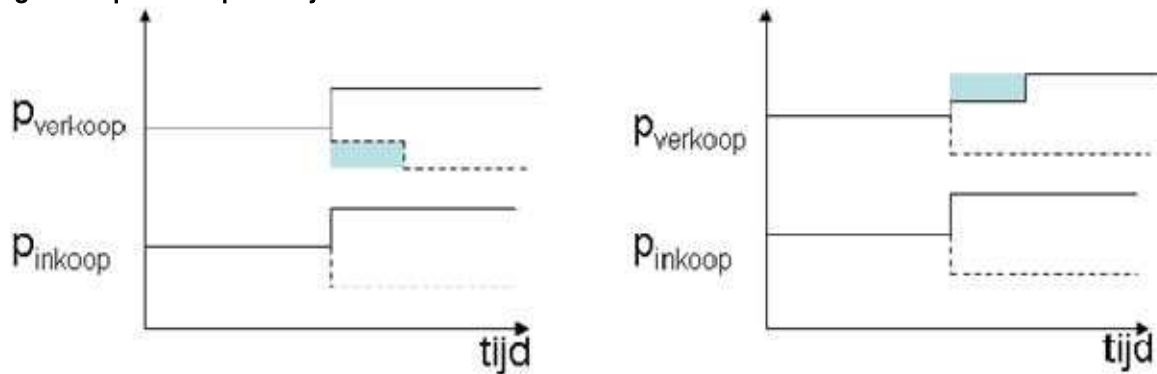
In the left-hand figure, a higher purchasing price (continuous line) will be passed on directly in a higher selling price. A lower purchasing price (dotted line) will be passed on with a delay. The shaded area concerns the margin advantage for the selling company. In the right-hand figure, a lower purchasing price (dotted line) will be passed on directly in a lower selling price. A higher purchasing price (uninterrupted line) will be passed on with a delay. The shaded area is the temporary margin disadvantage for the selling company. Source: Meyer and Von Cramon-Taubadel (2004): 584.

The second aspect concerns the size of the price adjustment. In this instance, higher purchasing prices will be passed on in their entirety to the following link, while price reductions will be passed on only to a limited extent (see figure 3). Here again, it is possible for a higher purchasing price not to be passed on in its entirety, but for a lower purchasing price to be passed on in its entirety. This form of asymmetric price adjustment leads to a permanent transfer of margins between the purchasing company and the selling company. Both aspects may also occur simultaneously.

Figuur 3: Size of a price adjustment
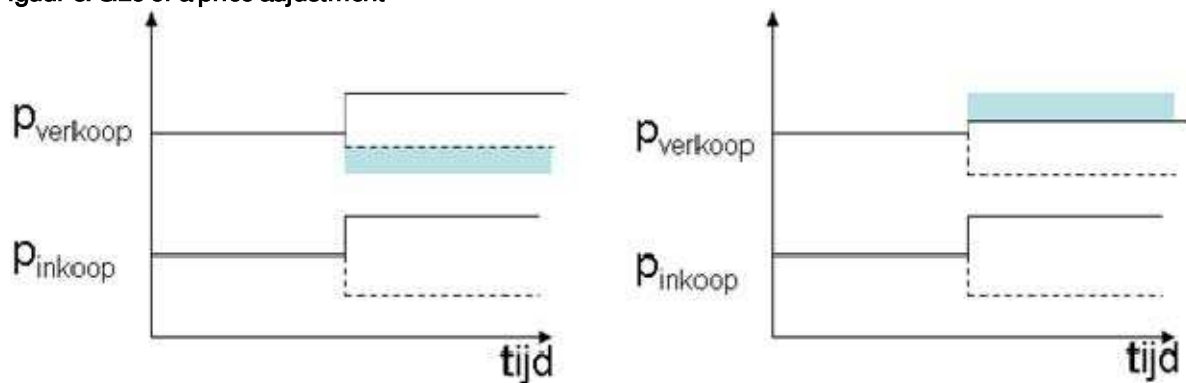
In the left-hand figure, a price increase (continuous line) will be passed on in its entirety in the selling price. A lower purchasing price (dotted line) will be passed on only partially. This results in a permanent advantage for the selling company equal to the shaded area. In the right-hand figure, a lower purchasing price (dotted line) will be passed on completely in a lower selling price. A higher purchasing price (continuous line) will be passed on only partially in a lower selling price. This results in a permanent margin disadvantage for the selling companies. Source: Meyer and Von Cramon-Taubadel (2004): 584.

The table below clarifies asymmetric price adjustment by means of a an example. This examines a percentage price mark-up.

Tabel 9: Example of percentage price adjustment

Purchasing price	Selling price	Margin
100	150	50
120	180	60
80	120	40

Based on a percentage price mark-up of 50%.

Say a company has a purchasing price of 100 units and applies a percentage price mark-up of 50%. Given this information, the company requires a selling price of 150 units and achieves a margin of 50 units. If the purchasing price increases to 120 units, the company will increase the selling price to 180 units and will achieve a margin of 60 units. The company has an incentive to pass on this increase directly in the purchasing price as the margin will directly increase by 10 units. If the purchasing price drops to 80 units, the company will have to lower the selling price to 120 units. The margin will then decrease to 40 units. However, the company has an incentive to wait as long as possible before lowering the selling price in order to achieve a temporarily higher margin.

Economic literature puts forward various explanations for asymmetric price adjustment:
- Asymmetric price adjustments can have to do with imperfect competitive markets, or in other words the existence of market power. It is generally assumed that if market power rests with the wholesalers or the supermarkets, the consequence will be that increases in producer prices will be passed on sooner and/or more than decreases in producer prices. The wholesaler or supermarket will then achieve temporary or permanently higher margins. However, there may also be market conditions in which market power can lead to temporary or permanent lower margins[15].
- Secondly, asymmetric price adjustment can be caused by asymmetric adjustment costs for changes to quantities and/or prices of inputs and/or outputs. For example, if the output increases, a company will have to incur extra costs to obtain extra input (search costs, pay a higher price). In the case of perishable goods like vegetables and bread, supermarkets might be cautious about increasing the price, because a possible reduction in demand might oblige them to throw away unsold products.
- Asymmetric price adjustment may further have to do with psychological price levels. Supermarkets generally charge prices like €0.99, €2.49 and €9.99. Relatively small price increases might not be desirable for this reason (€1.04, €2.61 and €10.48).
- A consumer will generally prefer to pay relatively stable prices for products. A consumer does not want to pay a different price every day for a loaf of bread in the supermarket because of fluctuations in the grain market. Therefore, some of these fluctuations will be absorbed by relevant links in the supply chain. Examples of ways of absorbing a fluctuation are the conclusion of forward contracts and the temporary application of higher or lower margins.
- Asymmetric price may further be caused by certain government interventions, like price thresholds and quality requirements.

Section IV.E analyses the extent to which the wholesaler and the supermarket can achieve an additional profit by applying asymmetric price adjustment.

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[15] For the specific market characteristics see Meyer and Von Cramon-Taubadel (2004), p. 587.

IV. ECONOMIC ANALYSIS OF PRICING

A. Introduction

This chapter presents the outcomes of the economic analyses of the investigation. Section B begins by setting out how prices have developed over the past four years. Section C continues by looking at the structure of cost prices of the examined supply chains. This is followed by a description of developments of margins (section D). Section E contains a further analysis of the price developments. Section F concludes the chapter. For a description of the origin of the data used in this chapter reference is made to annex 4.

B. Presentation of price developments between 2005 – 2008

(1) Comparison per product

The gathered data is usable to identify the development of prices in each link of the various supply chains. For each link a weighted average annual price was calculated based on the sales or turnover data of the companies in the link of the supply chain. This average annual price was then indexed using 2005 as the reference year. This was done in connection with the confidentiality of the data. However, the indexation does mean that the development of the average annual price is influenced by the price level that prevailed in 2005 (a good or a bad year). Figure 4 contains a diagrammatic representation of the development of prices.

Figuur 4: Development of average annual price per link (2005 through 2008)
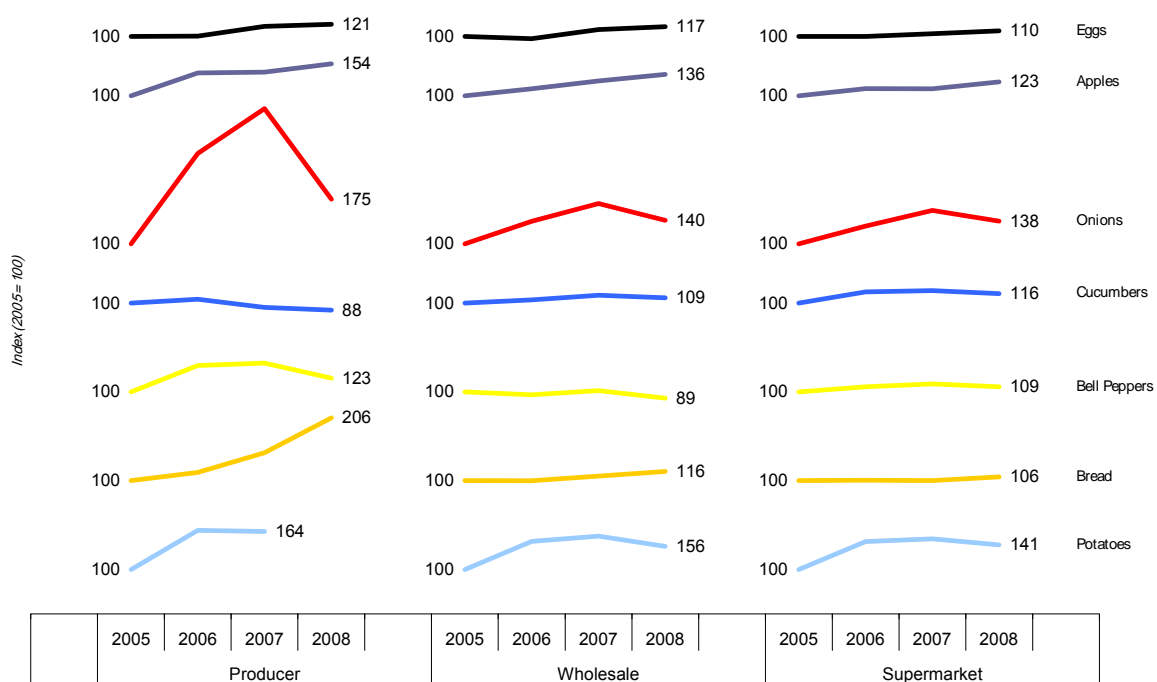
Source: LEI, wholesaler and supermarket price data

Prices at producer level have increased sharply over the past four years for the examined products. Cucumbers are an exception because prices have fallen on an annual basis. Prominent outliers are bread and

onions, which have increased over the past four years by approximately 106% and approximately 75%, respectively.[16]

The trend of prices at wholesaler level is similar to the development at producer level, except for bell peppers and cucumbers. In contrast with the producer price, the price of bell peppers at wholesaler level has decreased over the past four years. Against this, the price of cucumbers has increased in comparison with the producer price. The price of meal (not shown in figure 4) has risen by approximately 52% over the past four years. It can further be observed (as is to be expected based on the logics of chain organisation) that the rising trend visible at producer level has generally been less pronounced at wholesaler level. The producer price of onions was approximately 228% higher in 2007 than in 2005, whereas the wholesale price of onions in 2007 was only approximately 68% higher.

Compared with the development of wholesale prices, the development of supermarket prices has generally been less pronounced. Cucumbers and bell peppers are an exception, as their prices in the supermarket have actually risen faster than prices at wholesale level.

(2)   International comparison per product group

As mentioned earlier, the trade in the examined products is highly international. The data presented in the previous section concern only the Netherlands. For that reason there was an examination of how prices developed in the 2005-2008 period at producer level and at consumer level on a European scale. In connection with the availability of public information the data has been presented at a different level of aggregation than in the foregoing. The examined products – apples, cucumbers, bell peppers and unsliced onions – form part of the 'vegetables' category. Figure 5 and figure 6 show how prices have developed at producer level and at consumer level in the Netherlands compared with the average price of the 25 member states of the European Union. For a comprehensive comparison of price developments between the Netherlands and surrounding countries reference is made to the public version of the LEI report.

With the exception of vegetables, the prices at producer level have developed positively over the past four years. The sharp rise and fall of prices of wheat and consumer potatoes stands out. Prices of consumer potatoes in the Netherlands at producer level at year-end 2006 were many times higher than in 2005. This might be explainable because the prices of industrial potatoes (part of the consumer potatoes category) developed more strongly over the past four years than the development of prices of consumer potatoes as presented in figure 4. Furthermore, the prices of vegetables and eggs in the Netherlands are more volatile in relation to Europe. The prices at producer level of eggs, fruit and consumer potatoes have risen more sharply in the Netherlands than in Europe. The price development of vegetables and wheat in the Netherlands was in line with the European average.

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[16] It should be noted that the prices of onions at producer level were relatively low in 2005.

Figuur 5: Development of producer prices in the Netherlands and Europe (2005-2008, per quarter)
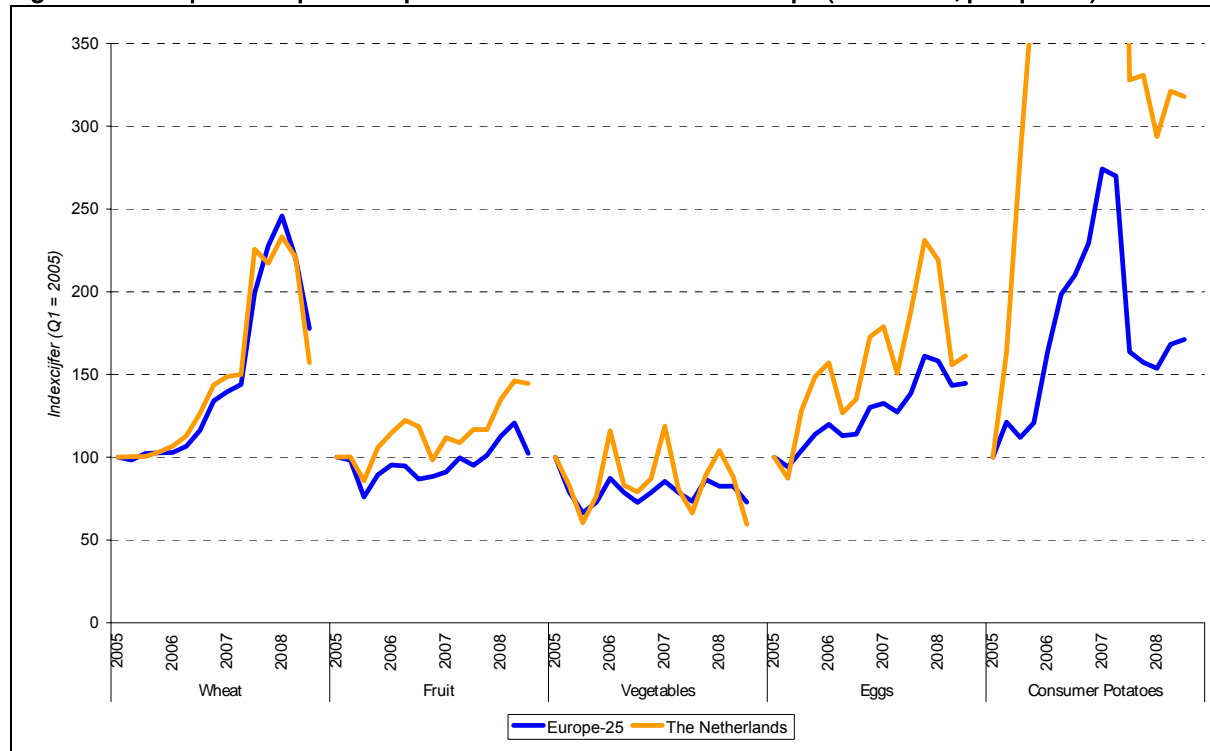
Source: Eurostat

As was the case with producer prices, the development of prices at consumer level exhibits a positive trend. However, the developments at consumer level are less strong than the developments at producer level, as can be seen from the values on the vertical axes of figure 5 and figure 6. Compared with 2005, the prices of foods (nutrition category) and bread in the Netherlands and in Europe have risen by between 10% and 20%, while prices in Europe have increased more than in the Netherlands. The price development of vegetables and fruit in the Netherlands was in line with the European average.

Figuur 6: Development of consumer prices in the Netherlands and Europe (2005-2008, per month)
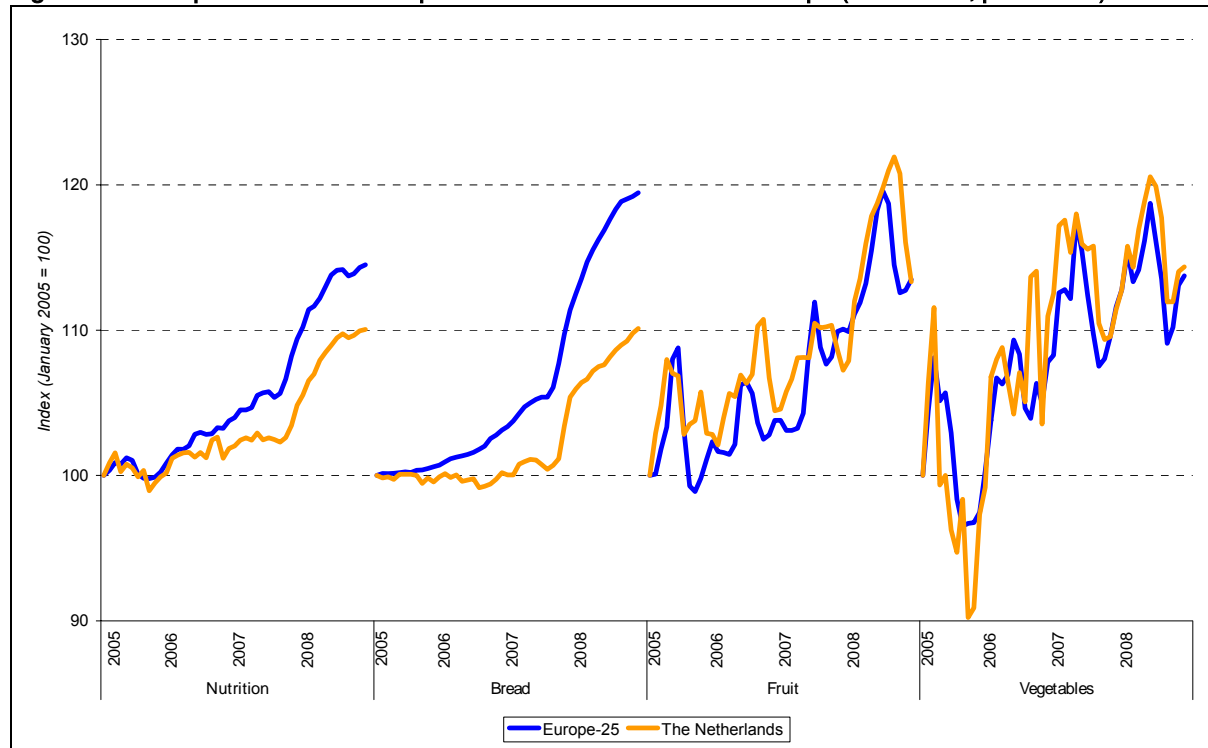
Source: Eurostat. The prices of potatoes and eggs at consumer level are not available, but fall under the 'nutrition' category.

Conclusion (answer to question one of the investigation)

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1. How did the selling prices of the different links in the supply chain develop nationally and internationally in the 2005-2008 period?

Prices at the producer, wholesale and supermarket levels have generally increased sharply over the past four years for the examined products. However, there has been a cushioning effect in the sense that the prices of a link lower in the supply chain have risen less sharply. The cucumbers supply chain is an exception because prices at wholesaler level and supermarket level have increased, whereas producer prices have decreased.

Viewed internationally, it is noticeable that prices at producer level of eggs, fruit and consumer potatoes have risen more sharply in the Netherlands than in Europe. The price development of vegetables and wheat in the Netherlands was in line with the European average. The Dutch consumer prices have also risen over the past four years. Compared with the European average, Dutch consumer prices for nutrition and bread have risen less than elsewhere in Europe. The price development of vegetables and fruit in the Netherlands was in line with the European average.

C.   Costs and margins in the supply chain

This section provides an insight into the structure of costs prices of the examined products. In other words, there is an examination of the costs that each link incurs and how high the margin is. For the present purposes, margin means the difference between the selling price on the one hand and the purchasing price and other costs on the other. Moreover, it has been assumed that all fixed costs are allocated to the product.

The approached companies provided comprehensive cost allocations to give an insight into general costs and overhead costs. The supplied data shows that the assumption that all fixed costs are allocated to the product is a reasonable one. At producer level, the family income, the profit plus the remuneration for labour of the entrepreneur and his/her family have been used as an indicator of the margin of this link in the supply chain. The term 'producer purchasing costs' means the purchasing of items like seeds. 'Other costs' include personnel costs, energy costs and depreciation.

The figures in this section show the cost price structure of the examined products. The various components have been expressed as a percentage of the consumer price. [17] The data represent an (unweighted) average of the years 2005 through 2008. NMa has observed that in respect of a number of products there is a difference between the selling price reported by the interviewed wholesalers on the one hand and the purchasing price reported by the supermarkets on the other. NMa checked possible explanations for this observed difference at a number of wholesalers and supermarkets. The picture that emerged from these interviews was that the observed difference can be regarded as a cost item for the wholesaler. The difference between the purchasing price and the selling price is explained in part by a different way of recording prices between wholesalers (gross prices excluding discounts, packaging and transport costs) and supermarkets (net-net prices). It should be noted that the wholesalers interviewed by NMa also supply non-interviewed wholesalers that subsequently supply supermarkets. These mutual deliveries lead to additional costs that are incurred at wholesaler level. One supermarket also stated that it sometimes receives discounts that are settled up with its suppliers on an annual basis. These discounts are not incorporated into the selling price of the wholesaler but are incorporated into the purchasing price of the supermarket. For the reasons stated above, the observed difference has been included in figure 7 and in figure 8 as costs for the wholesaler.

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[17] The prices for the products of potatoes, apples and (unsliced) onions are expressed as a price per kilogram. For the products of bread, eggs, cucumbers and bell peppers the price is expressed as a price per item.

Figuur 7: Cost price structure (average of the years 2005 through 2008)

Cost price structure (as % of the consumer price)

Producer purchasing costs ☐ Other costs Producer ☐ Family income Producer ☐ Wholesaler costs
☐ Wholesaler margin ☐ Supermarket costs ☐ Supermarket margin
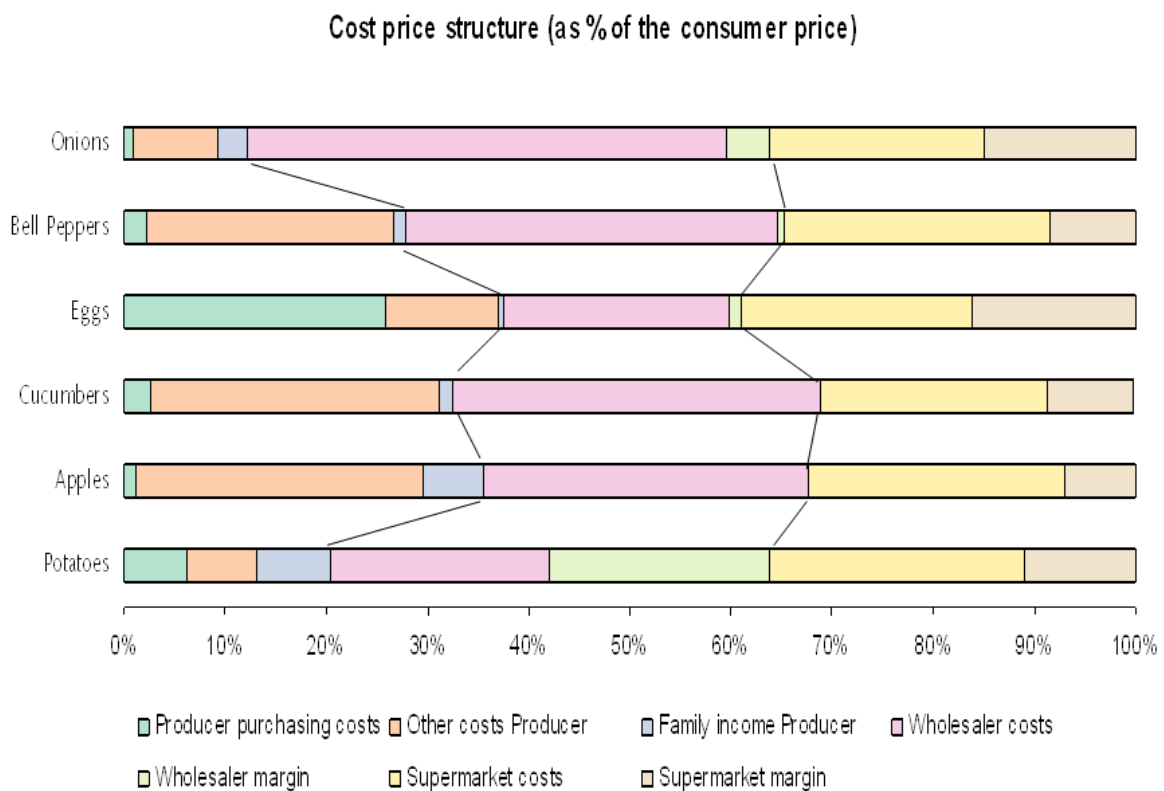
The two vertical lines show the prices (as % of the consumer price) at producer level and wholesaler level, respectively.

Figuur 8: Cost price structure (average of the years 2005 through 2008)

Cost price structure (as % of the consumer price)

☐ Producer purchasing costs ☐ Other costs Producer ☐ Family income Producer
☐ costs of Miller ☐ margin of Miller ☐ costs of Breadindustry
☐ margin of Breadindustry ☐ Supermarket costs ☐ Supermarket margin
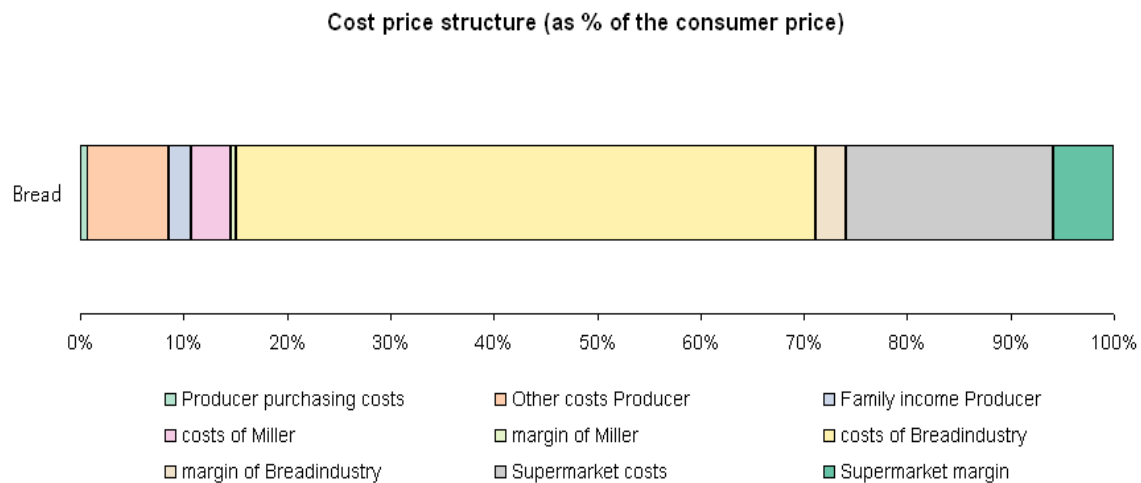
A number of matters stand out based on the two figures above. Firstly, the costs that the wholesaler incurs for a certain product are relatively high. For bread and (unsliced) onions, for example, the costs of the wholesaler/industry account for roughly half the consumer price. To a lesser extent the same applies to the costs of the supermarket. Generally speaking, this cost item accounts for approximately 20-25% of the consumer price. Annex 3 contains a breakdown of the costs of the wholesaler and supermarket for the examined products. The purchasing costs of the producer are limited in relation to the consumer price, with the exception of eggs.

As the wholesaler and (to a lesser extent) the supermarket incur relatively high costs, the consumer price is a multiple of the selling price at producer level (the three components on the left). This applies particularly to bread and (unsliced) onions (9 times and 7 times the selling price at producer level, respectively) and to a lesser extent to apples, cucumbers and eggs (3 times the selling price at producer level).

As regards the distribution of the margin in the supply chain, it is noticeable that the supermarket gets the highest margins in absolute terms. As stated above, however, the consumer price is a multiple of the producer price. Another indicator can be found by looking at the relative margin, or in other words the size of the margin divided by the selling price of the link concerned. In contrast with the distribution of the absolute margin, this produces a varied picture. For potatoes, apples, bread and onions, the producer has the highest relative margin measured against the selling price of the link. For eggs, cucumbers and bell peppers, on the other hand, the supermarket has the highest relative margin. The margin of the wholesaler is generally limited, except for potatoes.

Conclusion (answer to question 2 and question 3 of the investigation)

2. How high are the selling prices in the different links in the supply chain?
The prices in the supermarket are a multiple of the selling prices at producer level. This is explained largely by the costs that are incurred especially by the wholesaler and to a lesser extent by the supermarkets.

3. How high are the margins in the different links in the supply chain?
In absolute terms, the supermarket gets the highest margins. In contrast, the distribution of the relative margin between the different links in the supply chain concerned exhibits a varied picture. The supermarket gets the highest relative margin for roughly half the examined products, while for the other products the producers get the highest relative margin based on their family income.

D.   Representation of margin developments 2005-2008

Section C provided an insight into the size of the average margin of the various links in the examined supply chains. It is also possible to identify the relative margins per year. Internal data of LEI was used to examine the development of margins at producer level. For the wholesaler and supermarket links, the weighted average margin was calculated using the turnover data of the companies in the relevant link of the supply chain. Figure 9 shows for the examined products the different elements of the cost price as a percentage of the consumer price in the 2005-2008 period. Insufficient data was available for potatoes in 2008 for the cost price structures of the producers and wholesalers. Therefore, the figures do not show the cost price structure for potatoes in 2008.

Figuur 9: Development of average margin per link (2005 through 2008)

Cost structure (as % of the consumer price)

Producer Purchasing costs ▪ Other costs of producer ▪ Family income of producer ▪ Wholesaler costs ▪ Wholesaler margin ▪ Supermarket costs ▪ Supermarket margin
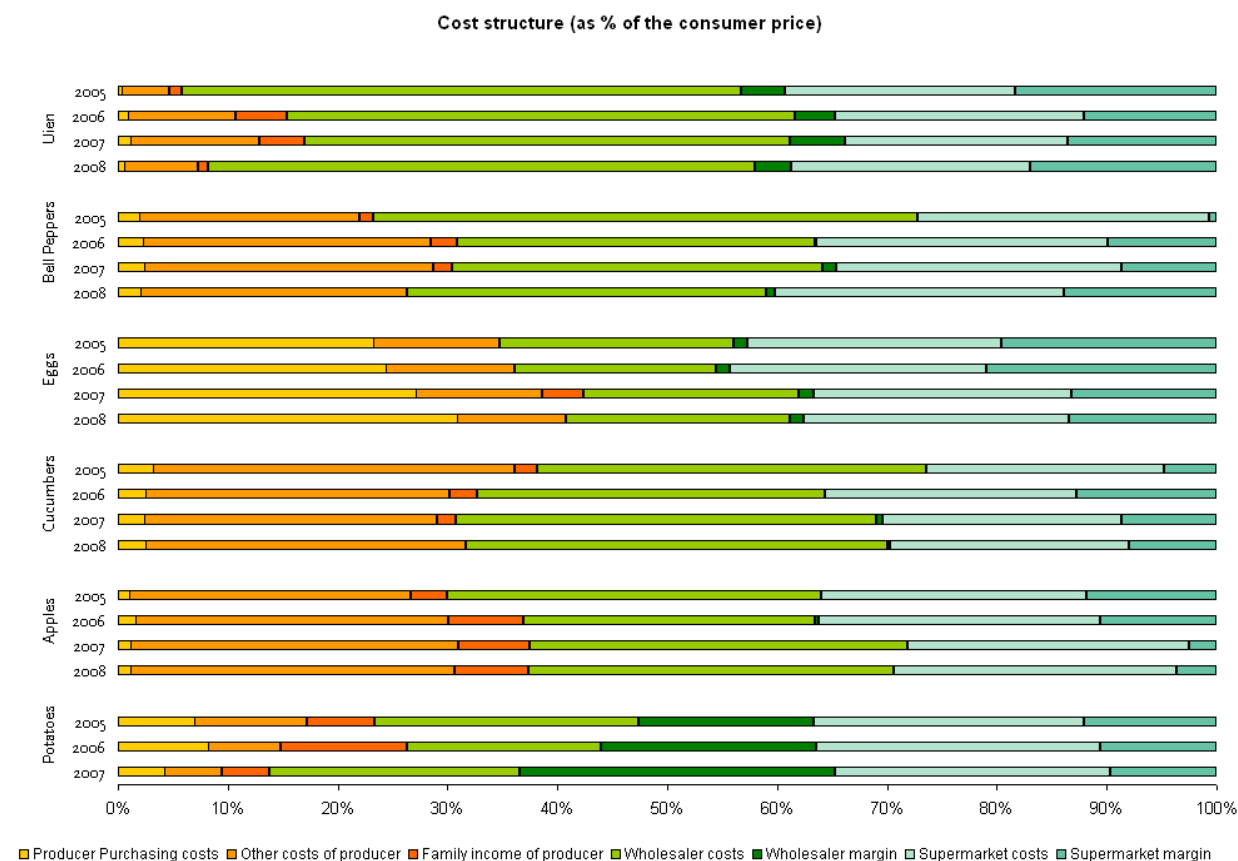
Source: LEI, price and cost data of wholesaler and supermarket, edited by NMa

Figuur 10: Development of average margin per link (2005 through 2008) for Bread

Cost structure (as % of the consumer price)

Producer Purchasing costs ▪ Other costs of Producer ▪ Family income of Producer ▪ Costs of Miller ▪ Margin of Miller
Costs of Breadindustry ▪ Margin of Breadindustry ▪ Supermarket costs ▪ Supermarket margin
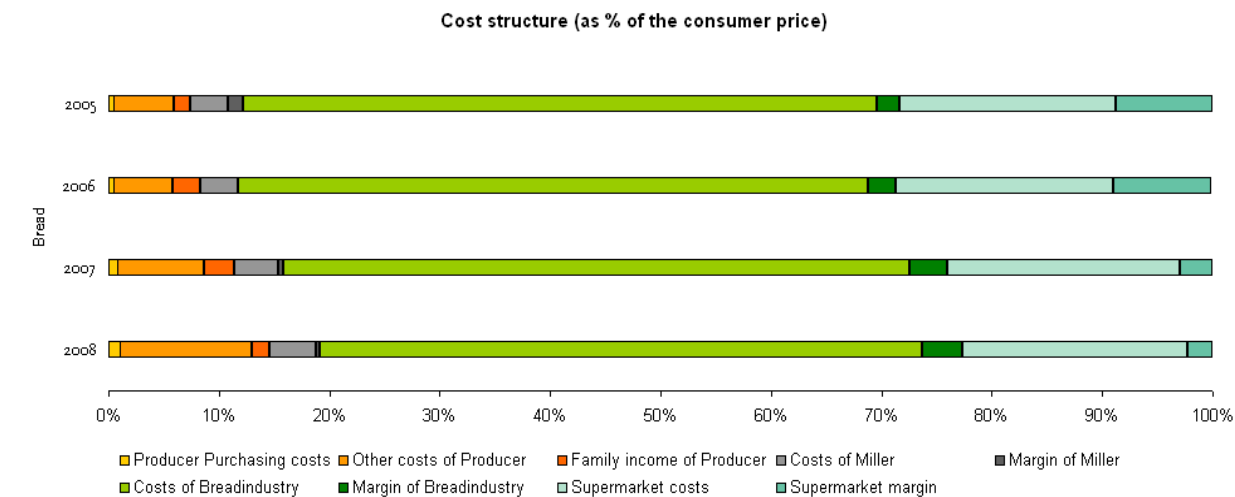
Source: LEI, price and cost data of wholesaler and supermarket, edited by NMa

The development of the margin at producer level exhibits a varying picture. The margin has developed negatively for most products over the past four years, while only the margin for apples has remained stable over that period. The development of the margin on onions was highly positive in 2006 and in 2007, but fell back to the 2005 level in 2008. The margin on eggs exhibited a very sharp increase in 2007 followed by a very

sharp decrease in 2008.[18]

The margin at wholesaler level has increased over the past four years for a majority of the examined products. Nevertheless, a number of matters stand out. Firstly, the margins at wholesaler level for bell peppers and cucumbers increased slightly, whereas the margins at producer level decreased sharply. To a lesser extent the same applies to eggs. For apples, on the other hand, the margin at wholesaler level decreased sharply in contrast with the increased margin at producer level.[19] In the bread supply chain, the bread industry link has greatly improved its margin over the past four years, whereas the margins of the miller and supermarket links (see figure 10) have decreased over the past four years.

The development of the margin at supermarket level also exhibits a varying picture. The supermarket improved its margin on cucumbers, bell peppers, onions and potatoes. The margin on bell peppers actually increased explosively in contrast with the development of the margin at producer level. It should be noted, however, that the (average) margin on bell peppers for the supermarket was very low relatively speaking in the reference year of 2005.[20] For apples, eggs and bread, on the other hand, the margin has decreased over the past four years. A possible explanation is that in 2008 the supermarkets made different decisions to those in 2005 concerning margins on the various agri-food products.

Conclusion (answer to question 4 of the investigation)

> *4. How did the margins of the different links in the supply chain develop in the 2005-2008 period?*
>
> In contrast with the generally increased prices in the 2005-2008 period, the development of the margin exhibits a varying picture. The margins at producer level and supermarket level increased compared with 2005 in respect of roughly half the examined products. Against this, the margins at these levels decreased for the other examined products. Only at wholesaler level have the margins achieved on each examined product increased over the past four years, with the exception of apples.

E.   Analysis of pricing in the different supply chains

(1)   Introduction

Section C provided a clear picture of the structure of the prices in the supply chains. Sections D and E identified the developments of prices and margins between 2005 and 2008 for the different links in the examined supply chains. This section analyses how the prices in the different links of the supply chain are interrelated (question 5 in the investigation). It also examines the influence of the increased concentration at supermarket level on the development of the consumer price (question 6 in the investigation).

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18 It should be noted with regard to the development of the margin for eggs at producer level that in absolute terms it concerns increases or decreases of a few tenths of euro cents.

19 It should be noted with regard to the development of the margin for apples and bell peppers at wholesaler level that in absolute terms it concerns increases or decreases of a few tenths of euro cents.

20 If 2006 is taken as the reference year for bell peppers, the margin for bell peppers at supermarket level increased by 39% in the period from 2006 up to and including 2008

(2)   The model

The models used in this section are at the Vector Autoregressive (VAR) model and the Vector Error Correction (VEC) model. With the help of such models, which include all weekly prices for a certain product in the 2005-2008 period, it is possible to examine whether and if so how an unexpected once-only shock in the price of a product in a certain link ('price shock') knocks on into the different prices in the supply chain.[21] The researcher inserts the shock in the model, for example a higher price at producer level. For analysis of the model it is not relevant to know the underlying reason for the higher price and how exactly it was established. In practice, one could envisage an unexpected decrease in production due to a crop failure, an increased demand or an unannounced market intervention. Subsequently, it is possible to analyse the effect of the price shock on the different prices in the supply chain. Important questions in this respect are:

-     Does a price shock lead to a permanent adjustment of one or more prices in the supply chain or do the prices revert to the old level?
-     If the prices revert to the old level, how long does this take?
-     For how long and to what extent do the prices of the other links in the supply chain respond to a price shock?

The example below explains the system used and the relationships between the different links in a supply chain. Annex 1 contains a comprehensive, more technical, explanation of the models mentioned above.

Example:

In a VAR model, the price in the supermarket and the price of the wholesaler at time t are explained by the prices in the supermarket in the previous period(s) and the wholesale price in the previous period(s). Additionally, there is a constant (a), a trend (δ), seasonal correction (SD) and an error term (u). Expressed as a formula the model looks like this:

$$P_{\text{supermarket}_t} = \alpha_1 + \delta_1 * t + \beta_{1,1,s} * P_{\text{supermarket}_{t-1}} + .. + \beta_{1,n,s} * P_{\text{supermarket}_{t-n}}$$

$$+ \beta_{1,1,g} * P_{\text{wholesaler}_{t-1}} + .. + \beta_{1,n,g} * P_{\text{wholesaler}_{t-n}} + \sum_{z=2}^{52} \lambda_z * SD_{1,z,t} + u_{1,t}$$

$$P_{\text{wholesaler}_t} = \alpha_2 + \delta_2 * t + \beta_{2,1,g} * P_{\text{wholesaler}_{t-1}} + .. + \beta_{2,n,g} * P_{\text{wholesaler}_{t-n}}$$

$$+ \beta_{2,1,s} * P_{\text{supermarket}_{t-1}} + ... + \beta_{2,m,s} * P_{\text{supermarket}_{t-m}} + \sum_{z=2}^{52} \lambda_z * SD_{2,z,t} + u_{2,t}$$

The various coefficients in the formulas are estimated based on the gathered weekly data. A prediction is then made of how the price will develop in the future after a shock has been given. For example, a change in the price of the wholesaler now (t=0, the shock) has in the following period (t=1) an effect on the price of the wholesaler. Similarly, the price in the supermarket at t=1 will be influenced by the wholesale price (t=0). Together, these two changes (i.e. in the price of the wholesaler (t=1) and the supermarket (t=1) in turn have an effect on the prices at the supermarket and wholesaler in the following period (t=2) and so on. The extent

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[21] This is referred to as an impulse response analysis. See for example Peasaran, H.H. & Shin, Y. (1998), Generalised Impulse Response Analysis in Linear Multivariate Models, Economics Letters, 58, pp. 17-29.

to which a shock in the price of the wholesaler is passed on to the supermarket and also the period of time within which this effect is noticeable will depend on the degree to which the wholesaler can pass on/impose price increases on the supermarket (ß). If the wholesaler in the supply chain does not have any market power, the wholesale price will not quickly revert to the long-term equilibrium price.

(3)   Prices in the supermarket influenced by prices higher in the supply chain

The relationship between the selling prices in a supply chain can be typified by three price determination methods. With cost-price-related pricing, a company takes the cost price of a product as its point of departure when determining its selling price. With customer-related pricing, the willingness of the customer to pay is the central consideration. A mixed pricing makes a distinction between two forms. Firstly, there may be competition in a supply chain for a distribution of the excess profits; see section III.A. Additionally, a company may look mainly at the prices of its immediate competitors instead of its suppliers and customers.

Based on the results in annex 1, table 10 shows whether a certain link responds to a price shock elsewhere in the supply chain. The first column shows whether the price at supermarket level responds to a price shock at wholesaler level, for example. The price of a link may respond in three ways to a price shock elsewhere in the supply chain: a permanent price adjustment (+), a temporary price adjustment (+/-) or no price adjustment (-). The first three columns assume in the case of price adjustments that there is a cost-price-related pricing, namely from producer to wholesaler to supermarket. In contrast, the final three columns assume in the case of price adjustments a customer-related pricing, namely from supermarket to wholesaler to producer. If the prices of the different links respond to each other by making price adjustments, this will be an indication of a mixed pricing. If a link responds little if at all to price shocks elsewhere in the supply chain, this will be another indication that there is competition in a supply chain for a distribution of the margin. For a comprehensive presentation of the outcomes shown below reference is made to annex 1. The following section discusses the effects of the different forms of price determination.

Tabel 10: Influencing of selling prices in the supply chain

Product	Cost-price-related pricing			Customer-related pricing			Typification of supply chain
	G responds to P	S responds to G	S responds to P	P responds to G	P responds to S	G responds to S	
Apples	+	+	+	+	+	+	Mixed
Potatoes	+	+/−	+	−	−	−	Cost-price-related
Bread	+	+/−	+	−	+	+	Cost-price-related
Eggs	+	+/−	+	−	+	+	Cost-price-related
Cucumbers	+/−	−	+/−	−	+/−	−	Mixed
Bell Peppers	+	−	+	−	+	+	Cost-price-related / Customer-related
Unsliced Onions	+	−	+	−	−	+/−	Cost-price-related / Mixed
Sliced Onions	n.a.	−	n.a.	n.a.	n.a.	+	

S = supermarket, G = wholesaler/bread industry, P = producer/miller

+ = permanent price adjustment, +/- = temporary price adjustment, - = no significant price adjustment

It is concluded in the above table for potatoes, for example, that the supply chain is cost-price-related. This is explainable because a price increase at the producer leads to a permanent price adjustment at the wholesaler. For their part, the supermarkets respond temporarily to a price adjustment at the wholesaler and across the board the supermarket responds permanently to the price increase at the producer. The wholesaler and producers do not respond to a price increase at the supermarket. Nor does the producer respond to price adjustments at the wholesaler. In other words, the costs drive pricing to a significant degree in this supply chain, whereas consumer demand has no driving role.

The producer plays an important role in the pricing of the examined supply chains. In almost all the examined supply chains, a price shock at producer level leads to a permanent adjustment of the selling price lower in the supply chain. Conversely, table 10 shows that producers respond hardly ever to a price change at wholesaler level. Nevertheless, the producer makes allowance for consumer preferences, since a change to the consumer price in the supermarket will lead in most cases to a price adjustment at producer level.

Pricing at the wholesaler is mixed. As mentioned above, a price shock at producer level leads in all of the examined supply chains to a price adjustment at wholesaler level. Moreover, the wholesaler responds in respect of a majority of the products to a price shock at supermarket level. This outcome is not surprising given the function of the wholesaler as a link between producer and supermarket.

Pricing at supermarket level depends greatly on pricing at producer level. In all cases a price shock at producer level leads to a (temporary) price adjustment in the supermarket. In respect of half the examined products this also applies to a price shock at wholesaler level. Consequently, the pricing at supermarket level is predominantly cost-price-related.

(4)   Limited permanent effects as a result of price adjustments

The previous section showed that the selling prices of the different links in the supply chains respond to each other to a certain extent. This response is temporary for most produce and the effect of a price increase evaporates over time and the prices return to their old level. Consequently, it is important to examine the scale of these temporary effects. If the wholesaler increases the price of one kilogramme of apples by 10%, for example, how will the supermarket respond? According to table 11, a price increase by the wholesaler leads to a temporary response at supermarket level. By combining the effects of increased purchasing prices and selling prices, it is possible to obtain a transparent picture of the extent to which the wholesaler can benefit temporarily from a higher price for one kilogramme of apples. The table below shows these effects. A plus sign means that the wholesaler gets a selling price that amply compensates for any increased purchasing prices and by consequence gets a higher margin. A minus sign means that the purchasing price of the wholesaler increases more than the selling price, or in other words there is a decreasing margin. The same calculation has also been made for the supermarket.

Tabel 11: Consequences of a price increase on the link's own margin

	Scale of effect Wholesaler	Duration of effect Wholesaler	Scale of effect Supermarket	Duration of effect Supermarket
Potatoes	+	Temporary	++	Temporary
Apples	+	Temporary	−	Temporary
Bread	++	Temporary	——	Permanent
Eggs	−	Temporary	−	Permanent
Cucumbers	−	Temporary	+	Temporary
Bell Peppers	++	Temporary	+	Permanent
Unsliced Onions	++	Temporary	+	Temporary
Sliced Onions	n.a.	n.a.	++	Permanent

++ = strong increase of margin, + = slight increase of margin, - = slight decrease of margin, -- = strong decrease of margin

Table 11 shows that in most cases the wholesaler can pass on a higher purchasing price to the supermarket. In turn, the supermarket passes on the higher purchasing prices to a limited extent to the consumer. In the case of apples, bread and eggs, the supermarket gets a lower margin as a result of its own price increase.

(5)   Negligible effect of asymmetric price adjustment

Section III.A stated that the relationship between purchasing prices and selling prices is explainable in three ways, namely *independent*, *absolute* and *percentage-wise*. There was an examination to see how this relationship can be characterised for the examined products. The table below shows the outcomes.

Tabel 12: **Relationship between purchasing price and selling price for the examined products**

Product	Supermarket versus Wholesaler	Wholesaler versus Producer
Potatoes	Percentage	Absolute
Apples	Percentage	Percentage
Bread	Percentage	Percentage
Eggs	Absolute	Absolute
Cucumbers	Percentage	Percentage
Bell Peppers	Percentage	Percentage
Onions	Absolute	Percentage

Source: price data requested from wholesaler and supermarket

The above table shows that a percentage price mark-up is used in most of the links of the examined products. An exception is the eggs supply chain where both the wholesaler and the supermarket apply a fixed amount as a price mark-up.

Given this outcome, there is a possibility that changes to the purchasing price would be passed on asymmetrically if there were to be a lack of competition in a supply chain. A company with a certain degree of market power has an incentive immediately to pass on an (unexpected) increase of the purchasing price in the selling price and to pass on an (unexpected) decrease of the purchasing price with a certain delay (see table 9). Consequently, there was an examination of whether the different links of the supply chains concerned exhibited asymmetric price adjustment conduct in the 2005-2008 period. For a description of the methodology of this analysis reference is made to the public version of the LEI report. The analysis shows

that the additional profits or losses for a link as a result of asymmetric price adjustments are very limited, often less than EUR 100,000. The largest positive amount stated in the LEI report is the extra profit for a cucumber wholesaler amounting to EUR 407,000 on total turnover of EUR 330,000,000 (i.e. 0.12% of total turnover). The biggest negative amount is the extra loss for supermarkets amounting to EUR 545,000, again for cucumbers. Based on the above, it may be concluded that an asymmetric price adjustment has a negligible effect on the pricing of the examined products.

(6)   Limited effect of supermarkets through concentration

Table 7 shows that the selling side of the supermarkets exhibits a strong degree of concentration. It is possible that this concentration influences pricing in the supply chains concerned. This is because an increasing concentration of a certain market will generally lead to higher selling prices. It follows from economic theory, for example, that the equilibrium price in a monopoly is usually higher than the equilibrium price in an oligopoly. Moreover, a supply chain consists of various links within which, as mentioned earlier, there is competition for the distribution of excess profits. This can result in the links higher in the supply chain demanding part of the higher margin at supermarket level in the form of higher selling prices of the link concerned.

Based on the models described earlier in this section, there was an examination of the effect of a relatively small increase in the C4 ratio at supermarket level on the (weekly) purchasing and selling prices of supermarkets.[22] These weekly price effects were multiplied by the average weekly sales and then cumulated in to an annual effect. This analysis can be used to determine whether the supermarket link is capable of improving the margin, i.e. turnover minus purchasing costs, as a result of an increased degree of concentration. Table 13 shows the results of this analysis. Additional to the significant values the figures stated in brackets indicate how the amount relates to the total annual turnover of supermarkets at product level in 2008. For a comprehensive presentation of the outcomes reference is made to annex 2.

Tabel 13: Effect of increase of C4 ratio of supermarkets on turnover and purchasing costs of supermarkets

Product	C_4-ratio in 2008	Effect of permanent increase in C_4-ratio on;	
		Turnover increase/decrease of the supermarket in euro per year (percentage relative to total product turnover)	Purchasing costs of supermarket in euro per year (percentage relative to total product turnover)
Potatoes	68,4%	**10.618 (< 0,1%)**	4.413
Apples	75,1%	**-81.339 (0,1%)**	-715
Bread	63,8%	**11.619.210 (2%)**	-2.273.510
Eggs	65,9%	**- 83.264 (< 0,1%)**	41.169
Cucumbers	72,4%	**676.140 (1%)**	22.334
Unsliced Onions	69,3%	77.071	94.030
Bell Peppers	60,9%	-59.890	-42.349
Sliced Onions	75,5%	87.115	**625.395 (7,8%)**

Source: Price data of wholesalers and supermarkets. Statistically significant values are printed in bold.

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[22] The study conducted by LEI also examined the effect of increasing the C4 ratio according to a different criterion, namely a proxy for the Lerner index.

The table above shows that a relatively small increase in the degree of concentration at supermarket level has no significant effect on the purchasing costs of the supermarket for the examined products, with the exception of sliced onions. A possible explanation for the effect on the purchasing costs of sliced onions is that this is the only PVF product that requires distinct processing. The effect on the turnover of supermarkets is statistically significant for the majority of the examined products. For potatoes, apples and eggs, however, the increase or decrease of turnover relative to the total turnover of these products at supermarket level is negligible. Only on bread and cucumbers do supermarkets get a turnover increase as a result of an increased degree of concentration. So if one of the four large supermarket formats sells more bread at the expense of a relatively small supermarket chain, the selling price of bread at supermarket level will increase and supermarkets will thus generate 2% more turnover on average. Based on the above, the conclusion is that the concentration at supermarket level has a limited effect on the purchasing and selling prices of supermarkets.

Conclusion (answers to questions 5 and 6 in the investigation)

5. How are the selling prices in a certain link in the supply chain influenced by the selling prices of other links in the supply chain?

The producer plays an important role in the pricing of the supply chain. Generally speaking, a price shock at producer level leads to a permanent adjustment of the selling price lower in the supply chain. For most of the products in the examined 2005-2008 period, none of the examined links was able to improve its margin permanently by means of its own price increase, because part of the price increase was negated by an increase of the purchasing price. However, producers were able to benefit permanently from their own price increases for eggs, potatoes and unsliced onions. The margins at the wholesaler, on the other hand, could not be improved permanently. In the case of bell peppers and sliced onions, the supermarkets were able to achieve a higher margin permanently.

6. What influence does the increased concentration at supermarket level have on the development of the purchasing and selling prices of supermarkets?

An increase in the C4 ratio at supermarket level has a limited effect on the purchasing and selling prices of supermarkets, with the exception of the purchase of sliced onions. A similar slight effect comes to the fore in the analysis of the effect of asymmetric price adjustment on the turnover of the wholesaler and supermarkets.

F.   Conclusion

This chapter presented the outcomes of the economic analyses of the investigation. It shows that the prices in the agri-food sector increased in the 2005-2008 period, generally speaking. But the development of the margins between the different links in the supply chain exhibits a varying picture. The econometric analysis revealed no indications that a certain link - the supermarket, for example - is able to improve its margins permanently. Finally, the influence of increased concentration at supermarket level and the incentive to use asymmetric price adjustment have a limited and negligible effect, respectively.

V.   CONCLUSION

To obtain a better insight into the functioning of the food supply chain in the Netherlands, the NMa considered it important to investigate the pricing of certain basic foods.

The NMa prioritised the agri-food sector among other things because various links are characterised by a high degree of concentration, numerous mergers and takeovers have occurred in the sector and the NMa has received over the past years various tips, signals and complaints about this sector.

The key questions in this investigation are:
1. How did the selling prices of the different links in the supply chain develop nationally and internationally in the 2005-2008 period?
2. How high are the selling prices in the different links in the supply chain?
3. How high are the margins in the different links in the supply chain?
4. How did the margins of the different links in the supply chain develop in the 2005-2008 period?
5. How are the selling prices in a certain link in the supply chain influenced by the selling prices of other links in the supply chain?
6. What influence does the increased concentration at supermarket level have on the development of the purchasing and selling prices of supermarkets?

To answer the above questions LEI and NMa gathered purchasing and selling prices for vegetables and fruit. LEI gathered the prices at producer level based on its own price statistics. The NMa requested purchasing and selling prices and cost data from cooperatives, wholesalers, the bread/meal industry and supermarket chains. A research agency further supplied sales and turnover information about consumer sales at Dutch supermarkets.

Supermarkets are not dominant in pricing in the agri-food sector
The investigation into pricing revealed no indications that the supermarket is dominant in the supply chain. Firstly, the prices at supermarket level are influenced by prices higher in the supply chain, particularly by prices at producer level. It was found that in respect of most products supermarkets are unable to improve their margin permanently by increasing their prices, because this will be compensated by price increases of wholesalers. The influence of increased concentration at supermarket level generally has a limited effect on the purchasing and selling prices of the supermarket. Finally, the influence of the incentive to use asymmetric price adjustment (i.e. a faster price increase if purchasing prices rise and a slower price decrease if purchasing costs fall) has a negligible effect on the margin of supermarkets.

Consumer price explained by underlying costs
Prices in the supermarket are a multiple of the selling prices at producer level. This is mainly due to the costs incurred by the wholesalers and to a lesser extent by the supermarkets themselves. However, the size of the absolute margin in the different links in the supply chain is highest at supermarket level. In contrast, the distribution of the relative margin exhibits a varied picture. For approximately half the examined products, the supermarket gets the highest relative margin, while for the other products the producers get the highest relative margin. The margin that the wholesalers get on a product is limited generally speaking.

Dutch food prices are increasing, but slower than elsewhere in Europe

Prices at the producer, wholesale and supermarket levels have generally increased sharply over the past four years for the examined products. However, there is a cushioning effect in the sense that the prices of a link lower in the supply chain increased less. An exception is the cucumber supply chain where prices at the wholesaler and supermarket levels increased, whereas the producer prices decreased. In contrast with the generally higher prices in the 2005-2008 period, the development of the margin exhibits a varying picture. For approximately half the examined products, the margins at the producer and supermarket levels increased relative to 2005. For the other examined products, the margins at these levels decreased. Only at wholesaler level have the margins achieved for each of the examined products increased over the past four years.

In relation to the 2005 level, producer prices in the Netherlands in 2008 increased by more than the European average, with the exception of vegetables and wheat. The selling prices of producers of vegetables and eggs in the Netherlands were found to increase faster than elsewhere in Europe, but they also decrease more quickly. Dutch consumer prices have also increased over the past four years. Compared with the European average, however, Dutch consumer prices for food products have risen less than elsewhere in Europe.

BIJLAGE I IMPULSE RESPONSE ANALYSIS OF PRICES

This study gathered price data on a weekly basis at the producer, wholesaler and supermarket.[23] The price data can be interpreted as a time series. The time series can be analysed by means of a Vector Autoregressive (VAR) model and/or a Vector Error Correction (VEC) model. These models are used to analyse systems of dependent time series (for the purposes of this study this means producer, wholesaler and consumer prices) and to examine the dynamic effects of an arbitrary disruption. In this analysis the value of $y_{1,t}$ is explained by its own delayed value(s) and the delayed value(s) of other variables ($y_{2,t}$, y_{3t} and $y_{4,t}$). There is also a check on the existence of a trend or seasonal influences. A precondition is that the time series is stationary (or stationary in the first or higher order).

A general specification of the VAR model is shown below;[24]

$$
\begin{bmatrix} y_{1,t} \\ y_{2,t} \\ y_{3,t} \\ y_{4,t} \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \end{bmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \end{bmatrix} t + \sum_{h=1}^{H} \begin{bmatrix} \beta_{11}^h & \beta_{12}^h & \beta_{13}^h & \beta_{14}^h \\ \beta_{21}^h & \beta_{22}^h & \beta_{23}^h & \beta_{24}^h \\ \beta_{31}^h & \beta_{32}^h & \beta_{33}^h & \beta_{34}^h \\ \beta_{41}^h & \beta_{42}^h & \beta_{43}^h & \beta_{44}^h \end{bmatrix} \begin{bmatrix} y_{1,t-h} \\ y_{2,t-h} \\ y_{3,t-h} \\ y_{4,t-h} \end{bmatrix} + \sum_{s=2}^{52} \begin{bmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \\ \lambda_4 \end{bmatrix} SD_{st} + \begin{bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \\ u_{4t} \end{bmatrix}
$$

In deze specificatie is:

- $\{y_{i,t}\}$ is the value of the variable yi at time t. $\{y_i\}$ can also be defined in first or higher differences; for first difference $\{y_{i,t}\}$ must then be read as $\{\Delta y_i,t\}$;
- α_i is the constant associated with the explanation of $\{y_i\}$;
- δ_i is the coefficient associated with the trend in variable i;
- β^h_{ij} is the influence of variable $\{y_j\}$, h periods ago, on variable $\{y_i\}$;
- SD_s is the seasonal dummy in the week s;
- λ_s the coefficient associated with the seasonal dummy;
- u_i is the disruption term for variable i.

If a time series is non-stationary, it will still be possible for a relationship to exist between two time series. This is sometimes called a co-integrating relationship. If two variables are co-integrated, the residues of an equation in which both variables are regressed against each other taking into account the co-integrated relationship, will be stationary.

Inclusion of this error correction mechanism in the VAR model results in the following specification:

$$
\begin{bmatrix} y_{1,t} \\ y_{2,t} \\ y_{3,t} \\ y_{4,t} \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \end{bmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \end{bmatrix} t + \sum_{h=1}^{H} \begin{bmatrix} \beta_{11}^h & \beta_{12}^h & \beta_{13}^h & \beta_{14}^h \\ \beta_{21}^h & \beta_{22}^h & \beta_{23}^h & \beta_{24}^h \\ \beta_{31}^h & \beta_{32}^h & \beta_{33}^h & \beta_{34}^h \\ \beta_{41}^h & \beta_{42}^h & \beta_{43}^h & \beta_{44}^h \end{bmatrix} \begin{bmatrix} y_{1,t-h} \\ y_{2,t-h} \\ y_{3,t-h} \\ y_{4,t-h} \end{bmatrix} + \begin{bmatrix} \varphi_1 \\ 0 \\ 0 \\ 0 \end{bmatrix} (y_{2,t-1} - \mu - \theta_1 y_{3,t-1}) + \sum_{s=2}^{52} \begin{bmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \\ \lambda_4 \end{bmatrix} SD_{st} + \begin{bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \\ u_{4t} \end{bmatrix}
$$

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[23] In the case of bread this concerns the arable farmer, the meal producer, the industrial baker and the supermarket.

[24] This definition comes from sources including LEI (2004), Prijsprojecties voor de pluimveesector, Cotteleer, G., M. Cornelis and J. Bolhuis, The Hague, 2004, Report 8.04.02.

In deze specificatie is:

- φ_1 is the coefficient associated with the error correction term for the explanation of $\{\Delta y_{1,t}\}$;
- $(y_{2,t-1} - \mu - \theta_1 y_{3,t-1})$ is the error correction term, in which the $\{y_2\}$ is related to $\{y_3\}$.

In the above specification, we have assumed that the error correction term is related only to $\{\Delta y_{1,t}\}$.

Based on the gathered data, the various coefficients were estimated so as to give a good explanation for the underlying price series. These results were then used to make an *impulse - response* analysis. This analysis defines the reaction of $y_{i,t+s}$ to a one-off shock of one unit given to y_{jt}, where all variables at time t and earlier are kept constant. There was an examination of how long and how strongly a shock in one of the prices in the supply chain had an effect on the other prices in the supply chain.

The graphs for the impulse response analysis are shown below for each product. The horizontal axis shows the time period (in weeks). The vertical axis shows the change in the selling price relative to the long-term equilibrium price (baseline) as a result of a one-off unexpected shock. Each figure consists of nine graphs. This is because there are three links and three possible shocks. Reliability intervals (95%) are indicated by the two blue dotted lines. If the baseline falls within the reliability interval, there will be no significant effect.
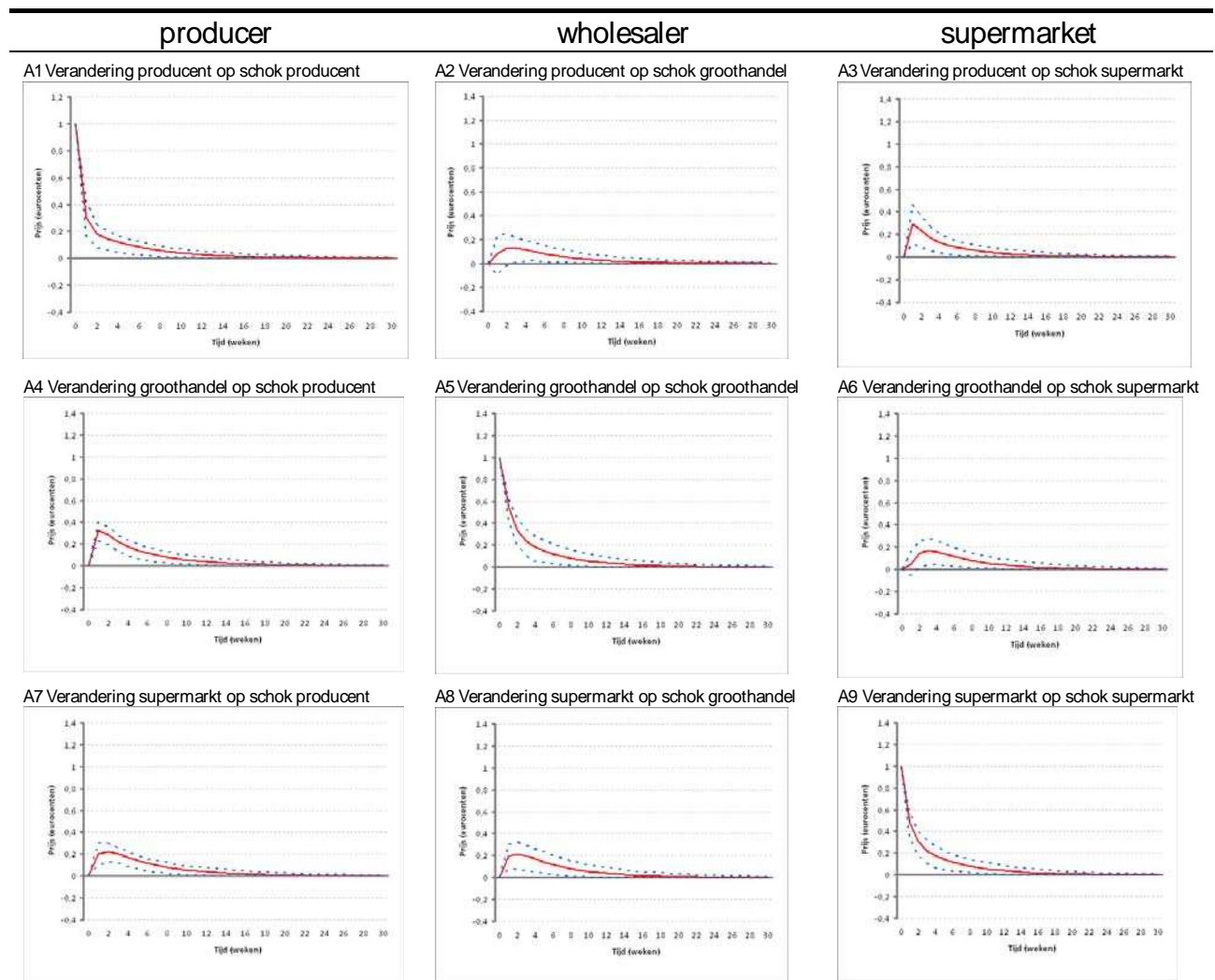
A.   Apples

producer	wholesaler	supermarket

A1 Verandering producent op schok producent

A2 Verandering producent op schok groothandel

A3 Verandering producent op schok supermarkt

A4 Verandering groothandel op schok producent

A5 Verandering groothandel op schok groothandel

A6 Verandering groothandel op schok supermarkt

A7 Verandering supermarkt op schok producent

A8 Verandering supermarkt op schok groothandel

A9 Verandering supermarkt op schok supermarkt

The figure above shows that the selling price of each link responds significantly to its own price shock (figures A1, A5 and A9). This shock has the value of one unit and is given at time t=0. However, the effect of this price shock will have evaporated after a number of weeks. So the parties cannot benefit permanently from a price shock at their own level. It can further be seen that the price shock at producer level leads to a significant, temporary increase in the selling price at wholesaler level and also at supermarket level (figures A4 and A7). The wholesaler and supermarket therefore follow the price development of the producer. They cannot benefit permanently from a price shock at producer level either. As regards a shock at wholesaler level, the producers (figure A2) and the supermarket (figure A8) cannot benefit permanently either. The same applies to the producers (figure A3) and the wholesalers (figure A6) with regard to a price shock at supermarket level. They can benefit hardly at all from such a shock.

B. **Potatoes**

producer	wholesaler	supermarket
B1 Verandering producent op schok producent	B2 Verandering producent op schok groothandel	B3 Verandering producent op schok supermarkt
B4 Verandering groothandel op schok producent	B5 Verandering groothandel op schok groothandel	B6 Verandering groothandel op schok supermarkt
B7 Verandering supermarkt op schok producent	B8 Verandering supermarkt op schok groothandel	B9 Verandering supermarkt op schok supermarkt

The figures above show that the selling price of each link responds to its own price shock (see figures B1, B5 and B9). The effect of such a price shock at supermarket level (figure B9) and wholesaler level (figure B5) will have evaporated after a number of weeks. The effect of this price shock on producers (figure B1) is permanent, however. It can further be seen that a price shock at producer level will lead to a permanent increase in the selling price both at wholesaler level (figure B4) and at supermarket level (figure B7). A price shock at wholesaler level or supermarket level will not lead to a higher selling price at producer level or supermarket level (figures B2 and B8) or at producer level and wholesaler level (figures B3 and B6), respectively.

C. **Bread**

producer	wholesaler	supermarket
C1 Verandering maalderij op schok maalderij	C2 Verandering maalderij op schok broodindustrie	C3 Verandering maalderij op schok supermarkt
C4 Verandering broodindustrie op schok maalderij	C5 Verandering broodindustrie op schok broodindustrie	C6 Verandering broodindustrie op schok supermarkt
C7 Verandering supermarkt op schok maalderij	C8 Verandering supermarkt op schok broodindustrie	C9 Verandering supermarkt op schok supermarkt

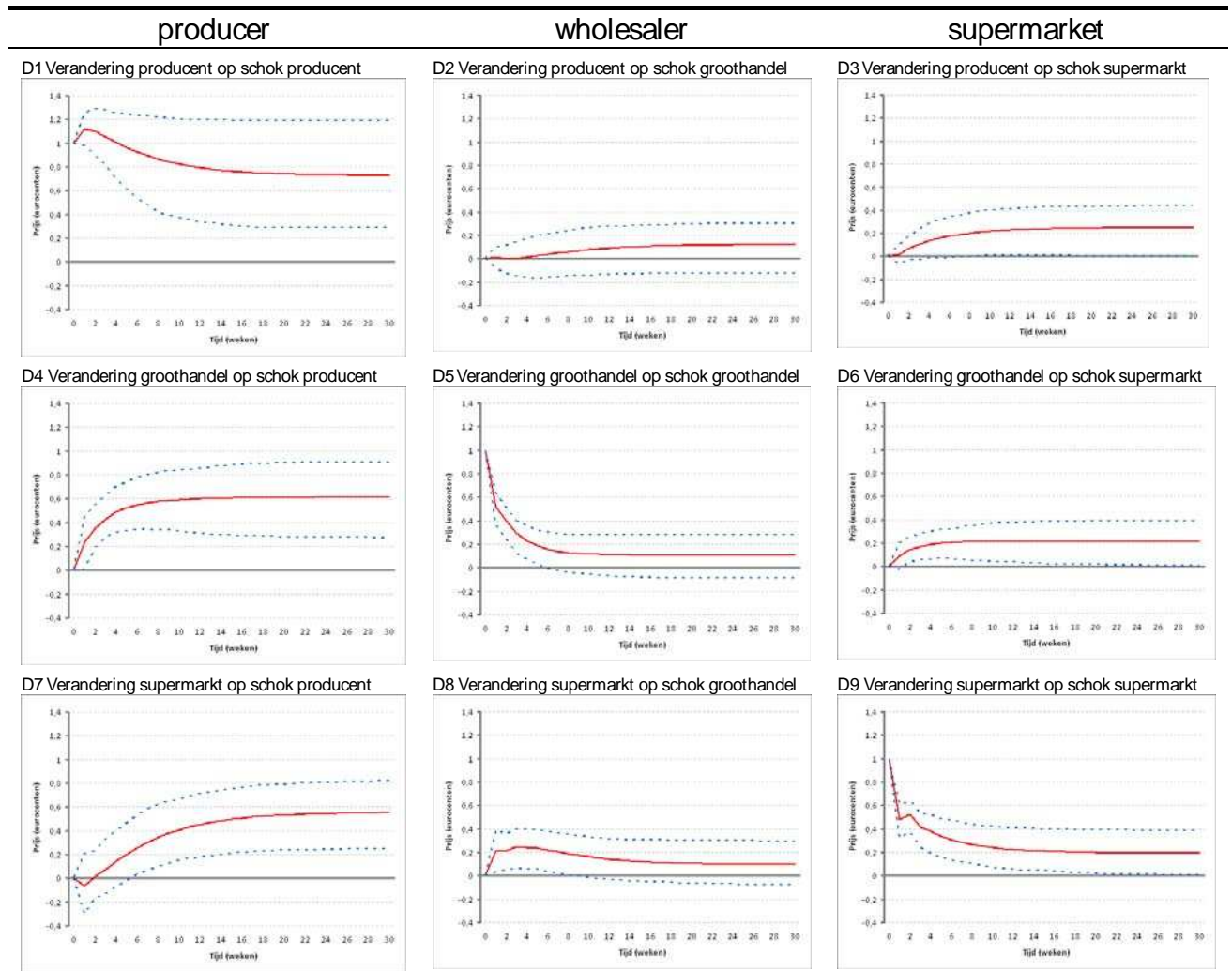In the case of bread, there was an examination of the link consisting of meal producer, bread industry and supermarket. The above figures show that the selling price of each link responds to its own price shock. The effect of such a price shock for the supermarket and the bread industry will have evaporated after two to three weeks (figures C5 and C9). On the other hand, there is a striking permanent effect of this own price shock for the millers (figure C1). This increase is even higher than the original shock. It can further be seen that a price shock of the millers will lead to a permanent increase in the selling price both for the bread industry and for the supermarket. The bread industry link is able to draw maximum benefit from these price increases and passes on the price shock including an extra mark-up (approximately 30%) in their entirety to the supermarket (figure C4). The supermarket does increase the prices permanently, but only partially passes on the increased purchasing costs (approximately 50%) to the consumer (figure C7). This is because the selling price of bread in the supermarket is determined in part by the purchasing price of bread. A price shock of the bread industry will also lead to a temporary increase in the selling price at supermarket level (figure C8). Finally, a price shock at supermarket level will not have any effect on the links higher in the supply chain (figures C3 and C6).
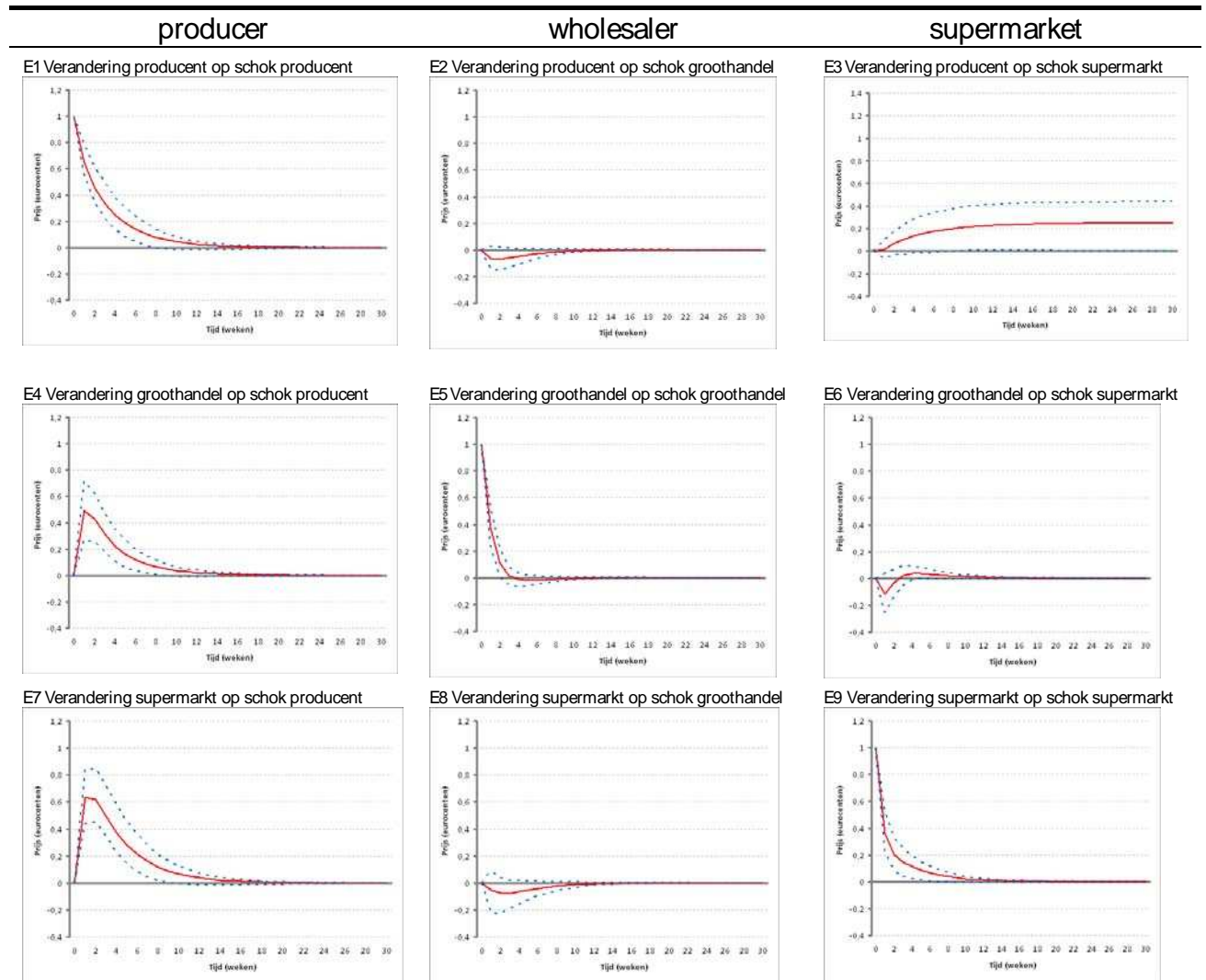
D.   Eggs

producer	wholesaler	supermarket

D1 Verandering producent op schok producent

D2 Verandering producent op schok groothandel

D3 Verandering producent op schok supermarkt

D4 Verandering groothandel op schok producent

D5 Verandering groothandel op schok groothandel

D6 Verandering groothandel op schok supermarkt

D7 Verandering supermarkt op schok producent

D8 Verandering supermarkt op schok groothandel

D9 Verandering supermarkt op schok supermarkt

The figures above show that the selling price of each link responds to its own price shock (see figures D1, D5 and D9). The effect of such a price shock at wholesaler level will have evaporated after a number of weeks (figure D5). But the effect of the link's own price shock at producer level and at supermarket level will be permanent (figures D1 and D9.) It can further be seen that a price shock at producer level will lead to a permanent increase in the selling price both at wholesaler level and at supermarket level (figures D4 and D7). A price shock at wholesaler level will have a temporary effect at supermarket level (figure D8) and will not have any effect at producer level (figure D2). A price shock at supermarket level will lead to a higher selling price both at producer level and at wholesaler level (figures D3 and D6).
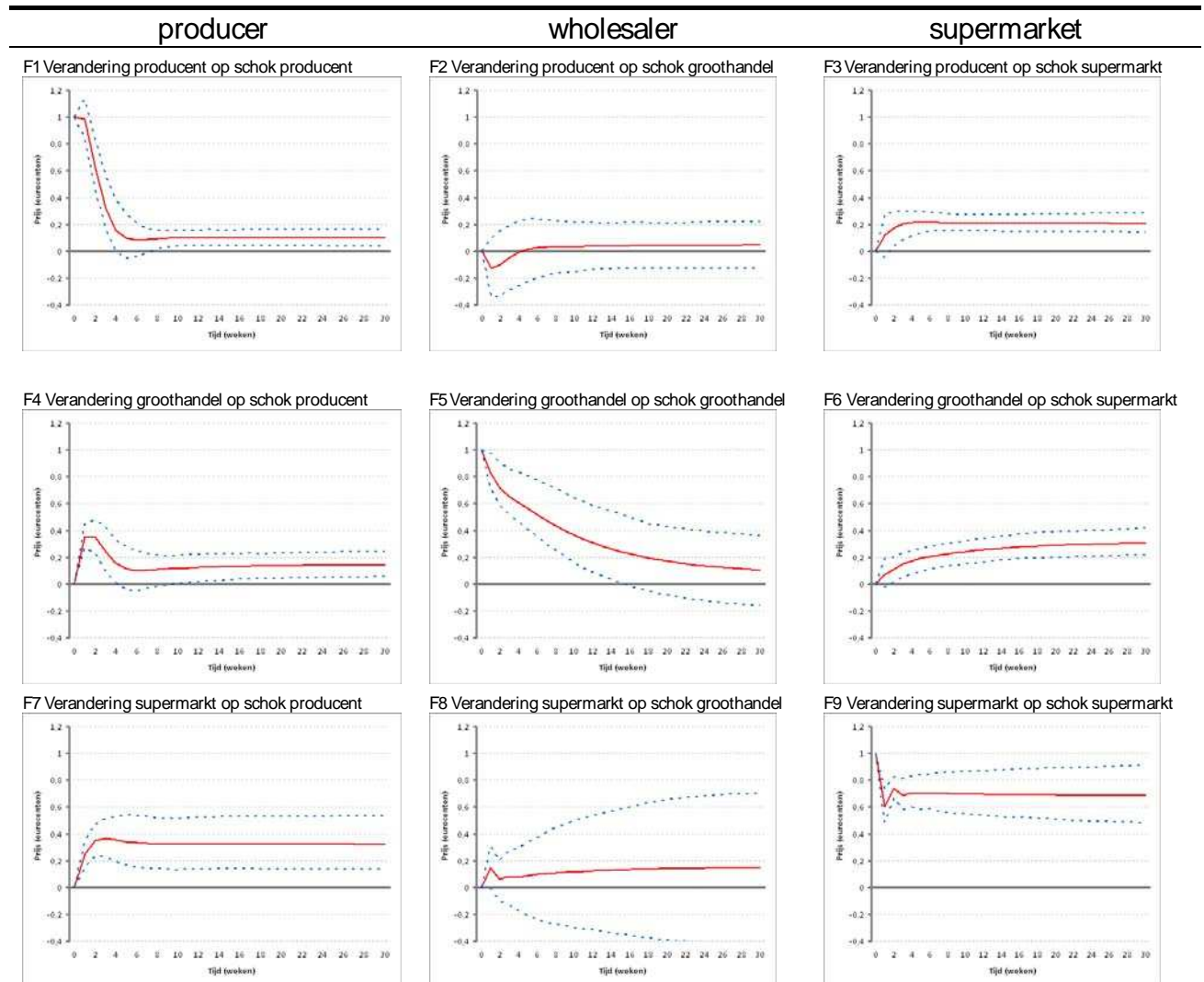
E. Cucumbers

producer	wholesaler	supermarket

E1 Verandering producent op schok producent

E2 Verandering producent op schok groothandel

E3 Verandering producent op schok supermarkt

E4 Verandering groothandel op schok producent

E5 Verandering groothandel op schok groothandel

E6 Verandering groothandel op schok supermarkt

E7 Verandering supermarkt op schok producent

E8 Verandering supermarkt op schok groothandel

E9 Verandering supermarkt op schok supermarkt

The figures above show that the selling price of each link responds significantly to its own price shock (figures E1, E5 and E9). The effect of such a price shock is very temporary, however. It can further be seen that a price shock at producer level will lead to a significant, temporary increase in the selling price both at wholesaler level and at supermarket level (figures E4 and E7). A price shock at wholesaler level and at supermarket level will not have any effect on the other links (figures E2, E3 and E6 and E8).

F.   Bell peppers

producer	wholesaler	supermarket

F1 Verandering producent op schok producent

F2 Verandering producent op schok groothandel

F3 Verandering producent op schok supermarkt

F4 Verandering groothandel op schok producent

F5 Verandering groothandel op schok groothandel

F6 Verandering groothandel op schok supermarkt

F7 Verandering supermarkt op schok producent

F8 Verandering supermarkt op schok groothandel

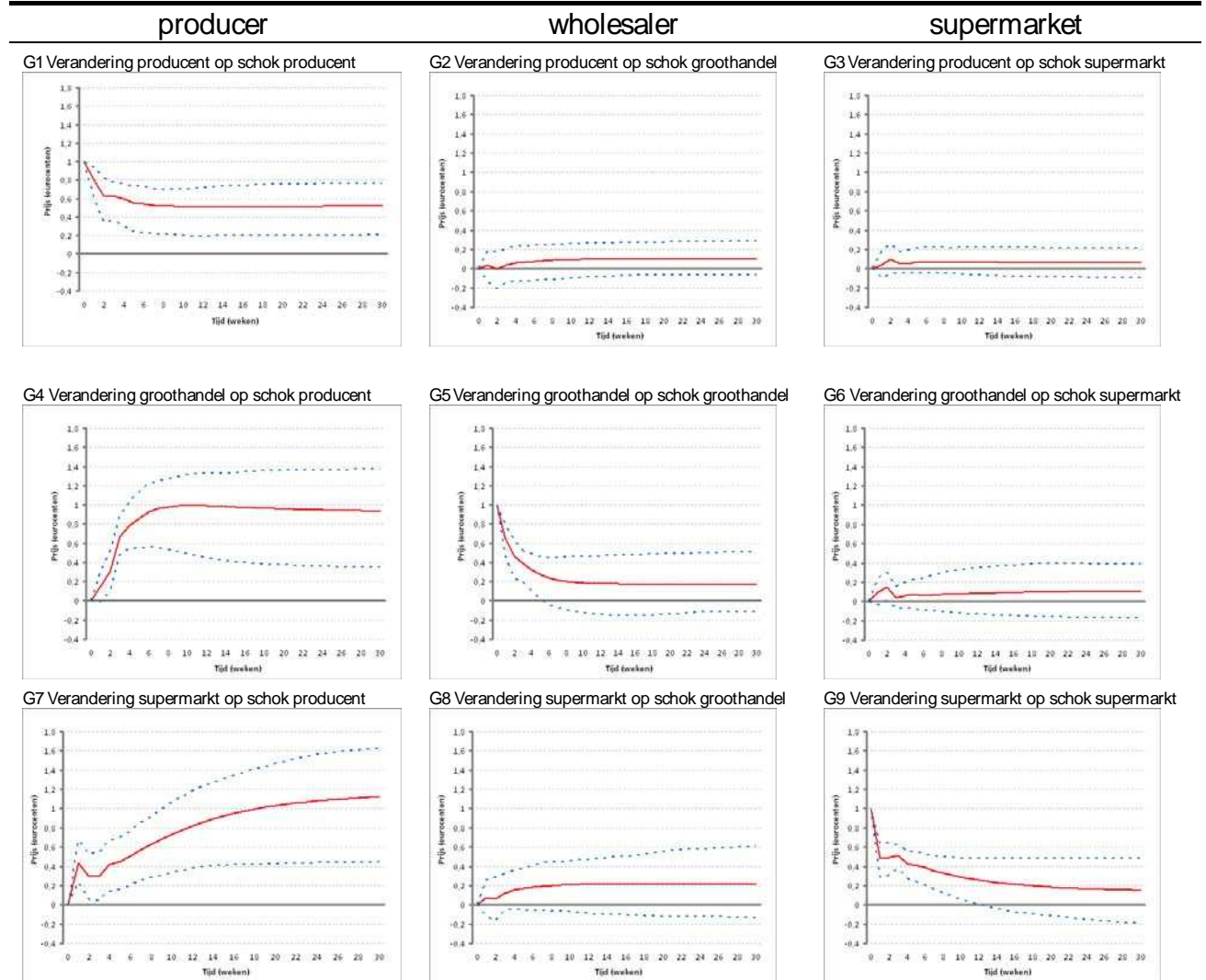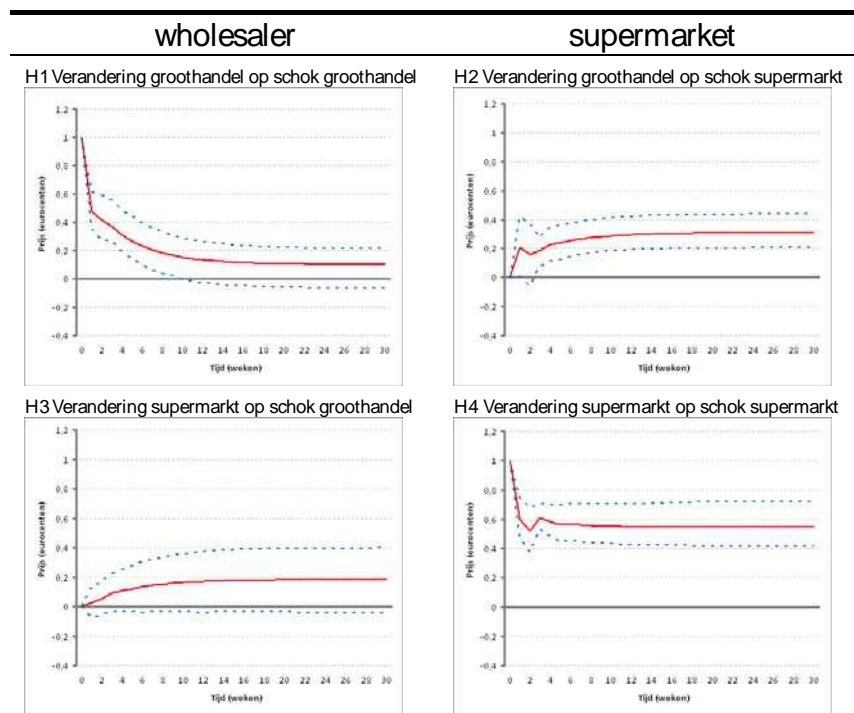F9 Verandering supermarkt op schok supermarkt

The figures above show that the selling price of each link responds significantly to its own price shock (figures F1, F5 and F9). The effect of such a price shock is temporary for the wholesaler (figure F5) but permanent both for the producer and for the supermarket (figures F1 and F9). It can further be seen that a price shock at producer level will lead to a significant increase in the selling price both at wholesaler level and at supermarket level (figures F4 and F7). The price shock at supermarket level will also have a significant effect on the links higher in the supply chain (figures F3 and F6). A shock at wholesaler level will not have any significant effect on the other links in the supply chain (figures F2 and F8).

G.   Unsliced Onions

producer	wholesaler	supermarket

G1 Verandering producent op schok producent

G2 Verandering producent op schok groothandel

G3 Verandering producent op schok supermarkt

G4 Verandering groothandel op schok producent

G5 Verandering groothandel op schok groothandel

G6 Verandering groothandel op schok supermarkt

G7 Verandering supermarkt op schok producent

G8 Verandering supermarkt op schok groothandel

G9 Verandering supermarkt op schok supermarkt

The figure above shows that the selling price of each link responds to its own price shock (figures G1, G5 and G9). The effect of such a price shock at wholesaler level and supermarket level (figures G5 and G9) will have evaporated after a number of weeks. The effect of the link's own price shock at producer level (figure G1) is permanent, however. It can further be seen that a price shock at producer level will lead to a permanent increase in the selling price both for the wholesaler level and for the supermarket level (figures G4 and G 7). A price shock at wholesaler level will not have any significant effect at producer level or at supermarket level (figures G2 and G8). A price shock at supermarket level will have a temporary effect (only in week 2) at wholesaler level (figure G6) and no effect at producer level (figure G3).

H. **Sliced Onions**

wholesaler	supermarket

H1 Verandering groothandel op schok groothandel
H2 Verandering groothandel op schok supermarkt

H3 Verandering supermarkt op schok groothandel
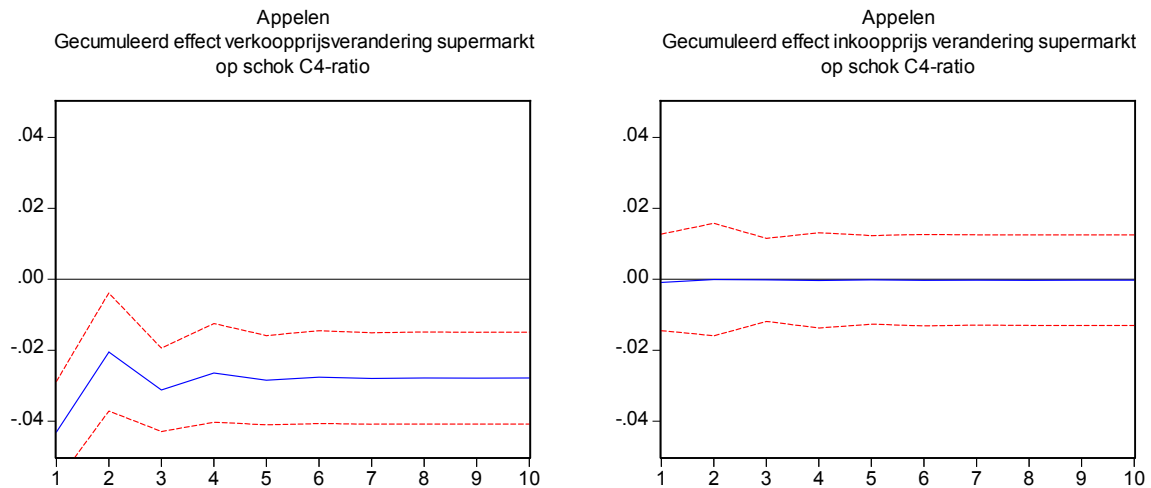H4 Verandering supermarkt op schok supermarkt

In view of the processing operation required at wholesaler level, there was for sliced onions only an examination of the wholesaler and the supermarket. The figures above show that the selling price of each link responds to its own price shock (figures H1 and H4). The effect of such a price shock is permanent at the supermarkets (figure H4) and temporary at the wholesaler (H1). It can further be seen that a price shock at supermarket level will lead to a permanent increase in the selling price at wholesaler level (H2), but that the supermarket price will not respond to a shock at the wholesaler (H3).

BIJLAGE 2 IMPULSE RESPONSE ANALYSIS C4-RATIO

This annex presents the *impulse - response* analyses by way of background to table 13. There are two figures for each product. The figure on the left shows the effect of a shock in the C4 ratio on the selling price at the supermarket. The figure on the right shows the effect of a shock in the C4 ratio on the purchasing price at the supermarket. The horizontal axis shows the time period (in weeks). The vertical axis shows the cumulative change to the price relative to the long-term equilibrium price (baseline) as a result of a one-off, unexpected, positive shock of the C4 ratio.[25] If the blue line stops changing after a time, it means that the price has reverted to the long-term equilibrium price. Reliability intervals (5%) are indicated by two red dotted lines. If the baseline falls within the reliability interval, there will not be any significant effect.
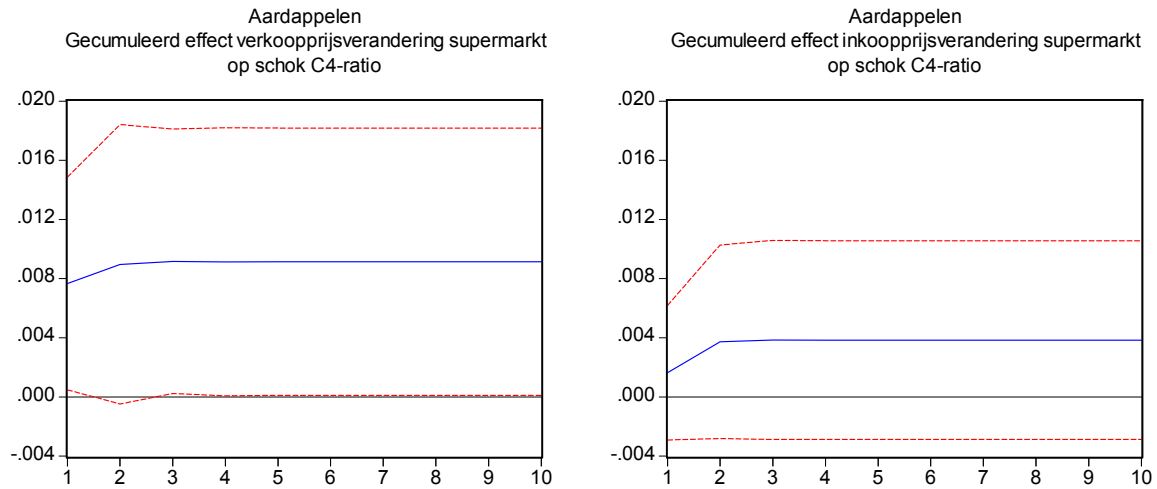
A.   Apples

Appelen
Gecumuleerd effect verkoopprijsverandering supermarkt
op schok C4-ratio

Appelen
Gecumuleerd effect inkoopprijs verandering supermarkt
op schok C4-ratio

The figures above show that a positive shock of the C4 ratio has a significant, negative effect on the selling price at supermarket level and no significant effect on the purchasing price of apples. The effect on the selling price will have evaporated after approximately six weeks. The price will then be back at the old long-term equilibrium price. An increase in the degree of concentration at supermarket level will therefore lead to a lower consumer price for apples. The size of the effect is negligible, however, as can be seen in table 13.
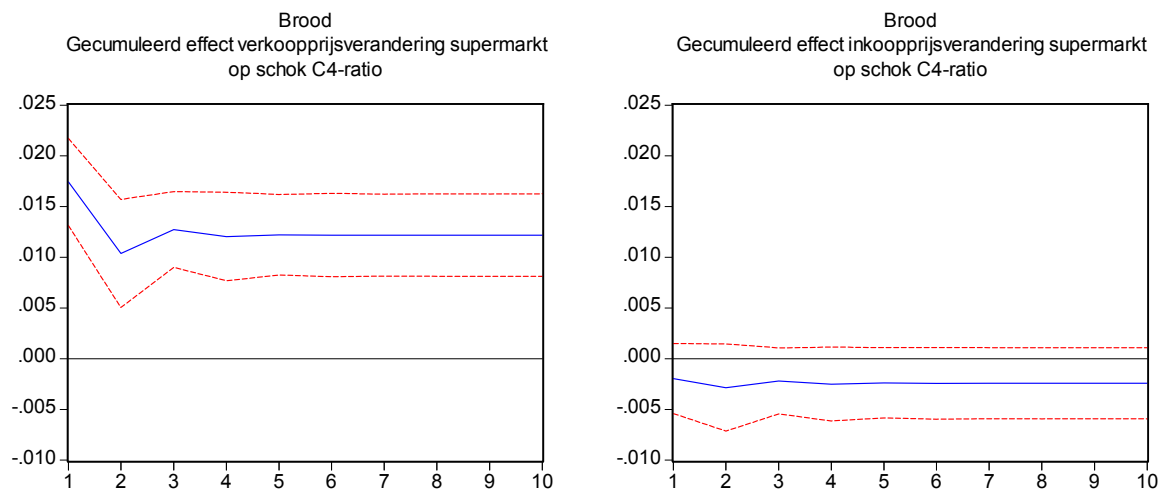
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[25] The price change was calculated based on first differences, i.e. the difference between the price in week x and the price in week x (-1).

B.   **Potatoes**

Aardappelen
Gecumuleerd effect verkoopprijsverandering supermarkt
op schok C4-ratio

Aardappelen
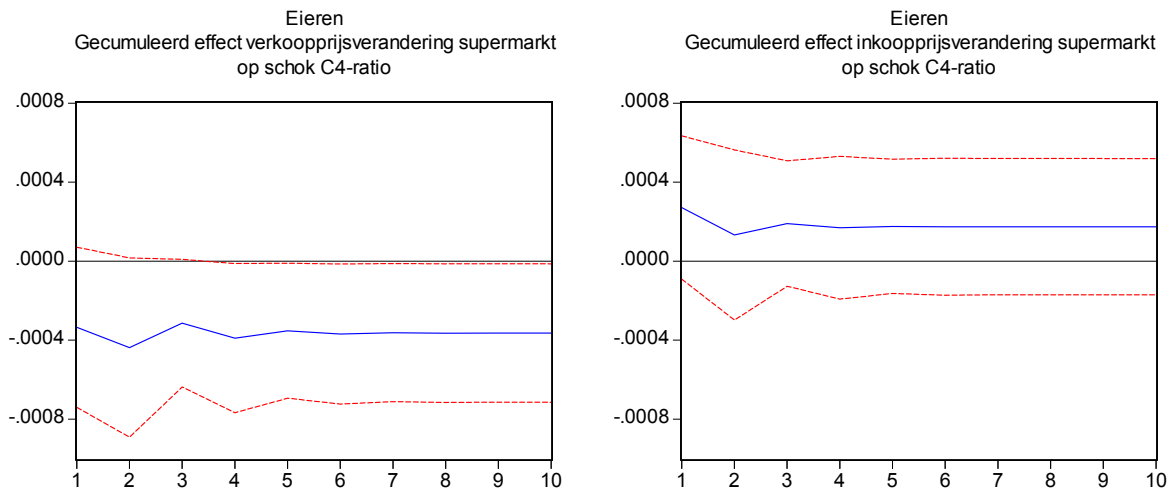Gecumuleerd effect inkoopprijsverandering supermarkt
op schok C4-ratio

The figures above show that a positive shock of the C4 ratio has no significant effect on the purchasing price of potatoes for the supermarket. Cumulatively, a positive shock of the C4 ratio will have a significant, positive effect on the selling price of potatoes at the supermarket. The dotted line at the bottom of the figure on the left is just above the baseline. The effect on the selling price will have evaporated after approximately three weeks. An increase in the degree of concentration at supermarket level will therefore lead to a higher consumer price for potatoes. The size of the effect is negligible, however, as can be seen in table 13.

C.   Bread

Brood
Gecumuleerd effect verkoopprijsverandering supermarkt
op schok C4-ratio

Brood
Gecumuleerd effect inkoopprijsverandering supermarkt
op schok C4-ratio

The figures above show that a positive shock of the C4 ratio has no significant effect on the purchasing price of bread for the supermarket. Cumulatively, a positive shock of the C4 ratio will have a significant, positive effect on the selling price of bread at the supermarket. This effect on the selling price will have evaporated after approximately seven weeks. An increase in the degree of concentration at supermarket level will therefore lead to a higher consumer price for bread. The size of the effect is shown in table 13.
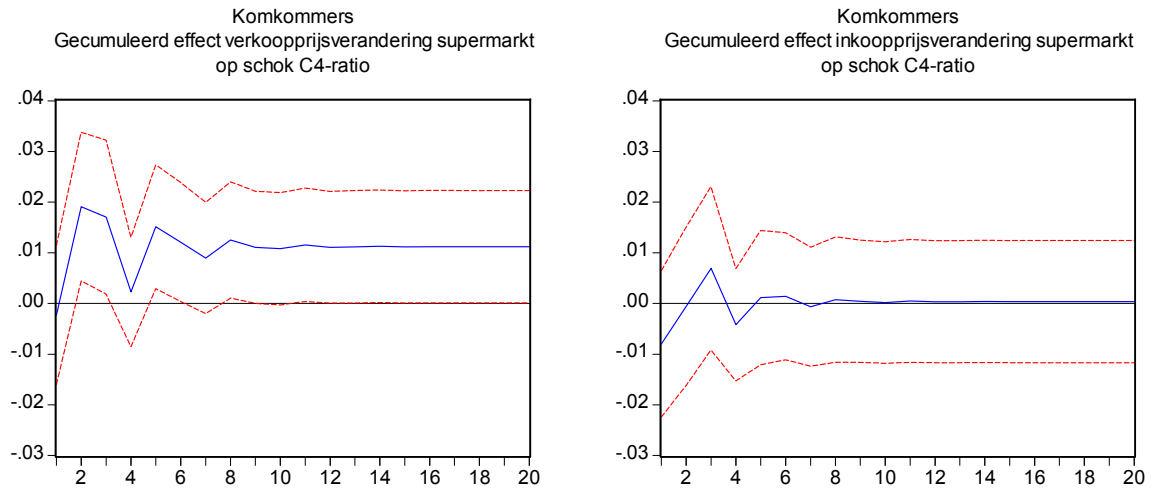
D. **Eggs**

The figures above show that a positive shock of the C4 ratio has no significant effect on the purchasing price of eggs for the supermarket. Cumulatively, a positive shock of the C4 ratio will have a significant, negative effect on the selling price of eggs at the supermarket. The dotted line at the top of the graph on the left is just below the baseline. The effect on the selling price will have evaporated after approximately eight weeks. An increase in the degree of concentration at supermarket level will therefore lead to a higher consumer price for eggs. The size of the effect is negligible, however, as can be seen from table 13.
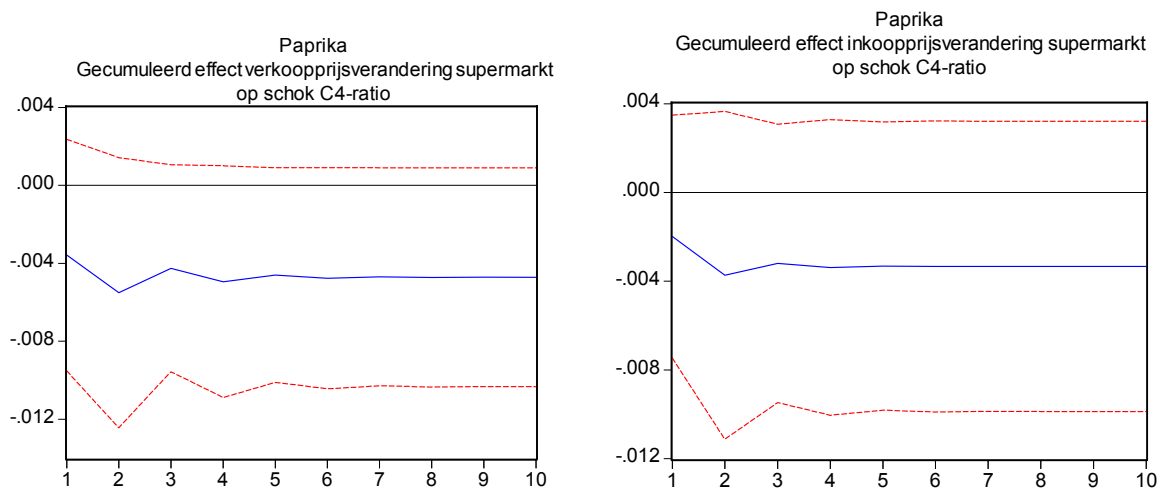
E. **Cucumbers**

Komkommers
Gecumuleerd effect verkoopprijsverandering supermarkt
op schok C4-ratio

Komkommers
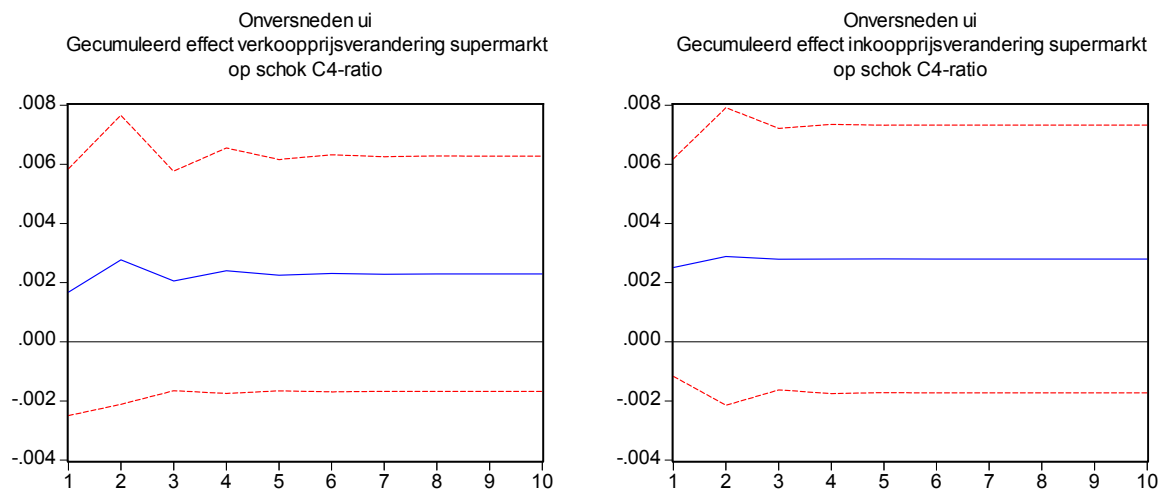Gecumuleerd effect inkoopprijsverandering supermarkt
op schok C4-ratio

The figures above show that a positive shock of the C4 ratio has no significant effect on the purchasing price of cucumbers for the supermarket. Cumulatively, a positive shock of the C4 ratio will have a significant, positive effect on the selling price of cucumbers at the supermarket. The dotted line at the bottom of the graph on the left is just above the baseline. The effect on the selling price will have evaporated after approximately twelve weeks. An increase in the degree of concentration at supermarket level will therefore lead to a higher consumer price for cucumbers. The size of the effect is shown in table 13.

F. **Bell peppers**

Paprika
Gecumuleerd effect verkoopprijsverandering supermarkt
op schok C4-ratio

Paprika
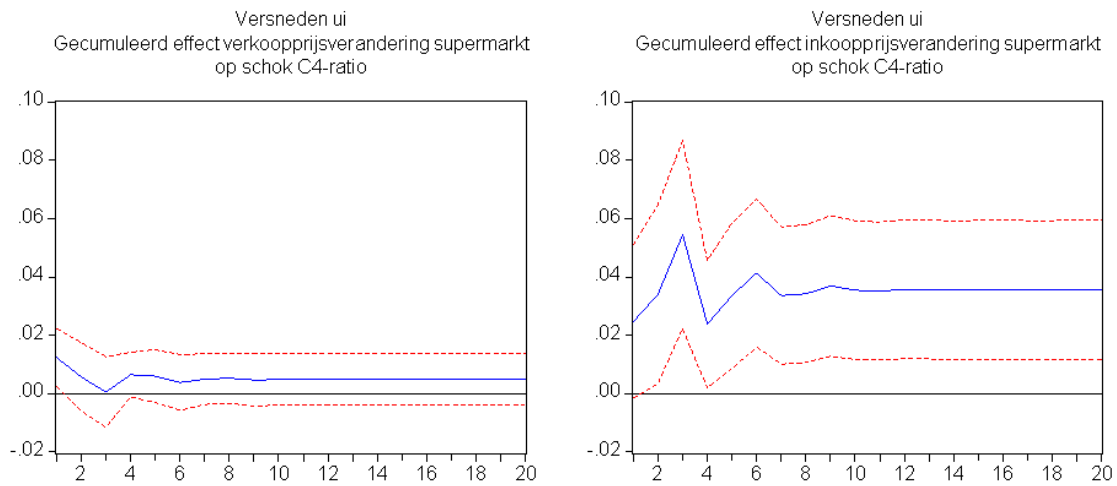Gecumuleerd effect inkoopprijsverandering supermarkt
op schok C4-ratio

The figures above show that a positive shock of the C4 ratio has no significant effect either on the purchasing price or the selling price of bell peppers at the supermarket.

G.   Unsliced Onions

Onversneden ui
Gecumuleerd effect verkoopprijsverandering supermarkt
op schok C4-ratio

Onversneden ui
Gecumuleerd effect inkoopprijsverandering supermarkt
op schok C4-ratio

The figures above show that a positive shock of the C4 ratio has no significant effect on either the purchasing price or the selling price of unsliced onions at the supermarket.

H.   Sliced Onions

Versneden ui
Gecumuleerd effect verkoopprijsverandering supermarkt
op schok C4-ratio

Versneden ui
Gecumuleerd effect inkoopprijsverandering supermarkt
op schok C4-ratio

The figures above show that a positive shock of the C4 ratio has no significant effect on the selling price of sliced onions at the supermarket. Cumulatively, a positive shock of the C4 ratio will have a significant, positive effect on the purchasing price of sliced onions for the supermarket. This effect on the purchasing price will have evaporated after approximately twelve weeks. An increase in the degree of concentration at supermarket level will therefore lead to a higher selling price of sliced onions at wholesaler level. The size of the effect is shown in table 13.

BIJLAGE 3 SPECIFICATION OF COSTS WHOLESALER AND SUPERMARKET

Figure 7 and figure 8 show the cost price structure of the examined products. It should be noted that the costs of the wholesaler and to a lesser extent of the supermarket are relatively high compared with the consumer price. However, it cannot be concluded from these figures which specific costs these are. Based on the information supplied by the interviewed companies, a further breakdown was made of the costs of the wholesaler and supermarket for the examined products.[26] The figures below show this itemisation. The interviewed companies allocated the costs per product to their various activities. A company that cannot allocate certain costs precisely to a specific activity places them under 'overhead and other costs'

Figuur 11: Specification of costs wholesaler (average of the years 2005 through 2008)
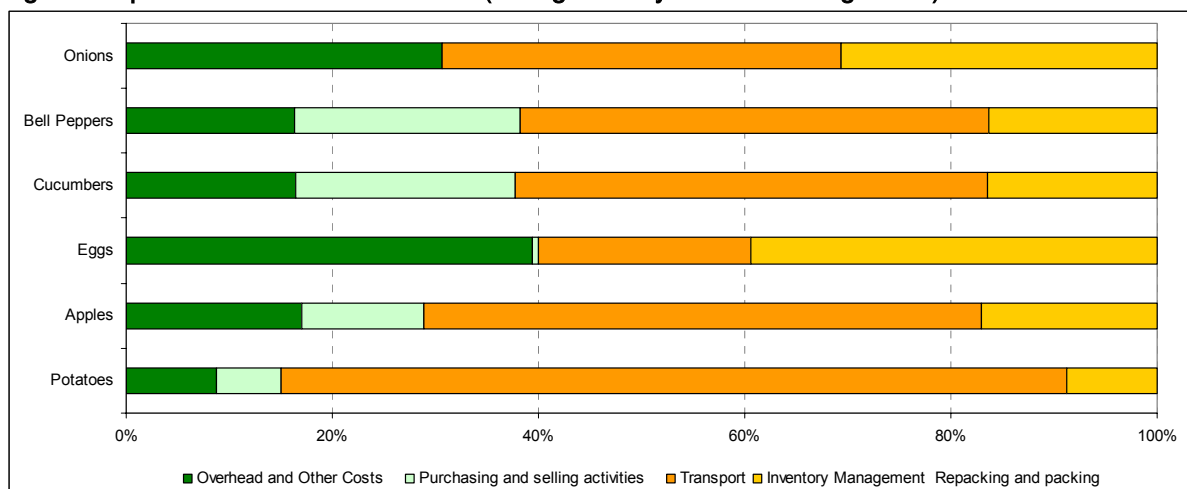
Figuur 12: Specification of costs supermarket (average of the years 2005 through 2008)

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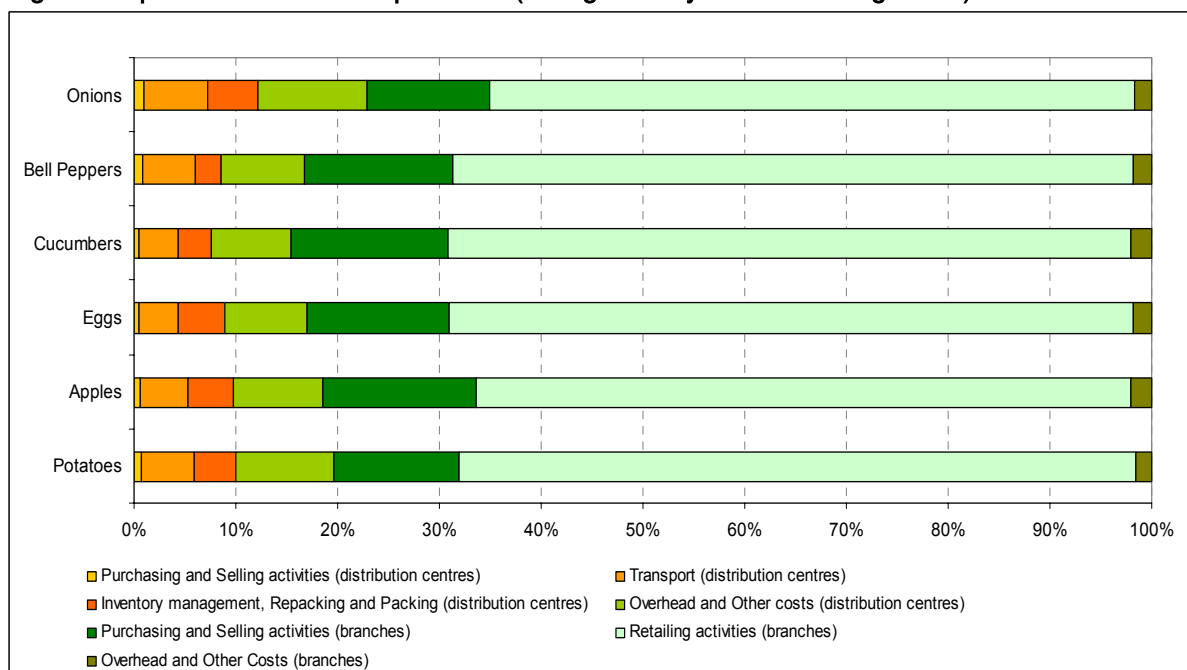
[26] It is not possible to give a more detailed itemisation for bread due to the absence of itemised cost information.

BIJLAGE 4 STRUCTURE OF INVESTIGATION

To make an econometric analysis of pricing in the different links of the supply chain, LEI and NMa gathered purchasing and selling prices for vegetables and fruit. LEI gathered prices at producer level based on its own price statistics. The NMa requested purchasing and selling prices from cooperatives, wholesalers, bread/meal industry and supermarket chains. A research agency additionally supplied sales and turnover information about consumer sales at Dutch supermarkets. On this basis the consumer prices at supermarket level were determined. Table 34 contains an overview of the number of companies from which the NMa gathered purchasing and selling figures. Based on the obtained price data, weighted average weekly prices were calculated for the different links of the supply chains concerned.

Tabel 14: Number of companies that provided purchasing and selling figures

Products	Number of interviewed companies
Bread	7
Potatoes	8
Onions (sliced and unsliced)	5
Cucumbers	10
Bell Peppers	9
Apples	6
Eggs	5

The NMa additionally asked 19 companies to provide, insofar as relevant, the revenues, direct costs and indirect costs for the eight examined products. These companies largely overlapped with the companies that were asked to provide price data. LEI additionally gathered costs and margin information at producer level based on its own statistics.