Pricing in the greenhouse horticulture sector

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Preface

At the beginning of 1996, Frank Koldijk announced the end of the auction clock in an article published in the ESB (ESB, 1 January 1996). Currently, the auction clock no longer plays a significant role in the marketing of fresh vegetables in the Netherlands. From 1996 onwards, the cooperative auction organisations transformed themselves into cooperative trading houses and, *en passant*, lost 50% of their joint market share. The market share the cooperative trading houses lost has been taken over by commercial trading companies, as well as by dozens of new producer organisations primarily organised around one product.

The reorganisation of the distribution of fresh vegetables was implemented due to the pressure imposed by the increasingly larger supermarket chains. Reports from the market and popular media suggest that the prices received by the greenhouse horticulture sector have come under pressure due to the concentration of retail chains and changes in pricing mechanisms. This memorandum reviews whether these reports are correct. The memorandum is based on a brief literature and data study pursuant to a concise request from the ministry of Agriculture, Nature and Food Quality (LNV).

The memorandum was written by Frank Bunte. The study was carried out with support from Youri Dijkxhoorn, Gerben Jukema and Erno Kuiper. Florpartners and ZMP supplied price data. The study was supervised by Maarten Kool, André Nieuwenhuijse, Jan Water (LNV), Cor Hendriks (RABO), Thijs Jasperse (Florpartners) and Nico de Groot (LEI).

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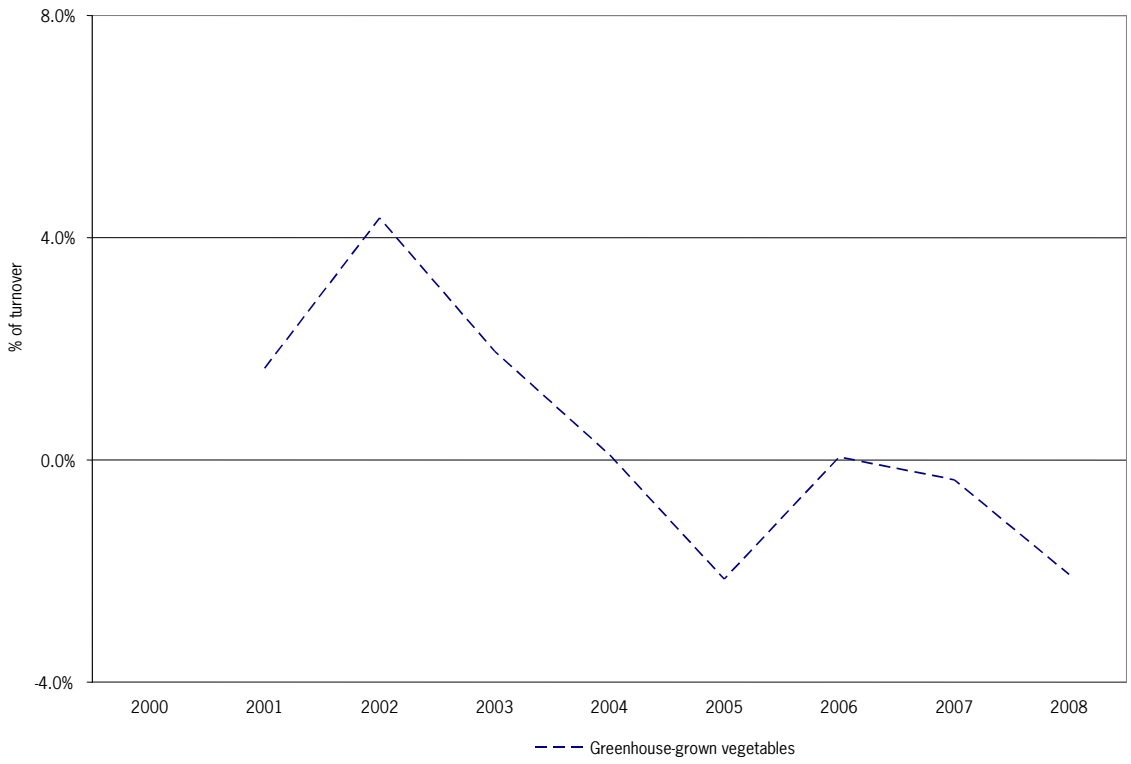
1 Introduction

Incomes in the greenhouse vegetable cultivation sector are under pressure (Figure 1.1), among other things due to the increasing gas prices in the past years. However, incomes in the greenhouse vegetable cultivation sector have been under pressure for a much longer time - since 2002 - and this gives cause to the question as to whether this pressure has structural reasons. In recent months, the popular media has referred to the growers' bargaining position as the reason for the pressure on prices (*Consumentengids*: November 2008). These reports propose that the Dutch growers and growers associations have a weak bargaining position relative to the retail chains. This memorandum presents a study carried out against this background of the movements in the greenhouse vegetable chain's pricing during the past twenty years. The study pivots on the question: how have the prices and margins developed during the past years, and is it possible to identify explanations for these movements?

Figure 1.1 **Net profit of the greenhouse vegetable cultivation sector a)**



a) The net profit is determined on the basis of a three-year moving average.
Source: LEI.

We do so as follows. We begin with a brief description of the Dutch greenhouse vegetable chain and then outline the changes in the retail chain's purchasing practices. This is followed by a systematic analysis of changes in the market structure, price institutions and, in conclusion, the prices and margins.

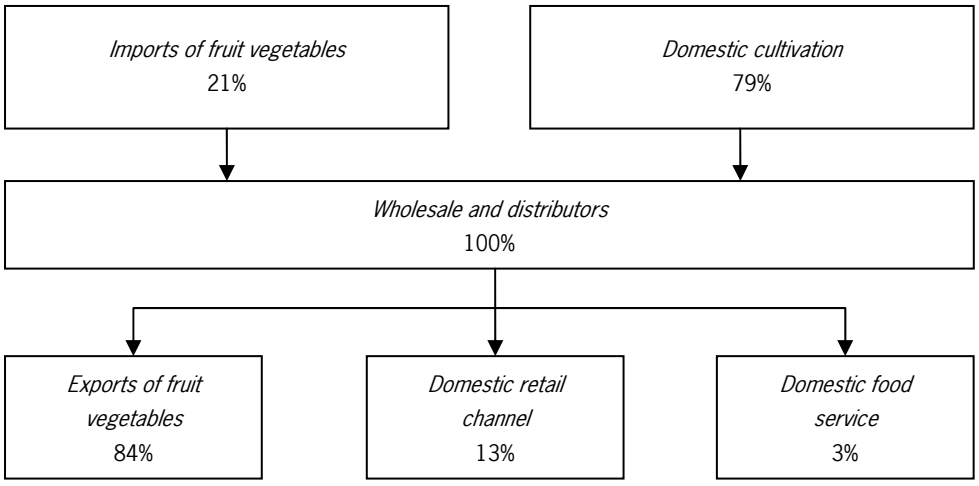
2 The Dutch fruit vegetable chain

The greenhouse vegetable cultivation sector is an important element of the total Dutch fruit and vegetable horticulture sector (Figure 2.1): almost 1,900 holdings are active in the production of greenhouse vegetables. The area allocated to the cultivation of greenhouse vegetables is 4,570ha, equivalent to a production value of €1.3 thousand million. The major greenhouse vegetables are fruit vegetables, namely tomatoes, sweet peppers and cucumbers followed, at a distance, by courgettes and aubergines. The Dutch greenhouse vegetable cultivation sector is relatively large and export-oriented, since the country's two major neighbours and markets, Germany and the UK, have a limited greenhouse vegetable output. During the period from 2000 to 2008, the area allocated to the cultivation of tomatoes increased by more than 30%, whilst in this same period the area devoted to cucumbers declined by 7% (Table 2.1). The area allocated to the cultivation of sweet peppers increased slightly from 2000 onwards before declining again slightly from 2005.

Imports of fruit vegetables are limited and amount to just 20% of the domestic supplies, i.e. the total of imports and domestic production. Imports are focused on re-export, and amount to one-fifth of the domestic supplies, i.e. the total of production and imports. The large majority of domestic production is destined for export (84%): the remainder is, in particular, marketed through the retail channel (13%). The supermarkets are the most important distribution channel in the retail sector.

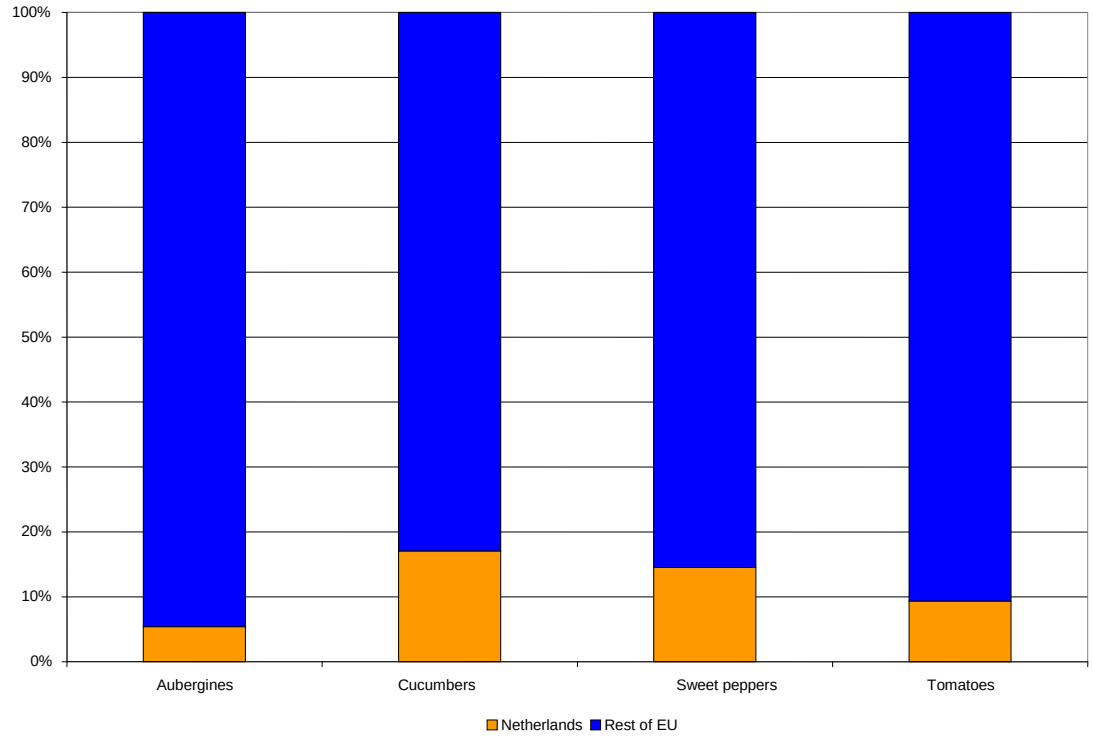
The EU is the market of relevance to fruit vegetables, in particular the EU15. Competition takes place at a European level. The Netherlands' market share of European production is limited to at most 17% for cucumbers (Figure 2.2), and is lower for all other major crops. However, the Netherlands has a larger market share in the summer months, since the output of producing countries such as Spain is low in the summer.

Figure 2.1 **The Dutch greenhouse vegetable chain (2007)**



Source: FAO.

Figure 2.2 The Netherlands' market share in the EU27 (2005, on the basis of production in tonnes)



Source: FAO.

Table 2.1 Movements in the greenhouse horticulture sector's acreage (2000-2008)

	Hectares in 2000	Hectares in 2008	% Change
Cucumbers	663	622	-7
Sweet Peppers	1,155	1,184	3
Tomatoes	1,134	1,485	31

Source: Statistics Netherlands (CBS).

3 Changes in the retail chains' purchasing policy

3.1 Concentration of retail chains

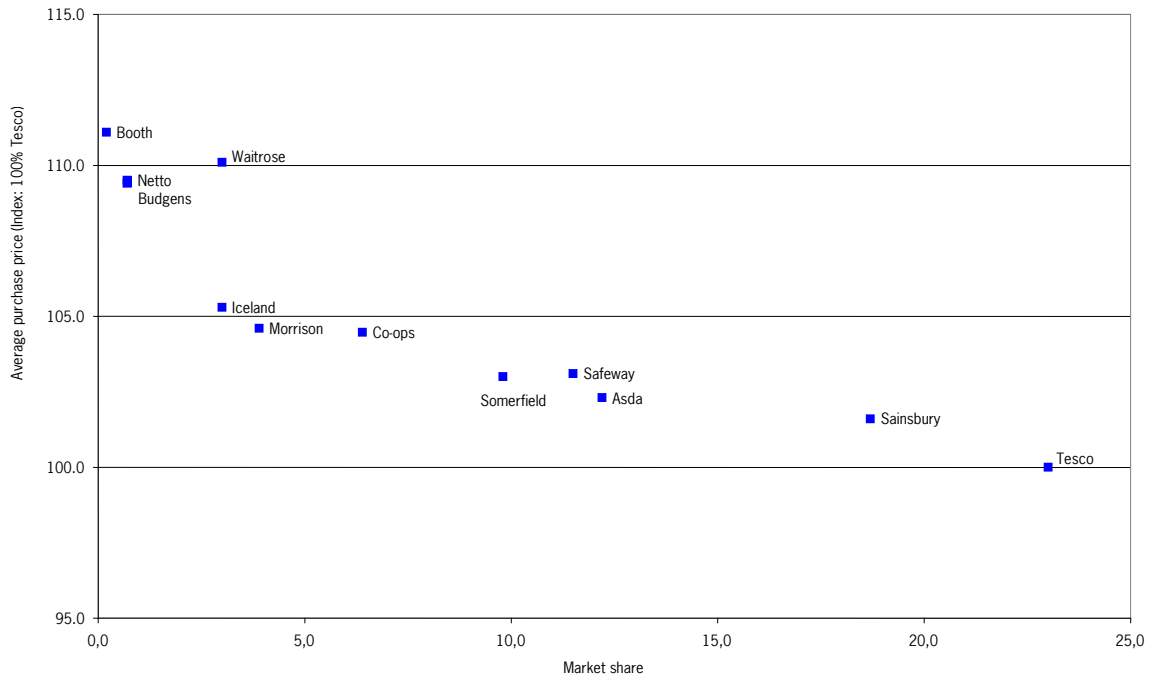
The pressure on the greenhouse vegetable cultivation sector's prices and income development is being imposed against the background of a revolution in the distribution of greenhouse vegetables. Over the course of the past twenty years, the distribution of Dutch greenhouse vegetables became concentrated in the hands of a limited number of retail chains in the Netherlands, Germany and the UK. During this same period, the significance of alternative distribution channels has decreased rapidly: by 2005, the alternative distribution channels had a joint market share of just 24%, including 9% held by greengrocers and 9% by the market (EIM, 2007).[1] During the period from 1994 to 2005, the number of greengrocers more than halved from more than 3,000 to fewer than 1,400 (EIM, 2007; PT, 2005). Turnover generated by greengrocers decreased by 30% in the period from 2000 to 2005 (EIM, 2007).

The concentration of retail chains has been detrimental to the relationship between supermarkets and their suppliers: the suppliers have become more dependent on retail chains than vice versa. This is evident from a study carried out by the UK Competition Commission which, although it dates from 2000, yielded results that are unique to an extent such that a reference to this study is appropriate (UK Competition Commission, 2000). Although the top five British supermarket companies account for a large share of the individual suppliers' sales, the top five suppliers account for a relatively small share of the individual supermarket companies' purchases: the top five supermarket companies' account for at least 70% and on average 86% of the sales of even the major suppliers. Conversely, Tesco's largest supplier has a share of just 2.7% of Tesco's purchases and no more than 230 suppliers (of a total of 2,600) have a share in excess of 0.1% (UK Competition Commission, 2000, p. 390). There is no reason to presume that the UK's market structure has changed to the benefit of the supermarket chain's suppliers in the years since 2000: for example, Tesco's market share has only increased in this period.

The market size of the supermarket chains has a major influence on the purchasing price they are able to negotiate, as is also evident from the study carried out by the UK Competition Commission. Large supermarket chains are able to negotiate substantially lower purchasing prices than smaller supermarket chains. Tesco's average purchasing price is 3.8% lower than the average in the British market: Tesco's largest competitors pay 1.5-3.0% more, medium-sized competitors' 5% more and smallest competitors' 10% more (Figure 3.1). Tesco can, as it were, generate its profit margin from its purchasing advantage (see continuation). This difference in purchasing price can be due to market power, but can also be a manifestation of cost advantages: larger purchases may yield scale advantages (cost advantages).

[1] Different sources issue different estimates. Sources that base their figures on consumer expenditure arrive at higher shares for the supermarkets (GfK: 80%). Sources that base their figures on turnover arrive at lower shares for the supermarkets (GfK: 76%). This is primarily due to the purchasing practices of small catering establishments, which source their produce from greengrocers.

Figure 3.1 **Purchasing price as a function of the British supermarkets' market share**



Source: UK Competition Commission.

3.2 Efficiency

This concentration has been accompanied by a major improvement in the efficiency of the food distribution chain. The supermarkets' product range has also increased steadily (OECD, 2006): in the vegetable and fruit segment, the number of tomato varieties available on the market - and in individual supermarkets - is exemplary.

All major European supermarket organisations have followed Wal-Mart's example and centralised their procurement operations in distribution centres (DCs), whereby the DCs serve as a turntable and have enabled the supermarket organisations to optimise their supplies. As such, the DCs are a manifestation of reverse vertical integration, and the role of the traditional wholesalers has gradually been transformed into that of a logistics services provider: the Albert Heijn - Bakker Barendrecht - Hartman et al. chain is a striking example of this development. The suppliers deliver their produce to the DCs and the supermarket organisations supply the individual supermarkets from the DCs. The chain has been shortened in two areas:

- certain operations have been cut out: the number of journeys between the grower and DC links in the chain has been reduced. Fresh vegetables and fruit are no longer transported to the auctions, and it is estimated that one quarter of the growers' associations now (2008) deliver their produce directly to the DCs;
- the reduction of the number of operations has been accompanied by a reduction of the number of links in the chain.

The reduction of the number of links in the chain has, in particular, been to the detriment of the wholesale and distribution sectors. The DCs have played an important role in the reduction of the purchasing and logistics costs incurred by the total chain, especially by the retail chains (OECD, 2006). Stocks are diminishing, or are held by the suppliers. Purchases are planned and delivery times are reduced (Just-In-Time deliveries and Efficient Consumer Response). At the same time the number of deliveries to supermarkets has increased. The increases in scale, the implementation of ICT and changes in logistics management have all played a major role in the achievement of cost savings (European Commission, 1997, p. 12). The reorganisation of deliveries has compelled suppliers to tackle inefficiencies in the supply chain.

The rationalisation of the supplies to retail chains is in part due to improvements in the harmonisation of the chain. The management literature and economic theory emphasise that two factors play a role in the harmonisation of the chain, namely the creation of added value and the distribution of this added value. Although the harmonisation of chains promotes the creation of added value, this does not automatically imply a balanced distribution of the added value it has created. In practice, the distribution is probably determined by the negotiation position of the market parties (Tirole, 1988). When retail chains possess substantial market power, their suppliers receive remuneration that enables them to implement efficiency improvements and just keep their heads above water. Chain harmonisation is desirable since it creates added value, but it does not imply an equal distribution of the resultant profit.

These developments have been accompanied by major institutional changes in deliveries to the supermarkets. The auction clocks have disappeared and the former cooperative auction organisations have transformed themselves into trading companies - and have lost 50% of the market share they possessed at the end of the 1990s. This memorandum continues with a more detailed review of changes in the market structure, price institutions and, in conclusion, the prices and margins.

4 Market structure

The consolidation in the entire chain is continuing at an unabated pace: the number of companies is decreasing and the market share of the major companies is increasing steadily. The concentration in a market is usually assessed on the basis of the market share of the top four companies (C_4) or by the Hirschmann Herfindahl Index (HHI) (see Bunte et al., 2003). A joint market share of the top four of 60% or more is indicative of powerful concentration.

Greenhouse horticulture

The horticulture sector is exhibiting consolidation accompanied, conversely, by differentiation and fragmentation. The number of holdings is decreasing steadily and the largest holdings are acquiring an increasingly greater weight in the market (Table 4.1). The number of greenhouse vegetable holdings decreased by more than two-thirds during the period from 1980 to 2005, with the exception of the number of holdings cultivating sweet peppers. The latter is due to the increase in production. Concentration in the greenhouse horticulture sector is limited: the C_4 is a maximum of 6.5%. However, when increasing product differentiation is taken into account, the degree of concentration is actually substantially higher: tomatoes long ago ceased being merely tomatoes. In 2003, the top four producers of cherry tomatoes had already acquired a joint market share of 48%.

Concentration in the horticulture sector is also evident at the level of the growers' associations (Table 4.2). A continually increasing number of growers are organising themselves in a continually increasing number of growers' associations. The number of growers' associations continues to increase, in particular in segments cultivating crops other than tomatoes. Conversely, the market share of the four largest growers' associations is also increasing.

Table 4.1 Concentration in greenhouse vegetable cultivation

Product	Number of producers a)		C_4	
	1980	2005	1980	2003
Cucumbers	1,133	399	2.9	6.1
Sweet Peppers	381	544	7.7	4.4
Tomatoes	2,955	531	1.1	6.5
- Tomatoes on the vine	not known	275	not known	7.9
- Slicing tomatoes	not known	218	not known	13.2
- Beef tomatoes	not known	-	not known	22.8
- Cherry tomatoes	not known	38	not known	48.3
All holdings	7,862	2,547	not known	not known

a) Number of producers; Market share of the top four (C_4).
Source: LEI and Bunte (2006).

Table 4.2a Tomato growers' associations

	2004	2008
Growers' association with brands	19	19
Number of members	404	443
Market share of the largest four on the basis of acreage	46	52
Market share of the largest four on the basis of the number of members	56	58

Source: Groente en Fruit 2004 and 2008.

Table 4.2b	Other growers' associations	
	2004	2008
Growers' association with brands	24	28
Number of members	598	814
Market share of the largest four on the basis of acreage	35	49
Market share of the largest four on the basis of the number of members	43	47

Source: Groente en Fruit 2004 and 2008.

Box 4.1 Fresh vegetable and fruit brands

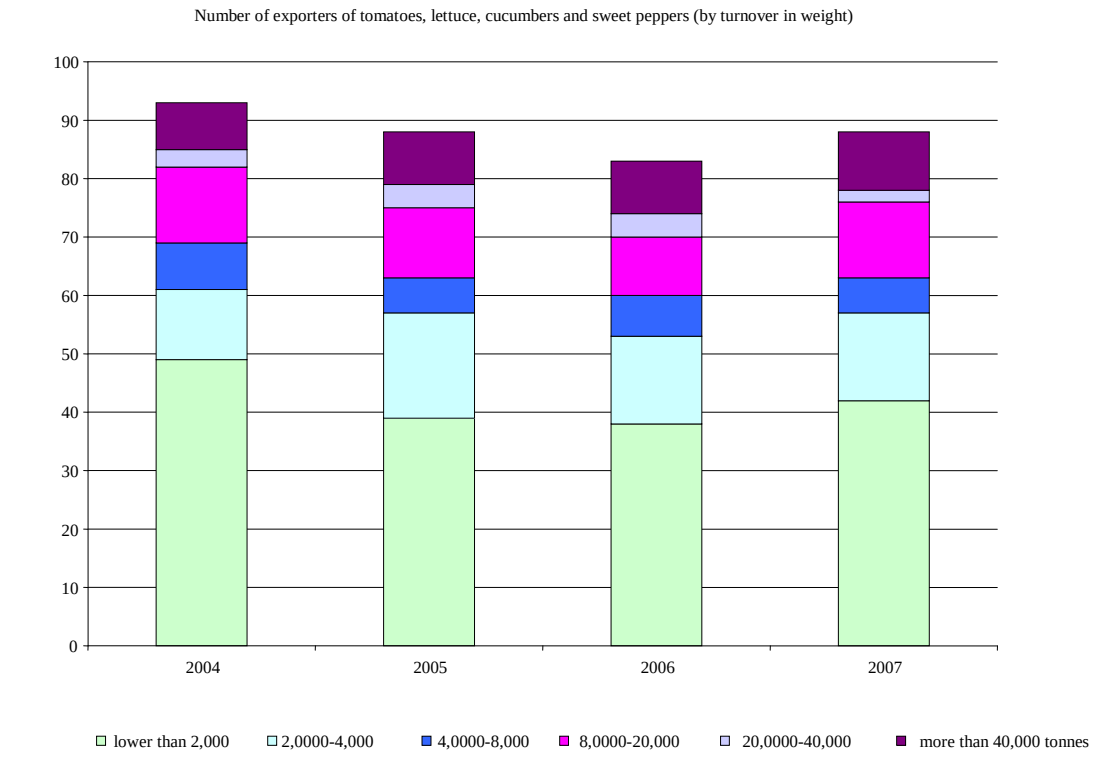
Fresh vegetables and fruit are usually marketed as generic products: there are no equivalents to Douwe Egberts and Campina for fresh vegetables and fruit. However, the Dutch horticulture sector has developed a number of brands during the past decade such as Tasty Tom, Les Meilleurs (strawberries), Salanova (lettuce, owned by Rijk Zwaan), Tinkerbell (sweet peppers, owned by Eminent) and Koppert Cress. Few vegetable or fruit brands have acquired brand awareness amongst consumers: at most five of the 60 to 70 brands are known to consumers, with Tasty Tom as the best-known exception. The development of a brand name for consumers is extremely expensive. Most brands enable growers and growers' associations to distinguish themselves from their competitors in the chain - which is not unimportant, since a brand, in analogy with a label, represents a certain quality for the direct customers. This development is comparable to the sale of cut-flowers by name, since cut-flower growers can use their name to acquire a reputation amongst their customers as a supplier of, for example, long-life flowers. Growers can develop B2B brands, but can also develop a brand in collaboration with retail chains or other parties.

Source: Riezebos and Zimmermann (2005).

Wholesalers

The following figure shows the number of Dutch exporters of cucumbers, sweet peppers, tomatoes and head lettuce. The number of exporters decreased from 93 in 2004 to 88 in 2007. Ten exporters accounted for 71% of the exports in 2007. There are still a large number of small exporters.

Figure 4.1 Number of greenhouse vegetable exporters by size category

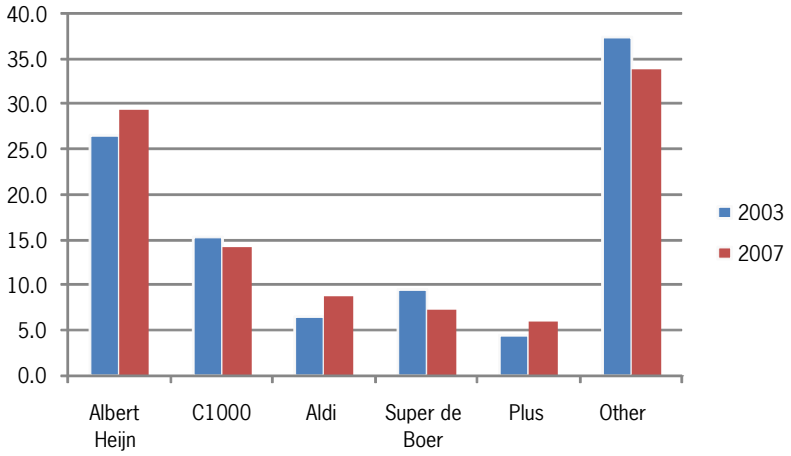


Source: Frugiventa (2008).

Retail chains

The following figures show the market share of the five largest supermarket chains in the Netherlands and a number of other European countries. These reveal that concentration in the supermarket chain is increasing steadily. The five largest supermarket chains had a market share of 63% in 2003 and 66% in 2007. In addition, many supermarket chains participate in purchasing consortia to procure their supplies, in some instances in cross-border consortia. The three largest Dutch purchasing combinations have a market share of 73% (Albert Heijn, Superunie and TSN). We expect further consolidation in the coming years. During recent years, the full-service supermarkets and discounters have succeeded in enhancing their position, to the detriment of supermarkets with a less pronounced profile.

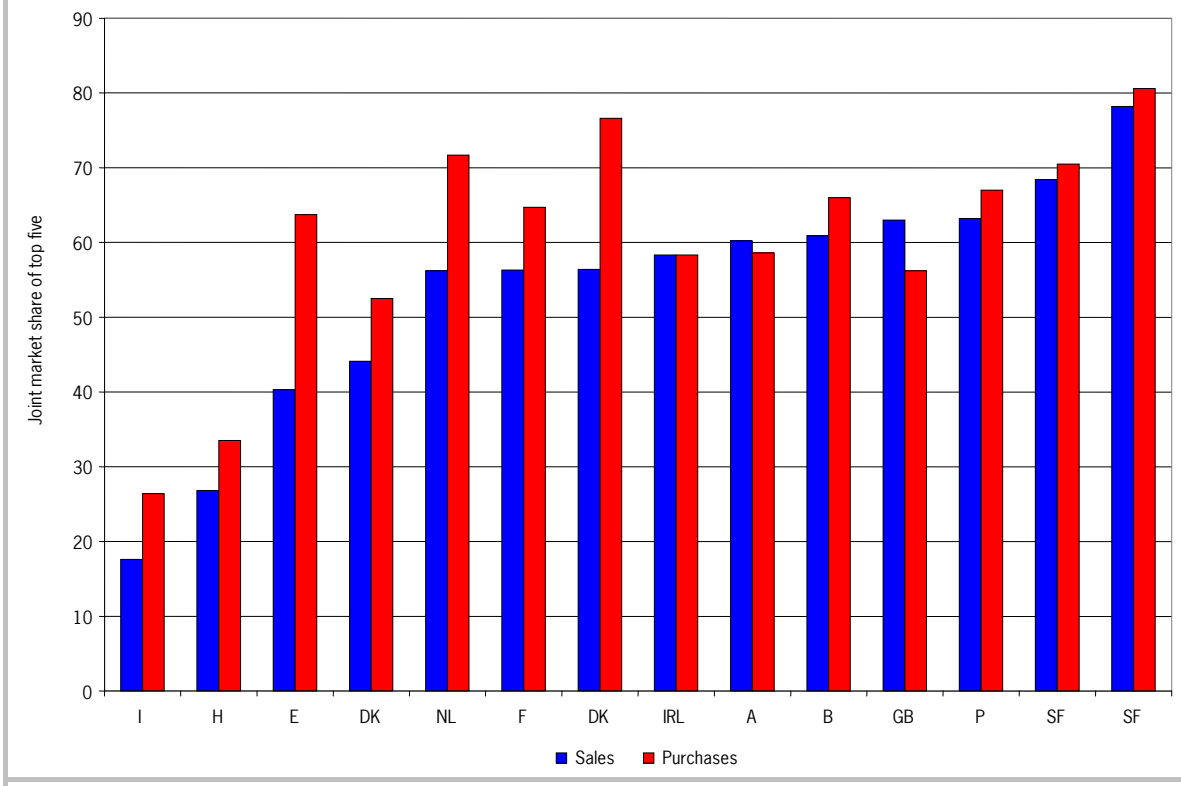
Figure 4.2 **Market share of the top five Dutch supermarket chains (%, Total food)**



Source: IRI, ACNielsen (2008).

The Netherlands is no exception in Western Europe: the same development is evident in other important markets for Dutch vegetables - Germany, France and the UK, where the five largest retailers also have a market share of almost 60% (Figure 4.3). In Scandinavia, their market share is 70% or more. The concentration of the supermarket channel is still limited in Eastern Europe, although it is increasing rapidly since all major supermarket chains are also active in these countries. In Italy, Hungary, Spain, Germany, France and Denmark, the concentration on the purchasing side is, in analogy with the Netherlands, substantially greater than on the supply side.

Figure 4.3 **Concentration in supermarket purchasing and sales in the OECD member states (2004)**



Source: OECD (2006).

5 Pricing in the greenhouse horticulture sector

5.1 Farewell to the auction clock

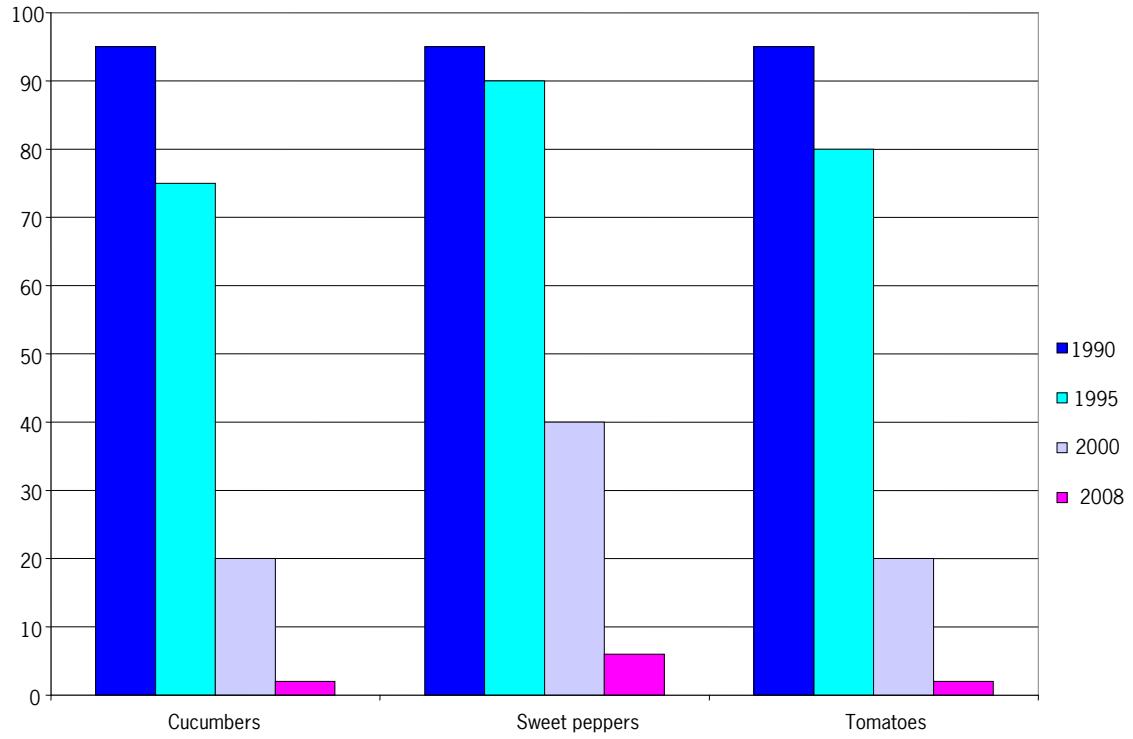
The revolution in the distribution of vegetables and fruit is not only manifested by the concentration of retail chains and the disappearance of small businesses (see above), but also by the disappearance of institutions such as cooperative auction organisations and auction clocks. The transformation of the former auction cooperatives into cooperative wholesalers has lessened their distinction from commercial wholesalers: in little more than ten years, the former vegetable and fruit auction cooperatives have lost 50% of their market share. In addition, dozens of new producers' associations have been formed. Auction clocks are now used to sell at most 5% of the supplies of fresh vegetables and fruit.

The growers' cooperatives introduced the auction clock as a pricing mechanism for fresh vegetables, fruit and ornamental plants at the end of the 1890s. The auction clock served as a marketplace for the daily supplies of fresh horticultural produce. In creating transparency and fixed pricing rules, the auction clock guaranteed a competitive equilibrium price to the large number of buyers and suppliers. The resultant transparency and the large number of suppliers and buyers ensured that sales via the auction clock approached the principle of perfect competition. By guaranteeing transparency, the auction clock contributed to perfect competition in the sales of fresh vegetables and fruit. However, in the first instance - and above all - the auction clock was a manifestation of the conditions for perfect competition: a large number of suppliers and buyers.

One century later, the use of auction clocks came under pressure during the 1990s, and they have now disappeared as the dominant pricing mechanism in the Netherlands (Figure 5.1). The auction clock, as a spot market, was no longer compatible with the retail chains' intention to centralise their purchases and to implement planned purchasing operations (see above): it is difficult - if not impossible - to organise Just-In-Time deliveries by purchases via auction clocks (Koldijk, 1996). The retail chains wished to conduct business directly with a chain of suppliers (growers and wholesalers), reach price agreements with their suppliers and avoid a dependency on the capricious fluctuations in auction-clock prices (Koldijk, 1996). The supermarkets were absolutely determined not to bid against themselves. Consumer and retail demand needed to determine the retail chain's purchasing policy, not fluctuations in supplies, and for this reason the former auction organisations gradually reduced the auction clocks' role in the expectation that they would be able to conclude long-term agreements with the retail chains.

In addition, the retail chains wished to reach agreement on the packaging and quality of the produce they purchased. The sector had its doubts about the auction clock's ability to meet the demand for product differentiation (quality and variety) even though the auction clock had, to a certain extent, met this need in the ornamental plant market sales (Koldijk, 1996). In addition, it was assumed that the transaction costs incurred in auction-clock sales were relatively high. In conclusion, major growers and supermarkets benefited from direct agreements as the large lots bore the lion's share of the auction costs: a cross-subsidy was employed in which the larger lots subsidised the smaller lots. This was the reason why the large, efficient growers, in particular, turned their backs on the former cooperatives during the course of the 1990s.

Figure 5.1 **The Dutch auction clock's market share, 1990-2008**



Source: The Greenery.

The growers' associations and trading houses have succeeded in concluding long-term agreements with the supermarket chains to only a limited extent: the auction clocks have been abolished, but the spot market has remained. The negotiations have retained their short-term character since the contracts relate to at most a couple of weeks. The relationship between Albert Heijn, Bakker Barendrecht and Hartman constitutes an exception. With the short-term character of the delivery and price agreements the market remains, in essence, a spot market. Solely the rules governing the spot market have changed: firstly, the transparency of the market has decreased since the market's equilibrium price is known only approximately. Secondly, scope for renegotiations has been created. Transactions carried out using the auction clock were confirmed by pressing a button, but bilateral agreements offer scope for the renegotiation of agreements (Klemperer, 1989; Jansen et al., 2001).[1] The combination of these developments has not been beneficial to mutual confidence between the market players in the greenhouse vegetable chain. More than in the past, confidence now needs to be acquired and maintained.

As such, a development which is more important than the abolition of auction clocks is the disappearance of the conditions to be met for perfect competition. Although the auction clock could be reintroduced - whereby it should be noted that auction clocks are still used in Belgium - this would not result in the return of the conditions for perfect competition. The demand side is dominated by a limited number of large supermarket chains in Germany, the Netherlands and the UK. Demand in north-western Europe is oligopsonistic, i.e. there are a limited number of buyers. This concentration has been accompanied by an improvement in the supermarket chains' negotiation position (Section 3.2). In addition, the number of suppliers in the horticultural and trading sectors is also decreasing steadily (see above) and the supply side is becoming increasingly oligopolistic. Moreover, the loss of transparency is also detrimental to the conditions for perfect competition.

[1] 'Auctions have the additional advantage of being institutions whose conduct can be delegated to an unsupervised agent. Public auctions offer fewer opportunities for kickbacks and behind-the-scenes agreements between the seller's agent and a single buyer than do negotiated agreements. In the early New England textile trade, established merchants sponsored laws against auction sales, thus indicating their awareness of how effectively auctions narrow their margins and prevent them from extracting better terms from the cotton farmers.' (Klemperer, 1989, p. 19)

5.2 Aggregation of supplies

During the past 15 years, the primary side has regularly referred to supply concentration as a means of creating a countervailing power against the concentration of the retail chains.

This call for supply concentration is not new. The auction clocks were abolished in the same period as the incorporation of The Greenery, a cooperative which combined the supplies from nine vegetable auctions (Bijman, 2002). The Greenery was incorporated for several reasons including supply concentration and the organisation of countervailing power. However, the endeavours to organise this countervailing power under The Greenery's flag have not been successful.

The Greenery's endeavours to improve the growers' prices and exercise force as a countervailing power have failed due to the free-rider behaviour in the sector of competing growers, cooperatives and trading houses - as well as The Greenery's own growers. This is one of the reasons why supply concentration by The Greenery has not been entirely successful. During the 1990s, The Greenery's market share declined almost as rapidly as it was acquired (Table 5.1). This deterioration was, in particular, beneficial to the former non-auction circuit in which wholesalers and growers conducted business independently of the traditional cooperatives. Other endeavours to achieve an aggregation of the supplies - for example, the price scheme between Komosa (ZON) and Friskom (The Greenery) in 1998 - were terminated for comparable reasons (Bunte, 1999). The aggregation of supplies is effective solely when the growers, traders and supermarket buyers do not opportunistically jump into every opening in the market.

The threshold for entry into the vegetable and fruit wholesale and distribution trade sectors is low: all that is required, as it were, is a mobile telephone and a truck. An opening in the market is comprised of a price difference between market segment, supplier or customer A and market segment, supplier or customer B. Competitors can take over suppliers, customers and even market segments within a relatively short timeframe, and in fact the wholesale sector does so every day. The wholesale sector implements arbitrage on a daily basis in which the wholesalers trade between themselves to transfer supplies from a market segment (niche) with an excess of supply and low prices to a market segment (niche) with a deficit of supply and high prices.

Table 5.1 **Breakdown of market shares in sales of greenhouse vegetables (1996-2008)**

	The Greenery			ZON			Other		
	1996	**1998**	**2008**	**1996**	**1998**	**2008**	**1996**	**1998**	**2008**
Aubergines	85	51	33	6	7	N/A	9	42	67
Cucumbers	74	41	19	22	25	5	4	34	76
Sweet Peppers	87	57	35	11	9	17	2	34	48
Tomatoes	76	57	40	14	8	11	10	35	49
Total	79	50	32	15	15	10	6	37	58

Source: LEI, The Greenery, ZON.

6 Developments in added value and net profits

At the beginning of this report we stated that the greenhouse horticulture sector's income is under pressure. At the end of this report, we compare the development in the greenhouse vegetable sector's income with those of the wholesale and food retail (the supermarkets) sectors and search for explanations for any patterns that may be apparent (subsection 6.1). Sub-section 6.2 contains a breakdown of the consumer price of sweet pepper. Subsection 6.3 examines the relationship between producer and consumer prices in the Netherlands and Germany. Subsection 6.4 reviews the discounts, payments and similar contractual conditions agreed between suppliers and supermarkets.

6.1 Profit, margin and added value

Figures 6.1 and 6.2 show the added value and net profit respectively of the three major links in the Dutch greenhouse horticulture supply chain. The data used in the figures is listed in Appendix 1. The data in the figures is derived from LEI and CBS data.[1] The data is not fully comparable since the product groups to which the data relates differ: the data for the horticulture sector refers to greenhouse vegetables, for the wholesale trade to all potatoes, vegetables and fruit, and for the supermarkets to all groceries. The following subsection contains a detailed analysis for one vegetable: sweet peppers. The data for the greenhouse horticulture sector relates to all revenues and, consequently, includes the data for the generation and sale of energy.

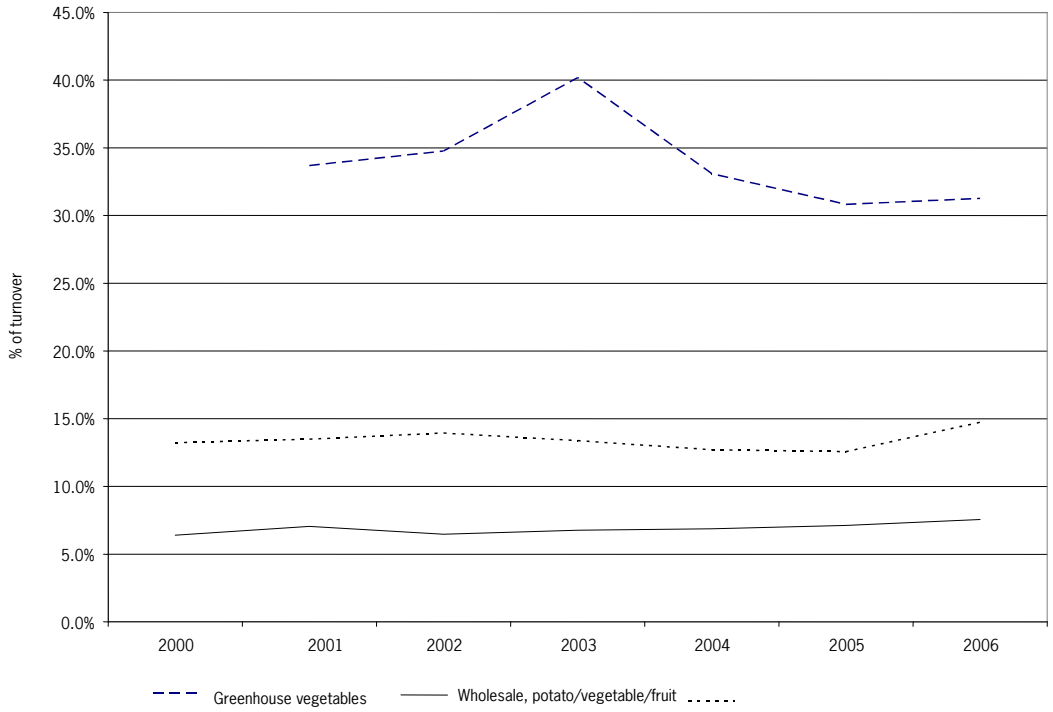
Figure 6.1 shows the development in added value, i.e. the total of the income received by the employees and entrepreneurs. Figure 6.2 shows the developments in the net profit before tax in the greenhouse vegetable cultivation, wholesale and retail trade links of the supply chain. The net profit in the greenhouse horticulture sector is determined by correcting the net profit for the entrepreneurs' deployment of labour. The following conclusions can be drawn from the figures and the underlying data:

1. The greenhouse vegetable cultivation sector's added value - the remuneration for the deployment of labour and capital - was larger during the 2001-2003 period than in 2004-2006 period, whilst the added value in the wholesale and supermarket links increased gradually during the 2000-2006 period. It should be noted that the greenhouse horticulture sector's added value as a percentage of turnover is relatively high as the greenhouse horticulture sector is both a labour and capital-intensive sector;
2. The greenhouse horticulture sector's net profit is under pressure, whilst the supermarkets' net profit has remained constant and the wholesale trade's net profit has increased from 2.4% to 3.0% of the turnover during the 2001-2007 period (CBS, Statline). When expressed as a percentage of total equity, the supermarkets' profit is actually equal to 7.1% and the profit of the wholesalers trading in potatoes, vegetables and fruit is equal to 6.4% (Backus et al., 2007). However, it is not inconceivable that some greenhouse horticulture holdings do record a net profit, since the variation in income in the agriculture and horticulture sector is, generally speaking, large.

Without being able to identify cause and effect, we can observe that the deterioration in the greenhouse horticulture sector's net profit and added value has been accompanied by an improvement in the net profit and added value of the wholesalers trading in potatoes, vegetables and fruit and the supermarkets.

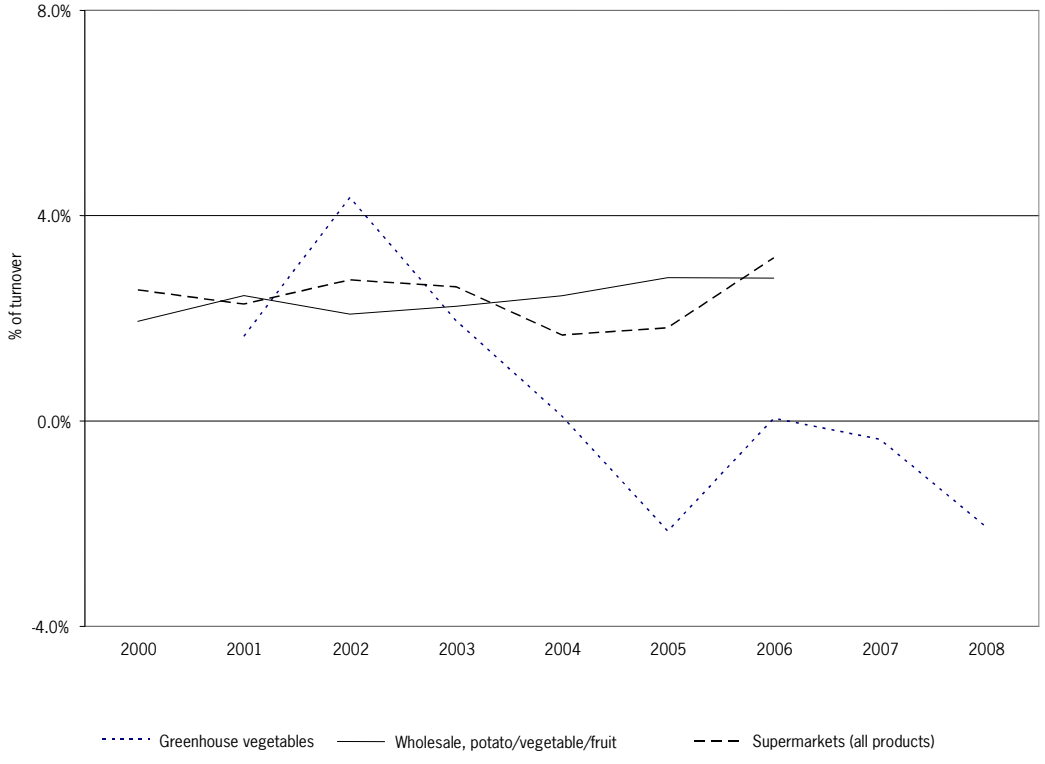
[1] The wholesale trade relates to the Dutch wholesale trade in potatoes, vegetables and fruit. The retail trade relates to the Dutch food retail trade (supermarkets). Companies are required to submit the results from their Dutch operations to the CBS.

Figure 6.1 **Added value in the Dutch greenhouse vegetable chain**



Source: CBS-LEI.

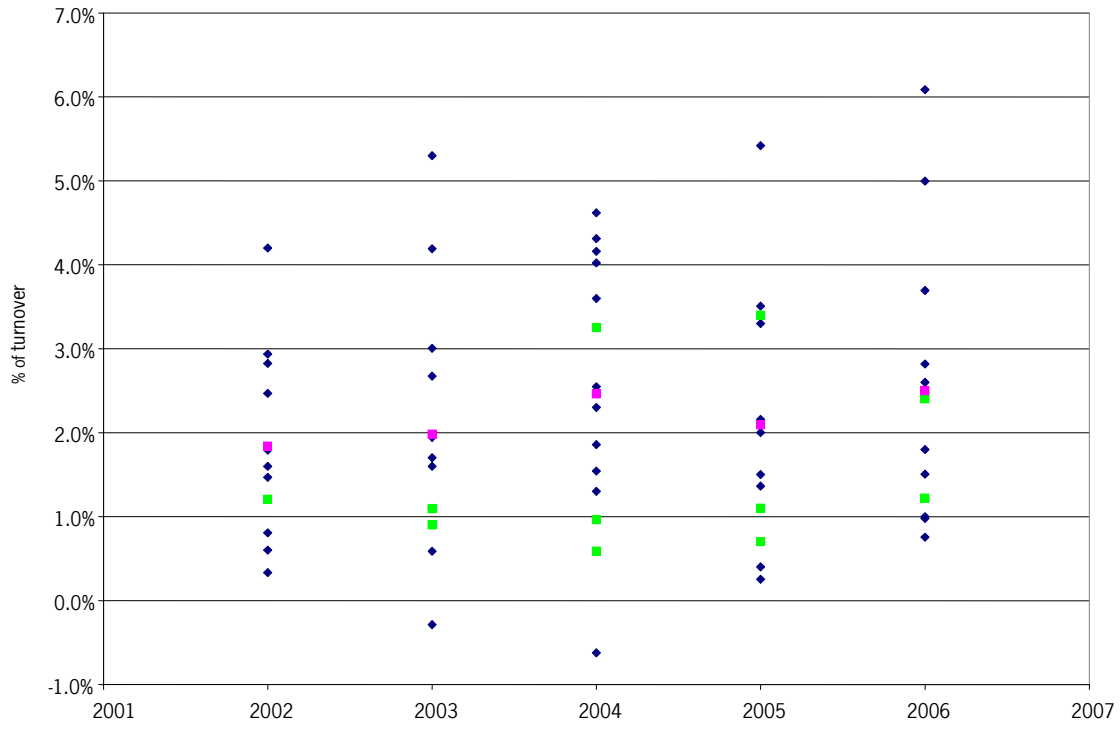
Figure 6.2 **Net profit before tax in the Dutch greenhouse vegetable chain (2000-2006)**



The greenhouse horticulture sector's net profit is determined on the basis of a three-year moving average.
Source: CBS-LEI.

When these figures are reviewed, it should be noted that there can be major differences between companies. Figure 6.3 shows the variation in the net profit of wholesalers in the Amadeus database. This shows an evident variation in the net profit - expressed in terms of a percentage of turnover - between the relevant companies, which ranges from 0% to 6%. The figure once again indicates the upward trend in the average net profit. In addition, the figure also clearly shows that the large former auction cooperatives (The Greenery and Fruitmasters) score below average. However, this is not the case for ZON and Zaltbommel, the smaller former auction cooperatives.

Figure 6.3 **Net profit before tax in the Dutch potato, vegetable and fruit wholesale sector (2000-2006)**



Green = Former cooperatives; Pink = Average; Blue = Other companies.
Source: Amadeus.

6.2 A supply analysis for sweet peppers

The above analysis shows the wholesale sector's net profit and added value on the basis of the entire food range. However, the net and gross margins on potatoes, vegetables and fruit are larger than those on other foods. The difference between the purchase and selling price - the gross margin - amounts to 19% for the entire food range, but is 28% for potatoes, vegetable and fruit (GfK, 2007). This is largely due to the difference in costs: a great deal of space is required, a great deal of labour is involved and fresh produce is highly perishable.

Table 6.1 reveals that the difference between the consumer and producer prices cannot be explained in full. Table 6.1 shows the result of the calculation of the purchase prices for supermarkets, wholesale trade and auction organisations on the basis of the consumer price and gross margins used by Nielsen and the CBS for supermarkets, wholesalers and auctions.[1] The auctions' purchase price should be the same as the growers' prices: however, this is not the case. The non-explainable difference between the consumer price and the

[1] The supermarkets' purchase price, as based on the supermarkets' gross margin of 28% on potatoes, vegetables and fruit, amounts to 72% of the consumer price exclusive of VAT (0.604 = 72%*0.839). The wholesalers' purchase price, as based on the wholesalers' gross margin of 12.5%, is 87.5% of the supermarkets' purchase price, et cetera.

growers' price implies that profit is generated somewhere in the chain, or that some costs are not accounted for. It is not entirely clear how the distribution centres' costs are accounted for. The calculation also assumes that only one wholesaler is involved in the distribution of greenhouse vegetables. However, since supply and demand cannot be forecast with full precision, it is possible that wholesalers conduct mutual trade in vegetables and fruit.

Table 6.1 Margins on sweet peppers (in € per pepper)

Link	Price
Growers' price in 2007	0.286
Non-explainable difference between growers' and consumers' price	**0.095**
Auction purchase price (28% transport and packaging costs as a % of the wholesaler purchase price)	0.381
Wholesaler purchase price (12.5% margin as a % of the supermarket purchase price)	0.529
Supermarket purchase price (28% margin as a % of the consumer price)	0.604
Consumer price exclusive of VAT	0.839
Consumer price inclusive of VAT	0.890

Source: GfK and P8.

6.3 Relationship between consumer, wholesaler and producer prices

We have carried out time-series analyses to examine the relationship between the prices in three links of the chain[1] in the Netherlands and Germany. The study of the Dutch figures related to the relationship between producer and consumer prices, and of the German figures to the relationship between the wholesale and consumer prices. The data required for the analysis were supplied by P8, K8 in collaboration with Florpartners (the Netherlands) and ZMP (Germany).

The analysis yields the following three conclusions:

- in the longer term consumer prices follow the growers' prices or wholesale prices on a one-to-one basis;
- changes in the supply prices (growers or wholesale prices) result in changes in consumer prices and not the converse;
- the Dutch figures reveal a difference between the retail chains' response to increases in purchase prices as compared to decreases in purchase prices. This is what is referred to as 'asymmetric price transmission'. This difference is not evident in Germany.

The results from the asymmetry test are listed in tables 6.2 and 6.3. It can be concluded, on the basis of the analysis of the data and the estimated values of the parameters, that Dutch supermarkets transmit increases in the growers' prices more rapidly than decreases in the growers' prices. However, the results are virtually insignificant, although it is expected that significant differences would be found if the number of observations was increased sufficiently.[2] German retailers probably transmit increases and decreases in purchase prices equally rapidly, possibly with the exception of prices of round tomatoes.

This difference may be due to the fact that in the Netherlands the market share of convenience and value-for-money supermarkets is larger than the market share of the discount supermarkets, whilst the reverse is the case in Germany. This conclusion is applicable both to calculations based on consumer prices at a national level and consumer prices at supermarket-formula level (Aldi, Edeka, Markant, Metro, Rewe). The discount supermarkets had a market share market of 41% in Germany in 2006 (ZMP) as compared to just 18% in the Netherlands (IRI). Albert Heijn dominates in the Netherlands, whilst Aldi dominates in Germany. Consequently,

[1] The analysis is analogous to the analysis in Bunte et al. (2003).

[2] The indications of asymmetry are markedly greater than the indications Bunte et al. (2003) found for meat and potatoes, and are in agreement with international studies such as the studies by Meyer and Von Cramon Taubadel and by the OECD (2006) for meat.

the UK - where Tesco dominates - may be expected to exhibit comparable price patterns to those in the Netherlands.

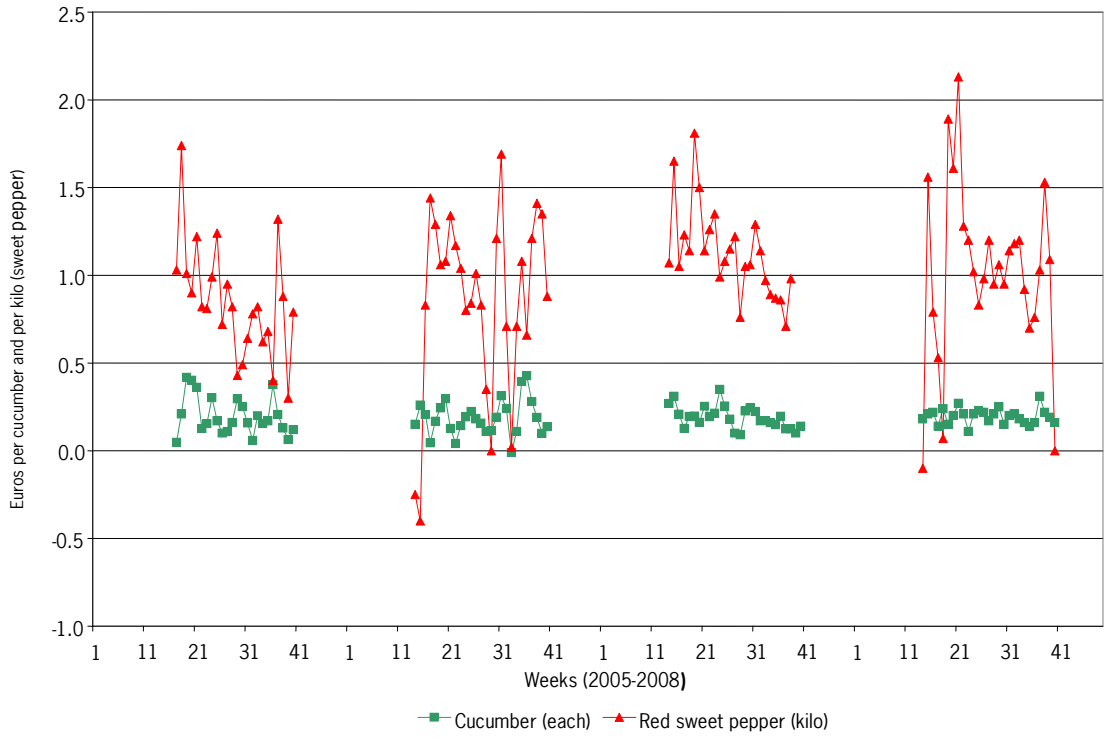
Table 6.2	Response of Dutch supermarkets to increases and decreases in purchasing prices	
	Asymmetry	**Significant**
Cucumbers	Yes	No
Yellow sweet peppers	Yes	Yes
Green sweet peppers	Yes	No
Red sweet peppers	Yes	No
Source: Florpartners and ZMP. Processing: LEI.		

Table 6.3	Response of German supermarkets to increases and decreases in purchasing prices	
	Asymmetry	**Significant**
Cucumbers (E)	No	No
Cucumbers (NL)	No	No
Red sweet peppers (E)	No	No
Red sweet peppers (NL)	No	No
Round tomatoes (E)	Yes	No
Round tomatoes (NL)	?	No
Source: Florpartners and ZMP. Processing: LEI.		

One element of the above analysis can be nuanced when the prices of the individual supermarket formulae are examined. Table 6.4 shows that the difference between Aldi Germany's consumer price and growers' price for red sweet peppers increased during the 2005-2008 period. The price difference for cucumbers remained constant. This is not so much due to a trend in the price difference as to a trend break between 2006 and 2007 (Figure 6.4). Aldi probably generates a greater gross profit on red sweet peppers since 2007. Supermarkets implement cross-subsidies in their product range, whereby they deliberately incur a loss on a number of products to draw customers into their stores and promote sales of the entire range. They generate their profit from other products. When viewed from this perspective, sweet peppers have served as a cash cow for Aldi since 2007, at least in comparison with the preceding period. However, it is also possible that Aldi now stocks a more expensive variety of sweet pepper. Cucumbers could serve as a loss leader.

Table 6.4	Difference between Dutch growers' prices and Aldi Germany's consumer prices			
	Cucumbers		**Red sweet peppers**	
	Euros, per cucumber	**Index 2005 = 100%**	**Euros, per kilo**	**Index 2005 = 100%**
2005	0.20	100	0.85	100
2006	0.19	94	0.87	102
2007	0.19	96	1.13	133
2008	0.20	99	1.06	124
Source: Florpartners. Processing: LEI.				

Figure 6.4 **Difference between Dutch growers' prices and Aldi Germany's consumer prices**



Source: Florpartners.

6.4 Beyond pricing

Nowadays the distribution of income in the chain is, more than ever before, not only dependent on the agreed prices but also on a complex of discounts and contributions negotiated between the parties. The literature suggests that in the future retail chains will generate their profit from letting shelf space rather than from the resale of foods. One form of financial contribution frequently discussed in the literature is the 'slotting allowance', a fee the supplier pays the supermarket for the provision of shelf space for a new product. Other fees include volume discounts, financial contributions to the supermarket's promotional activities or investments, a charge for the introduction of new products, or the obligation to buy back products that no longer comply with the quality requirements. Studies by the UK Competition Commission and US ERS reveal that these discounts and contributions are requested on a regular basis (tables 6.5 and 6.6). The British study examined foods in general: the US study examined fresh vegetables and fruit. Other than volume discounts, the requests for discounts from the fresh vegetable and fruit chains is a phenomenon that has emerged during the past two decades (ERS 2001). Although the study is dated it is, to the author's knowledge, the sole study which has carried out a detailed study of the use of discounts and financial contributions. There is no reason to assume that the practices reviewed in the study have been discontinued.

Supermarkets endeavour to negotiate discounts and fees, on occasion by threatening to terminate the business relationship. The US study reveals that a large number of suppliers refuse requests for fees and then lose the account. The study carried out by the UK Competition Commission indicates the occasional abuse of market power.

Table 6.5	Business practices in the supplier-customer relationship between British supermarkets and their suppliers (percentage of respondents)			
	Never	Sometimes	Often	No answer
Delay payments by 15 days more than terms	77	18	4	2
Delay other amounts due by more than 15 days	66	22	11	2
Break other contract terms	69	12	4	16
Change quality agreed without adequate notice	83	11	0	7
Change other agreed requirements without adequate cause	54	26	9	11
Threaten delisting without reasonable cause	63	32	2	4
Require charitable contributions to be made	48	37	13	4
Require payments/discounts when main party's profit from products is less than the main party expected	51	30	16	4
Require buyback of unsold goods	82	11	4	4
Make deductions from returns to cover wastage	77	12	6	5
Impose slotting charges	55	18	21	7
Charge for shelf space	68	18	11	4
Charge for listing	56	25	14	5

Source: UK Competition Commission.

Table 6.6a	Percentage of suppliers of fresh vegetables and fruit that pay and/or receive a request for a fee from supermarkets or wholesalers (US, 1999)	
Fee type	Providing fee	With a fee request
Volume discounts	40	73
Promotional allowances	34	62
Other rebates	29	58
E-commerce fees	28	42
Free-product discounts	12	24
Buy-back unsold products or failure fees	11	22
Retail capital improvement fees	9	40
Pay-to-stay fees	8	27
Slotting fees	6	24

Source: ERS (2001).

Table 6.6b	Percentage of suppliers of fresh vegetables and fruit that have lost an account due to non-compliance with requirement for fee (US, 1999)
Volume discounts	33
Promotional allowances	50
Other rebates	64
E-commerce fees	25
Free-product discounts	0
Buy-back unsold products or failure fees	25
Retail capital improvement fees	23
Pay-to-stay fees	63
Slotting fees	57

Source: ERS (2001).

7 Conclusion

During the past two decades, a revolution has occurred in the distribution of vegetables and fruit against the background of the gradual concentration of the retail chains, the disappearance of greengrocers and consolidation of the wholesale and horticulture sectors. Supermarkets have centralised the purchasing of foods in DCs and rationalised their supplies in short, efficient chains. Demand has become determinative, and this has been accompanied by revolutionary institutional changes in the distribution of fresh vegetables. The former auction cooperatives into have transformed themselves into cooperative wholesalers and, in so doing, have lessened their distinction from commercial wholesalers. This has been accompanied by the cooperative wholesalers' loss of 50% of their market share. In addition, dozens of new producers' associations have been formed. Auction clocks are now used to sell at most 5% of the supplies of fresh vegetables. In the past, auction clocks symbolised perfect competition in the sale of vegetables and fruit. Following this concentration and consolidation, the conditions attached to perfect competition are no longer met. The loss of transparency and the disappearance of fixed selling rules have resulted in noise in the sales of vegetables at the primary level.

Against this background, this report has identified the following changes in pricing and income development:

1. The wholesale sector has improved its profitable position since 2000;
2. Dutch supermarkets would appear to transmit increases in the purchase price more rapidly than decreases;
3. The difference between the Dutch producers' prices and the German consumers' prices has increased for sweet peppers marketed by Aldi in Germany;
4. In addition, the difference between the Dutch growers' prices and consumer prices cannot be explained in full.

This memorandum does not indicate that the observed differences in pricing and income development can be imputed to possible misuse of market power. Other explanations, such as the expansion of the acreage allocated to tomato cultivation cannot be excluded.

Other than pricing, a further series of contractual conditions are of importance to the development and distribution of income, such as the fees retail chains charge for purported services provided to their suppliers. Little is known about the significance of these purchase conditions for the relationship between suppliers and supermarkets in the Netherlands.

During the past decade, the primary side has endeavoured to implement the aggregation of supplies as a countervailing power against the concentration of the retail chains. Endeavours to improve the growers' prices have failed due to the free rider conduct of the growers, growers' associations, wholesalers and retail chain buyers. The low threshold for entry into the wholesale sector has offered scope for this opportunistic conduct. The aggregation of supplies has not, to date, proven to be an effective answer to the concentration of the retail chains.

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Appendix 1

Profit, margin and added value in figures

Table B1.1 Net margin in the Dutch fruit vegetable chain (%)

	Greenhouse vegetables	Potato, vegetable and fruit wholesale trade	Supermarkets (all products)
2000		1.9	2.6
2001	1.6	2.4	2.3
2002	4.4	2.1	2.7
2003	2.0	2.2	2.6
2004	0.1	2.4	1.7
2005	-2.1	2.8	1.8
2006	0.1	2.8	3.2
2007	-0.4		
2008	-2.1		

Source: LEI and CBS.

Table B1.2 Added value in the Dutch greenhouse vegetable chain (%)

	Greenhouse vegetables	Potato, vegetable and fruit wholesale trade	Supermarkets (all products)
2000		6.4	13.2
2001	33.7	7.1	13.5
2002	34.8	6.5	13.9
2003	40.2	6.8	13.4
2004	33.1	6.9	12.7
2005	30.8	7.1	12.6
2006	31.3	7.6	14.7

Source: LEI and CBS.

Appendix 2

Time series analyses

The time series analyses are based on a review of the long-term relationship between the consumer price p and the growers' price w. The absolute retail margin $m = p - w$ depends on a number of cost items such as distribution, presentation in the store, quality control and waste.

It is, generally speaking, possible to predict these costs with more accuracy than the fluctuations in the growers' prices and, to the extent that they are passed on, in the consumer prices. Consequently, since the supermarkets' net profit will remain within certain limits, it is to be expected that there will be a certain linear combination of the consumer price and the growers' price, such as the absolute retail margin m, which will follow a clearly predictable pattern over the course of time with brief negative and positive divergences from the horizontal line. These divergences will be brief since the retail price is continually corrected by these divergences, as a result of which the retail margin will never diverge from the horizontal line to a great extent or for a long period of time. The constant revealed by the horizontal line may be expected to be positive when this constant represents the average retail margin over a period of time.

A simple model in which the retail price is corrected by divergences from the average absolute retail margin is as follows:

(1) $\Delta p_t = \alpha (m_{t-1} - \beta) + \varepsilon_t$

where $\Delta p_t = p_t - p_{t-1}$ is the weekly change in the retail price, index t indicates the relevant week, $t-1$ indicates one week earlier, β the average absolute retail margin, α the adjustment parameter with a value above -2 and below 0, and ε_t is the component of the change in the retail price that is not explained by the model. Formula (1) is what is referred to as an 'error-correction model'. When last week's margin, i.e. m_{t-1}, was above average, i.e. $m_{t-1} - \beta > 0$, then multiplication with the negative adjustment correction factor α will result in a negative change to the retail price: the retail price will fall. This reduces an excessive margin. Conversely, when the margin is below average, i.e. $m_{t-1} - \beta < 0$, then multiplication with the negative adjustment correction factor α will result in an increase in the retail price: the margin will receive a positive impetus.

Asymmetric price adjustments that enable the retailer to profit from a temporarily higher margin are indicated by a model in which the absolute value of the adjustment parameter α is smaller for an above-average margin. An expansion of formula (1) that takes account of this approach is as follows:

(2) $\Delta p_t = \alpha^-(m_{t-1} - \beta)I(m_{t-1} - \beta \leq 0) + \alpha^+(m_{t-1} - \beta)I(m_{t-1} - \beta > 0) + \varepsilon_t$

where $I(.)$ the indicator function is equal to 1 when the restriction is satisfied and equal to 0 when the restriction is not satisfied. Asymmetric price adjustment to the retailer's benefit then implies that $-2 < \alpha^- < \alpha^+ < 0$. Symmetric price adjustments are implemented when $\alpha^- = \alpha^+$: formula (2) is then reduced to formula (1).

A further possible expansion of the model can be achieved when the zeros in the indicator functions in formula (2) are replaced by constants $-c$ and c ($c > 0$) respectively to yield what is referred to as an 'asymmetric band-threshold error-correction model':

(3) $\Delta p_t = \alpha^-(m_{t-1} - \beta)I(m_{t-1} - \beta \leq -c) + \alpha^+(m_{t-1} - \beta)I(m_{t-1} - \beta \geq c) + \varepsilon_t$

such that divergences from the average margin within the interval $(-c, c)$ will not result in price adjustment. Constant c is assigned a low value, i.e. a value below which it is not considered worthwhile to respond to divergences falling within the interval.