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Static efficiency in Dutch supermarket chain

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Abstract in English

In this study, we analyse changes in market power in the Dutch supermarket chain and discuss the effects on welfare. The supermarket chain includes consumers, supermarkets, buyer groups and food manufactures. We look at the theoretical background of market power. Special attention has been paid to recent theories of buyer power of retailers in the vertical chain. Theory suggests that supermarkets can enhance their buyer power by, for instance, using own private brands as an outside option in bargaining with manufacturers. Using firm-level data, indicators reveal that profit margins of both supermarkets and of manufacturers have declined between 1993 and 2005. Hence, competition on these markets seems to have become tougher and mark-ups lower over time. Furthermore, we find no significant empirical indications that supermarkets were able to use their buyer power to shift profits from manufacturers to supermarkets after 1993. Finally, all else equal, in terms of welfare consumers have benefited from fiercer competition in terms of lower prices.

Key words: Supermarket, price cost margins, buyer power, seller power, welfare

JEL code: D40, D61, L11

Abstract in Dutch

Deze studie onderzoekt veranderingen in marktmacht in de supermarktketen en bespreekt de mogelijke effecten ervan op de welvaart in Nederland. De supermarktketen bestaat hier uit consumenten, supermarkten, inkooporganisaties en fabrikanten van levensmiddelen. De studie gebruikt een theoretisch raamwerk met de nadruk op recente inzichten over inkoopmacht van supermarkten aan de inkoopzijde. Supermarkten kunnen hun inkoopmacht versterken door bijvoorbeeld huismerken naast A-merken op te nemen in hun assortiment. Met bedrijfsgegevens over de periode 1993-2005 laten we zien dat zowel tussen supermarkten als tussen fabrikanten de concurrentie heftiger is geworden en dat de gemiddelde marges op beide markten in de supermarktketen zijn gedaald. Daarnaast vinden we geen overtuigend bewijs dat door meer inkoopmacht van supermarkten hun winsten na 1993 toenamen ten koste van de fabrikanten. Tot slot, consumenten hebben geprofiteerd van lagere prijzen en dat kwam ceteris paribus ten goede aan de welvaart.

Steekwoorden: Supermarkten, prijskostenmarges, inkoopmacht, verkoopmacht, welvaart

Een uitgebreide Nederlandse samenvatting is beschikbaar via www.cpb.nl.

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Preface

The study investigates the impact of changes in market power between supermarkets and manufacturers of food products on total welfare in terms of static efficiency. In recent years, the supermarket chain in the Netherlands has received a lot of attention. This is related to the price war and producers' fears that increased concentration of supermarkets has facilitated the supermarkets' ability to exercise market power over them and over consumers. This shift in the balance of (market) power in the supermarket chain may then affect total welfare, particularly the surplus of final consumers.

This study was conducted by a project team consisting of Harold Creusen, Arno Meijer, Gijsbert Zwart and Henry van der Wiel (project leader). We would like to thank the members of the advisory committee. The responsibility for the contents of this document and any omission or incorrectness remains with the CPB Netherlands Bureau for Economic Policy Analysis. Special thanks also to Jan-Willem Grevink (Food Service Instituut Nederland), Joop Holla (GFK Nederland), Barbara Baarsma and Michiel de Nooij (both SEO Economisch Onderzoek), Kees van Ommeren (Decisio) and Michiel Langman (LangmanEconomen). They have contributed to our better understanding of the market structure and other features of the supermarket chain. We are grateful to Arjan van Loon (Statistics Netherlands) who helped us with data issues. We further thank Fred Kuypers for his contribution to the database and making of this document. Last but not least, we express our thanks to Paul de Bijl, Free Huizinga and George Gelauff and other CPB colleagues for their comments on earlier versions of this document.

Finally, part of the data analysis reported in this document was carried out at the Centre for Policy Related Statistics of Statistics Netherlands. Statistics Netherlands is responsible for the quality of the firm-level data that is used as input for this study. CPB is responsible for the analysis of the data reported in this study.

Coen Teulings
Director CPB

Summary

Research questions

This study investigates changes in the balance of market power between supermarkets and manufacturers of food products on total welfare, in terms of static efficiency. In recent years, the Dutch supermarket sector received a lot of attention for two reasons. The first reason is that supermarkets have been involved in an enduring price war since the end of 2003. The second reason is that some manufacturers complained about excessive buyer power of supermarkets. Manufacturers fear that increased concentration of supermarkets has strengthened the supermarkets' ability to exercise market power over them and over consumers. This shift in the balance of (market) power in the supermarket chain may then affect total welfare, particularly the surplus of final consumers.

Main conclusions

The study shows that seller power of supermarkets and manufacturers declined between 1993 and 2005 according to a number of indicators based on firm-level data. We find lower mark-ups for both manufactures and supermarkets inducing relatively lower prices at the benefit of consumers. Moreover, no clear indications emerge from our analysis that supermarkets have raised their buyer power between 1993 and 2005 to expand their profits at the costs of consumers or manufacturers either at the aggregated level or at the level of six main product categories. All else equal, lower overall mark-ups may have improved static welfare.

Supermarket chain

Supermarkets can be considered as intermediaries between manufacturers of food products and consumers, a market structure that is not unique to supermarkets. They gather and distribute a broad assortment of products, and thus benefit from economies of scale and economies of scope in a multi-product setting. Their existence and the nature of their activities depend on the existence and nature of certain distribution costs in the chain.

We focus in this study on two submarkets within the supermarket chain:

- Retail market, involving supermarkets and final consumers
- Wholesale market, involving manufacturers of food products (as suppliers) and buyer groups (as buyers)

There exists a close relationship between both submarkets and particularly between supermarkets and buyer groups, as most of the buyer groups are closely connected to retailers. Stated otherwise, buyer groups represent supermarkets on the wholesale market.

Theory on market power

This study aims to measure market power on both markets in the supermarket chain. Market power in this chain has two interrelated dimensions. First, individual firms in each separate layer compete with each other horizontally. Second, there is a vertical dimension to market power. While manufacturers and supermarkets cooperate in selling products to end-users, they clearly have diverging interests regarding the distribution of the resulting profits. This distribution depends on the bargaining power of both sides on the wholesale market.

Supermarkets can, amongst other things, strengthen their buyer power by using private brands as strategic weapon in bargaining with manufacturers of brands or extending joint purchases through vertical integration or buyer groups. In contrast, tougher competition at the retail market may reduce their buyer power. If consumers' loyalty to one particular retailer is low, manufacturers have attractive alternatives to reach consumers via other supermarkets.

To assess the effect of buyer power on static efficiency it is important to distinguish between the types of contract. To settle wholesale prices and conditions for delivery of food products, supermarkets and manufacturers may use linear contracts or non-linear contracts. In case of linear contracts, the supermarket and manufacturing firm bargain only about the wholesale price of the product. In case of non-linear contracts, the supermarket and manufacturer jointly determine optimal prices *and* quantities of purchased products that maximize joint profits, and bargain for volume related discounts and lump sum fees for sharing these joint profits. For example, supermarkets with buyer power demand a slotting fee to adopt the manufacturer's products in the supermarket's assortment.

In case of linear contracts, the impact of buyer power on static efficiency depends on the existence of a trade-off. In principle, there can be a trade-off between efficiency gains of (large) powerful buyer groups versus potential abuse of their market dominance in relationship with increased selling power downstream leading to higher consumer prices. In case of non-linear contracts, supermarkets' buyer power in relation to manufacturers' seller power is not important (in the short term). Any change in bargaining power will not affect the quantity traded or the price for consumers. The only important issue then becomes the (joint) seller power on the retail market.

Measuring seller and buyer power

We use three indicators to measure developments in seller power of supermarkets and manufacturers. We apply the price-cost margin (PCM) of firms on their sales, the profit elasticity as a measure of competition, and the well-known concentration index.

We calculate two indicators to measure changes in buyer power of supermarkets. The first indicator is based on the concentration level of supermarkets with respect to their purchases. The second indicator compares the supermarkets' profitability with the manufacturers'

profitability. In the analysis, we also relate the developments of both indicators to the determinants of buyer power, such as the size of supermarkets and joint purchases.

All indicators are based on firm-level data for the period 1993-2005. These data stem from the surveys of several Production Statistics of Statistics Netherlands. We also use additional data sources to detect the determinants behind buyer power and to check the robustness of the results obtained from firm-level data.

Empirical results

The empirical results can be summarised as follows. First, the empirical evidence shows that the seller power of supermarkets on the Dutch retail market declined in the period 1993-2005. Nowadays, supermarkets compete more fiercely than in the early 1990s. A reason for this fiercer competition could be that consumers have become more price sensitive. The decline in seller power resulted in relatively lower prices and thus in higher (static) welfare all else equal. Indeed, consumers have benefited mostly from the modest price development between 1993 and 2005, which remained below the level of inflation in the whole economy.

Second, no clear indications emerge from our analysis that supermarkets have raised their buyer power between 1993 and 2005. Stated otherwise, supermarkets were not able to use their buyer power to shift profits from manufacturers to supermarkets after 1993. Although the decomposition of the PCM provides some indications for increased buyer power up to 2002, this is not the case afterwards. Moreover, other indicators for buyer power do not support the view that buyer power has increased over time. Although larger firm size and more private labels might have been conducive to bargaining power of retailers towards manufacturers, manufactures for their part increased their countervailing bargaining power as a result of more competition between supermarkets and the outside option of exporting to supermarkets abroad. At the product level differences in the extent of buyer power may be present. For instance, supermarkets seem to have relatively more buyer power in fresh food segments rather than in segments with brand products. Again, we do not find a clear change in this power over time.

The lower mark-ups in both retail and wholesale markets have improved static efficiency all else equal. This result does not seem to depend on the type of contracts being used between supermarkets and manufactures. Since there are no indications of changes in buyer power, the potential trade off between efficiency gains and abuse of buyer power in case of linear contracts has probably not emerged (or changed). In case of non-linear contracts, static efficiency will not be affected at all by any change in buyer power as only seller power on retail market matters.

However, more competition as driving force for lower mark-ups is not always conducive to higher static welfare as fiercer competition may negatively affect category assortment sizes. Or stated otherwise, existing products within product categories may have disappeared due to tougher competition. We have no hard empirical evidence to argue whether this effect occurred and dominates our case.

1 Introduction

1.1 Background

Almost daily, consumers buy many kinds of products from retailers, whom in turn purchase from wholesalers or directly from manufacturers that produce those products. Retailers operate as intermediaries between producers and end-users or consumers. Examples of such retailers range from butchers, boutiques to supermarkets and department stores.

Supermarkets and manufacturers (or suppliers) of food products are the subject of this document. More precisely, firms operating in the Dutch supermarket chain are the main focus.[1] The market structure across the vertical chain of suppliers and retailers is not unique to supermarkets. This particular branch is, however, an interesting one to analyse more closely due to the price war among supermarkets that started at the end of 2003 and simultaneous complaints of producers about the presumably aggressive conduct of supermarkets.

Intermediaries such as supermarkets derive their profits from being able to sell products to consumers at a mark-up compared to the price they pay to their suppliers. But these intermediaries can only exist as a result of advantages they offer to both sides of the market: the supply side (i.e. suppliers and producers) and the demand side (i.e. consumers). Advantages for the supply side are related to lower distribution costs, economies of scale and the economies of scope of selling multiple brands. Advantages for consumers are lower transaction costs, sales services, lower prices and more product variety. There appear to be significant economies of scope in shopping (largely rooted in transportation and waiting costs). As a result many consumers may strongly favour one-stop weekly or bi-weekly shopping at single retail outlets, at least for fast moving consumer goods such as groceries.

1.2 Research question

In recent years, supermarkets have been subject of various debates in The Netherlands. It all started with the price war at the end of 2003 among supermarkets, initiated by Albert Heijn (one of the large Dutch supermarkets). Subsequently, (mainly domestic) producers in the food sector complained about potential buyer power of supermarkets. This buyer power would enable supermarkets to establish favourable prices and other conditions for their purchases from suppliers. The criticisms of those suppliers are threefold.

First, supermarkets are claimed to have passed on the lower prices of the price war to the suppliers. Second, manufacturers and small supermarkets argue that it should be forbidden that

[1] This document ignores farmers and agri- and horticulturists as main producers of food. This is due to the absence of firm-level data for these types of industries.

allegedly supermarkets sell some of their products below cost price. The claim is that those low prices can be detrimental for both small supermarkets and, if price cuts are pushed onwards, for the suppliers in the chain, including farmers and horticulturists. Finally, it is argued, the distribution of buyer power is not optimal for the economy in the longer run, because profits of suppliers are lower due to the lower prices for their products. The consequence would be that too much buyer power hampers innovation in new products.

Indeed, over time, concentration among supermarkets seems to have increased due to several mergers and acquisitions. Producers' fears that increased concentration has strengthened the supermarkets' ability to exercise market power over them and over consumers might therefore be realistic. This document addresses the following question:

What is the distribution of market power between supermarkets and producers, and what is its impact on welfare in terms of static efficiency for the Netherlands?

This document provides an assessment of static efficiency in the supermarket chain. A market is statically efficient if the combined welfare of consumers and producers is maximized, while production takes place at the lowest possible cost using the current technology and production capacity (see Bennet et al. 2001, and Canoy and Onderstal, 2003). Market imperfections, such as the use of market power, result in welfare losses because of deadweight losses. Markets operate inefficiently and consumers pay higher prices. Without market imperfections, consumers pay the lowest prices for products given the costs of producing those products with the current technology.

We consider recent developments in static efficiency of the supermarket chain from a theoretical and empirical point of view. Theoretically, we will, among other issues, elaborate on the phenomenon of buyer power. We address what buyer power is and what its consequences can be for the supermarket chain, its vertical relations and welfare. The theoretical literature on buyer power is a developing area with a growing body of new studies (see, for instance, Inderst and Mazarotta, 2006, for a recent survey). Next, starting from recent theoretical insights on competition in the supermarket chain, we discuss several indicators for measuring (changes in) static efficiency. We particularly focus on how to measure buyer power.

For our empirical analysis, we mainly employ firm-level data from Statistics Netherlands over the period 1993-2005. The results of most of the indicators are based on this type of data. Firm-level data is one of the main sources for the National Accounts. For this study, we rely on the developments of firm-level data for the following reasons. It provides the opportunity to go beyond aggregated industry data and analysing differences across firms within a branch.

This kind of data directly enables studying the impact of competition on resource allocation, firm dynamics and firm performance. Second, most competition indicators cannot be measured at an aggregated level. Third, the use of comparable micro data ensures that variables have the same source that makes especially ratios of those variables more reliable.

The central idea in this document is that the supermarket chain consists of a number of submarkets. On each market, preferences, market power and conduct of firms operating on this market determine the price, volume and quality of a product. At first sight, the recent price war among supermarkets seems to have been favourable for consumers given the lower prices they had to pay for their basket of goods. However, the question can be posed: which actors in the supermarket chain are eventually paying for these lower consumer prices? The answer to this question is related to the importance of horizontal competition between competitors on one particular market, but also to vertical relations between supermarkets and suppliers trying to extract rents from each other.

Finally, although the price war between supermarkets is one of the main motivations for this document, it is not our major focus. We will not look at the sources or drivers of the price war itself, as data availability limits this kind of analysis. Instead, we will focus on whether the price war means a significant break in particular trends over time, in particular in relation with buyer power.

1.3 Structure of the document

This document is structured as follows. We start in section 2 with a description of the market structure of the supermarket chain including discussing some main trends. Section 3 discusses the theory of supermarkets and competition in the vertical chain. In particular, we review the theoretical literature on buyer power and its potential implications for the supermarket chain. Next, in section 4, we present how we can measure (changes in) market power and static efficiency, and discuss various indicators. Section 5 contains the empirical analysis of the Dutch supermarket chain. We show the empirical results of market power indicators applied to all layers of the chain, and sketch and analyse the impact on welfare in terms of static efficiency. Section 6 goes beyond the aggregates and focuses on two specific issues, i.e. the impact of the price war on the overall results and differences between product groups. Section 7 concludes and discusses some final notes. The latter includes issues that not have been taken into account in this study but might be important in assessing welfare effects.

2 Structure of the supermarket chain

2.1 Introduction

Food products typically reach final consumers after passing several layers of distribution and intermediaries that create value added.[2] Supermarkets form the final step in this chain to access customers. All kind of firms operate in this chain, each trying to maximize its profits. Their individual behaviour depends on the behaviour of their competitors and other market conditions such as (future) preferences of consumers, available technology, (potential) barriers to enter the market, including both regulatory issues and competition policy. All together they determine the price, volume and quality of a product.

This section briefly highlights the market structure of the supermarket chain. It discusses the different actors operating in this chain, their interrelationships, their strategic weapons, and kind of products being produced (section 2.2). Section 2.3 discusses competition issues with regard to the strong relationship between buyer groups and supermarkets. Also, some main trends are sketched related to issues of market power in the chain (section 2.4). Finally, we elaborate on the issue of the relevant market (section 2.5).

2.2 Structure of the market

2.2.1 Introduction

To define the relevant markets for the analysis, we distinguish two vertically related markets in the supermarket chain (see figure 2.1): the wholesale market (or upstream market) and the retail market (or downstream market).

The *wholesale market* consists of buying groups (for supermarkets) on the demand side, and manufacturers/producers of food products on the supply side. In general, National Statistical Offices like Statistics Netherlands classify the buying groups in SIC 5139, but some refinements are necessary for our research (see section 2.2.3).[3] The manufacturers operate on the supply side of the wholesale market and include miscellaneous producers. Here, we focus on the SIC 151 to 159 (except 157) and SIC 245. We ignore the tobacco industry and the animal feed industry because the products of these industries are not mainly sold via supermarkets. The *retail market* includes final consumers on the demand side and supermarkets on the supply side. In practice, Statistics Netherlands classifies supermarkets under SIC 5211.

Finally, note that we abstract from farmers and agri- and horticulturists as main producers of food in this document. This is due to the absence of firm-level data for these types of industries.

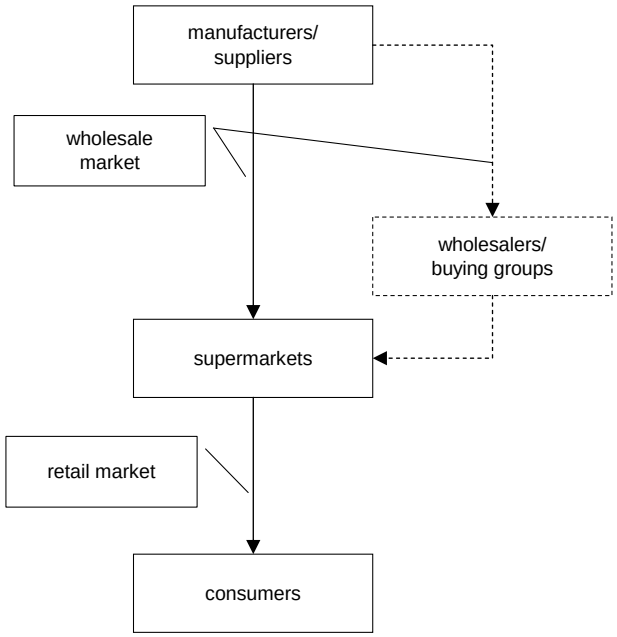
[2] A producer of household products selling directly to final consumers is more the exception than the rule.

[3] SIC stands for the Standard Industrial Classification code that determines where a firm should be classified.

2.2.2 Retail market

Supermarkets and consumers operate on the retail market. We start with discussing consumers and their preferences.

Figure 2.1 Supermarket chain



Consumers

Although consumers (or end-users) are often not united in one group, they are all together important as countervailing power, in the sense of an exerting force against supermarkets and manufactures, in the supermarket chain in two respects. First, they primarily determine jointly in a non-cooperative way whether (new) products are successful or not. Second, they also determine to a large extent whether a supermarket is profitable or viable.

Consumer's preferences for one particular supermarket or one particular product are related to issues as income, mobility, health, convenience, and culture. These preferences differ between consumers and over time. For instance, differences in preferences are evident between households, and due to time constraints, consumers nowadays prefer ready-to-eat vegetables instead of basic vegetables as used to be practice in the past. Recent common trends in preferences with respect to food are: convenience, health and wellness, joy and fair trade (products) (see e.g., Rabobank, 2004).

Another common feature that has already been present for several decades is that most consumers tend to favour "one-stop" shopping. Supermarkets offer this feature. From a consumer perspective, significant economies of scope in shopping (largely rooted in transportation and waiting costs) appear. As a result, many consumers may strongly favour one-

stop shopping at single retail outlets, at least for fast moving consumer goods such as groceries, than visiting multiple specialist stores (see box).

The one-stop shopping phenomenon does not necessarily mean shoppers are fiercely loyal to a single retailer. The strength of such loyalties will presumably depend on the product and service differentiation across retailers, and its alignment with consumer preferences, as well as consumer switching costs related to consumer uncertainty over price and quality of rival retailers.

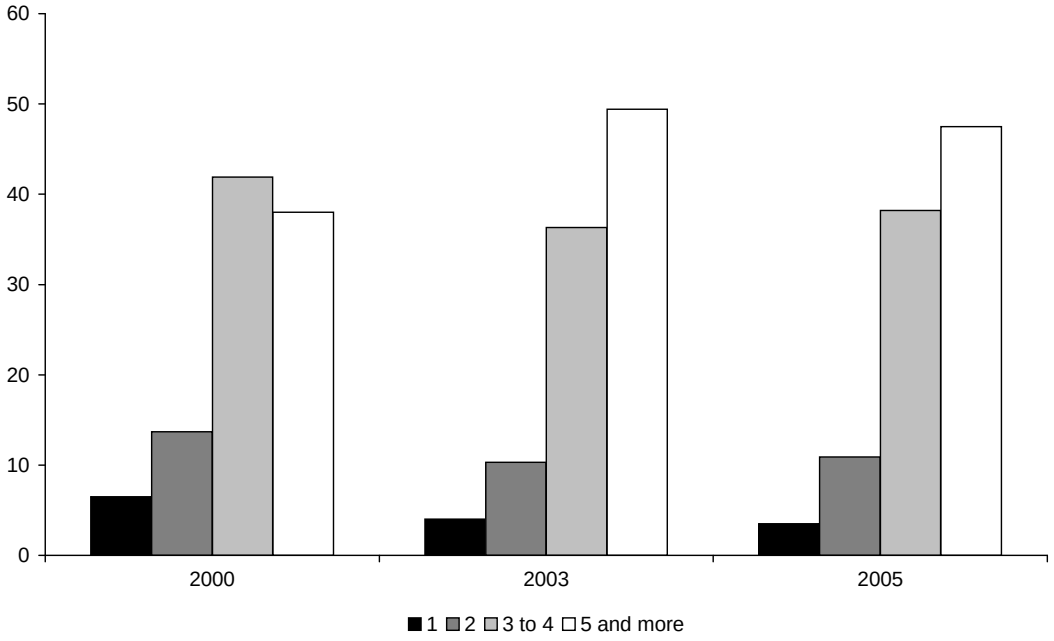
Switching costs are probably the most important reason why the loyalty of consumers for one particular supermarket is stronger than the loyalty for one single brand. According to all kind of consumer surveys, key element in consumers' choice of one particular supermarket is the price of a product (see e.g., Deloitte, 2007). In that respect, the retail market generally seems to be rather transparent in terms of prices and products and therefore consumers can be easily become aware of price differences. As long as price differences for particular products are not too large compared with a competing retailer, consumers do not immediately switch to other retailers. Other issues consumers find important in this retailer choice are the extent of fresh food and its quality. Although the size of assortment should not be ignored, it is valued less importantly in surveys than previously discussed elements.

Less specialist food retailers

Specialist food retailers have been particularly hard hit where customers have demonstrated their preference for the convenience of one-stop shopping offered by the supermarkets. This format of one-stop shops attracts consumers primarily through their need for regular (weekly) shopping for groceries, and then relies on them as 'captive' consumers buying other complementary products (Dobson et al, 1998). Moreover, supermarkets enjoy (substantial) economies of scope due to bundling of sale of groceries. In part the rate of decline of small retailers has been lessened by restrictive planning regulations preventing or limiting new hypermarket store openings. Nevertheless, small-format stores have survived operating as convenience stores for 'top-up' shopping.

Most consumers have one favourite retailer they weekly visit. Nevertheless, only a few consumers (mostly households) stick to one retailer during one year (see figure 2.2). Approximately 65 percent of all households visit more than three retailers in a year. Note that there is a decline between 2000 and 2005 in the percentage of households that visit only one retailer. This decline seems to have started already before the price war. It seemingly indicates that loyalty to one particular retailer has declined over time.

Figure 2.2 Distribution of number of household visits to supermarkets, 2000-2005



Source: GFK, consumer tracking.

Supermarkets

Table 2.1 shows some key figures for supermarkets operating in the Netherlands. We focus on some main developments.

Table 2.1 Key figures supermarkets in the Netherlands, 1995-2005

	1995	2000	2005
Net sales (billions of euro)	16.8	20.5	25.4
Employment (in persons, x1000)	174	226	219
Labour productivity (in persons x 1000) [a]	97	91	116
Number of firms [b]	4165	3575	3145
Number of stores	6460	6500	5760
Store size in square meters	405	594	707

[a] Labour productivity is defined as ratio of net sales and employment in persons.
[b] I.e. franchisers and franchisees.
Source: Statistics Netherlands, Statline, except store size (Deloitte, 2007).

Over time, both the number of supermarkets (including franchisees) and number of stores have declined, whereas the net sales have risen. Hence, the sales per store rose considerably in the period 1995-2005. Moreover, the store size of supermarkets (in square meters) became larger to reap economies of scale. Surprisingly, labour productivity only increased after 2000. Before 2000, for whatever reason, supermarkets seem to have neglected to improve their productivity as employment increased faster than the net sales.

The trend of less supermarkets and larger store sizes will go on according to EFMI and Rabobank (2007) in the next decade. Still, in an international perspective, the store size in the Netherlands is relatively low (see McKinsey&Company, 2007). According to McKinsey& Company this is related to regulatory barriers for hypermarkets and differences in municipality policies with respect to spatial planning requirements and procedures.

In this study, we consider the sale of food products through supermarkets to be one relevant (retail) market (see also section 2.4) where firms compete on a national level with each other. Nonetheless, differences between supermarkets do exist in at least one dimension: product/price assortment. Although other taxonomies are possible, here we divide the supermarket into four types of food retailers or segments (see table 2.2).[4]

Table 2.2 Segmentation of supermarkets

Type	Examples	Price/services	Assortment
Services	Albert Heijn, Spar, Super de Boer, Coop, Plus	High prices/High services	Large
Value for money	C1000, Deka, Deen, Poiesz	medium prices/services	Medium to large
Quality discount	Jumbo, Dirk, Hoogvliet	medium to low prices/services	Medium to small
Hard discount	Aldi, Lidl	Low prices/low services	Small

Source: EFMI and Rabobank (2007).

Supermarket such as Albert Heijn, Super de Boer and Plus focus on a high level of service and a large assortment. High prices are linked to the level of services (including activities like dry cleaners and mobile phones) and selling brands. Large full service supermarkets have approximately 15.000 to more than 20.000 items in their product assortment. Besides brands, their assortment includes also specials and premiums. Those are often private labels as well, but with high price/quality content. Nonetheless, their assortment also consists of budget products and private labels with lower price levels.

In contrast, hard discounts have relatively low prices, low service levels and limited assortment. Aldi and Lidl are the two largest discounters in the Netherlands. They have substantially expanded their number of stores over time. Their main strategic weapon is competing aggressively on price, whereas their assortment is characterized by smaller category assortment sizes (see e.g. ACNielsen, 2007). Moreover, their concept of pallets contributes to shelf utilization and to efficient logistics. Nevertheless, even between both discounters differences exist. The key difference is the size of the assortment: Aldi contains 1.200 articles, whereas Lidl has 2.500 articles.

[4] Another difference that exists is between a franchisee and branch retailer. Most enterprises such as Albert Heijn apply both options. This distinction does not matter from the perspective of the manufacturer.

The remaining two segments, value for money and quality discount, are operating in between the segment of 'services' and 'hard discount' with their prices as well as their assortment.

Driven by consumer preferences, supermarkets constantly have to cope with selecting the price, service and assortment strategy that maximizes profitability. As there is a common trend towards larger assortments over time, retailers also continuously have to deal with the limits of the shelf and the store at large. All those elements are key instruments[5] for supermarkets to differentiate themselves from competitors and to be attractive to consumers affecting their supermarket choice. Additionally, supermarkets have to deal with different price sensitivities across products of consumers determining the margin per product as well. In general, it is all about the share in the expenditures of consumers, market shares between supermarkets, and having the optimal sales concept.

Supermarkets operate on different levels with respect to geographical dimension too. [6]Some retailers only operate on local/regional markets (e.g., MCD and DEEN), whereas other retailers work countrywide (e.g. C1000). Only a limited number of retailers are active across the border, mostly in Europe, like Aldi and Lidl.

It is not that easy to enter this downstream market featured by saturation elements (see also section 2.3). Substantial investments are needed in stores and distribution to start a supermarket. Moreover, regulatory barriers like local and urban planning laws and policies hamper entry as well. Nonetheless, entry (including franchisees) does occur but is limited as percentage of total operating firms. Lidl and Jumbo are recent examples of retailers that entered the market successfully in the past two decades. The Belgian discounter Colruyt has plans to become operational in the Netherlands as well in the near future.

NMa views on relationship C1000 and Albert Heijn

The Dutch Competition Authority (NMa) considers C1000 and Albert Heijn as one organisation in competition cases due to the strong interrelationship. So, in case of a merger or the recent sale of Edah and Konmar stores, C1000 and Albert Heijn are treated as a single retailer. In fact, the NMa has ordered Ahold and Schuitema to sell its outlets (either Albert Heijn or C1000) in cities like Almere, Beilen, The Hague and Zoetermeer if it plans to take over Konmar stores at those locations. This NMa-view tries to prevent too much market power for Ahold at local levels and to ensure sufficient consumer choice.

In this study, we look at aggregated data of supermarkets as part of the retail market at large. If competition is hampered, or market power is abused by both retailers, this should be taken care of by the NMa. At least in the period 1998-2005, we are not aware of such incidents. Hence, in this respect we assume that the outcomes are not biased for the supermarket chain as a whole. We do not know to what extent the results are affected before 1998 as information is lacking.

[5] In marketing literature, those elements are often summarized in the well-known 4 P's: price, product, promotion and place.
[6] Note that supemarkets tailor their product assortment to local consumer preferences as well.

Finally, the interrelationship between Albert Heijn and C1000 is very strong (see also box). C1000 is 100 percent property of Schuitema. Royal Ahold N.V., however, is the largest stockholder of Schuitema, as 73 percent of the shares of Schuitema are held by Ahold. Moreover, two out of five board members of supervisory directors are connected to Ahold.

2.2.3 Wholesale market

This market consists of two actors: suppliers of food products and buyer groups. We discuss both actors hereafter.

Manufactures of food products

Firms on this market manufacture a range of products. It varies from fresh products like meat and meat products, fish and fish products, fruit and vegetables, dairy products to non-perishable products such as groceries and beverages. Main (multinational) manufacturers operational in the Netherlands are, for example, Heineken, Campina, Coca Cola, Friesland Foods, Unilever and Nestlé.

Table 2.3 Key figures food products industry in the Netherlands, 1995-2005

	1995	2000	2005
Gross value added (mln euro)	6961	8118	9349
Employees (fte, x1000)	121.2	116.9	102.3
Labour productivity (x1000 euro)[a]	57	69	91
Number of firms	5730	5120	4535
Export intensity[b]	47.6	48.3	47.3
Import intensity[c]	30.8	32.6	33.5
Share in total economy	2.3	1.9	1.8

[a] Labour productivity is defined as ratio of gross value added and employees in full-time equivalents.
[b] Export as percentage of gross production.
[c] Import as percentage of gross production.
Source: Statistics Netherlands, National Accounts and Statline.

Table 2.3 and table 2.4 presents some key figures for the food products industry in the Netherlands. We highlight a couple of interrelated results.

First, the current share of this industry in the total Dutch economy is nearly 2 percent, and slightly declining over time. The most important segment within this industry is the food groceries branch. The relatively low growth rate of production in the period 1995-2005 accentuates the shrinking relevance of the food industry for the total economy. The saturation of the food market is one of the most fundamental reasons for these limited growth rates.

Second but strongly related to the first, this industry has particularly focussed on efficiency gains and being innovative to cope with limited growth perspectives. The focus on both aspects can be traced back to the labour productivity performance and to the number of firms. Labour

productivity growth was considerable in the period 1995-2005, particularly due to lower labour inputs. Growth rates even accelerated after 2000. Additionally, the number of firms in the Dutch food industry has substantially declined. This downward trend is visible in most segments except in fruit and vegetables (SIC 153), dairy products (SIC 155) and beverages (159). The latter, contrasting developments could be related to innovation in those branches.

Finally, although this industry is primarily focussed on the domestic market, export has been growing faster in volume than domestic sales (see table 2.4). The export market is, therefore, an attractive option to ensure future growth. On the other hand, firms operating within the Dutch borders dominate the domestic market as can be deducted from the level of the import intensity (see table 2.3). Only 30 percent of all products on the domestic market stems from import.

Table 2.4 Developments in volume of the food industry in the Netherlands, 1996-2005

	1996-2000	2001-2005
	annual growth in %	
Gross value added	1.3	0.8
Labour productivity	2.1	3.6
Domestic sales	0.9	0.1
Export	2.2	0.8

Source: see table 2.3.

Most manufacturers produce several types of products or sets of closely related products, so-called product lines (see Rooderkerk, 2007). Firms also have incentives to introduce new products (or product lines) due to changing consumer preferences and (international) competition. Therefore, likewise supermarkets, manufacturers continuously need to determine the optimal composition of their product assortment given consumer preferences and their competitors.

To become operational in this industry, potential producers of food products face relatively high entry barriers. Related to economies of scale, they encounter substantial (*sunk*) investments in factories and specific machines, R&D in products and processes, marketing and advertising.[7] Regulatory barriers like controls on product quality/safety and environmental regulation are also evident. Despite those potential barriers and the downward trend in the number of firms, entry still occurs frequently in the industry. According to data from Statistic Netherlands, some branches within this industry experiences an entry rate of over 10 percent as percentage of total amount of active firms.

[7] This industry features mostly large firms. The average firm size is more than 20 employees in fte's.

Buyer groups

Buyer groups operate on the upstream wholesale market to purchase products for supermarkets from manufacturers. They are generally classified in SIC 5139.

We had, however, to restrict the scope of SIC 5139 as target group on the wholesale market because this industry turns out to contain a very heterogeneous group of firms. In fact, SIC 5139 is originally an intermediate branch between manufacturers and retailers including supermarkets. It includes wholesalers and buying groups taking care of the purchase, storage and distribution of various food and non-food products. In the period observed, the number of firms classified as SIC 5139 increased considerably. Based on additional information of Statistics Netherlands, this rise is probably due to an increase of wholesalers not delivering to supermarkets. Moreover, experts in the field explicitly distinguish 7 buyer groups related to supermarkets (see table 2.5). Therefore, in collaboration with Statistics Netherlands, we have refined the SIC 5139 to focus in the remainder of this study on a limited group of firms.

In general, two types of buyer groups can be distinguished: type I: Exclusive purchases for particular retailer(s), and type II: (cooperative) purchases for different retailers.

Table 2.5 Current buyer groups in the Netherlands

	Supermarket members	Type of buyer group
Ahold	Albert Heijn	I
Superunie	Boni, CoopCodis, DEEN, Dekamarkt, Hoogvliet, Jan Linders, Jumbo, MCD, Nettorama, Poiesz, Sanders, Spar, and Vomar	II
Schuitema	C1000	I
Laurus [a]	Super de Boer	I
Koopconsult	Dirk van den Broek, Bas van der Heijden, and Digros	II
Aldi Holding	Aldi	I
Lidl Nederland	Lidl	I

[a] As from 2007, Laurus has no longer Edah and Konmar as banners

In general, buyer groups and supermarkets are closely linked, and buyer groups can be seen as representatives of supermarkets. Within type I, a further distinction can be made in buyer groups representing one versus more retail formulas. Aldi, Lidl, Ahold, and Schuitema have only one formula, whereas Laurus ran more than one concept up to 2007. Buyer groups of type II purchase products for their members: C.I.V. Superunie and Koop-Consult. Superunie is a cooperative buyer group for independent supermarket companies.[8] Koop-Consult (Samenwerkende Dirk van den Broek Bedrijven) represents Dirk van den Broek, Bas van der Heijden and Digros supermarkets.

[8] Superunie is a buyer group representing 15 independent supermarket formulas in the Netherlands. Many members operate on local markets incorporating the knowledge of regional and local market conditions. Superunie provides its members with private labels like Perfekt, Spar and Markant Merk. Additionally, it develops premium brands.

The question can be raised whether retailers within type II have scope to compete with other 'members' if wholesale prices for their purchases are likely to be equal.[9] We argue that the answer is affirmative. As long as those supermarkets are allowed to set their own (consumer) prices not dictated by the buyer group at large, equal wholesale prices should not be an issue in competition among members. Supermarkets still have scope for (strategic) options to compete driven by differences in efficiency and private labels. Moreover, to some extent, these supermarkets are regional retailers confronted with national operating supermarkets such as Albert Heijn or Aldi. Their presence likely disciplines members to be competitive.

Most buyer groups (except to some extent Superunie) are operating on a national level and their market power in an international perspective is probably limited due to the relatively small Dutch economy. Likely, this is the case in bargaining with large multinational food suppliers of brands that operate worldwide. At the national level, the (buyer) power of buyer group is probably more evident in bargaining with domestic producers.

2.3 Main trends

The supermarket chain has experienced substantial modifications across Europe and the United States in the last couple of decades. Here, we concentrate on those changes that are interesting for the main focus of this document: changes in market power that may have an impact on static efficiency. More precisely, we distinguish four key developments:

- More product variety within supermarkets
- Lower number of firms on the downstream retail market
- Lower number of firms on the upstream market
- Increase of private labels

These trends are not exclusive to the Netherlands as all European countries have witnessed similar changes in retail trade. Nonetheless, differences in the extent of these changes do exist across Europe. For instance, in the Netherlands one hardly finds large supermarkets, let alone, hypermarkets, as is the case in France.

Trend 1: More product variety within supermarkets

The market for food products sold in supermarkets can be characterized by saturation elements. First, the number of supermarkets per inhabitant is relatively large in the Netherlands. Second, as most products of the supermarkets are normal goods rather than luxury goods, demand will

[9] Although information is limited, it can even be argued that wholesale prices across members are not at all equal for at least two reasons. First, buyer groups purchase not the whole product assortment for their members. Second, the distribution of the costs for operating a buyer group (e.g. personnel costs and accommodation costs) are likely based on a fixed fee and flexible part related to the market share of each member.

not increase proportionally as income rises. Consumer expenditures on food products will decline relatively and, hence, the share of sales of supermarkets in total value added is subjected to pressure. Consequently, supermarkets have mainly three key strategies for growing: i) to employ economies of scale by mergers/acquisitions (see trend 2), ii) to venture abroad, iii) to create more value added per square meter.

The last strategy is closely related to more product variety. Driven by consumers' tastes and wealth, product variety has strongly increased in supermarkets. For instance, the average number of different items sold in a typical supermarket in the US has gone up from about 6 000 in 1960 to approximately 45 000 in 2006 (OECD, 2007). Similar expansions can be observed in the Netherlands.[10] Although hard evidence is lacking, the general view is that the diversity within product categories has mostly been reduced after the mid-1990s, whereas the diversity across products has expanded. Examples of the former can be particularly found in detergents.

Trend 2: Lower number of firms on the downstream market

Looking at the structure of the downstream retail market two elements arise: increasing concentration rates and a skewed distribution of market shares.

Table 2.6 Market shares and number of stores of large supermarkets in the Netherlands[a]

	2002		2005	
Supermarket	Market share (in %)	Number of stores	Market share (in %)	Number of stores
Albert Heijn	27.0	698	26.9	674
C1000	15.0	487	14.8	462
Aldi	8.0	390	9.5	391
Super de Boer	10.0	425	NA	380
Edah	6.0	287	NA	276
Konmar	5.0	137	NA	44
Dirk vd. Broek	4.0	90	NA	NA
Spar[b]	4.0	539	6.2	539
Jumbo	1.8	NA	3.5	NA

Source: LEI, Landbouw-Economisch bericht

[a] Market share based on sales.

[b] Includes also other formulas of the Sperwer-group (i.e. Plus and Garantmarkt).

First, the downstream market experienced a rise in concentration rate in the last decades. As discussed, besides more product variety and larger stores, saturation forces supermarkets to employ economies of scale by mergers and acquisitions. As a result, the number of supermarkets (stores) has declined considerably over time (see table 2.1). The latest development has been the exit of the Edah and Konmar formulas. Almost all stores of Edah and Konmar are reallocated and sold among other supermarkets.

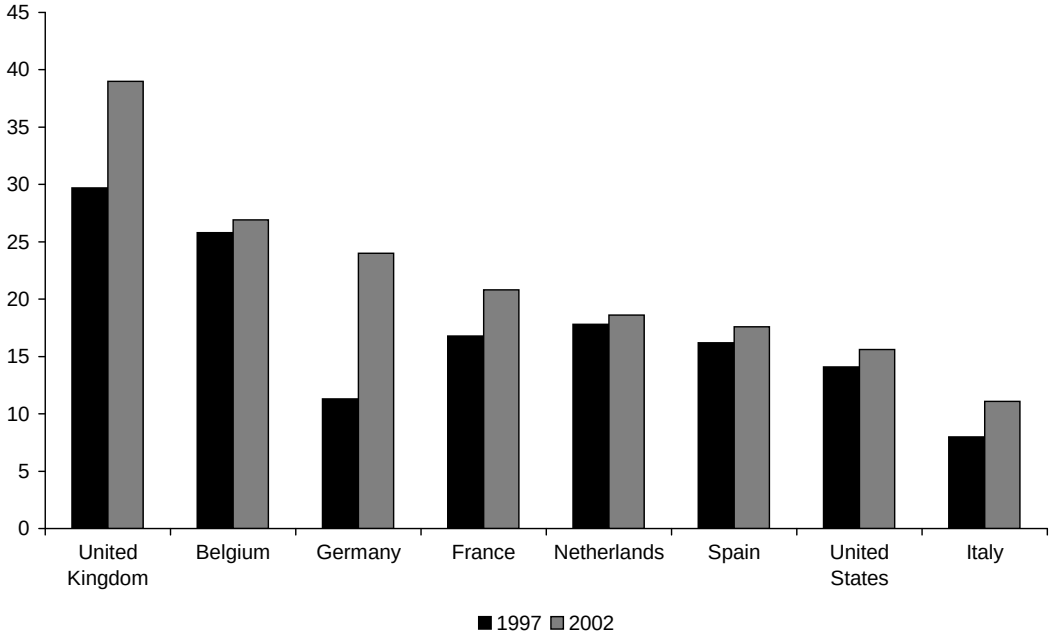
[10] Experts guess that product variety has increased with at least 50 percent from 1980 onwards.

Second, the market shares are very unequally divided across retailers operating on the market for supermarkets. It is very difficult to obtain information on the precise market shares, but combination of different sources provide some indication (see table 2.6). Nine large retailers possess approximately 80 percent of the market. Additionally, the largest firm, Albert Heijn, is market leader with a market share of more than 25 percent. The second major player, C1000, is considerably smaller.

Trend 3: Lower number of firms on the upstream market

There are a small number of buyer groups operating in the Netherlands, whereas the number of suppliers is much larger. This provides the buyer groups to some extent market power (i.e. buyer power) as manufactures have limited options to reach the final consumer (see section 3). On the other hand, the number of food producing manufactures active on the Dutch market has also declined over time (see table 2.3).

Figure 2.3 Share of private labels in supermarkets, 1997 and 1992



Source: ACNielsen, Results United States are for all channels that sell groceries. Sales in other countries are for grocery stores only.

Trend 4: Increasing share of private labels

Another major trend in the supermarket chain is the increase in sales of private labels relative to brands over time (see figure 2.3). In the Netherlands, the share of private labels in the total sales of supermarket is approximately 20 percent today.

A number of key drivers have contributed to the increase in private labels, both from the perspective of the demand side and the supply side.

From the demand side, consumers have been more open towards private labels driven by the higher quality and larger product assortment. Recently, ACNielsen (2005) asked consumers around the world what they thought about supermarket own brands. It turned out that Dutch consumers ranked at the top of the world that supermarkets own brands are a good alternative to other brands: 91 percent vs. 68 global average. According to Deloitte (2007), 79 percent of the respondents of its survey choose a private label because of the (lower) price. Moreover, particularly in the growing segment of 'easiness' for consumers, as for instance ready-to-eat articles, innovations by manufacturers of brand products were relatively scarce. Also, the growing importance of discounters as Aldi and Lidl has contributed to this trend as discounters hardly sell any brand. But this latter has begun to change as hard discounters also have started to sell brands reducing differences between supermarkets segments.

With respect to supermarkets (i.e. supply side), the increase of private labels is related to having a strategic weapon at its disposal in competing with their competitors (i.e. horizontal competition) but also in the chain itself (i.e. vertical relations). This strategic weapon is mainly twofold.

First, private labels offer supermarkets generally higher profit margins than brands do. To some extent, this could be due to less market power of manufactures of private labels compared to producers of brands. Moreover, the growth of private labels has deteriorated the position of manufacturers of brands. In fact, the existence of private labels as an outside option provides supermarkets a strategic weapon in the vertical relations.

Second, it gives the opportunity to compete against their competitors on the downstream market. Having a unique private label is an option to distinguish oneself by its assortment from other competitors as those competitors also sell similar brands. Recent developments are that products of private labels are moving to higher value added segments (so-called premium "branded" Private Label products) with high profit margins, thereby increasing the unique selling point for the store for the consumer. Consumers can only buy those products in one store.

In both ways, supermarkets aim to increase their proportion of consumers' expenditure and tighten their overall grip on the market.

Other trends

In addition to the four trends discussed above, the OECD (2007) distinguishes two other trends in the retail sector over the past of couple of decades: the extent of internationalisation of the retail sector and technological driving forces. First, although most retailers mainly operate in their home country, the retail sector has become more and more international over time. For instance, Ahold is operating in Europe and the United States. Second, innovations including ICT have transformed the retail sector over the past couple of decades. Those developments are

related to manage its supply chain including inventory control, logistics and product standards. If a supermarket becomes more efficient than its competitor, it has a competitive advantage.

2.4 Scope of study

Although supermarkets to some extent compete with specialised suppliers of fresh food and non-food, such as bakers and butchers in local geographical markets, we will ignore these markets in this study. This is also in line with analysis by the Competition Authority NMa, who views substitution elasticities between the various types of retailers sufficiently small to consider supermarkets to be in a separate relevant market from a competition law perspective. Non-supermarkets like specialist stores are therefore not part of this market.

As to geographical scope, in this study we use aggregate data for the Netherlands. The most important supermarket retailers appear to operate nationally in terms of price and other strategy policies.[11] Although consumers evidently only choose among locally competing supermarkets, this observation of price uniformity may be the result of the high population density and consequent chain substitutability between supermarkets at various locations.[12] Alternatively, transaction costs for retailers may simply motivate such price uniformity.

Driven by data availability, we also consider the upstream market at the *national* 3-digit SIC-level, assuming that also manufacturing firms compete within these industries at the national level. Though it can well be argued that several producers operate on a European or global level, it frequently appears that those multinationals have local factories serving the domestic market. In fact, 70 percent of the products sold on the domestic market origin from a firm that is active in the Netherlands (see table 2.3). In section 5, we analyse the suppliers as whole, whereas in section 6 we differentiate between product groups.

[11] Local differences in price and/or assortment of national retailers may occur due to specific competition issues in local markets.

[12] Stated otherwise, competing supermarkets form an interconnected chain through the Netherlands.

3 Theory

3.1 Introduction

In this study, we aim at measuring market power, both upstream and downstream, in the supermarket chain, and discuss the effects on welfare. Market power in supplier-retailer chains has two, interlocked, dimensions. On the one hand, individual firms in each separate layer compete with each other horizontally. Various manufacturers produce products that may be partial substitutes, and vie for the same end-users, and similarly, different supermarkets compete with each other for customers. On the other hand, there is a vertical dimension to market power. While manufacturers and supermarkets cooperate in selling products to end-users, they clearly have diverging interests regarding the distribution of the resulting profits. In the end, this distribution of profits in the chain depends on the bargaining power of both sides of the wholesale market, and furthermore, the bargaining process may have aggregate welfare effects.

In this section, we look at the theoretical background of market power in both dimensions. We will be relatively brief on the horizontal component of competition, as this is generally well known. In contrast, we spend more attention on the theory specific to the vertical chain of manufacturers and retailers, and in particular on the description of current theories of buyer power.

3.2 Market failures and welfare

Static efficiency

Static efficiency is the extent in which total surplus[13] is maximised in the short run. Put differently, a market is statically efficient if the combined welfare of consumers and producers is maximized, while production takes place at the lowest possible cost using the current technology and production capacity.

Static efficiency builds on two concepts: productive and allocative efficiency. Productive efficiency refers to the efficiency in the use of inputs to produce some (given) quantity of output, or stated otherwise to the extent in which total costs to produce the quantity of output is minimized. Allocative efficiency refers to the match of supply and demand such that resources are allocated in the most efficient use.

[13] Note that in this way we ignore the political choice in weighing consumer and producer surplus. In fact, we consider consumer and producer surplus as equally important.

Market failures: the role of market power

Market imperfections result in inefficiently operating markets. Potential market failures are the existence of market power, externalities, the hold-up problem of investments and information asymmetry (see box).

In this document, we primarily focus on the role of market power in the supermarket chain. Market power can relate to the seller of a product in the market place as well as to the buyer of this product. Seller power is generally defined as a firm's ability to set its price above marginal cost when *selling* a product on the market (Tirole, 1988). Conversely, buyer power can, in its simplest form, be defined as a retailer's ability to influence the terms and conditions on which it purchases goods, for example to reduce wholesale prices by extracting rebates.[14, 15] In contrast, retailers without buyer power on the wholesale market cannot affect the wholesale prices, like final consumers cannot affect the retail prices. So eventually, retailers with buyer power gain a competitive advantage by extracting rebates over the retailer without buyer power.

Market failures

Apart from market power, the following market failures influence the efficient operation of the market:
Externalities arise if decisions or activities of agents, i.e. suppliers, supermarkets or consumers, generate benefits or costs that are not taken into account by the agent. An example is when one retailer advertises a product or supplies information on the product and this leads to higher sales of the same product by a rival retailer as well. The retailer is then not fully rewarded for all the benefits of his actions, and hence may spend too little on such activities.
Information asymmetry also may lead to market failures. It occurs when one market party has more or better information than another party. One example is when the level of sales effort by a retailer is not observable by an (upstream) producer of the goods involved. In this case, the sales contracts may deviate from their (welfare) optimal forms in order to give the retailer incentives to make sufficient effort. Another consequence of asymmetric information may be the inability to agree on a mutually beneficial contract between retailer and producer at all.
The *hold-up problem* may occur when two parties could efficiently make investments to facilitate cooperation. If either party fears that after having made his investments, his partner will be able to extract all profits, inefficient behaviour results. In particular, in the case of sunk costs of specific investments, the risk of opportunistic behaviour of one party (i.e., once investments have been made) might deter the other party from investing in cooperation at all.
In this study we merely focus on the role of market power.

If firms have seller power and correspondingly are able to set high prices - compared to the case of perfect competition - to maximise profits, output will be suboptimal. The market will become allocatively inefficient, because consumers who will not buy at the resulting high market price, may still perceive a positive surplus from buying a(n) (additional) product at a price at or just above its marginal cost (Cabral, 2000). Instead, consumers have to spend their disposable

[14] See OECD, 1999. Technically speaking, buyer power reflects the ability of the downstream firm (i.e. the supermarket) to set an input price that is lower than would be consistent with the supermarket's marginal profitability on the product. Dobson et al., 2001, view buyer power as the "ability of leading firms to obtain from suppliers more favourable terms than those available to other buyers, or to be expected under normal competitive conditions […between supermarkets] ".
[15] Section 3.5 discusses how retailers may attain buyer power.

income on a product with a lower marginal utility, implying that available resources are put at work in producing products that are valued less. Market power may also induce productive or X-inefficiencies due to the fact that the existing profits provide firms fewer incentives to be productively efficient. Hence, the market imperfection of market power results in lower welfare than would be maximally attainable.

3.3 Why do supermarkets exist?

Traditionally, economists have not devoted much attention to wholesale and retail trade as it was merely considered as a gateway from producers of products to consumers (McClelland, 1962). More recently, the attention for the economics of retailing have increased because of the rise of large wholesalers and retailers (and manufacturers) and the presumed value added of its activities (Betancourt, 2004).

What is the economic function of wholesale and retail firms in the supermarket chain? Or, more specifically, why do supermarkets exist? By definition, wholesalers and retailers are marketing intermediaries and their existence and the nature of its activities depend on the existence and nature of certain distribution costs. Betancourt and Gautschi (1988) view the retailer as a firm offering at least one product to consumers at an observable market price and providing services that can reduce the distribution costs, which consumers would incur if they were to trade directly with producers. Distribution services comprise transport, storage and warehousing and the marketing of products. Apparently, buyer groups and retailers such as supermarkets provide services consumers' value. The price a consumer pays for a certain product at a retail outlet is lower than the sum of the purchase price of this product bought directly from the producer and the (implicit) costs from obtaining it such as search costs, cost of travel and the opportunity cost of time. Consumers and producers outsource transport, distribution and storage to a third party as a result of economies of scale.

Particularly in a multi-product setting, specialised wholesalers and supermarkets may provide the service of transport, distribution and storage more cheaply than direct contact between producer and consumer can (see e.g. Dobson and Waterson, 1996). Consumers will have to spend more travel cost and time to buy products at the production locations of the different producers, or at retailers at different locations. A resulting preference for "one-stop shopping" leads to agglomeration externalities (i.e. retailers prefer to be located close to each other and benefit from customers attracted by nearby retailers), and supermarkets, selling many product lines, may successfully internalise such externalities (Hay and Smith, 2005). In addition, supermarkets may benefit from the ability to spread fixed costs over multiple product lines (Dobson and Waterson, 1996).

Welfare effects of the creation of a vertical chain

In the main text we explained how economies of scale and scope provide a rationale for the development of large multi-product wholesalers and retailers as an intermediate between producers and consumers. The independence of those retailers from the manufacturer may have additional welfare effects, stemming from conflicting interests between the two parts in the chain, as well as between competing retailers (see Rey and Vergé, 2005, and Dobson and Waterson, 1996). Externalities may restrict the ability to coordinate between either manufacturer and retailer, or between retailers. For example, in its price setting, the retailer may ignore the effects of its own price choice on the manufacturer's profits, leading to double marginalization. In that case both the manufacturer and the retailer choose a mark-up above their own (marginal) cost leading to a higher price, lower output and consequently to a lower surplus for both of them than maximizing their joint surplus. As another example, existence of multiple retailers who benefit from each other's efforts in sales support and advertising may lead to inefficiently low investment in such activities. Sometimes, competition between retailers in selling one manufacturer's product (i.e. intrabrand competition) may undermine the manufacturer's ability to efficiently exploit its market power (see Hart and Tirole, 1990).
In most (but not all) cases, conflicts of interest reduce manufacturer-retailer joint profits. The effects on welfare, however, are ambiguous. For example, double marginalization is detrimental to overall welfare, whereas strong intra-brand competition may improve static efficiency. The generally negative effect on joint profits does provide a rationale for the occurrence of various types of vertical restraints, or contractual limitations on manufacturers' or retailers' behaviour. Examples of such restraints are exclusive dealing, retail price maintenance, and non-linear contracts (on which more below). As might be expected, the welfare effects of such restraints can again be ambiguous (see Rey and Vergé, 2005).

3.4 Horizontal competition in the supermarket chain

Horizontal rivalry and vertical relations between players upstream and downstream influence competition between the different actors in the supermarket chain. Here, we focus on (horizontal) competition between actors in the supermarket chain to assess static efficiency and look at the welfare implications different theories provide.

Seller power in the supermarket chain

The extent to which entry barriers exist determine the number of firms active in the different stages of the supermarket chain. Entry barriers may provide incumbents with market power.

Physical, non-physical and regulatory factors determine the level of entry barriers, and these will differ across firms in the supermarket chain. Physical entry barriers are related to large investments in factories, retail outlets, warehouses, specific machines, R&D in products and processes which may be sunk or not. Sunk investments are firm specific and the costs incurred cannot be recovered to any significant degree. Economies of scale more generally restrict opportunities for entry. The number of firms active in the market will decline, as higher entry barriers require large output to operate at minimum efficient scale and to have low average cost. Non-physical entry barriers refer to investments in marketing and advertising to build up a brand name or raise customer awareness. Regulatory barriers also exist in the supermarket chain and can arise due to restrictions to the freedom of establishment, such as local and urban planning laws, and controls on product quality or safety and environmental regulation.

The level of product substitutability or differentiation, as well as consumer switching costs also influences market power of firms. At the manufacturer level, products from different manufacturers are seldom perfect substitutes. Price sensitivity decreases as products are more differentiated, allowing higher mark-ups without consumers opting to buy an imperfect substitute. Similarly, supermarkets can differentiate, in service levels, product range, but also in location choice (see e.g. Dobson and Waterson, 1996). Switching costs relate to consumers' inertia in choosing a different supermarket, even if products offered there would be more attractive or priced lower. Such behaviour may arise from consumer unawareness of all prices of competing supermarkets (and the costs of acquiring such information).

Price competition on the retail market

Competition on price is one way supermarkets try to distinguish them from others and to attract consumers. In the retail market, the market failure of imperfect information is likely to arise: consumers generally are unaware of the prices a multi-product retailer asks for its numerous products. Supermarkets advertisements on prices and discounts and independent price comparisons (i.e. Consumentenbond) can partially help to overcome price unawareness, but also influence price perception. Supermarkets have to attract consumers to their outlets and then to persuade them to buy a set of products that maximizes its total profits. The supermarkets' strategies might be to charge relatively low prices for products consumers are price sensitive to (and for which they possess high price awareness), and relatively high prices for products to which consumers are price insensitive.

Economic theory provides several models that aim to mirror competition in markets in the real world. The model of perfect competition is usually taken as the benchmark for static efficiency, but hardly serves as a representative market structure. In this model a large number of independent sellers of a uniform product are active under perfect information. Entry into the market is free and sellers on the market have to take prices as given. In this model static efficiency is optimal because suppliers produce and sell goods at a price that equals average and marginal cost.

In reality, however, two other models seem more applicable to (horizontal) competition in the supermarket chain, namely the models of monopolistic competition and oligopoly (see the box below). Welfare effects depend, in general, on the trade-off between increased product variety[16] on one side, and higher mark-ups and costs resulting from product differentiation on the other side.

[16] Provided that such additional varieties also increase consumer valuation for some consumers.

Monopolistic competition and oligopoly

Monopolistically competitive markets have the following characteristics (Varian, 1992):

• There are many producers and many consumers in a given market;
• Products are heterogeneous: consumers have clearly defined preferences and sellers attempt to differentiate their products from those of their competitors;
• There are few barriers to entry and exit; and
• Producers have a degree of control to set the price of the product.

A market characterized by monopolistic competition has a market structure in which several or many sellers each produce slightly differentiated products, and where each producer can set its price. In the short run a firm can obtain profits by successfully differentiating its product from competitors' products, but in the long run these profits disappear as competitors or new entrants copy a successful product.
The welfare implications of this type of competition are ambiguous. A monopolistically competitive firm is inefficient because the firm produces at an output where average total cost is not a minimum. But, this type of inefficiency does not necessarily have to be problematic because there exists product variety and the implications for welfare are dependent on how much product variety consumer's value. This relevant question of whether the market produces socially optimal product diversity has been analysed in a framework of monopolistic competition. Chamberlin (1933) suggested that monopolistic competition equilibrium is "a sort of ideal." Dixit and Stiglitz (1977) and Spence (1976) examined this idea using models based on a representative consumer formulation. They demonstrate that the equilibrium number of differentiated products can be higher or lower than that of the (constrained) social optimum, so that it is difficult to assess if static efficiency is lower than under perfect competition.
Where entry barriers are so substantial that the number of firms is more or less fixed, oligopoly models in which a market or industry is dominated by a small number of sellers are more apt descriptions. Common descriptions have a fixed number of firms competing in prices over (horizontally) differentiated products, for example in similar settings as the Hotelling and Salop models. An example of such a model of Bertrand competition in differentiated goods applied to the supermarket industry is Smith (2004), who estimates product differentiation (and effects on mark-ups of changes in market structure through mergers) for a sample of UK supermarkets.

3.5 Wholesale market: importance of buyer power

3.5.1 Introduction

Static efficiency is not only determined by competition on the retail market but also by interaction of supermarkets and suppliers on the wholesale market.

Market power in the wholesale market may arise from selling power of upstream producers, but also from buyer power of retailers. Buyer power is more broadly defined as the ability of the buyer to influence the terms and conditions on which it purchases goods (OECD, 1999). In the literature the term countervailing power, a term introduced by Galbraith (1954), is often used. It indicates the ability of large buyers in concentrated downstream markets to exact price concessions from suppliers.

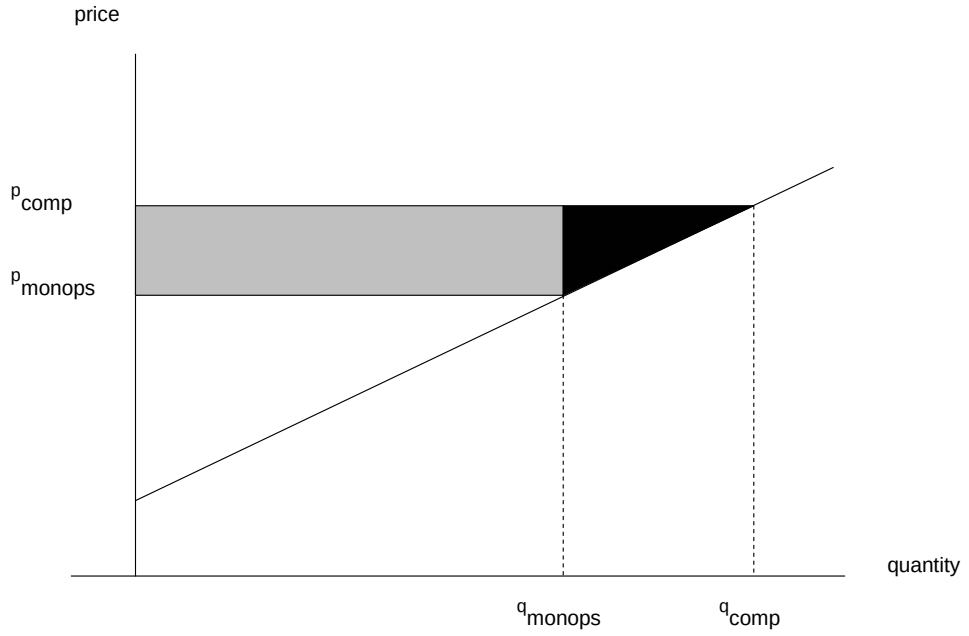
We review economic theory on buyer power here. We first briefly discuss buyer power in terms of 'traditional' monopsony power, and then extend this to include two features that are of

relevance in vertical industry chains in general, and for the supermarkets in particular. The first is that buyer power (by retailers such as supermarkets) often coexists with some extent of seller power of their counterparties, the manufacturers: hence, the term countervailing power. In the supermarket chain, clearly the degree of upstream selling power may differ substantially across product categories, but it is not hard to imagine that some of the larger manufacturers might have some muscle over their distribution channels. The second extension concerns the type of contracts that can exist between manufacturers and retailers. Rather than only specifying prices, such contracts in the supermarket industry may involve more complex price structures, including volume discounts, rebates and bonuses, slotting allowances and other fees, such as for instance for promotional activities. As we will discuss, such general contracts allows firms to increase their joint profits in transactions between upstream and downstream segments.

3.5.2 Traditional model and two extensions

The standard description of buyer power for a monopsonist (a 'monopoly buyer') is the mirror image of a monopolist seller. While a monopolist seller reduces its sales below the welfare optimum to raise price and profits (equating marginal revenues to marginal costs), a monopsonist likewise strategically lowers its demand to reduce price (see Figure 3.1).

Figure 3.1 Monopsonist



If the monopsonist reduces its price from competitive to monopsony levels, it reduces its payments (grey rectangle) but forgoes the benefit from some consumption (black triangle). While the monopsonist suffers a loss since it does not satisfy all its demand at the market price, this loss is compensated by the reduction in costs (because of the lower wholesale price) on the

(inframarginal) purchases it does make. In other words, the rents that the monopsonist wins from paying less to all suppliers that remain outweigh its loss of underconsumption.

The reduction of the wholesale price when volume is reduced relies, in a competitive seller market, on an upward sloping supply curve of the wholesale good. A reduction in the price offered by the monopsonist to the suppliers then results in an extraction of the rents of those low cost producers whose cost remain below the offered price. However, some sellers with higher marginal costs would now stop selling to the monopsonist as prices are lower than their marginal costs – even if their marginal costs are lower than marginal benefits of consumption by the buyer, and producing is welfare optimal. As a result, such monopsony behaviour towards competitive sellers is always detrimental for total welfare. It is sometimes argued that if the monopsonist itself operates in a competitive downstream market, such lower prices would be passed on to, and benefit, consumers. As Noll (2005) points out, this cannot be the case: even if the monopsonist faces strong competition when selling to final consumers, the consequence of its reduction in purchases upstream is that some efficient producers do not produce. Instead, higher cost substitute products, leading to inefficient production and too high end-user prices, replace these sales.[17] As Dobson et al. (1998) show, in case the single buyer is also a monopolist in the downstream market welfare losses are even higher with a lower industry output, lower input prices and higher retail prices (i.e. double marginalisation).

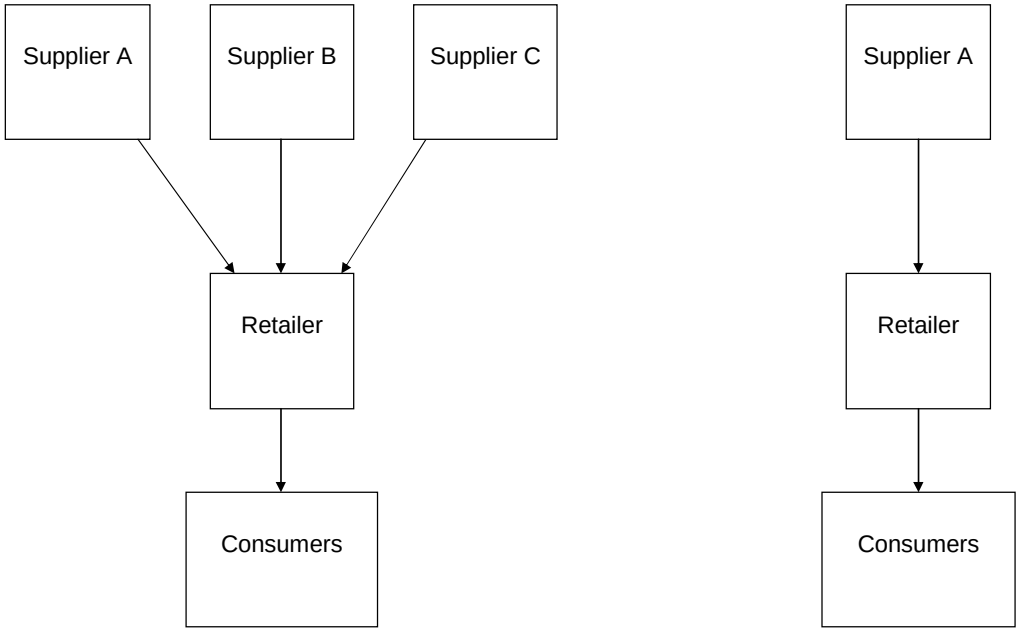
Extension 1: Bilateral monopoly/oligopoly

In more general settings, one may expect both upstream suppliers and downstream retailers to possess some bargaining power. In this case of more balanced bargaining positions one cannot simply assume that either party can unilaterally set the price. Market outcomes in such situations may be analysed by using bargaining theory.

In the simplest setting, upstream and downstream firms engage in bargaining over a single parameter, the wholesale price per unit product. Firms sign linear contracts based on one parameter, price, in which total payments are simply proportional to the quantity bought. Later on we consider scope for improvement on this outcome by engaging in more general negotiations. A frequently used approach to analyze the interaction between supplier and supermarkets is the Nash bargaining solution, as used e.g. in Von Ungern-Sternberg (1996) and Dobson and Waterson (1997). In this approach, the different supermarkets take as given the equilibrium prices agreed between their competitors and the supplier of the product. They then bargain with the supplier over price. The outcome of this bargaining process depends crucially on the outside options that both parties have.

[17] See also the analysis by Blair and Harrison, 1993.

Figure 3.2 Monopsony buyer, facing competitive suppliers (left) versus bilateral monopolists (right)



Outside options (or threat points) are defined as the profits that either side will have if no deal is struck. For the supplier, this will mean that it will only make profits on the other supermarkets it transacts with, while for the supermarket it equates to the profits it makes if it does not carry the product. The incremental joint profits of concluding the (extra) trade between the two parties will then be divided among them according to the (exogenously specified) relative bargaining power of the two sides. They may, for instance, split these incremental profits evenly.

In bilateral oligopoly (as in figure 3.2, right hand panel), the supermarkets' bargaining power over the supplier will be larger as the loss to the supplier upon failing to conclude a trade with any single supermarket increases: the value of its outside option then decreases. A supplier having no alternative channels for selling its products than selling to the supermarket will be more willing to accept an offer close to its marginal costs than a supplier who does have such alternatives. As an example, recent sharp increases in the world prices for milk powder (as a result of increased demand in the Far East) give dairy farmers an improved bargaining position towards retailers (and indeed, to dairy cooperatives). Vice versa, the supermarket's outside options, and his bargaining power, improve if the effect of not reaching an agreement with the manufacturer becomes less severe, for instance because good substitutes are available. The tendency for supermarkets to increase the number of private label products may be seen as an attempt to reduce the dependence on certain branded products, and as such an increase of bargaining power.

Dobson and Waterson (1997) study mergers between supermarkets facing a single (monopoly) supplier. They analyse the effect of such mergers on countervailing market power, and on total

welfare. The authors focus on two competing effects. On the one hand, the reduction in number of supermarkets as a result of the merger leads to a decrease in outside options to the supplier, and hence an improved bargaining position for the retailers. The question is then whether the resulting gains from lower wholesale prices are passed on to consumers. Since in the Dobson-Waterson model, supermarket competition is modelled as differentiated goods Bertrand competition, a decrease in competitors (as a result of a merger) increases the firms' downstream market power. While in this model mergers always increase buyer power, generically, the consumers turn out to be worse off as a result of the merger, since the increase in downstream market power allows firms *not* to pass through the cost reduction to consumers. Only for fierce competition (low product differentiation) can the net effect on welfare be positive. Von Ungern-Sternberg (1996) reached similar conclusions.

We so far focused on models of bargaining over linear price contracts. Such linear price contracts are generally inefficient as they involve deadweight loss: the resulting trade quantity differs from the quantity that optimises supermarket and manufacturer's joint profit. Essentially, a trade-off occurs between joint productive efficiency and exercise of buyer power: in order to raise its share of the total surplus generated by the two players, the supermarket can only reduce the wholesale price, and hence also the total quantity below the joint surplus optimum.

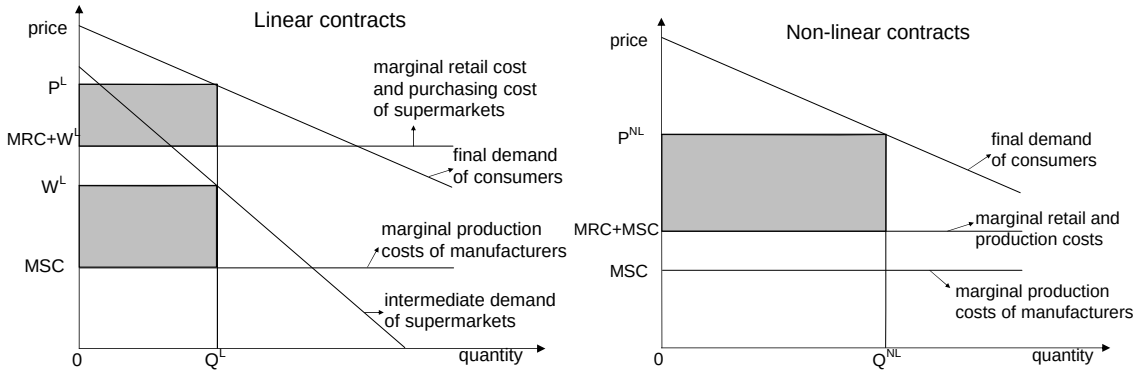
Extension 2: Bargaining and general, non-linear contracts

More generally contracts between suppliers and supermarkets may involve non-linear price structures. In fact, contracts involving various types of fixed fees, such as slotting fees or various types of volume dependent rebates appear to be quite common in the industry (see Competition Commission, 2000, Villas-Boas, 2007). Under these conditions, supermarkets may have the opportunity to at the same time optimize joint supplier-supermarket profits, by adjusting the variable wholesale price so as to stimulate suppliers to deliver optimal quantity, and exercise buyer power by extracting its share of the surplus, for instance through a fixed fee. This theoretical insight relies on the absence of information asymmetries between the two parties, which could introduce distortions in the transactions between them. Significantly, under such conditions the magnitude of supermarket buyer power may be immaterial to the retail prices charged downstream as sellers: from the consumer perspective, the supplier-supermarket pair behaves as a vertically integrated combination.

Example: why can non-linear contracts be jointly optimal?

A simple example may illustrate the usefulness of such non-linear contracts. Suppose both seller (manufacturer) and buyer (supermarket) are monopolists, with equal bargaining power. We first consider the counterfactual in which supermarkets and manufacturers can only agree on a single tariff, i.e. negotiate a linear price contract. We then see how a deviation to a more complex non-linear contract is attractive to both sides.

Distribution of profits in cases of linear contracts or non-linear contracts



If both parties set a single wholesale transaction price for goods sold by the manufacturer to the supermarket (a linear price contract W^L), this transaction price will need to be above costs for the manufacture to make a positive profit (assuming marginal costs MSC are constant). The supermarket will view the contract price for the good as a per unit cost. As a monopoly retailer, it will adjust its retail price P^L so as to optimise downstream profits *given* this cost (as well as its other marginal costs of retailing MRC), i.e. add a monopoly mark-up to this cost to determine the retail price. Total, aggregate prices under such linear price contracts therefore include mark-ups as a result of market power of both manufacturer and supermarket, a phenomenon known as double marginalisation. Since in determining these mark-ups, firms are chiefly concerned with the impact of any price rise on their profits (and not on those of its vertical counterparty), they do not optimise their joint profits.

A change to non-linear price contracts (or two-part tariffs) can improve the situation for both retailer and manufacturer. Joint profits are optimised, by determining the retail price P^{NL} by adding a mark-up to the actual manufacturer's production costs and retailer's retail cost, rather than on the inflated transaction (wholesale) price. Suppose both contract partners now sign a contract setting their transaction price equal to marginal production costs (leading to the monopoly price for end-consumers). Since the joint surplus is now higher, the manufacturer and supermarket can in principle agree on a lump sum side payment (from the supermarket to the manufacturer) for which each will be better off, compared to the single price example. Since as a result, prices are reduced (and volumes increase), even consumers gain in this case.

It is therefore natural that supermarkets and manufacturers engage in general 'non-linear' contracts (where payment is not directly proportional to traded quantity), as this is beneficial for both parties. The extent to which such contracts may succeed in optimising their joint surplus will be mainly determined by the information they have on each other's (production) costs and benefits. When information asymmetries are completely absent, the joint welfare optimal contract is attainable. Asymmetries in information may limit the ability to agree on optimal contracts (see Myerson and Satterthwaite, 1983). In practice this can manifest itself in (temporary) breakdowns in negotiations, for example. Also, if moral hazard is present (e.g. if

the supermarket benefits from some effort on the part of the supplier, for instance relating to product quality, but the manufacturer may shirk on this effort since it is non-contractible or non-observable), then some deviation from first-best optimal contracts (from the supermarket's point of view) may be required. In this case, the desire to maximise joint profits should be balanced against the necessity to alter contracts so as to give incentives to suppliers to exert sufficient effort (Martimort and Stole, 2003).

Non-linear contracts in practice

A well-known form of non-linear tariffs is that of two-part tariffs, consisting of a price per product plus a sales-independent franchise fee. Contracts involving such two-part tariffs would specify that supermarkets pay a volume dependent price, and in addition, there is a lump sum (volume independent) transfer between the two parties. If supermarkets and manufacturers negotiate on prices and sales volumes simultaneously, the same price structure could be phrased as an (average) per unit price that decreases with the volume of product bought by the supermarket.
In practice, apart from per product prices, it appears that direct side payments from manufacturers to supermarkets are common. As an example, the UK Competition Commission (2000) lists several price components that large retailers use in their dealings with manufacturers. Among these are:
- volume or sales related discounts (sometimes retrospectively)
- contributions towards promotion of products
- payments for extending the product range of a supplier carried by the supermarket, or for the introduction of a new product line
- listing or slotting fees, i.e. payments for use of shelf space or use of specific display areas (such as gondola ends)

To the extent that such payments do reflect a dependence on (actual or expected) sales volumes, such fees may be simply a reflection of the (possibly imperfect) application of two-part tariffs: as volumes increase, the net price per product decreases.

3.5.3 Implications of non-linear contracts for welfare and measurement

Non-linear contracts allow upstream and downstream firms to eliminate welfare loss in their transactions, and to increase their joint profits consequently, compared to standard linear pricing. Consumers are better off as well compared to straightforward linear price contracts: the elimination of double marginalisation reduces consumer prices (to the simple monopoly price, in the above example), so the reduction in deadweight loss benefits all players in the game.

Since, with full information, such contracts result in joint optimal profits, irrespective of the distribution of bargaining power between the upstream and downstream parties in the chain, any *change* in bargaining power will not affect the quantity traded, or the downstream price. As a result, in the short run static welfare and consumer surplus are independent of bargaining power when optimal non-linear contracts can be concluded between manufacturers and supermarkets. The only short-term result of a change in bargaining power is then that, while the joint surplus of a supermarket and a manufacturer is not affected, the division of this surplus between both

parties is. In measuring such changes in bargaining power, one would therefore have to concentrate on the changes in shares of sector profits between the two segments of the market.

Slotting allowances

Slotting allowances (or slotting fees) are one particular type of payments by manufacturers that have attracted some attention in the theoretical literature as a potentially anticompetitive device. Slotting allowances are payments required from manufacturers in return to gaining access to (limited) shelf space. Under one interpretation, one may simply view such allowances as price discounts relating to the expected higher sales volumes associated with more prominent display in the store. Another interpretation is, however, that these represent lump sum fees that allow supermarkets to commit to compete less fiercely with each other.

The latter argument rests on the following observation. As noted, in bilateral monopoly (i.e. a monopoly manufacturer and a monopoly supermarket), two-part tariffs with a per unit price equal to marginal production costs plus a volume independent fee allow supplier and supermarket to successfully optimise their joint profits on the monopoly result, avoiding double marginalisation and yielding the joint optimal outcome. In contrast, a similar tariff structure with two competing supermarkets would be much less attractive to manufacturer and supermarkets: competition between supermarkets would drive prices down below the monopoly level. As observed by Shaffer (1991), a solution to this 'problem' (from the point of view of the firms, not the consumers), is for each supermarket to agree on a contract with the manufacturer with higher per unit prices, raising the supermarket's effective marginal costs of sales. Such higher costs constitute a commitment not to price very aggressively, dampening downstream competition. Clearly, the bulk of profits using this pricing scheme is gained by the manufacturer, who sells at the high per unit cost. However, if supermarkets possess strong bargaining power, they would negotiate a large fixed fee – a slotting allowance - paid by the manufacturer to the supermarket to compensate for the high variable price, and to appropriate the rents gained by the sector as a whole.

As explained by Kuksov and Pazgal (2005), such an interpretation implies that slotting fees would be higher with higher supermarket competition (indeed, for supermarket monopoly no such scheme would be warranted). Also, higher buyer power would mean higher slotting allowances.

The suggested explanation crucially depends on the fact that contracts between the supplier and a supermarket are observable to the rival supermarket (O'Brien and Shaffer, 1992). If suppliers can secretly (re)negotiate the contract terms, there is a risk of opportunism: the supplier has an incentive to adapt the price, increasing the joint profits of itself and the supermarket, at the expense of the rival supermarket. Foros and Kind (2006) point out that it may be sufficient that observability holds among partners in the same buying group, a condition more likely to hold in practice.

Another (dynamic) welfare effect may be at play, however. In the longer run, market parties may adjust their behaviour precisely to increase their buyer power (and enlarge their share of the joint supplier-supermarket profits). Such changes in behaviour may have either positive or negative welfare consequences. We explore some of such mechanisms in the following section.

3.5.4 Determinants of buyer power

We have seen that the distribution of bargaining power depends on the outside options available to both parties in the negotiation. But what factors influence these outside options for both supermarkets and suppliers? And, given such factors, what strategies may retailers follow to improve their outside options and increase their bargaining position? Understanding the

determinants of buyer power may shed some light on the incentives on firms to improve their positions, and sheds some light on potential welfare consequences of such firm behaviour.

Downstream competition and buyer power

Changes in manufacturer-supermarket bargaining power do not directly lead to changes in downstream competition and prices, if both parties are able to write general non-linear contracts optimising their joint profits (since in that case, only lump sum transfers are altered). The converse, however, is more conceivable: if the strength of competition between supermarkets changes, their bargaining power vis-à-vis the manufacturer is altered.

Suppose, as an example that two supermarkets engage in price competition. Both are located some distance apart, and consumers prefer the closest one to their homes. Lower prices will however induce some consumers to travel somewhat further to the cheaper supermarket: consumers consider the two supermarkets to be imperfect substitutes.

Both supermarkets may sell a product from monopoly manufacturer M, and make contract offers to M. Optimal contracts always involve a variable price component equal to M's marginal production costs. These provide supermarkets incentives to make optimal selling effort, while in addition the supermarkets offer a fixed fee contributing to M's profits. The size of this fixed fee then reflects the buyer power of the supermarkets. (In practice, as discussed above, the aggregate payment scheme is often more complicated, and may rather take the form of higher wholesale prices and volume dependent rebates from manufacturer to supermarket).

The size of the fee offered in equilibrium depends on M's outside option: if he turns down one supermarket's offer, he would only supply the other one, and lose part of sales. A supermarket cannot make too low offers for fixed fees if M can serve many of its consumers by supplying its rival. The extent to which this is the case depends on the level of substitutability between the two supermarkets: the further the two supermarkets are apart, the larger the supermarkets' buyer power, as consumers will not be easily persuaded to buy the product at the alternative location.

Suppose now that for exogenous reason substitutability between supermarkets increases. This may be because consumers become more price sensitive, for instance. In that case, on the one hand competition between supermarkets will become fiercer, leading to lower mark-ups in retail prices. Total profits for the entire industry chain therefore decrease. On the other hand, also the outside option to the manufacturer improves: consumers are more willing to travel to the other supermarket. As a result, the upstream supplier may obtain a larger share of these decreasing profits.

The effect of increased competition between supermarkets therefore not only leads to lower selling power, but also lower buying power of the supermarkets. Total supermarket profits then decrease. The effect on upstream manufacturers is ambiguous: they obtain a larger share of the smaller pie.

Downstream competition

As discussed in the text box above, the degree of inter-supermarket competition affects supermarkets' buyer power. If, for some reason, competition increases, supermarkets' bargaining position may also deteriorate. Vice versa, if supermarkets make an effort to increase differentiation among each other, they not only may succeed in charging higher prices to end-consumers, but they also improve their buyer power vis-à-vis manufacturers. The upstream relations therefore increase supermarkets' incentives to differentiate and reduce competition. The welfare effect of that is ambiguous, since increased differentiation itself can also generate additional surplus.

Firm size

Although large supermarkets (or supermarkets with large market shares) are often assumed to possess large buyer power, both theoretically and empirically the role of size is not completely straightforward (Inderst and Mazzarotto, 2005). A number of theoretical arguments that might explain how size creates buyer power exist. One strand of arguments relies on the assumption that large retailers may be better able to switch between suppliers, for instance because there are fixed costs associated with such a switch (which a large supermarket may spread over more customers, see e.g. Inderst and Valletti, 2006). If a large supermarket can credibly threaten to facilitate upstream entry by new manufacturers, this may improve its outside options, and hence his buyer power. Such dependence on size may result from economies of scale in manufacturing: for upstream entry, cooperation of a larger new customer may be necessary.

Another argument that would explain larger buyer power is that, if losing a large customer leads a supplier to incur large costs to find new outlets for his goods, the supplier's outside options are reduced in value, and again this might lead to increased buyer power.

If a supplier's production technology exhibits decreasing returns to scale, retailer size may also help in increasing the amount that is open for negotiation to the supermarket (Chipty and Snyder, 1999).[18] The intuition is that the supplier and retailer negotiate over the incremental joint surplus generated by additional sales. The sales a supplier makes to a small buyer do not generate additional profits to the buyer: the volume sold to such a buyer is produced at high marginal costs. The average per unit costs of the incremental sales to a large buyer, conversely, is lower. Loss of these sales also means loss of a large fraction of volume produced at lower marginal costs. This larger loss of losing a larger customer, compared to losing a smaller customer, confers buyer power on the larger customers. The situation is precisely the reverse when marginal production costs are decreasing. Buyer power is, more generally, determined by the degree to which the buyer is essential to increase the total surplus (Battigalli et al., 2006).

How may these determinants influence firms' behaviour? If size indeed creates buyer power, this may explain mergers among buyers, or the formation of purchasing groups common among supermarkets.[19] Clearly, if purchasing groups also succeed in increasing their market power downstream, on the market for consumers, this has negative consequences. From a social welfare perspective, these negative effects should be traded off against any economies of scale from cooperation. The increase in buyer power itself, as argued above, is welfare neutral if optimal non-linear contracts can be struck, but in reality suboptimalities in contracting will occur, that may have ambiguous welfare effects.

The relation between size and the slope of a supplier's production function leads Inderst and Wey (2005) to point out that buyer power may increase upstream incentives to innovate. In a

[18] See also Inderst and Wey, 2003.

[19] Another explanation may be reduction of transaction costs due to economies of scale in purchasing and distribution.

situation where buyer power is increased as a result of steeply increasing marginal costs of production, the supplier may improve his bargaining position vis-à-vis a larger buyer by investing in technology that reduces the diseconomies of scale in production.

The 'waterbed effect'

The Competition Commission, in its ongoing groceries inquiry, has also related size to a 'waterbed effect'. This effect has received theoretical attention in, among others, Inderst and Valletti (2006). The claim is that if large buyers can extract lower wholesale prices, this may in fact result in higher wholesale prices for the same product to smaller rival supermarkets.

The waterbed effect relies on the assumptions that a) size indeed leads to better terms for the buyer, and b) that these terms are reflected in lower marginal wholesale price (rather than lump sums). If this is the case, then the lower marginal costs to the large supermarket drive it to more aggressive retail competition. This, in turn, takes away market share from its smaller rivals, who, as a consequence of their smaller size, lose even more buyer power. Their wholesale prices therefore increase.

As the Competition Commission (2006) points out, the relevance of such an effect in reality is not immediate. First, while wholesale prices for the same product do differ among retailers, the advantage in (UK) practice does not seem to be consistently for the larger retailer. Second, non-linear tariffs appear quite common in reality, rendering assumption b) contentious.

Vertical integration and private labels

Another mechanism of altering the outside options of both supplier and supermarket is (the threat of) vertical integration. In the simplest case, if a supermarket integrates with one supplier, producing a private label, its bargaining position vis-à-vis the other brands improves (depending on the substitutability of the products): it will lose fewer customers if it does not stock the independent supplier's brand product. Production of private label goods may also improve the information on production costs available to the retailer, and as a result improve his negotiation strength with other suppliers. Since such vertical integration requires large capital outlays, Katz (1987) (see also Inderst and Wey, 2005) argues that larger firms (i.e. supermarkets) can more credibly threaten to integrate backwards, leading to lower prices for such buyers.

Since the motivation for such integration results from a desire to shift the distribution of rents within the industry, rather than increasing total profits for the industry, such moves may result in welfare loss from inefficient behaviour. It might for example promote socially wasteful duplication of products, or inefficient merger.

3.5.5 Conclusions

Do changes in buyer power affect total welfare? As argued, as long as buyer power is not met with manufacturer's seller power in the wholesale market, and if the buyer power results in the buyer exacting lower (linear) wholesale prices from his suppliers, buyer power reduces welfare. This is so even if the buyer itself competes fiercely in its downstream market.

No investigation of buyer power of supermarkets

The Dutch competition authority (NMa) saw no reason for an investigation of buyer power of supermarkets in the Netherlands, regardless whether buyer power actually rose because of the price war (see NMa, 2004).
The NMa states that only abuse of buyer power is prohibited. The authority argues that in the case of the present price war, buyer power is not predominantly abusive, because all benefits of it will accrue to the final consumers as a result of sufficient competition in the downstream market. Note, however, that as Noll (2005) points out even if supermarkets face strong competition on the retail market, the consequence of buyer power in case of linear-contracts implicates a reduction in purchases upstream and, hence that some efficient producers do not produce.

The story is different when also manufacturers have market power in the wholesale market. If transactions remain being concluded on simple contracts with linear wholesale prices only, welfare results are ambiguous. However, it is, in this context of both powerful buyers and manufacturers in the wholesale market, doubtful whether both parties will not extend their negotiations over non-linear contracts, to their mutual benefits. Under fully efficient contracting, changes in buyer power will only change distributions of rents through changing lump sum payments, as manufacturers and retailers will strive to optimise their joint profits anyway. In this case, an increase in buyer power has no direct welfare effect.

Reality is, without doubt, represented neither by the extreme of linear prices nor by the other extreme where market power on either side of the wholesale market only affects lump sum payments, and unambiguous conclusions on welfare effects cannot be drawn. Welfare effects do result if there are large transaction costs or asymmetries of information that do not allow such efficient, non-linear, contracts to be concluded. Furthermore, the drive to alter bargaining power itself, by altering outside options, induces potentially inefficient rent-seeking behaviour.

4 Measuring static efficiency

4.1 Introduction

This chapter discusses how we measure static efficiency. We argue that an assessment of the welfare effects of the supermarket chain should include measures of mark-up and competition intensity.[20]

As discussed in section 3, the existence of intermediaries (such as the supermarket) between producers and consumers is motivated by efficiency: making the trade process more efficient by exploiting economies of scale and economies scope in supermarkets, as well as by internalising (agglomeration) externalities. Consumer prices and the transport costs (or stated otherwise the sum of marginal cost over the supermarket chain) are lower than without supermarkets because of higher (productive) efficiency. The mark-up over costs also depends on the extent of competition, both among producers and supermarkets.

This chapter describes a number of indicators to provide a comprehensive picture of developments of competition in the supermarket chain.[21] The structure of this chapter is as follows. Section 4.2 and section 4.3 concentrate on how to measure seller power and buyer power respectively. All measures focus on outcomes, as we assume that problems related to market power should ultimately show up in those indicators. Section 4.4 presents a measure of static efficiency in terms of the extent of dead weight loss.

4.2 Measuring seller power

4.2.1 Three indicators

The empirical IO-literature has put forward a number of indicators that try to measure market power or the intensity of competition. Nonetheless, how to measure competition ultimately is still an unsettled question in the literature, as competition is a complex phenomenon. In line with empirical applications in Boone et al. (2007) and in Creusen et al. (2006), we use the following notion of product market competition. In a more competitive market, firms are punished more harshly in terms of profits for being inefficient. In principle, a low level of market power or a high level of competition intensity is related to low levels of mark-up in an industry or economy. This memorandum explores three indicators.

[20] In section 5, we also reflect on the relationship between competition and product variety with respect to static efficiency.
[21] We restrict to statistical indicators, as lack of appropriate data hinders the (more direct) estimation of structural models to measure the extent (and changes in) seller power and buyer power.

- *Herfindahl index* (HHI) takes account of the extent of concentration of market shares in markets. High concentration of market shares is seen as a signal of weak competition that leads to high prices and high price cost margins.
- *Price cost margins* (PCM) as a measure for market power. It is the ability of firms to set their prices higher than their marginal costs. Conditional on marginal costs, a high PCM suggests market power, and hence lower competition.[22]
- *Profit elasticity*: the elasticity of a firm's profits with respect to its cost level. A higher value of this profit elasticity (PE) signals more intense competition.

Option 1: Concentration rate selling side

In practice, several concentration ratios are available, but this document uses the so-called HHI based on market shares.[23] Concentration in market shares may point to market power to set prices above marginal costs.[24] The size of the index is high if a few firms have large market shares and dominate the market. The extreme case is a monopolist. In that case, the HHI is equal to 1 as one firm holds 100% of the market. If many firms operate on the market and each one possesses a small market share, no domination in the market exists and the HHI approaches zero.

The HHI on total sales is computed as follows:

$$HHI_{sales} = \sum_i \left(\frac{s_i}{\sum_i s_i} \right)^2 \qquad (4.1)$$

with s_i the market share in percentages of each retailer or each supplier in the total sales of the respective industry. Due to the squaring procedure, greater emphasis is placed on large firms in the market. Note that a high HHI does not necessarily imply competition problems, as large firms can be more efficient due to economies of scale. A disadvantage of the HHI is the fact that the outcome relies heavily on the relevant product and geographical market chosen, therefore making it particularly vulnerable.

[22] PCM is not in all cases an ideal indicator for competition (see Boone et al., 2007).

[23] Another indicator of concentration is the market share of the largest x firms, the so-called Cx-ratio. This indicator has the advantage to the Herfindahl-index that it does not require the information of all firms. The disadvantage is that the Cx-ratio does not consider the skewness of the distribution in market shares. For example, a market of 20 symmetric firms has the same C10-ratio (0.5) as a market consisting of a dominant firm with 45.5% market share, nine smaller firms with 0.5% market share each and a large fringe of 1000 firms with each 0.05% market share.

[24] See Cabral (2000). In some circumstances, the industry PCM is proportional to the HHI divided by the consumer price elasticity.

Option 2: Definition and measurement of PCM

We apply the PCM as an indicator for the overall mark-up to suppliers and supermarkets as follows.

Marginal prices and marginal costs

Theoretically, computing PCM requires using marginal costs: the extra costs of producing one more unit of the product. In practice, such data is often not available, and we have to focus on average variable costs. By approximating marginal costs by average variable costs, we implicitly assume constant returns to scale.

Similarly, on the price side, use of the PCM is most suited to situations where transactions are governed by linear contracts, where price equals total payment divided by total volume of goods. If, on the other hand, contracts involve payments that are not linear in produced goods (volume rebates, lump sum transfers etc.), one might be interested in the marginal price (the extra payment required for purchase of one extra unit of the product). Again, for computation of the indicator, we do assume that price equals payments divided by volume, implicitly assuming linear contracts only.

Our calculations of the PCM might over- or underestimate the size of the (real) PCM based on marginal prices and costs. The PCM levels calculated will generally be higher than the theoretical most feasible option because the nominator effect will outweigh the denominator effect. Deviations of changes in the PCM are harder to interpret, but an increase in non-linear elements will lead to an overestimation of the calculated PCM, compared to calculations using marginal prices and costs.

The computation of the PCM as presented here can also be interpreted as computing earnings over total revenues, an indicator (or 'multiple') useful in its own right.

Manufactures

For each manufacturer in the supermarket chain we define its PCM as[25]

$$PCM = \frac{W - MC}{W} \tag{4.2}$$

with W the wholesale price of each product, $MC = MSC(q)$ the marginal production cost at the manufacturer's production level q.[26] Note that the estimated PCM may include non-linear price elements and average variable costs (see box for further discussion). Further, we implicitly assume that the factor prices of all inputs of the suppliers, including the raw materials, are given.

In practice, for each firm *i* belonging to the suppliers of supermarkets we measure its PCM of all products as

$$\overline{PCM}_i = \frac{total\ sales - variable\ costs}{total\ sales} \tag{4.3}$$

[25] Subscripts are only added if necessary.

[26] Note that the wholesale price depends on the match between total demand and supply of each individual wholesale segment, say milk, meat or coffee.

with *variable costs* equal to the sum of the costs of all raw materials and wages.[27] The industry PCM of each manufacturing segment is then the product of the weighted average of all individual PCMs, weighted by each firm's market share:

$$\overline{PCM}_{manufacturers} = \sum_i s_i \overline{PCM}_i \tag{4.4}$$

with s_i the market share of supplier *i.*

Supermarkets

For each supermarket *j*, we define its PCM for any product as

$$PCM = \frac{P - MC}{P} = \frac{P - MPC - MRC}{P} \tag{4.5}$$

with P the retail price of the product, and MC the marginal costs of each product sold if Q products are sold.

The retail price depends on the match between total demand and total supply of each product on the retail market. The marginal costs can be divided into two relevant parts: the marginal retail and distribution costs (*MRC*), and the marginal purchasing costs (*MPC*). The marginal retail costs refer to transportation costs, storage costs and wages. The marginal purchasing costs reflect the impact of the supermarket's demand for products on its total purchasing cost, which is the total quantity of products (Q), each purchased at the wholesale price (W). Note that due to buyer power, the supermarket may have an impact on the (marginal) wholesale price. The marginal purchasing costs also pick up the latter effect, as

$$MPC = \frac{\partial WQ}{\partial Q} = W + \frac{\partial W}{\partial Q} Q \tag{4.6}$$

Further, as supermarkets or buyer groups sell a bunch of products, the PCM of the individual firm reflects the weighted average of the PCMs for each sold product.

For each supermarket *j* we measure its average PCM of all products as

$$\overline{PCM}_j = \frac{total\ sales - puchases - retail\ costs}{total\ sales} \tag{4.7}$$

[27] Note that the PCM is comparable to the ratio of gross earnings (i.e. profits and cost of capital) over sales.

with *purchases* as the total costs for purchasing the trade goods and *retail costs* as the costs for distribution, storage and advertising as well as wages. Again, using this procedure we follow common practice to approximate both the marginal purchase costs and marginal retail costs by their average costs.

The *industry* PCM of the supermarket industry as a whole is calculated as the weighted average of the firms' measured PCM, each weighted by its market share s_j in total industry sales:

$$\overline{PCM}_{supermarkets} = \sum_j s_j \overline{PCM}_j \tag{4.8}$$

Option 3: Profit Elasticity

Following Boone et al. (2007) (see also Creusen et al., 2006), we use a new empirical measure of competition: the Profit Elasticity (PE). PE is defined as the percentage fall in profits due to a percentage increase in (marginal) costs. In all markets, an increase in costs reduces a firm's profits. However, in a more competitive market, the same percentage increase in costs will lead to a bigger fall in profits. The underlying intuition is that in a more competitive market, firms are punished more harshly (in terms of profits) for being inefficient.

We estimate the PE by the (negative) relation between firm's profit and its marginal costs. Again, as data on marginal costs are not directly observable, we use the average variable costs (i.e. the sum of the purchasing costs of *all* intermediate products and labour costs, divided by the total sales) as an approximation. Using regression techniques, the slope β in the basic relationship estimates the PE:

$$log\,\pi_{it} = \alpha - \beta\, log\, c_{it} + \varepsilon_{it} \tag{4.9}$$

with π_i gross profit of firm *i* and c_i marginal costs of firm *i*. A high PE (=β) corresponds with a high level of competition. In order to estimate the PE accurately, we adjusted the basic equation for firm-specific effects.

4.2.2 Limitation of indicators

Although it is beyond the scope of this document to discuss the limitations of all three indicators at length[28], we briefly sketch some specific issue that need to be taken into account when reading.

The approximation of marginal purchasing costs by average variable costs implies a fundamental assumption. More precisely, by applying this procedure we implicitly assume that the supermarket (or buyer group) has no buyer power (resulting in $\partial W/\partial Q = 0$ in equation

[28] See for a more comprehensive discussion, for instance Boone et al. 2007, and Creusen et al. 2006.

(4.6)). It can be verified that the measured level of PCM overestimates the actual level of PCM by a factor that is related to the firm's buyer power and the HHI of industry purchases.[29]

Moreover, changes in the PCM may be the result of other determinants rather than changes in selling power. For example, new technologies inducing higher productivity may result in less input of labour and other raw materials (i.e. lower marginal costs). On the other hand, prices of output and inputs may change as well because of exogenous or cyclical developments not related to competition issues. Both factors affect the mark-up and consequently the PCM.

4.3 Measuring buyer power

4.3.1 Conceptualization of buyer power

Similar to the discussion of seller power, the theoretical and empirical literature on buyer power is neither straightforward in terms of definition nor in indicators measuring (the exercise) of buyer power. Analysing the issue, distinction between monopsony power and countervailing power is important (see chapter 3). Countervailing power (buyer power when there is also seller power) is more likely to improve economic efficiency than unilateral monopsony power. The latter reduces the quantity purchased, whereas the former can be important if competition among suppliers is imperfect. The result can be lower prices for consumers.

To operationalise the concept of buyer power in practice, we have looked at the empirical literature that has put forward three types of measures of buyer power:

- Buyer concentration
- Elasticity of supply
- Performance measures

Buyer concentration

Just as on the selling side of the market, a concentration rate with respect to the buyer on the purchasing market is a way to measure buyer power. In general, a high concentration rate of buyers at the purchasing market may reflect substantial buyer power. Nonetheless, a high concentration rate does not directly imply that one or more supermarkets exercise significant buyer power (see theory in section 3, where in particular it is argued that the relation between size and buyer power is not necessarily straightforward).

Elasticity of supply

Just as a high price elasticity of consumers indicates limited seller power of supermarkets, a low price elasticity of suppliers indicates to some extent buyer power of supermarkets and buyer

[29] See Appendix A.

groups.[30] If supply is less than perfectly elastic, the buyer can curb its demand leading to a lower price for its purchased products. A monopsonist makes higher monoposonistic returns if supply is less elastic. In general, for a given demand curve, the more inelastic is supply, the greater the welfare loss resulting from buyer power. On the other hand, as referred to, buyer power can also be used in negotiations as countervailing power if competition among suppliers is not perfect.

In practice, supply elasticities require the availability of both wholesale prices and quantities. We do not have such data at our disposal, so we cannot measure the elasticity with econometrics using structural models.

Performance measures

Indicators that directly measure the impact of buyer power on performance are a third channel that could be implemented to analyse the existence of buyer power. Examples are the size and development of: buyer's discount on the price, slotting allowances, better terms of payments, suppliers' contribution to promotional activities of supermarkets, and exclusivity requirements. Such strategic information turns out to be limited available for this study.

An alternative option put forward in literature is to look at the profitability of the buyers in relation to the profitability of suppliers. Note that we already apply this option on the assessment of the selling side of the markets as both the PCM of supermarkets and suppliers respectively are taken into account.

4.3.2 Measuring buyer power: 2 options

This paper uses two indicators for measuring buyer power that can help to signal possible buyer power problems:

- Concentration rate
- Relative Buyer Power Index (=BPI)

Option 1: Definition and measurement of buyer concentration

The buyer concentration rate is similar to the concentration rate for the selling side. Instead of the sales, we look at the purchases of traded goods. So the HHI for total purchases is computed as:

$$HHI_{purchases} = \sum_j \left(\frac{p_j}{\sum_j p_j} \right)^2 \qquad (4.10)$$

[30] The price elasticity of manufacturers (in short elasticity of supply) refers to the change of the quantity supplied due to a 1% change in wholesale price.

with p_j the market share in percentages of each supermarket or wholesale company in the total purchases of the respective industry.[31]

Option 2: definition and measurement of relative BPI

Buyer power can also be interpreted as the buyers' ability to obtain rebates (at the expense of the supplier) or a lower wholesale price than the "competitive" wholesale price in negotiations with suppliers. Blair and Harrison (1993) build on this interpretation and define a Buyer Power Index (in short BPI) as the mirror image of the PCM for selling power.

More precisely, the BPI for each supermarket or wholesale company is defined as

$$BPI = \frac{VMP - W}{W} \tag{4.11}$$

with VMP the value of marginal product of each purchased product purchased, and W the wholesale price of each product. The value of marginal product is defined as the marginal revenue on the retail market minus the marginal retail costs:

$$VMP = \left(P + \frac{\partial P(Q)}{\partial Q} Q \right) - MRC(Q) \tag{4.12}$$

Note that the seller power of the supermarket or wholesale company raises the marginal revenue and thus the value of marginal product of each purchased good. Further, as supermarkets and buyer groups sell a bunch of products, the BPI of the individual firm is the result of the weighted average of the BPI's for all products.

The value of marginal product, however, cannot be measured directly. To estimate this value, we approximate the marginal revenue of each product sold by its selling price, and the marginal retail costs by the average retail costs:

$$BPI = \frac{(PQ - RC) - WQ}{WQ} = \frac{\overline{VMP}\,Q - WQ}{WQ} \quad \text{with} \quad \overline{VMP} = P - \frac{RC}{Q} \tag{4.13}$$

For each supermarket *j* we then measure its average BPI of all products as

$$\overline{BPI}_j = \frac{(total\ sales - retail\ costs) - purchases}{purchases} \tag{4.14}$$

[31] Note that it is also possible to compute the HHI-indices of purchases for each manufacturing industry. However, analysis of this index is beyond the scope of this study, because we do not investigate the buyer power of manufacturers on their input markets.

The *industry* BPI of supermarkets or buyer groups is calculated as the weighted average of the firms' measured BPI, each weighted by its market share p_j in total purchases of all supermarkets or buyer groups:

$$\overline{BPI}_{supermarkets} = \sum_j p_j \overline{BPI}_j \tag{4.15}$$

There is, however, a problem with the BPI as there exists a close relationship between the BPI and the PCM. It is can be verified that, the measured BPI is the same as the measured PCM multiplied by the ratio of sales over purchases.

An alternative option is to look at the balance of power between supermarkets or buyer groups on the one side and manufacturers on the other side. Intuitively, a high ratio between the profits of supermarkets and profits of manufacturers may point to buyer power of supermarkets. In fact, exerting buyer power including rebates on the wholesale prices, supermarkets capture higher profits at the expense of the manufacturers.

Following this intuition, we define the relative buyer power as the ratio between the BPI of the supermarkets and the PCM of the manufacturers:

$$BPI^{rel}_{supermarkets} = \frac{\overline{BPI}_{supermarkets}}{\overline{PCM}_{manufacturers}} \tag{4.16}$$

In a similar way, we can derive the relative buyer power of the buyer groups $BPI^{rel}_{buyer\ groups}$. Note further, that the relative BPI is equal to the ratio of profits, but only if the quantity of products supplied by the manufacturers is equal to the quantity purchased by the supermarkets or buyer groups.

4.3.3 Limitation of indicators

We discussed various limitations of indicators measuring the seller power. Similar limitations are valid for the indicators of buyer power. Moreover, it is difficult to disentangle buyer power from seller power due to close interrelationship between both elements. Here, we only touch on limitations of the relative BPI.

The approximation of marginal revenue of each purchased good by its selling price implies a fundamental assumption. More precisely, this approximation implicitly assumes that the supermarket/wholesale company has no seller power on the retail market (resulting in $\partial P/\partial Q = 0$ in equation (4.12)). It can be verified that the measured BPI overestimates the actual BPI by a factor that is related to firm's selling power and the HHI on total sales (see appendix A). In addition, changes in the BPI may also reflect other developments rather than changes in buyer power. The other arguments for change in the PCM also hold for the BPI.

4.4 Price effects on static efficiency

Given the limitations of indicators, the implication for an assessment of buyer power and seller power in practice is that indicators should not be used in isolation but in a coherent analysis.

Nonetheless, it is possible to provide an overall impression of the price effect on the static efficiency in the supermarket chain. More precisely, we derive a price effect indicator that is based on an extended version of the famous Harberger's triangle or the Dead Weight Loss (see also Viscusi et al., 1992). Three elements play a crucial role in the price effects on static efficiency:[32]

- Mark-up;
- Price elasticity of consumers (demand side); and
- Elasticity of marginal costs (supply side).

The price-effect indicator is based on a number of assumptions that are to some extent open for discussion.

First, the expression is derived from the production of homogeneous goods. However, as products – and supermarket services – are heterogeneous, there is no single equilibrium price, and consumers may have different valuations for different products.

Further, the derived formula for the price-effect indicator depends on the marginal retail costs of the least efficient supermarket *and* the marginal production costs of the least efficient supplier. However, in reality, in each year there are several firms with a negative PCM. This suggests that the indicator would be zero/negative in each year. Therefore, the calculation of the price-effect indicator has been adjusted for outliers and incidental losses of firms.

Finally, note that in the expression of the price-effect indicator it is assumed that all variables can be observed directly. However, for our study this is not possible for the price elasticity of consumers (ε), and the elasticity of all marginal costs (δ). The latter issue makes it to some extent difficult to calculate the actual change in the price-effect indicator and requires estimates of these elasticities. But things are not as bad as it seems, because changes in this indicator are mostly affected by changes in the PCM of the least efficient supermarkets and manufacturers.

Assuming that non-linear price elements are accounted for in either the wholesale price or the purchasing costs by statistical offices, the measurement of the price-effect indicator can be applied both in case of linear price contracts as well as non-linear price contracts. Linear prices may result in a high price-effect indicator because of double marginalisation. Since measured payments may in fact include lump sum transfers, marginal (wholesale) prices may deviate from observed prices. In particular, if firms can write optimal contracts, there is no welfare loss

[32] See Appendix B for the details of the derivation of this measure.

in the upstream contracts, and only downstream prices compared to total costs need to be considered. However, this situation is also reflected in the size of our price-effect indicator as long as the lump sum transfer is taken into account in either the wholesale price or the purchasing costs by statistical offices.

5 Assessment of static efficiency 1993-2005

5.1 Introduction

This section turns to empirics using the indicators discussed in the previous section. It focuses on the extent of horizontal competition on the retail market and wholesale market respectively over the period 1993-2005. Moreover, it analyses potential changes in buyer power.

This section is organized as follows. Section 5.2 discusses data issues. Section 5.3 presents the development of indicators on seller power. In section 5.4, we analyse the results of section 5.3 in more detail and decompose the PCM by investigating trends in prices and firms' efficiency. Section 5.5 focuses on the issue of buyer power by looking at the development of the indicators of buyer power and a couple of determinants. Finally, in section 5.6 we assess the effects on static efficiency and discuss the impact of the observed developments on static welfare.

5.2 Data issues

The empirical results are mainly based on three data sources, all from Statistics Netherlands. The most important source is firm-level data. This data source gives complete coverage of firms with at least 20 employees for all observed markets. Non-manufacturing firms with fewer than 20 employees are sampled. To obtain figures for the key indicators, we aggregate data of individual firms for each distinguished market.[33] The second data source is Statline, the central database of Statistics Netherlands. This database contains aggregated data at the industry level. The final source is the National Accounts (NA), which provides data on the developments of retail prices and wholesale prices. As firm-level data are our main source, we use data over the period 1993-2005, the maximum number of years with complete data for all markets. Appendix C describes most indicators in more detail.

Section 2 argued that buyer groups and supermarkets are strongly related. This relationship has the following consequences for the empirical analysis. First, when assessing the extent of horizontal competition on wholesale market and the retail market, we focus on the indicators for manufactures and supermarkets respectively (section 5.3). Second, when assessing the extent of vertical competition, we focus on the buyer power indicators for both the buyer groups and the buyer groups integrated with supermarkets (section 5.5). Doing so, this approach deals with the possibility that profits of buyer groups might be allocated to affiliated supermarkets.

[33] Due to confidentiality, we are not allowed to report individual results of firms or aggregated results than can be traced back to specific firms.

5.3 Seller power 1993-2005

5.3.1 Introduction

Particularly related to the argument that the overall mark-up is an essential element in the existence of supermarkets, the evident starting point here are the mark-ups in the supermarket chain. Therefore, we first look at the PCM of supermarkets as an indicator of their seller power in the retail market, and the PCM of manufacturers pointing to manufacturers' seller power in the wholesale market. In principle, four cases are possible if the PCM of 2005 is compared with the PCM of 1993:

- Case 1: higher PCM supermarkets and higher PCM manufacturers
- Case 2: higher PCM supermarkets and lower PCM manufacturers
- Case 3: lower PCM supermarkets and higher PCM manufacturers
- Case 4: lower PCM supermarkets and lower PCM manufacturers

Particularly, case 2 is relevant. In that case, the retail margin increases while the manufacturers' margin decreases. This case definitely corresponds to the complaint of some manufacturers that retailers have gained buyer power at the cost of lower margins for manufacturers over time.

Given the limitations of the (weighted) PCM, this indicator should not be employed in isolation for an assessment of the supermarket chain. Therefore, we also look at PE and HHI to provide a more comprehensive analysis.[34] In that respect, we use the word 'competition' as well. For instance, a lower PCM and a higher PE suggest tougher competition with lower mark-ups for each firm operating on one particular market.

Finally, note that this section focuses on trends over time, but not on specific years or on the price war as such. With respect to the latter, section 6 specifically addresses the impact of the recent price war.

5.3.2 Developments

Table 5.1 presents the main indicators or key figures for seller power of supermarkets and manufacturers. We discuss these figures below.

Retail market

In general, competition seems to have increased with lower margins among supermarkets. The development of PCM suggests that the average mark-up of supermarkets declined in the period 1993-2005, pointing to diminishing seller power and thus to more competition on the retail

[34] Note that both the PCM and the HHI are adjusted to generate results for the total population of firms in one particular industry using the raising factor of the sample provided by Statistics Netherlands.

market. The PE-results confirm this development. PE increased suggesting that supermarkets face stiffer competition in 2005 than in 1993. Also, HHI suggests that the concentration of supermarkets became less in the period 1993-2005, and thus also points to increased competition. The decline in concentration is remarkable as the number of firms declined in the period observed (see table 2.1). The lower levels for HHI seems to be related to less skewed deviation in market shares among supermarkets as some (major) players lost market shares in the beginning of the 2000s.

Table 5.1 Key figures seller power, 1993-2005

	1993	1995	2000	2002	2005
Supermarkets					
PCM	6.3	6.5	5.3	5.4	3.8
PE	2.8	2.8	4.5	3.3	3.9
HHI in sales (x100)	9.0	8.8	9.4	7.5	7.0
Manufacturers					
PCM	12.1	11.2	10.3	8.8	9.3
PE	9.7	9.5	10.3	9.3	10.4
HHI (x100)	11.7	10.8	13.1	16.9	15.3

Source: CPB calculations based on firm-level data.

Why did competition between supermarkets increase in the period 1993-2005?

The indicators point to less market power and more competition between supermarkets. There may be several reasons why competition has increased, and further research is definitely needed. One reason might be that consumers may have experienced a decline in switching costs, as they have become better informed on prices and have become more mobile. Second, foreign companies, particularly foreign price fighters, have entered and captured substantial market shares on the retail market at the expense of domestic incumbents.

Wholesale market

The extent of competition among manufacturers appears to have intensified in the period 1993-2005 according to the development of the PE and the PCM. The PE became somewhat higher over time suggesting that inefficient firms are nowadays more punished for being inefficient than in the past. The PCM declined pointing to lower mark-ups. The increase of the HHI is in line what we would expect according to the decline in the number of firms operating in this industry. The more intense competition might, amongst others, be linked to intensified exposure to foreign competitors. Interesting to note is that small manufacturers were not driven out of the market, as their share in total sales was constant between 1993 and 2005.

International comparison of Dutch supermarkets

An international comparison shows that prices of Dutch supermarkets are relatively low compared to most other EU-countries, whereas the level of PCM is moderately higher than on average across Europe.[a]

Recently, ACNielsen published its Euro Price Barometer. This barometer compares and measures price convergence and divergence trends across Europe. It is based on the cost (including taxes) of almost 200 identical international branded products sold in fifteen European markets. Germany and the Netherlands are the cheapest countries in Europe to fill one's grocery basket. The price level is 15 percent lower than for total Europe. Norway and Denmark are expensive countries.

The PCM of supermarkets in the Netherlands was somewhat higher than on average in Europe in 2000. Although data is scarce, the PCM for a number of European countries can be measured using Eurostat data. The table presents the outcomes for 1995 and 2000.

It is interesting to note that the coherence between the Euro Price Barometer and Eurostat results is seemingly low. Both the rankings of the Netherlands and Germany based on Eurostat are not as good as that according to the ACNielsen Euro Price Barometer. Potential explanations for this limited correlation are that the PCM also depends on the extent of marginal costs, and the Barometer only takes into account identical brands sold across Europe while the PCM per country is based on all products sold in each country.

Results PCM supermarkets in an international perspective, 1995 and 2000

	1995	2000
Italy	26.3	14.3
Denmark	16.2	14.4
Norway	NA	18.4
Sweden	NA	18.7
Austria	29.7	19.6
Spain	NA	25.5
Belgium	NA	25.9
Finland	NA	27.1
Netherlands	27.1	27.1
Luxembourg	NA	28.0
France	NA	29.5
Germany	NA	34.2
Ireland	28.9	36.5
United Kingdom	42.6	39.0

Source: Eurostat

[a] This PCM is not directly comparable with the PCM in the main text.

5.3.3 Putting the pieces together

Putting the overall trends of the PCM of supermarkets and manufacturers together, we obtain case 4 as both the PCM of supermarkets and manufacturers (see box, next page) decreased in the period observed. A preliminary conclusion is then that if supermarkets (or buyer groups) had increased their buyer power to achieve lower wholesale prices in the period 1993-2005, these lower prices have been passed on to end-users.

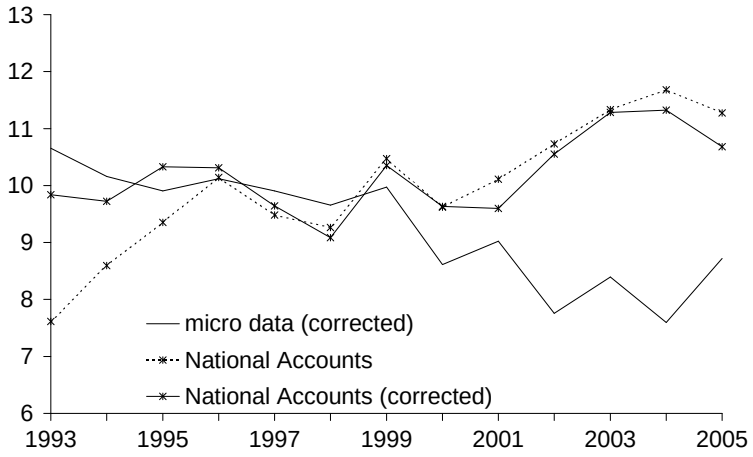
PCM-results manufacturers of food products: micro versus macro

It turns out that there are large differences between the results of the analysis on firm-level data and National Accounts (NA), with respect to the development of the PCM of manufacturers of food products (see figure). Different developments are still present, also at lower levels of aggregation and after controlling for coverage and definitions (including corrections for subsidies and indirect taxes). Further research on the causes of these differences is necessary and will be addressed by Statistics Netherlands and CPB.

According to the firm-level data, the PCM of manufactures declined between 1993 and 2005. The NA-figures however do not confirm this development. The mark-ups of manufactures became higher over time according to the NA. More precisely, up to 2000, the adjusted NA-results suggest that the PCM of manufacturers was more or less stable, whereas the micro data show a clear decline in the PCM. After 2000, the NA-results point towards a rise in PCM, while the micro data at the most indicate a steady PCM. The gap in development between both sources is particularly large since 2002.

For this study we rely on the developments of firm-level data for at least three reasons. First, it directly enables studying the impact of competition on resource allocation, firm dynamics and firm performance. Second, competition indicators like concentration rates and the PE cannot be measured at an aggregated level. Third, the use of comparable micro data ensures that variables have the same source that makes especially ratios of those variables more reliable.

PCM comparison using different sources, 1993-2005



[a] Moreover, results from the PS/Statline are more in line with the firm-level data with respect to the development.

The decline in PCMs of both supermarkets and manufacturers point to a reduction in static inefficiency due to lower overall margins. As said, the PCMs are useful as starting point of the analysis of static efficiency, but further examination of the data is needed as the PCMs may also reflect changes in other factors, such as cost savings in the production process due to improvements in productivity including s reduction in technical inefficiencies.[35] Section 5.4 provides this supplementary analysis.

[35] As we look at a longer time perspective, the effect of cyclical fluctuations on the level of PCM seems less likely.

5.4 Decomposition of price-cost margin

5.4.1 Introduction

Here we take a closer look at (potential) causes behind the declines in the PCMs of supermarkets and manufacturers. To gain more in-depth knowledge, we focus on the two basic elements of the mark-up, i.e. prices and (marginal) costs. A lower PCM for supermarkets could be the outcome of either higher marginal (retail and wholesale) costs and/or lower consumer prices. Conditional on a firm's marginal costs, a high PCM indicates market power, whereas conditional on price, a high PCM may reflect efficiency but also buyer power on the supply side.

With respect to changes in marginal costs, we focus on changes in, for instance, labour productivity, labour costs and retail costs. We also look at differences in trends of retail prices, wholesale prices and manufacturers' prices of raw materials. These trends may be helpful to pinpoint changes in market power.

5.4.2 Components of supermarkets' PCM

A low(er) PCM may reflect (relatively) high(er) marginal costs. So, the question can be raised: is there evidence available that the marginal costs for supermarkets have relatively increased in the period 1993-2005?

The (marginal) costs of supermarkets consist of the following three elements: labour cost, retail and distribution costs, and finally wholesale purchases. Particularly, both the first and second elements are directly related to productive efficiency and not to buyer power issues. In contrast, the third element is related to the extent of buyer power, besides productivity issues. Table 5.2 presents the developments of the shares of each type of cost in the total sales of supermarkets.

Table 5.2 Average cost shares in total sales of supermarkets , 1993-2005

	1993	1995	2000	2002	2005
	in % of total sales				
Labour cost	10.7	10.2	10.7	11.1	10.9
Retail cost	5.7	6.3	9.5	9.7	9.6
Wholesale purchases	77.3	77.0	74.5	73.8	75.7
Net profits/PCM[a]	6.3	6.5	5.3	5.4	3.8

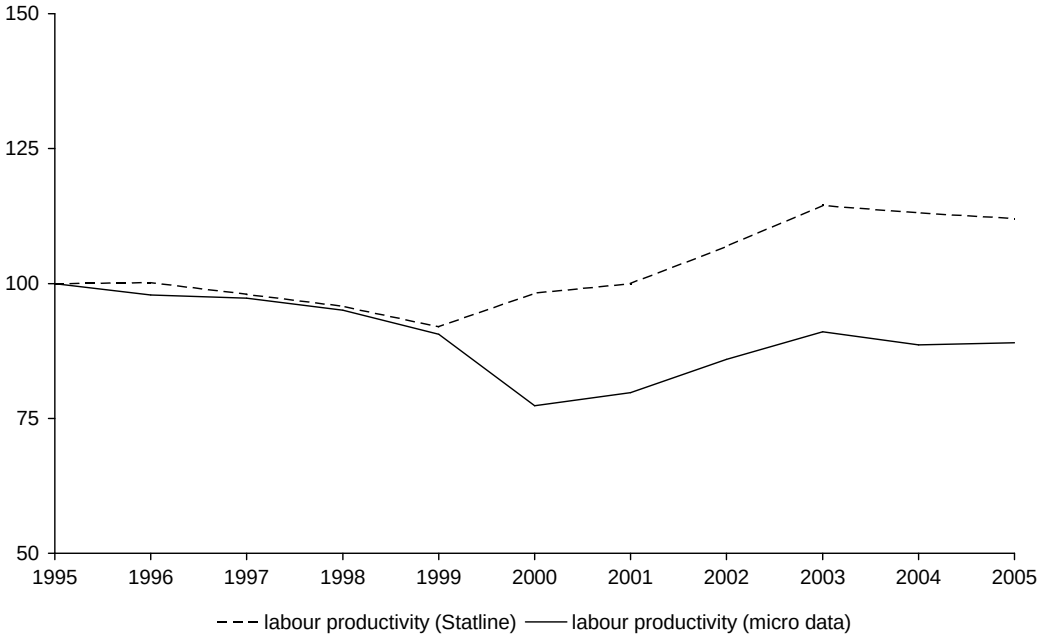
Source: CPB calculations based on firm-level data.

[a] I.e. total sales minus labour costs, retail costs and wholesale costs. The share of net profits in total sales is equal to PCM.

Development labour cost supermarkets

One option is that the PCM of supermarkets has declined due to higher labour costs, e.g. by substantial wage increases or meagre labour productivity performance. The data provide no evidence for this option. In fact, table 5.2 reveals that the share of labour costs in total sales hardly increased between 1993 and 2005.

Figure 5.1 Average labour productivity level of supermarkets[a]



[a] (Weighted) average of value added per employee, based on firm-level data and data from Statline/Statistics Netherlands respectively. Both series are deflated by the price index of trade margin on food products from NA Input-output tables, Statistics Netherlands.

Figure 5.1 shows that on average supermarkets labour productivity has improved gradually after 2000.[36] Given the stable labour cost share, this suggests that real wage growth has been in line with the gains in (real) labour productivity.

Development retail costs supermarkets

Table 5.2 reveals that higher retail costs have put a downward pressure on supermarkets' PCM up to 2000. After 2000, the share of this cost type levelled off. The retail costs entail a bundle of variable costs, such as advertising, transportation and storage costs. In the period before 2000, these costs relatively increased in comparison with the sales due to either inefficiencies in the

[36] The negative shock in labour productivity according to the micro data in 2000 is probably partly related to a change in the system of collecting data by Statistics Netherlands. Note that the recent price war went hand in hand with a lower labour productivity. The lower productivity after 2003 is probably due to a downturn in the business cycle in conjunction with labour hoarding.

production process or tougher competition on the retail market requiring more advertising expenditures.[37]

Development wholesale costs supermarkets

Over the whole period, the share of wholesale purchases declined contributing positively to a larger PCM in supermarkets (see table 5.2). Does this outcome indicate increasing buyer power of supermarkets? Not directly if one takes a closer look. A distinction should be made between the years before 2003 and the years afterwards. From 1995 to 2003, the share of wholesale cost in total sales went down by more than 3%-point. In contrast, the share increased with approximately 2%-point from 2003 to 2005.

Both periods can be further examined by decomposing the share into a price ratio and a volume ratio. The price ratio relates the average retail prices with the wholesale prices. The volume ratio links the volume of purchases with the volume of sales. An increase in the latter indicates more value added per unit of purchases. The NA Input-Output tables of Statistics Netherlands provide data on the (average) retail and wholesale prices for a set of products related to the food industries at the 3-digit level.

Robustness of wholesale prices

To check the robustness of the NA-data, we have also applied an alternative method to derive wholesale prices. This method combines data from Statline on supermarkets' total output, their wholesale purchases and consumer prices in two steps:

- calculate volume change of supermarkets' sales by adjusting supermarkets' total sales with the (average) consumer price index
- derive changes in wholesale prices from changes in total wholesale purchases and volume change of supermarkets' sales, assuming that supermarkets have minimal (or no) changes inventories.

A comparison reveals that the wholesale price derived from both data sources are quite similar. This suggests that the development in wholesale prices as depicted in the main text is robust.

Figure 5.2 presents the development of the aggregated prices between 1995 and 2005.[38] Although difference in growth rates between the retail prices and the wholesale prices appears to be small for the overall period, differences are clearly noticeable in intervening years. For instance, at the end, the retail prices dropped owing to the price war between supermarkets, while the wholesale prices slightly went up.

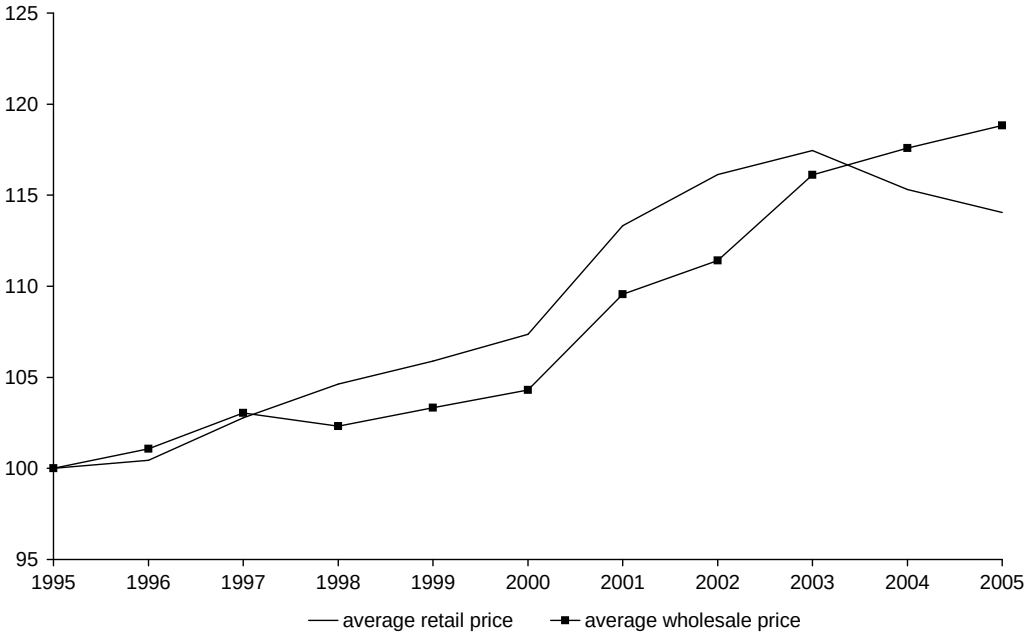
The decline in the share of wholesale purchases in total sales in the period 1995-2003 is due to relatively lower wholesale prices compared to retail prices. To some extent, fiercer competition between manufacturers on the wholesale market or more buyer power of

[37] A reason for those inefficiencies might be the negative effect of longer opening hours on labour productivity (see CPB, 1995).

[38] We have no similar data at our disposal for the years 1993 and1994.

supermarkets could be the driving forces. After 2002, relatively higher wholesale prices raised the share despite improvements in the volume ratio as result of creating more value added.

Figure 5.2 Development of average retail and wholesale prices of food products (1995=100), 1995-2005[a]



[a] Average retail prices (of Dutch and foreign products) and average wholesale prices of Dutch products. Source: NA Input-output tables, Statistics Netherlands.

Conclusions

The decline in supermarkets PCM can be attributed to relatively higher retail costs compared to wholesale prices up to 2002. After 2002, relatively lower retail prices increased the share of wholesale purchases in total sales and, subsequently reduced the mark-ups on the retail market. The development of the latter is particularly interesting as this suggests that increasing buyer power of supermarkets appears to be not much of an issue in recent years including the period of the price war. This issue will be further analysed in section 5.5.

5.4.3 Components of manufacturers' PCM

Similar to supermarkets, we take a closer look at the components of the PCM of manufacturers. For the manufacturers we only classify two types of (marginal) costs: labour cost and cost of raw materials. Both are related to productive efficiency. Table 5.3 presents the developments of their shares in total sales.[39]

[39] Note that here the PCM of manufactures as a whole is based on weighted PCMs of individual segments, where the weights are the annual market shares. The PCM in table 5.1 is based on the weighted PCMs of individual segments using the market shares of 1993. The differences between both approaches are small.

Development labour cost manufacturers

Table 5.3 shows that the development of labour cost have not contributed to the decline in the PCM of manufacturers. In contrast, between 1993 and 2005 the share of labour cost in total sales declined slightly, resulting in a positive impact on manufacturers' PCM. Particularly in the 1990s, improvements in labour productivity had a positive effect on the PCM.

Table 5.3 Average cost shares in total sales of manufacturers, 1993-2005

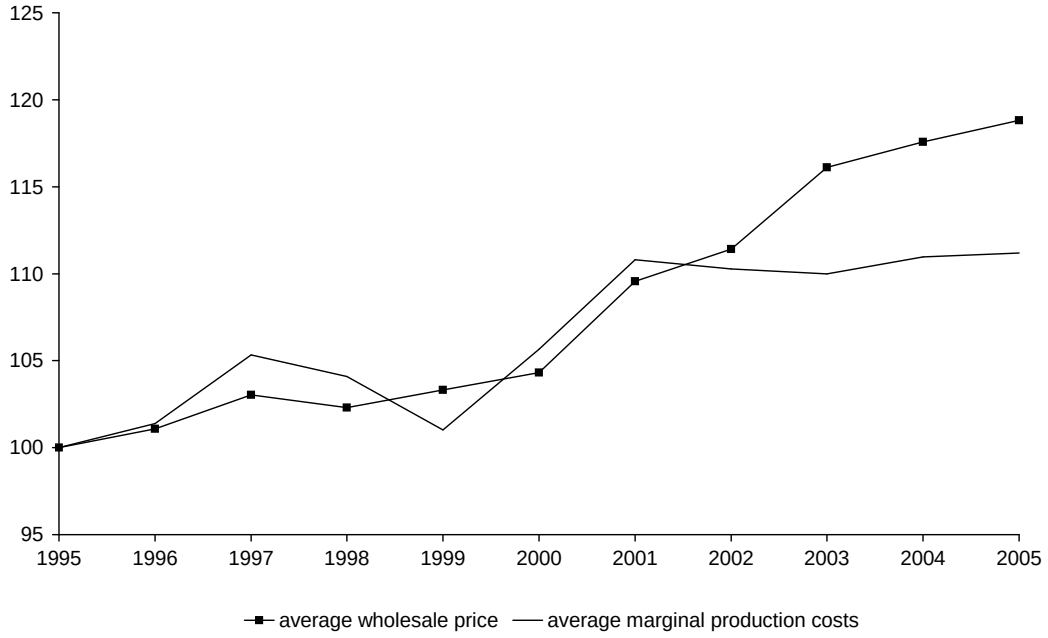
	1993	1995	2000	2002	2005
	in % of total sales				
Labour cost	10.9	10.3	9.8	10.2	9.9
Raw material cost	77.0	78.3	80.2	80.9	80.2
Net profits/PCM[a]	12.1	11.4	10.0	8.9	10.0

Source: CPB calculations based on firm-level data.
[a] I.e. total sales minus labour costs and raw material cost. The share of net profits in total sales is equal to PCM.

Development in raw material cost manufacturers

The share of raw material costs increased between 1993 and 2005, but mainly before 2000. This higher share puts the positive effect of higher productivity in the shade and it contributed to the lower PCM.

Figure 5.3 Development of average wholesale prices, marginal production costs of food products (1995=100), 1995-2005[a]



[a] Average wholesale prices and marginal production costs of Dutch manufacturers. Marginal production costs are based on the price changes of wages and raw materials per unit of each input. Source: NA Input-output tables, Statistics Netherlands.

Similar as in the case of supermarkets, taking into account price developments may deepen the analysis for manufacturers.[40] Figure 5.3 presents the development of the average wholesale price and marginal production cost. Up to 2001, the difference in the wholesale price and marginal production cost of manufacturers is limited.

As there are no clear indications that the volume ratio between intermediate inputs and sales substantially changed in the period 1993-2000, the increase in the share of raw material costs relates to relatively higher prices for raw materials versus wholesale prices. After 2002, the wholesale prices increased relatively stronger than the marginal production cost, contributing to a higher mark-up.

Conclusions

In the period 1993-2005, the decrease of the PCM of manufacturers is related to the increasing share of material costs in total sales. Up to 2002, this decline could be the outcome of either more competition between manufacturers or more buyer power of supermarkets. Both reasons drive the development of wholesale prices in line with (exogenous) marginal costs. However, it is particularly interesting to note that the PCM of manufactures after 2002 slightly increased despite the price war. Again, the development of the latter is particularly interesting as this suggests that increasing buyer power of supermarkets appears to be not much of an issue in recent years.

5.5 Buyer power 1993-2005

5.5.1 Development of indicators

The outcomes of the indicators on buyer power observed do not directly support the fear of manufactures that increased concentration of the retail market implies more buyer power. Table 5.4 presents the indicators on buyer power.

Table 5.4 Key figures buyer power, 1993-2005

	1993	1995	2000	2002	2005
Supermarkets					
HHI in purchases	8.0	7.9	8.2	6.1	5.9
Relative BPI to manufacturers	0.68	0.75	0.69	0.83	0.54
Supermarkets and buyer groups[a]					
Relative BPI to manufacturers	0.61	0.63	0.59	0.74	0.53

Source: CPB calculations based on firm-level data.
[a] I.e. assuming that supermarkets and wholesalers add up to one industry.

[40] The NA Input-Output tables of Statistics Netherlands provide data on the (weighted average) wholesale price for bunch of products and the marginal production costs of the food industries at 3-digit level.

Here, we focus on the joint results of supermarkets and buyer groups as both are strongly interrelated.[41] The *relative* BPI is rather stable up to 2000. After 2000, the indicator initially increases but since 2000 it sharply drops suggesting that supermarkets could not fully pass on the lower consumer prices of the price war to manufacturers. This finding is in line with the HHI in purchases. Less concentration in supermarkets' procurement reduces their (potential) buyer power. So both findings are not conducive to more buyer power of supermarkets.[42]

5.5.2 Determinants of buyer power

Here, we look in more detail at a number of determinants of buyer power. Section 3 has put forward four main determinants that are linked to outside options and buyer power:

- Downstream competition at the retail market
- Firm size
- Vertical integration and private labels
- Outside options of suppliers as countervailing power

Disputes between manufacturers and supermarkets are still going on…

Newspapers have published many articles about supermarkets and manufacturers disputing wholesale prices and delivery conditions. Randomly, we present three recent examples. Some manufacturers have employed an offensive strategy and demand for higher prices. For example, in February 2007 Campina, manufacturer of dairy products, announced to raise its prices and was prepared to accept temporary boycotts of supermarkets.
But supermarkets do not hesitate to put aside manufacturers' demands. For example, in February 2007 Superunie-members ceased the supply of Heineken beer, as negotiations between Superunie and Heineken did not proceed 'smoothly'.[b] In July 2007, Albert Heijn did not accept the recent price increase of the 1,5 litre-bottles of Coca-Cola, particularly after the high price increases in 2006 related to the introduction of a new bottle. Albert Heijn has even threatened Coca-Cola with a boycott.[c]

[a] See *Het Financieele Dagblad* of 3 February 2007, "Campina eist hogere prijs van supermarkten".
[b] See *Algemeen Dagblad* of 5 March 2007, "Ruzie tussen Heineken en supers".
[c] See Het *Financieele Dagblad* of 6 July 2007, "AH zet druk op Coca Cola".

Downstream competition

The intensity of competition between supermarkets affects supermarkets' buyer power. If competition increases, supermarkets' bargaining position may deteriorate. We find indications that competition between supermarkets became more intense between 1993 and 2005 (see table 5.1). Hence, this finding suggests that their (overall) buyer power might be reduced. For instance, this may be because consumers became more price sensitive (between supermarkets). In addition, the outside option of the manufacturer has improved: consumers are more willing to

[41] See appendix D for robustness checks.
[42] In addition, an econometric check does not come up with clear evidence for higher buyer power of supermarkets. Results can be obtained on request by the authors.

travel to another supermarket. Consumer surveys give rough indications of increasing consumer attitudes towards switching between retailers.

Firm size

The relationship between firm size and buyer power is not in all cases evident but large supermarkets may entail relatively more buyer power. If so, this may explain mergers among buyers, or the formation of purchasing groups common among supermarkets. Although already starting in the 80s, for example, the demand side of the wholesale market became more concentrated by establishing buyer groups (such as Superunie) and by conglomerating retail formulas (like Laurus in its early days).

Given the skewed distribution of market shares at the downstream market and the forms of cooperation, we examine the developments beyond the aggregated firm-level data. Due to confidentiality requirements of Statistics Netherlands, the analysis is to some extent restricted.

Table 5.5 Comparison between small supermarkets and large supermarkets[a]

	1993	1995	2000	2002	2005
Small supermarkets					
Operating costs as % of firm's sales[b]	94.3	94.5	95.9	94.6	95.9
Purchasing costs as % of firm's sales	80.2	80.0	78.3	78.1	78.5
Productivity level	15.2	14.6	11.7	15.8	16.8
Share in total industry sales	43.2	41.9	44.3	46.8	47.9
Large supermarkets					
Operating costs as % of firm's sales[b]	93.1	92.8	93.7	94.6	96.4
Purchasing costs as % of firm's sales	75.1	74.9	71.5	70.0	73.0
Productivity level	17.0	18.2	17.6	20.2	17.0
Share in total industry sales	56.8	58.1	55.7	53.2	52.1
Cost-disadvantage ratio of smaller firms[c]	0.9	0.8	0.6	0.8	1.0

Source: own calculations based on micro data Statistics Netherlands.
[a] I.e. per year the 10 largest supermarkets.
[b] Operating costs entail purchasing costs of sales, wages and other variable costs.
[c] Cost-disadvantage ratio is defined as the ratio of net labour productivity level (value added excluding depreciation) of small firms and net labour productivity level of large firms.

Table 5.5 compares the average shares of operating costs of the 10 largest firms with the other, smaller supermarkets, including most franchisees. It shows that the largest supermarkets had relatively lower operating costs than smaller supermarkets, and thus higher PCMs in 1993. However, the advantage of larger supermarkets declined over time, particularly in recent years. Their PCM eventually drops below the PCM of the smaller firms. One remarkable difference is that the latter improved their productivity, particularly since 2000.[43] Additionally, the share of

[43] Interesting to note is that differences in productivity development between large and small supermarkets seem to be related to different impact of changes in longer opening hours and business cycle.

purchasing costs of smaller supermarkets did not increase after 2000, while it definitely became larger for large supermarkets. This might suggest that the larger supermarkets could not benefit from their potentially higher buyer power as in previous years. But other factors could be at stake as well. For instance, larger retailers could be more involved in the price war than their smaller counterparts could.[44] We, however, did not come across information that support the latter argument.

Vertical integration and private labels

Vertical integration (or the threat of it) may alter the outside options of both manufacturer and supermarket. If a supermarket integrates with one manufacturer, producing a private label, its bargaining position vis-à-vis the other brands improves (depending on the substitutability of the products): it will lose fewer customers if it does not stock the independent manufacturer's brand. Empirics suggest that supermarkets have increasingly extended their private brands in their product assortment as an outside option to strengthen their bargaining position against manufacturers of A-brands (see also section 2).

Outside options manufacturers

Just as buyers have outside options, manufacturers have them as well. Partly, they are related to the issue of downstream competition including the number of supermarkets that can be served. This issue we already discussed with competition between supermarkets on the retail market. Another option for manufacturers to countervail domestic buyers is through exporting to supermarkets abroad. Indeed, the volume growth of export has been faster than the volume growth of domestic sales (see table 2.4 in section 2) providing manufacturers stronger bargaining position from that perspective. Multinationals could even decide not to produce for and to sell to Dutch supermarkets anymore. Finally, other distribution channels such as caterers and petrol stations are also opportunities to increase their sales.

5.5.3 Conclusion

To wrap up, no clear indications emerge from our analysis that supermarkets have raised their buyer power between 1993 and 2005 to expand their profits at the costs of consumers or manufacturers. This analysis is based on examining the development of buyer power indicators, their determinants and the investigation of the decomposition of PCMs in the previous subsection. The latter provides some indications for increased buyer power up to 2002, but remarkably not afterwards as was suggested by some manufacturers. Moreover, other indicators of and determinants for buyer power do not support the view that buyer power has increased

[44] Note that the differences across supermarkets in PCM or operating costs as a percentage of total sales does not say anything on the differences in nominal retail prices or operating costs *per product*. Then theoretically, the decline in advantage of the largest supermarkets may point to two possible developments. First, the operating costs *per* product of the largest supermarkets have increased more (or declined less) than in case of small supermarkets. Second, the largest supermarkets reduced their retail prices more radically (or raised the prices at a lower pace) than the smaller supermarkets.

over time. Firm size and private labels might be conducive to bargaining power of retailers towards manufacturers, but we do not find significant indication that (these) supermarkets have exerted their buyer power to increase their retail margin at the cost of consumers or manufacturers.

Grocery inquiry of Competition Commission in the UK

Recently, the Competition Commission (CC) in the UK has investigated the market for the supply of groceries. Their principal concern is to focus on competition between supermarkets at the local level, and on the relation between supermarkets and grocery suppliers.

In its (provisionally) conclusion[a], the CC argues that supermarkets deliver a good deal for consumers. Nevertheless, in some areas local supermarkets raise entry barriers by land holdings, restrictive covenants and controlling the environmental planning system. Further, the CC is also concerned about supermarkets' ability to transfer excessive risks and unexpected costs to suppliers, which could adversely affect product quality and innovation for consumers. Particularly national supermarkets have such buyer power, but the Supermarkets Code of Practice constrains to some extent the exercise of that buyer power

Finally, it is remarkable that the CC relates the relevant market to the size of stores and to local areas. More precisely, the Commission discerns large supermarket stores, mid-size supermarket stores and (smaller) convenience stores. The latter stores compete with other convenience stores and with mid-size and large supermarkets, but all in the local area. Larger stores compete also with larger stores in more distant areas, with the distance progressively increasing with the store size but at most within 10 to 15-minute drive time. The definition of the relevant market by CC is in strong contrast with that of the NMa in the Netherlands. The latter defines it as the national market irrespective of types of supermarkets.

[a] See Competition Commission, News Release of 31 October 2007, "Groceries market provisional findings".

5.6 Impact of trends on static efficiency

5.6.1 Types of contracts

Here we analyse the overall impact of the observed developments on the static efficiency in the supermarket chain. Remember that the (absolute) impact of market power on static efficiency depends much on the type of contracts between supermarkets/buyer groups and manufacturers. Following section 3, the analysis below distinguishes two cases: linear pricing and non-linear pricing.

Case 1: Linear pricing: trade-off between buyer power and seller power supermarkets?

Here, the impact of buyer power on static efficiency depends on the existence of a trade-off. In principle, there can be a trade-off between efficiency gains of (large) powerful buyer groups versus potential abuse of their market dominance in relationship with increased selling power downstream leading to higher consumer prices.

As the PE (PCM) of supermarkets has risen (declined) in the period 1993-2005, there is seemingly no fear for such a trade-off. Supermarkets are forced to pass on benefits to

consumers including potential lower wholesale prices as result of increased buyer power. With respect to the latter, we do not find obvious indications for an increase in the extent of buyer power.

Case 2: Non-linear prices

This case assumes that 'non-linear' price contracts (e.g. slotting allowances) mainly dominate the interaction between the downstream and upstream firms.

As section 3.3 discussed, upstream and downstream firms engage in non-linear contracts, as these contracts may be more beneficial for both parties than linear contracts. Then for total welfare, supermarkets' buyer power in relation to manufacturers' seller power is not important. Any change in bargaining power will not affect the quantity traded or the price for consumers. Hence, in this situation, the impact of buyer power can to some extent be neglected in the short term of analysing changes in static efficiency. The only important issue then becomes the (joint) seller power on the retail market.[45]

Then, as the joint PCM of supermarkets and manufacturers declined in the period 1993-2005, the overall seller power decreased.

Synthesis: linear or non-linear pricing?

So, both cases point to positive developments in static efficiency (all else equal). What may differ then is the size of its contribution to static efficiency, as consumers are better off in case of non-linear price contracts if linear price contracts go hand in hand with double marginalisation leading to higher consumer prices.

Both cases are realistic. Slotting allowances and other types of non-linear prices do exist in the Dutch supermarket chain according to experts' opinion. The question can be raised whether the situation with linear or non-linear pricing is more realistic today. Stated otherwise: what happened in the Netherlands presently?

Although evidence is scarce, it is likely that the case of non-linear pricing has become more important over time for the following reason. Competition between supermarkets appears to have intensified driving supermarkets to higher efficiency. According to Kuksov and Pazgal (2005), this fiercer competition among supermarkets may stimulate the use of slotting allowance or other non-linear terms of trade. Although empirical evidence is not available, a trend towards more non-linear contracts would be more likely according to the opinion of

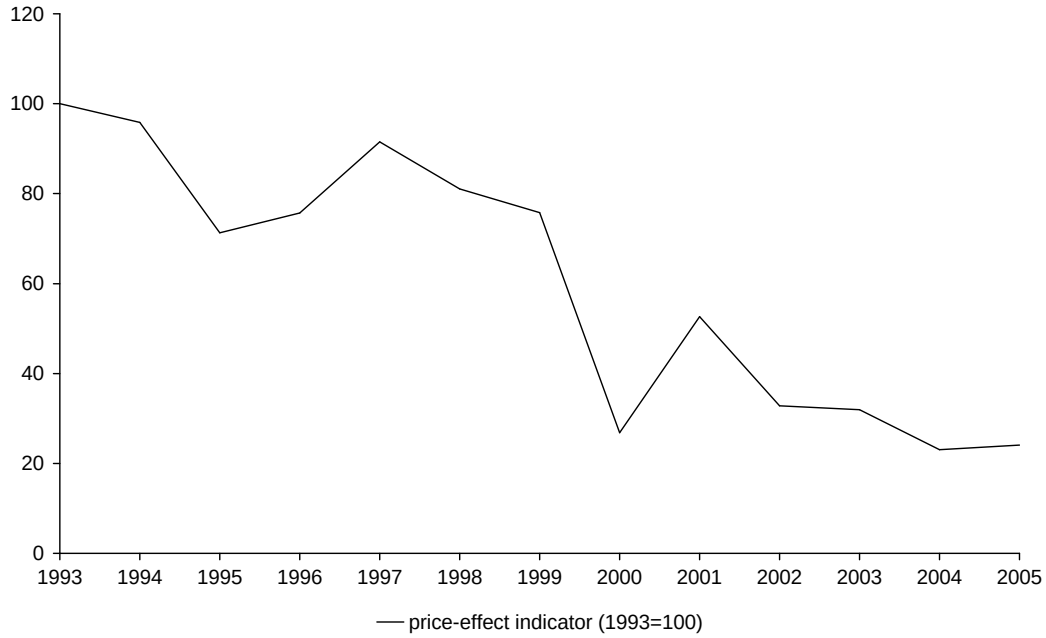
[45] The extent of buyer power of supermarkets only determines its share in total profits of supermarkets and suppliers together.

experts. However, the size of those kinds of contracts is relatively small compared to linear types of contracts (i.e. guesstimate of 1 percent of total sales).[46]

5.6.2 Development of static efficiency

Figure 5.4 presents the development of the price effects-indicator on static efficiency in the supermarket chain.[47] It shows that the indicator declined substantially between 1993 and 2005. The lower PCMs of manufacturers mainly attributed to the decline up to 1999.[48] The recent price war that started in 2003 contributed positively to further reduction in the indicator. Finally, note that if the case of non-linear contracts has become more realistic, the decline in the measured DWL is even underestimated as non-linear prices overstate the 'true' PCM (see also section 4.4).

Figure 5.4 Development of price effects-index on static efficiency in supermarket chain[a]



[a] Note that a decline indicates an increase in static efficiency.

Relation with product variety and static efficiency

All else equal, this lower price-effect indicator means higher static welfare. However, lower PCMs do not always go hand in hand with more welfare in the short term (see Boone, 2000), as vigorous competition may diminish the number of products within a product category reducing welfare. The overall effect of fiercer competition can, therefore, be positive or negative on static welfare. On the one hand, welfare might be lower if supermarkets and manufacturers offer too

[46] In percentage of the profits, the relative size of non-linear contracts is likely much higher.

[47] See appendix B for robustness checks.

[48] The plunge in 2000 may be due to statistical errors, but may also be related to a modest price war in combination with a boom in prices of raw materials. For example, high prices of meat due to the BSE-crisis in 2000.

little variety with respect to consumer preferences and mainly focus on cheap homogeneous products. On the other hand, the existing number of products within a product category at a particular moment might be a reflection of consumer preferences.

We have no hard empirical evidence to argue which argument dominates in the supermarket case. Sometimes it is put forward that product variety within certain product groups (mostly brands) might have decreased over the years. Information of IRI-Netherlands on items sold in supermarkets does not confirm this statement. Additionally, no clear-cut evidence is available how consumers value multiple choices within particular product categories. Nonetheless, experts suggest that scrapping items within certain categories by manufactures and supermarkets has likely been driven by consumer preferences. Hence, retailers (and manufacturers) have rationalised their assortment in line with those preferences. Moreover, the remaining products including the private labels seem to be close substitutes to the products that disappeared.

Finally, two remarks can be made. First, with respect to the number of products per product category versus new product categories and limited shelf space, we assume that consumers prefer new products. Second, limited assortment size within product categories provide the opportunity for niches, like speciality shops as ‘multivlaai’.

Given those two remarks, it could be stated that more competition in the supermarket chain has been conducive to static welfare in terms of its price-effect as well as its effect on product variety. However, this statement can only be put to a test if data becomes available.

6 Beyond aggregate data

6.1 Introduction

This section analyses two issues beyond the empirical analysis at the aggregate level in the previous section. The first issue (section 6.2) addresses the question whether or not the recent price war changes or nuances the conclusion drawn in section 5. The second issue concerns the differentiation between product groups (section 6.3). In this case we analyse the effects on our indicators if we drop the assumption of one national product market and instead assume that there are a number of relevant markets closely related to the type of product.

6.2 Price war between supermarkets

The recent price war between supermarkets started in October 2003. Albert Heijn, supermarket leader, initiated this price war.

Potential causes and effects of price war

Theory points to several reasons for a price war (see also Baarsma and de Nooij, 2004):

- A (temporary) distortion of a price cartel: members of a price cartel punish a deviant of the (tacit) price agreement by lowering their own prices;
- Incumbents' strategy of predatory pricing: incumbents reduce their prices to deter entry of new competitors on the market; once the threat of entry is over, the incumbents will raise their prices to recoup high profits;
- Incumbents' competitive response to entry: following the entry of price fighters, incumbents in the premium segment reduce their prices in order to recoup some of their lost market share; and
- Cyclical downturn including less demand: in cyclical downturns consumers become more price sensitive and more reluctant to spend their income; to attain a sufficient level of capacity utilization, firms reduce their prices to recover demand.

To determine the actual cause of the price war between the supermarkets in the Netherlands, a comprehensive investigation is required. For example, the Competition Act does not allow for price agreements between firms, thus those are mostly tacit. Detection of tacit collusion therefore requires cautious investigation of firms' interactions. Further, delineating predatory pricing from a "healthy" competitive response requires monitoring of competition for a long period, particularly after the price war.

Such comprehensive analysis of the price war is beyond the scope of this study. At the outset, opinions are divided. Some experts suggest that the combination of economic downturn and increased price-awareness of consumers on the one side, and competitive responses of

leading firms, particularly Albert Heijn, on the other side resulted in the price war. Boer, senior executive of Albert Heijn, confirms those reasons (see Financieel Dagblad, 20 July 2007). He states that until 2002 Albert Heijn had little incentives to compete fiercely. The economic downturn has shaken them up to take action, and to set out AH's strategy for price reductions at the end of 2003.

In contrast, SEO concludes that the first reason, distortion of a price cartel, is the most obvious reason for the price war (see Baarsma and de Nooij, 2004). SEO stated that the price war of supermarkets might point to (tacit) collusion in the pre-war period, indicating the existence of seller power in the supermarket chain.[49]

Ignoring potential underlying reasons, the impact of the recent price war is observable in the figures of the PCMs and PE of supermarkets (see table 5.1 in section 5.3). After 2003, the PCM of supermarkets declined substantially. In general, the increase of the PE on the retail market in 2005 confirms that competition has intensified since the price war. More competition and lower PCM of supermarkets turn up in lower levels of the price-effect indicator suggesting improved static efficiency of the market.

Relation between price war and buyer power

Supermarkets are alleged to have passed on the lower prices of the price war to manufacturers. However, we hardly find any robust empirical evidence that supermarkets exercised more buyer power to manufacturers because of the price war. In fact, the relative BPI of supermarkets (and buyer groups) declined in 2005 (see table 5.4).[50] The PCM of manufacturers became slightly higher after 2003. This small rise could be partly due to long-term price contracts between manufacturers and supermarkets. In that case, lower retail prices on the retail market affect wholesale prices with a certain delay.

6.3 Differentiating between product groups

Analysis across six segments

So far, we implicitly assumed that the degree of (upstream) selling power is the same across product categories. It is though not hard to imagine that some of the larger manufacturers in the supermarket chain might have some muscle over their distribution channels.[51] Therefore, we raise two questions in this subsection: Are there differences in the balance of (market) power on separate wholesale segments, i.e. seller power of manufacturers for specific products versus buyer power of supermarkets/buyer groups? What can we learn from these differences?

[49] Note that the PCM has declined over time even before the price war.

[50] The decline in the relative BPI may also be biased due to lower profits on the retail market, as this indicator is also interrelated to supermarkets' seller power on the retail market (see section 4.3.3).

[51] Sometimes, it is argued that differences exist between large and small, and medium-sized firms in the food-industry. We do not find indications for significant differences with regard to their PCM in terms of levels and changes over time.

We try to answer these questions by analysing the developments of market power on six segments or groups of food products. These segments concern[52]:

- Four fresh food segments with mostly non-brand products: meat and meat products (SIC 151), fish and fish products (SIC 152), fruit and vegetables (SIC 153), and dairy products (SIC 155)[53]
- Two segments of non-perishable products with mostly brand products: groceries (SIC 154, 156 and 158) and beverages (SIC 159)

Limitations and adjustments in measurement of market power in segments

The six segments are still quite broad, but lack of data precludes analysis of more detailed product groups. Firm-level data only allow the measurement of manufacturers' seller power for product markets at 3-digit level. Further and more important, firm-level data provide insufficient information to calculate the PCM or the PE *for each product segment* at the retail market. Statistics Netherlands provides no firm-level data on supermarkets' sales and variable costs of specific products to calculate competition indicators for each separate segment. Likewise, the relative BPI as indicator for buyer power cannot directly be measured at this level of aggregation. Consequently, welfare analysis per product group is hardly feasible.

Still, to come up with an assessment of buyer power at this level of aggregation, we employ other data sources and indicators. Here we consider three alternative indicators for measuring buyer power per product group.

First, we can approximate the relative BPI for supermarkets and buyer groups as one group using the ratio of gross profits (RGP), derived from NA-data on product groups at three-digit level. The box below elaborates on the definition and limitations of this ratio. An increase in this ratio may point to more buyer power.

Second, we compare the HHI of manufacturers' sales across segments in order to detect differences in scope for extending buyer power between product groups. The underlying idea is that (few) manufacturers operating in a segment with high HHI may have a stronger bargaining position than (many) manufacturers operating in a segment with a low HHI.

Third, for each product group we also compare the development in retail prices (paid by consumers) with the development in wholesale prices (charged by manufacturers) over time. Intuitively, if wholesale prices increase less than retail prices it may suggest that supermarkets and buyer groups have bargained for more rebates on the wholesale price, and thus have exerted more buyer power on the wholesale market. However, the ratio of prices has restrictions as well, because it may also rise due to increased seller power on the retail market.

[52] Lack of data restricts the analysis, as SIC 245 cannot be included.

[53] We consider dairy products as a brand segment.

Ratio of gross profits: alternative measure for buyer power

For each product group, we calculate the ratio of gross profits (denoted as RGP) as the ratio of
- gross profits of supermarkets and buyer groups: i.e. sales to final consumers minus purchases from Dutch manufacturers
- gross profits of manufacturers: i.e. value added (sales minus material production costs) of manufacturers realised on the Dutch market.

More formally, the RGP of product group *i* is defined as

$$RGP_i = \frac{(total\ sales - purchases)_{supermarkets/buyer\ groups}}{\left((total\ sales - total\ material\ costs) \times \left(\frac{sales\ on\ Dutch\ market}{total\ sales}\right)\right)_{manufacturers}}$$

These ratios are calculated from the detailed NA Input-output tables at the three digit level over the period 1993-2005. Note that this dataset attributes the gross jointly profits of supermarkets and buyer groups to the six product groups, in contrast to our dataset with firm-level data. Further, the NA Input-output tables make no distinction between supermarkets and buyer groups, and in this respect treat them as one group.

The RGP is similar to the relative BPI. In fact, both indicators compare the profitability of supermarkets and buyer groups with the profitability of manufacturers. In that respect, the RGP may also serve as an indicator of buyer power. A high RGP may point to buyer power as supermarkets and buyer groups capture higher profits at the expense of the manufacturers, e.g. demanding higher rebates on the wholesale prices or favourable delivery conditions. The limitations on the relative BPI, particularly the difficulty to disentangle buyer power from seller power, also hold for the RGP.

However, the ratio of gross profits deviates from the relative BPI in two respects:
- In contrast to the BPI of supermarket and buyer groups (as the numerator of the relative BPI), the gross profits of these firms for each product group do not contain other retail and labour costs as these costs cannot be attributed to specific product groups. This restriction on the RGP favours the relative BPI.
- In contrast to the PCM of manufacturers as the denominator of the relative BPI, we have to attribute some gross profits of manufacturers to the Dutch market and adjust gross profits for gains from exports. The reason is that the RGP is a ratio of two amounts in euro that must be comparable and refer to similar markets.

Seller power of manufacturers

Table 6.1 presents the PCM of manufacturing firms in each segment. The developments of the PCM (but also of the other indicators) at this level of aggregation turn out to be, as usual, more volatile than at the aggregated level. However, the downward trend[54] of the PCM is still obvious in most segments. The PCM declined in five segments with at least 1 percent point between 1993 and 2005, particularly in dairy products and fish products.

[54] We assume that changes of the indicators between +1 and –1 (%-point, in case of PCM), over the period 1993-2005 are not significant. In that case, there is no clear upward or downward trend observable.

Table 6.1 Indicators of seller power per product group in food industry

	Share in final sales	PCM				
	1993	1993	1995	2000	2002	2005
Total food[a]	100.0	12.1	11.1	10.2	8.7	9.2
Meat and meat products[b]	20.9	5.2	4.5	3.8	4.7	6.0
Fish and fish products[b]	1.5	9.2	6.3	4.6	3.7	3.9
Fruit and vegetables[b]	5.6	10.6	12.1	12.5	8.9	9.2
Dairy products	18.6	8.3	6.8	4.2	3.4	3.7
Food groceries	43.4	12.9	11.7	10.1	9.3	9.3
Beverages	10.0	31.5	30.2	34.9	25.0	26.6

Source: CPB calculations based on firm-level data.
[a] Excluding soap, detergents and toilet articles.
[b] I.e. processing and preservation of these products.

The developments of PE per segment vary even more widely yearly than developments of the PCM. Table 6.2 presents the PEs for each product group, representing the development of competition in each manufacturing market in the period 1993-2005. It shows that the PE in four segments (i.e. in fish products, fruit and vegetables and in both non-perishable products) increased significantly, while the PE of the other two segments (i.e. in meat products and in dairy products) decreased.

So, the developments on seller power in specific product groups are mostly in line with the developments for the total food industry (see section 5.3). In most product markets (except dairy products) the PCM declined and, in accordance, the PE increased, suggesting that the seller power of manufacturers declined between 1993 and 2005 due to increased competition.

Table 6.2 Indicators of seller power per product group in food industry

	Share in final sales	PE				
	1993	1993	1995	2000	2002	2005
Total food[a]	100.0	9.7	9.5	10.5	9.4	10.5
Meat and meat products[b]	20.9	14.4	12.8	15.1	11.4	12.8
Fish and fish products[b]	1.5	11.2	12.8	18.8	12.3	24.3
Fruit and vegetables[b]	5.6	8.7	7.8	8.7	9.4	14.6
Dairy products	18.6	11.6	9.2	14.1	14.7	6.2
Food groceries	43.4	8.3	9.6	8.7	7.4	11.5
Beverages	10.0	3.3	3.3	2.1	3.8	5.3

Source: CPB calculations based on firm-level data.
[a] Excluding soap, detergents and toilet articles.
[b] I.e. processing and preservation of these products.

Buyer power of supermarkets

Table 6.3 compares the manufacturers' concentration rates with the concentration rates in purchases of supermarkets and buyer groups. In some segments, the HHIs in manufacturers'

sales look rather unsteady between 1993 and 2005, but there is an overall trend towards higher concentration rates over time.

Table 6.3 Key figures of concentration rate per product group in manufacturing

	1993	1993	1995	2000	2002	2005
	Share in final sales	HHI in sales (x100)				
Total food[a]	100.0	11.7	10.8	13.3	17.2	15.6
Meat and meat products[b]	20.9	2.2	1.6	2.1	2.4	2.9
Fish and fish products[b]	1.5	5.1	5.4	9.1	8.3	7.6
Fruit and vegetables[b]	5.6	4.0	4.6	4.8	5.9	6.1
Dairy products	18.6	19.9	15.8	16.8	17.0	30.0
Food groceries	43.4	13.0	12.6	14.9	23.4	16.0
Beverages	10.0	15.8	17.4	28.2	28.8	19.8
		HHI in purchases (x100)				
Supermarkets		8.0	7.9	8.2	6.1	5.9
Buyer groups		23.4	13.2	14.2	24.3	36.9

Source: CPB calculations based on firm-level data.
[a] Excluding soap, detergents and toilet articles.
[b] I.e. processing and preservation of these products.

Ignoring the shortcomings of HHI, the comparison suggests that supermarkets and buyer groups could have lost buyer power in each segment, as the number of manufactures operating in each (domestic) market has declined (see table 2.3). In fact, in all segments the concentration of manufacturing firms increased while the concentration of supermarkets and buyer groups declined.

Further, in terms of levels, table 6.3 suggests that supermarkets have less buyer power in segments with brand products than non-brand segments. In fact, the HHIs of manufacturers in the former, i.e. dairy products, food groceries and beverages, are always substantially higher than in the non-brand segments (which are all fresh food segments).

Table 6.4 Comparison of retail prices and wholesale prices

	Share in final sales	Ratio of retail prices and wholesale prices			
	1995	1995	2000	2002	2005
Total food[a]	100.0	100	102.7	103.4	96.4
Meat and meat products[b]	23.5	100	104.0	110.0	99.2
Fish and fish products[b]	1.4	100	76.8	72.2	37.6
Fruit and vegetables[b]	7.2	100	99.3	94.5	92.5
Dairy products	16.8	100	102.3	101.9	99.2
Food groceries	34.6	100	102.4	102.3	98.4
Beverages	16.5	100	110.4	116.0	101.5

Source: CPB calculations based on National Accounts Input output tables.
[a] Excluding soap, detergents and toilet articles.
[b] I.e. processing and preservation of these products.

Table 6.4 compares the development of retail prices with the development in wholesale prices per segment. More precisely, if the ratio rises then retail prices increase more than wholesale prices, which might point to an increase of buyer power. The table shows that between 1995 and 2005, retail prices increased at a lower pace than the wholesale prices in most segments, except for beverages. This was especially the case after 2002, in line with the price war. Until 2002, the ratio of prices for meat and for beverages were significantly higher than 100.

Table 6.5 presents the development of the RGP for the period 1995-2005. For the overall, supermarkets (and buyer groups) gained a slightly higher share in profits. This increase is to some extent owing to a substantial expansion in one segment: fish and fish products. In the segment of food groceries, and beverages, supermarkets experienced higher shares as well, but those are limited and probably not significant. In the meat and dairy segment, both fresh food products, the ratio of gross profits substantially declined.

Table 6.5 Ratio of gross profits (RGP) per product group

	Share in final sales	RGP			
	1995	1995	2000	2002	2005
Total food[a]	100.0	3.07	3.71	3.91	3.41
Meat and meat products[b]	23.5	11.18	11.74	8.39	6.77
Fish and fish products[b]	1.4	9.25	19.42	27.31	17.06
Fruit and vegetables[b]	7.2	4.85	3.96	4.25	4.49
Dairy products	16.8	12.50	7.37	8.54	5.49
Food groceries	34.6	1.87	2.43	2.62	2.29
Beverages	16.5	1.15	2.03	2.47	2.35

Source: CPB calculations based on National Accounts Input output tables.
[a] Excluding soap, detergents and toilet articles.
[b] I.e. processing and preservation of these products.

What can we conclude from tables 6.4 and 6.5 with respect to (changes in) buyer power? If anything, the overall picture is not straightforward. For instance, in the segment of fish and fish products, the RGP considerably increased. This could suggest that the bargaining position of supermarkets in this segment strengthened in the period 1993-2005. However, the considerable drop in the ratio of retail prices and wholesale prices does not support this.

As discussed in section 2 and section 3, the aim of supermarkets is to maximise profits of the whole assortment. Given the intensity of competition, it allows supermarkets to apply a strategy to be relatively cheap in some product categories. Doings so, they attract customers to their stores whom buy other relatively more expensive products as soon as they visit the store. In that case, the RGP per product category is ambiguous. All in all, given the lower PCMs of manufacturers in most segments and the level of the ratio of retail prices and wholesale prices, the results suggests that even if supermarkets have gained buyer power, they appear to have passed on the benefits of buyer power to final consumers

Conclusions

Differentiating between product groups, we find that seller power of manufacturing firms in most segments shrank in the period 1993-2005 due to increased competition. This finding is in line with the results for the total food industry in section 5. Generally, supermarkets (and buyer groups) seem to have a relatively higher level of buyer power in fresh food segments rather than in segments with brand products. However, we find no obvious indications in any segment that supermarkets raised their buyer power between 1993 and 2005.

7 Concluding remarks

7.1 Conclusions

Trends market power in supermarket chain

This study analysed developments of seller and buyer power of supermarkets and manufacturers of food products in the supermarket chain. The ongoing price war between supermarkets on the retail market in the last four years and complaints of manufacturers about supermarkets exercising their buyer power may point to changes in relative market positions and the distribution of market power in favour of supermarkets.

The empirical indicators of market power reveal that both seller power of supermarkets and manufacturers declined in the period between 1994 and 2005. The overall decline can be related to more competition between supermarkets on the retail market. Also, manufactures have to compete more fiercely in an enlarged European market.

Theory suggests that supermarkets can enhance their buyer power by employing private brands and vertical cooperation or integration with preferred manufacturers as an outside option in bargaining with (other independent) manufacturers, or by extending joint purchases through buyer groups. We found no significant empirical indications that supermarkets' buyer power increased in any segment between 1993 and 2005.

Impact of market power on static efficiency

The observed changes in market power have enhanced static efficiency in the supermarket chain. Reduced seller power of both supermarkets on the retail market and manufactures on the wholesale market resulted in lower prices and eventually in higher static welfare given the product variety. Indeed, consumers benefited mostly from the modest price developments of available products between 1993 and 2005, particularly taking account of the higher level of general inflation.

The size of the buyer power effects on static efficiency depends on the type of contracts between supermarkets and manufacturers. As there are no indications of changes in buyer power, the potential trade off between efficiency gains and abuse of buyer power has probably not emerged in the case of linear contracts. Hence, the decline of manufacturers' seller power only raises static efficiency. In case of perfect non-linear contracts, static efficiency will not be affected at all, in the short run, by any change in buyer or seller power.

Although the supermarket chain is the centre of interest of many market research organisations, data availability directly related to welfare issues is scarce, and considerably limits our analysis in this respect. There are some but only limited indications that product variety within product

groups might have decreased over the years. On the one hand welfare might relatively low if supermarkets and manufacturers offer too little variety, but on the other hand current product variety might be a reflection of consumer preferences. However, to our knowledge, empirical evidence is lacking for checking which argument dominates.

7.2 Final notes

This study has analysed the interrelationships in the supermarket chain between consumers, supermarkets, buyer groups and food manufacturers with regard to static efficiency. In this respect, a number of issues may, however, be important as well but are beyond the scope of this study. We list and discuss them here briefly.

Dynamic efficiency

This study does not address dynamic aspects of efficiency. Dynamic efficiency denotes the extent to which the present value of a (future) stream of total surpluses can be maximized over time (long enough to allow for investments in product and process innovation). Explicitly then, the issue of timing and efficiency in the future are taken into account.

Total welfare over a longer period of time, and thus dynamic efficiency, can be improved via product and process innovation. Better products (new products or higher product quality) will increase consumers' willingness to pay and entail an upward shift in consumer demand. Additionally, improved or new production techniques, which reduce firms' (marginal) production costs, entail a downward shift of the supply curve. Maximising dynamic efficiency is not in all cases the same as maximising static efficiency in every period, because under some circumstances dynamic efficiency requires conditions that adversely affect static efficiency and vice versa. So, there may be a trade-off between static and dynamic efficiency, or between competition and innovation.

Although this study indicates that static efficiency has improved in the period under investigation, it is unclear if the right conditions are present for dynamic efficiency. Will increased competition between supermarkets and manufacturers provide the incentives to invest in R&D from a society perspective or not? Theoretically, the relationship between competition and innovation is, however, not clear. Too little competition could reduce the incentives to innovate, because the 'reward' for an innovating monopolist is generally smaller than the reward for a competitive firm. On the other hand, competitive firms have the incentive to escape from competition by innovating leading to monopoly profits. However, if the innovation is easily imitated, these monopoly profits will merely be temporary. Other firms will simply copy the innovation, making the innovator lose its competitive advantage. When the innovator knows this in advance, it will have much smaller incentives to invest in innovative activities. Therefore, the presence of too many competitors that can easily imitate an innovation reduces the incentives to innovate.

Price competition versus quality competition

The trade-off between price competition and quality competition has not been analysed in this study due to the lack of meaningful data about the level of quality of products. Also, the issue of variety in products available is relevant: supermarkets might offer various combinations of high quality/high price and low quality/low price products. This study does not offer full insight on the optimal level of product variety offered by the market.

Externalities

The availability of products might lead to either positive or negative (consumptions) externalities that have not been taken into account. High quality products may be healthier and may, for instance, reduce the cost on health care due to a lower risk of obesity (i.e. positive externality). Large number of products may also put a burden on the environment due to waste of food and packing materials.

Related issues

As said earlier, this study discusses the distribution of market power and its implications for static efficiency. However, in the last couple of years, various policy issues have been discussed and debated that potentially impact the level of competition, in particularly a level-playing-field for firms. We mention them briefly:

- *Spatial planning restrictions and its differences across regi*ons: at the national and certainly at the local level (i.e. municipalities) planning restrictions may hinder firms' flexibility to adjust to current market situations. Notably are the existing time lags from plans to realize new outlets (due to licensing and spatial planning policies). Also, municipalities follow different administrative procedures for expansion, turnaround and establishment of retail outlets.
- *Other local policy differences*: municipalities also have different policies regarding distribution times of supply outlets, restrictions regarding noise limits and practical issues such as parking relieves.
- *Establishment of large retail outlets ("weidewinkels")*: the Dutch government has prohibited the establishment of large retail outlets at the outskirts of cities. Main aim is to protect small retail outlets in city centres with the purpose of protecting the liveability or amenity of city hearts. This prohibition might affect static efficiency as McKinsey (2007) shows that the size of outlets in the Netherlands are small compared to other countries and concluded that there is plenty of room for improvement in productivity if large retail outlets are allowed. Another issue is the limited space available for larger outlets in the current plans.
- *Pricing below cost*: the price war between supermarkets has put the issue of pricing below cost and its prohibition again on the agenda a few years ago (see, e.g. Ministry of Economic Affairs, 2005). Although this issue remains debated, the government has decided not to take legislative action.

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Appendix A Detailed issues of indicators

Overestimation of PCM and relation with BPI

The assumptions made to estimate the PCM ($\overline{PCM}_j$, see equation 4.7), result in overestimation of the *actual* level of PCM. We assume that the marginal purchasing costs are approximated by *average* purchasing cost or equivalently the wholesale price (*W*). Then the estimated PCM implicitly assumes that the supermarket has no buyer power, and thus no impact on the wholesale price: $(\partial W(Q))/(\partial Q_j)=0$. However, it can be verified that

$$PCM_j = \frac{P-MPC-MRC}{P} = \frac{P-\left(W+\frac{\partial W(Q)}{\partial Q_j}Q_j\right)-MRC(Q_j)}{P} = \frac{P-W-MRC(Q_j)}{P} - \frac{\partial W(Q)}{\partial Q_j}\frac{Q_j}{P}$$
$$= \overline{PCM}_j - \frac{\partial W(Q)}{\partial Q_j}\frac{Q_j}{P}$$

and with $BPI_j = \frac{\partial W(Q)}{\partial Q_j}\frac{Q_j}{W}$ we get $PCM_j = \overline{PCM}_j - BPI_j\frac{W}{P}$.

The actual level of PCM is overestimated by a term that is related to the buyer power or actual BPI of the supermarket on the wholesale market.

Overestimation of BPI and relation with PCM

The assumptions made in order to estimate the BPI ($\overline{BPI}_j$, see equation 4.13) result in overestimation of the *actual* level of BPI. In fact, for the BPI we assume that marginal revenue of each product purchased is approximated by the retail price of the product (*P*) minus the marginal retail cost. Then, the estimated BPI implicitly assumes that the supermarket has no seller power and thus no impact on the retail price: $(\partial P(Q))/(\partial Q_j)=0$. However, we can verify that

$$BPI_j = \frac{VMP_j - W}{W} = \frac{\left(P+\frac{\partial P(Q)}{\partial Q_j}Q_j\right)-MRC(Q_j)-W}{W} = \frac{P-MRC(Q_j)-W}{W} + \frac{\partial P(Q)}{\partial Q_j}\frac{Q_j}{W}$$
$$= \overline{BPI}_j + \frac{\partial P(Q)}{\partial Q_j}\frac{Q_j}{W}$$

and with $PCM_j = -\frac{\partial P(Q)}{\partial Q_j}\frac{Q_j}{P}$ we get $BPI_j = \overline{BPI}_j - PCM_j\frac{P}{W}$

The actual level of BPI is overestimated by a term that is related to the seller power or the actual PCM of the supermarket on the retail market.

Appendix B Derivation of price-effect indicator

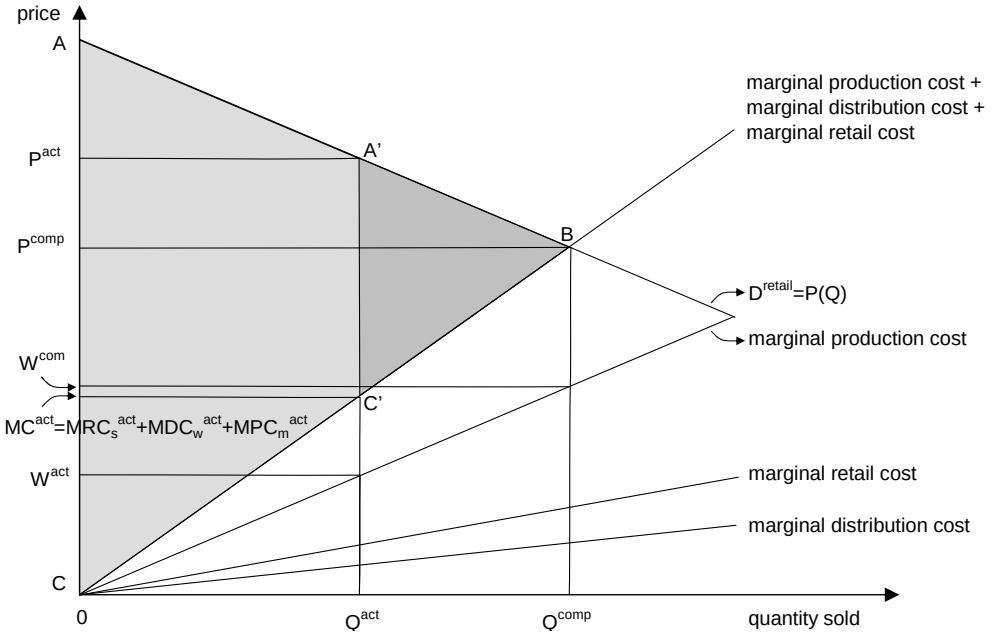
Intuition and assumptions

Assume that due to some market failures (of what type is not relevant here), prices will be so high that the total quantity will be constrained. Then, what are the losses in welfare due to the quantity constraints induced by the market failures? This appendix derives a (stylized) expression of the price-effect indicator in the supermarket chain, which builds on a generalization of Harberger's triangle or the Dead Weight Loss (see Viscusi et al., 1992).

Note that to calculate the price-effect indicator, we discern three stages in the supermarket chain: manufacturers of food products, buyer groups purchasing from manufacturers and distributing food products to supermarkets, and finally supermarkets selling on the retail market.

We illustrate the price-effects on the static efficiency in the supermarket chain in figure 7.1. This figure represents the demand function of final consumers on the retail market ($D^{retail} = P(Q)$), the industry marginal production costs of all manufacturers and the industry marginal retail and distribution cost of all supermarkets or buyer groups.[55]

Figure 7.1 Illustration of welfare loss due to price-effect



[55] The industry marginal costs of firms can be derived in two steps. The first step is to rank individual firms by their efficiency level, such that for all (relevant) individual supplied quantity levels firm *i* is more efficient than firm *i*+1. The second step is to plot the output/quantity of the most efficient firm against its marginal costs up to its (competitive) constraint, then followed by a similar plot of the second efficient firm, of the third efficient firm etc. Note that a firm's quantity sold can be constrained due to diseconomies of scale. Beyond a particular quantity level the firm's marginal costs becomes too high such that the firm cannot compete against the (initially) lower marginal cost of the adjacent competitor.

Due to market failures, the actual retail price is so high that total quantity is restricted to Q^{act}. This level is lower than the level in which no market failures exist and in which supermarkets, buyer groups and manufacturers compete perfectly Q^{comp}.[56] By the resulting higher retail price and quantity restrictions, market failures end up in a welfare loss which is represented by the dark grey triangle A'BC' in figure 7.1. The surface of this triangle, and thus the amount of the welfare loss, can be calculated by the price-effect indicator.

Before deriving the price-effect indicator, we first have to make a note on interpreting industrial marginal costs. Then we will make simplifying assumptions on the approximation of the joint "supply elasticity" of supermarkets, wholesalers and suppliers, and on approximation of consumers' price elasticity.

First, note that for any stage in the supermarket chain, the level of industry marginal cost at the actual quantity (Q^{act}) reflects the marginal cost of the least efficient firm. So at Q^{act} MRC_S^{act} reflects the marginal retail cost of the least efficient supermarket *S*, MDC_W^{act} the marginal distribution cost of the least efficient buyer group *W*, and MPC_M^{act} the marginal production cost of the least efficient manufacturer *M*. At the competitive quantity level (Q^{comp}) the retail price will be equal to the sum of marginal costs of the least efficient supermarket, wholesaler and manufacturer:

$P^{comp} = MC^{comp} = MRC_S^{comp} + MRC_W^{comp} + MPC_M^{comp}$.

Then, we assume that the sum of all marginal costs ($MC = MRC_S + MDC_W + MPC_M$) changes with the quantity offered at a constant elasticity, say $\delta = (\partial MC/\partial Q)(Q/MC)$. In this way we can approximate percentage changes in marginal costs by $\Delta MC/MC_{start} \approx \delta(\Delta Q/Q_{start})$. Similarly, we assume that consumers have a constant price elasticity with $\varepsilon = (\partial P/\partial Q)(Q/P) < 0$. In this way we can approximate percentage price changes by $\Delta P/P_{start} \approx \varepsilon(\Delta Q/Q_{start})$.

[56] In case of perfect competition, the demand function intersects at the sum of industry marginal retail costs, industry distribution costs and industry marginal production costs.

Derivation of formula

In order to calculate the price-effects indicator, we first derive an expression on the competitive quantity multiplied by actual prices:

$$\varepsilon\left(\frac{Q^{comp}-Q^{act}}{Q^{act}}\right)\approx\frac{P^{comp}-P^{act}}{P^{act}}=\frac{P^{comp}}{P^{act}}-1\Leftrightarrow\varepsilon\left(\frac{Q^{comp}-Q^{act}}{Q^{act}}\right)+1\approx\frac{P^{comp}}{P^{act}}\quad\text{and}$$

$$\delta\left(\frac{Q^{comp}-Q^{act}}{Q^{act}}\right)\approx\frac{MC^{comp}-MC^{act}}{MC^{act}}=\frac{P^{comp}}{MC^{act}}-1\Leftrightarrow\delta\left(\frac{Q^{comp}-Q^{act}}{Q^{act}}\right)+1\approx\frac{P^{comp}}{P^{act}}\frac{P^{act}}{MC^{act}}$$

$$\begin{aligned}
\text{give}\quad & \varepsilon\left(\frac{Q^{comp}-Q^{act}}{Q^{act}}\right)+1=\left(\delta\left(\frac{Q^{comp}-Q^{act}}{Q^{act}}\right)+1\right)\frac{MC^{act}}{P^{act}} && \Leftrightarrow\\
& \left(\frac{Q^{comp}-Q^{act}}{Q^{act}}\right)\left(\varepsilon-\delta\left(\frac{MC^{act}}{P^{act}}\right)\right)=\frac{MC^{act}}{P^{act}}-1 && \Leftrightarrow\\
& \frac{Q^{comp}-Q^{act}}{Q^{act}}=\left(\frac{MC^{act}-P^{act}}{P^{act}}\right)\left(\varepsilon-\delta\left(\frac{MC^{act}}{P^{act}}\right)\right)^{-1} && \Leftrightarrow\\
& P^{act}\left(Q^{comp}-Q^{act}\right)=\left(\frac{P^{act}-MC^{act}}{P^{act}}\right)\left(\delta\left(\frac{MC^{act}}{P^{act}}\right)-\varepsilon\right)^{-1}P^{act}Q^{act}
\end{aligned}\qquad (7.1)$$

Then the price-effect indicator (PEI) (dark grey area in figure 7.1) is given by:

$$\begin{aligned}
\text{Price-effect} &= \tfrac{1}{2}\left(P^{act}-P^{comp}\right)\left(Q^{comp}-Q^{act}\right)+\tfrac{1}{2}\left(P^{comp}-MC^{act}\right)\left(Q^{comp}-Q^{act}\right)\\
&= \tfrac{1}{2}\left(\frac{P^{act}-MC^{act}}{P^{act}}\right)\left(P^{act}Q^{comp}-P^{act}Q^{act}\right)\\
&\overset{(7.1)}{=} \tfrac{1}{2}\left(\frac{P^{act}-MC^{act}}{P^{act}}\right)^{2}\left(\delta\left(\frac{MC^{act}}{P^{act}}\right)-\varepsilon\right)^{-1}P^{act}Q^{act}\\
&= \tfrac{1}{2}\left(1-\frac{MC^{act}}{P^{act}}\right)^{2}\left(\delta\left(\frac{MC^{act}}{P^{act}}\right)-\varepsilon\right)^{-1}P^{act}Q^{act}
\end{aligned}\qquad (7.2)$$

Notice that the price-effect indicator can only be positive (as by definition) if

$$\delta\left(\frac{MC^{act}}{P^{act}}\right)-\varepsilon>0\Leftrightarrow\ \frac{MC^{act}}{P^{act}}>\frac{\varepsilon}{\delta}$$

This condition automatically holds if $\varepsilon<0$ and $\delta>0$ which yields diseconomies of scale, but may also hold if $\varepsilon<0$ and $\left(P^{act}/MC^{act}\right)\varepsilon<\delta<0$ which yields economies of scale.

If we assume that all intermediate and final prices[57] are similar across firms, and that all firms holds no inventories (as food products are perishable), then we can approximate MC^{act}/P^{act} as

$$\begin{aligned}\frac{MC^{act}}{P^{act}} &= \frac{\left(MRC_S^{act} + MDC_W^{act} + MPC_M^{act}\right)}{P^{act}} \\ &\approx \frac{average\,retail\,cost_S}{P^{act}} + \frac{average\,distribution\,cost_W}{I^{act}}\frac{I^{act}}{P^{act}} + \frac{average\ production\,cost_M}{W^{act}}\frac{W^{act}}{P^{act}} \quad (7.3) \\ &= \frac{retail\,cost_S}{sales_S} + \frac{distribution\,cost_W}{sales_W}\frac{sales_W}{sales_S} + \frac{production\,cost_M}{sales_W}\frac{sales_M}{sales_S}\end{aligned}$$

with

$sales_S = P^{act}Q^{act}$	total sales of all supermarkets
$sales_W = I^{act}Q^{act}$	total sales of all wholesalers
$sales_M = W^{act}Q^{act}$	total sales of all manufacturers

All variables in last equation for the price-effect indicator can be observed directly, except the elasticities ε and δ. The latter makes it difficult to calculate the actual change of the price-effects on the static efficiency of the supermarket chain. Further, normalising the price-effect indicator to the current sales may provide more insight.

However, in equation (7.2) changes in the first quadratic term will be more volatile than changes in second term with the supply elasticity and consumers' price elasticity, or changes in the third term with actual total sales on the retail market. The reason is that the sum of all price-cost margins changes more rapidly than the share of all variable costs in total sales, or the total sales.

Note further that the expression for the price-effect indicator generalizes Harberger's Dead Weight Loss (see Viscusi et al., 1992) on three respects:

- We allow marginal costs to rise at a constant rate with quantity, while Harberger assumes constant marginal costs or constant returns to scale (which implies $\delta = 0$)
- We allow more firms on a market, while Harberger assumes that there is only one firm on the market (i.e. the monopolist)
- We consider the price-effects on static efficiency for a whole supply chain (with three vertically related markets), while Harberger focuses on a single market.

[57] I.e. the wholesale price between manufacturers and wholesalers (W^{act}), the intermediate price between wholesalers and supermarkets (I^{act}), and the final retail price (P^{act}) are all homogenous prices.

Minor impact of size elasticities

The price effect outcome on static efficiency is based on the assumption of constant (and predetermined) elasticities. To some extent, this assumption is debatable because the elasticities depend on several other determinants. For example, consumers may have been less price sensitive just after the transition to the euro as they (temporarily) lost an adequate value for money (e.g. money illusion). They may also become less price sensitive in times of economic prosperity and high purchasing power.

The elasticity of total marginal costs to changes in total output depends on the extent of returns to scale. A positive elasticity points to decreasing returns to scale, a negative elasticity to increasing returns to scale. Further, technological changes and innovation may have an ambiguous impact on the latter elasticity.

However, it turns out that the assumptions on both elasticities have minor impact on the development of measurement of price effects in the supermarket chain (see table B.1). In fact, changes in the PCMs have more impact on this indicator than changes in the consumer price elasticity or changes in the elasticity of total marginal costs.[58] In this robustness check, we assume that price elasticity of consumers is negative, but allow the elasticity of marginal costs to be positive (yielding diseconomies of scale) or to be negative (yielding economies of scale). It shows that indicator has declined between 1993 and 2005 for all chosen combinations of elasticities.

Table B.1 Price effect indicator using different elasticities

Elasticity of marginal costs	Price elasticity of consumers	1993	1995	2000	2002	2005
Economies of scale						
δ =1	ε =– 0.5	100.0	71.5	26.8	33.5	24.3
δ =1	ε =– 1	100.0	71.3	26.8	32.8	24.1
δ =1	ε =– 2	100.0	71.1	26.8	32.0	23.8
Diseconomies of scale						
δ =– 0.3	ε =– 1	100.0	65.9	25.8	20.8	19.6
δ =– 0.3	ε =– 2	100.0	69.2	26.4	27.1	22.2

[58] The condition for the DWL to be positive is that the ratio between ε and δ is smaller than the ratio of the sum of marginal costs of the least efficient supermarket, buyer group and manufacturer over the final consumer price.

Appendix C Sources and variables

Sources

For our empirical analysis, we mainly employ firm-level data from Statistics Netherlands over the period 1993-2005. The results of the market power indicators are based on this type of data. Firm-level data is one of the main sources for the National Accounts. It provides the opportunity to go beyond aggregated industry data and analysing differences across firms within a branch.

We performed several 'cleansing' activities on the firm-level data to safeguard against undesirable results due to outliers or measurement errors for various reasons (largely similar to Creusen et al. (2006)). We removed: 1) observations of firms with no turnover and employment; 2) the second observation of the same firm in one year; 3) observation of year t+1 if a firm has identical output and employment data (or value added) in two consecutive years; 4) observation of firms with negative variable profits; 5) observations of firms with negative intermediate inputs; 6) observations of firms with huge changes in key variables as output and employment; in particular, firms with more than 500% increase in turnover or employment or decrease by more than 80% in these variables.

We also use additional data sources to detect the determinants behind buyer power and check the robustness of the results obtained from firm-level data. These sources are Statline and National Accounts (NA), both from Statistics Netherlands. For instance, we use time-series for prices based on NA.

Data definitions

We highlight those variables that are most worth discussing because they may have implications for interpretation of the results.

Total sales or gross output

Gross output denotes the output of firms including other activities (e.g. industrial services such as installation costs).

Labour costs

Labour costs are defined as the salary of employees including social security charges and extra allowances.

Intermediate inputs

Intermediate inputs consist of costs like materials, energy and marketing. We distinguish between retail costs and purchases. Here, the latter include the direct (wholesale) costs for buying the products from the manufacturer of food products. The retail costs are the indirect

costs related to selling the products to consumers, for instance, energy costs, distribution costs and marketing costs.

Variable costs
The variable costs are calculated as the sum of the labour costs and the intermediate inputs. As explained, the average variable costs approximate the missing observations for marginal costs.

Gross profits
Profits are defined as firm's revenue (or gross output) minus variable costs.

Measurement issues
Firm-level data based on surveys are prone to measurement errors for all kind of reasons. Hence, the market power indicators could be distorted to some extent as well. For instance, measurement errors in profits or variable costs could be due to faulty response in the surveys due to badly designed questionnaires, respondent bias including deliberate distortion of responses (e.g. strategic behaviour), and processing errors.

To some extent, we try to overcome measurement issues through our cleansing activities. We can, however, not guarantee that measurement errors are completely absent. In that respect, we are responsible for the analysis of the data reported in this study. Although Statistics Netherlands constantly tries to provide the best possible firm-level data, we are not responsible for incorrect or incomplete data collected by Statistics Netherlands. Note that as we are most interested in changes over time, measurement errors are not an issue if they are constant over time.

Another measurement issue might be related to the type of governance. At the retail market, there are more or less two types of organisations: branch retailer and franchisee. Franchisees are part of branch retailers. The latter are mainly large retailers such as Albert Heijn and C1000. There are clearly more franchisees than large retailers. Although branch retailers can have more than one store, the questionnaire of Statistics Netherlands is only send to the branch retailer at large, asking for the overall results of all its stores. In contrast, franchisee are sampled individually. Therefore, franchisees are to some extent overrepresented in our sample compared to branch retailers, as the former are not fully independent in terms of their competitive behaviour. Two remarks. First, for the PCM we use a weighted measure. Hence, a branch retailer will have a larger weight than an individual franchisee. Second, sampled franchisees are probably randomly located across the Netherlands. Consequently, we pick up the potential existence of local differences

Finally, as discussed in section 2.3, we had to refine SIC-code 5139 to gauge the buyer groups that are directly or mainly linked to supermarkets. Although we are quite confident, the results

for this new group might to some extent still be biased. Appendix D provides robustness checks.

Appendix D Robustness checks on buyer groups

As mentioned in section 2, it is hard to delineate the relevant buyer groups operating in SIC 5139 (i.e. wholesale trade of a general assortment in food products) because this industry includes also firms that deliver to other industries, for example to restaurants and hotels. Moreover, further investigation of Statistics Netherlands revealed that some buyer groups are classified to other industries for which we have no data at our disposal.

In the main text, we focus on the 10 largest firms in SIC5139 as being representatives for the buyer groups of some supermarkets. As robustness checks, this appendix presents the results of three "categories" of buyer groups. More precisely, we calculate the key figures of buyer power for all firms in SIC 5139, the 10 largest firms in SIC 5139 and the 20 largest firms in SIC 5139. Moreover, for each category we present the outcomes for the buyer groups solely as well as integrated with the supermarkets. The latter subcategory takes into account that buyer groups and supermarkets are frequently closely linked at the firm level.

Table D.1 Key figures buyer groups, 1993-2005

	1993	1995	2000	2002	2005
Buyer groups with all firms in SIC 5139					
Buyer groups					
- HHI in purchases	11.2	9.0	12.3	18.8	30.8
- Relative BPI to manufacturers	0.34	0.36	0.40	0.51	0.50
Supermarkets and buyer groups[a]					
- Relative BPI to manufacturers	0.58	0.62	0.59	0.73	0.53
Buyer groups with only the largest 10 firms in SIC 5139					
Buyer groups					
- HHI in purchases	23.4	13.2	14.2	24.3	36.9
- Relative BPI to manufacturers	0.35	0.35	0.39	0.51	0.51
Supermarkets and buyer groups[a]					
- Relative BPI to manufacturers	0.61	0.63	0.59	0.74	0.53
Buyer groups with only the largest 20 firms in SIC 5139					
Buyer groups					
- HHI in purchases	14.8	9.7	12.9	20.8	32.2
- Relative BPI to manufacturers	0.32	0.36	0.40	0.50	0.50
Supermarkets and buyer groups[a]					
- Relative BPI to manufacturers	0.59	0.62	0.59	0.73	0.53

Source: CPB calculations based on firm-level data.
[a] I.e. assuming that supermarkets and buyer groups add up to one industry.

Table D.1 presents the results. These results do not provide robust evidence for an increase in buyer power.