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How Retailers' Assortment Strategies and Food Prices Are Linked: Some Empirical Evidence for Germany[a)]

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ABSTRACT

The economics of grocery retailing is dominated by studies on pricing behaviour and the role of prices for the competitive position of retailers. Linkages to product policy have rarely been analyzed although the management literature indicates that an attractive assortment is one of the most important determinants of consumers' store choices or even the most important one. Therefore, we raise the question how the retailers' assortments and their price level are linked. After a literature review on the role of assortments and their influence on consumers and food prices, we analyze a large dataset for eight major German online retailers and their whole assortments of foods and beverages. It is investigated whether and how the assortments of online retailers affect their overall price level for foods and beverages. The econometric analysis reveals that various indicators of retailers' product assortments drive the price level: (i) A deeper assortment of an online retailer raises his price level of foods and beverages significantly. (ii) The organization of the website and, thus, consumers' transaction costs, matter too. (iii) There are strong retailer-specific fixed effects on the price level which may picture further assortment variables such as the breadth of the assortment or the private-label share.

1 Introduction

It is widely acknowledged that pricing plays a major role in grocery retailers' marketing activities. The following results have been derived in the literature:

(i) Consumers are sensitive to prices. Everyday-low-price (EDLP) strategies are important for discounters as are high-low (HiLo) strategies with varying and strong price discounts for supermarkets and hypermarkets (Möser, 2002).

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(ii) Short-run price discounts are a highly important marketing instrument and they raise price variability in retailing. Apart from this, prices in grocery retailing are rather rigid (Herrmann et al., 2005; Weber, 2009; Loy and Schaper, 2014).

(iii) For individual foods and brands, the law of one price does not hold – even not on online markets where full information is theoretically available for consumers (Fedoseeva et al., 2017). Studies indicate that price dispersion may even be larger online than offline (Zhuang et al., 2018).

The industrial-economics literature on food retailing has concentrated mainly on pricing strategies when analyzing the role of retailers in the food marketing chain. This view is certainly too narrow. It has been stressed in business-management studies that other marketing activities such as assortment strategies determine the success of retailers, too, as does the marketing-mix. Nevertheless, analyses of linkages between the different instruments, such as assortment and pricing strategies, have been rare. There are exceptions, such as Richards and Hamilton (2006), who have shown for the US that retailers compete strongly in price, quality **and** assortment.

Given this background, it is the objective of this contribution to investigate some major linkages between assortment and pricing strategies in food retailing with an empirical focus on Germany. In a first part, selected research results on assortment strategies in grocery retailing will be presented. A brief overview of general contributions on an optimal assortment breadth or depth will be provided. Furthermore, empirical studies are addressed which cover one of the two following questions: (i) how assortment strategies deviate between grocery-retailing firms and (ii) whether the breadth or depth of the product assortments of food retailers is related to the price level charged by the respective retailer. It is of special interest whether and how food retailers who can set higher prices on the market differ in terms of their assortment strategies. A broader or wider food assortment may well attract consumers and retailers with such an assortment might be in a position to set higher prices. Recent case studies indicate significant connections between assortment strategies and pricing based on recent empirical evidence across selected brick-and-mortar stores or online stores. In a second part of this paper, we provide new evidence on the relationship between assortment strategies and pricing of online food retailers. The analysis differs from the available literature on individual food groups as it is based on a much broader database. It allows to compare aggregate results for food and beverages as well as across various food groups. We will finally discuss these results in the context of the available literature and derive some implications for future research.

2 Retailers‘ Assortment Strategies and Food Prices: A Brief Literature Survey

2.1 Basic Definitions

The assortment strategy is one key area in product policy and management that determines the success of firms apart from price policy. In particular in retailing, different product assortments with varying degrees of product depth and product breadth can be successful and compete with each other (Varley, 2014). The product breadth is defined by the number of product lines a retailer carries, and the product depth is the variety within the product lines. Product breadth and depth characterize a retailer’s product assortment.

The statistical evidence on product assortments in grocery retailing often concentrates on the average number of products which different retailer types offer. For the major types of food retailers, a stable result has been for Germany that the average number of articles is highest for hypermarkets, followed by large supermarkets, supermarkets, and discounters (Statista, 2016; EHI, 2018). Table 1 shows the numbers for 2016. It follows a widely used classification that distinguishes these four major types of retailers in the German grocery-retailing sector. Whereas discounters are defined according to their everyday-low-price strategies, hypermarkets, large supermarkets, and supermarkets are defined by their sales area. Hypermarkets (SB-Warenhäuser in German) typically combine a supermarket with a department store and are characterized by a sales area of 5,000 m^2 or more. We define supermarkets and large supermarkets as all other food-full-range providers. Large

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supermarkets are defined by a sales area between 2,500 and 4,999 m^2 and supermarkets between 400 and 2,499 m^2 (EHI, 2018).

Table 1: The breadth of product assortments in different types of German grocery retailers, 2016

Retailer type	Average number of articles
Discounters	2,295
Supermarkets	11,830
Large supermarkets	25,005
Hypermarkets ("SB-Warenhäuser")	48,870

Source: EHI (2018).

2.2 Assortment Strategies in Retailing: An Overview of the Literature

Retailers' assortments matter for the consumer's selection of a grocery store. Shoppers reported that the most important determinants of their store choices are (i) a convenient location, (ii) low prices and (iii) an attractive assortment (Arnold et al., 1978). The analysis of Briesch et al. (2009) suggests an even greater role of assortments. In modelling store choice decisions as a function of product assortments, along with prices, convenience, and feature advertising, the authors derive that, "in general, assortments are more important than retail prices in store choice decisions" (ibid., p. 178). These findings point to the critical role of retailers' decisions on store locations, on pricing and assortment strategies for their competitive position in the market. Often, attractive assortments for consumers have been equated with large assortments in terms of breadth and depth as this signals more choice options for consumers.

Conceptually, assortment strategies have been assessed under the assumptions of utility-maximizing consumers and profit-maximizing retailers by Baumol and Ide (1956). These authors developed a model in which consumers maximize expected utility with regard to two important factors: (i) the attractivity of a retail store that rises with an increased product assortment due to more choice options; (ii) the transaction costs due to a visit of the store, which increase with the assortment as well as a consequence of higher search costs. The consumer will visit the store if the expected net benefit rises. Other business-management studies compared additional revenues and costs for retailers arising from various decisions that affect the size or structure of the firm's product assortment. Methodologically, laboratory experiments (Broniarczyk et al., 1998) or natural experiments (Drèze et al., 1994; Boatwright and Nunes, 2001) have mainly been applied.

The rule "more choice is better" has been discussed extensively and challenged in the business-management literature as well as in welfare economics. A broad and deep assortment in brick-and-mortar stores is associated with high costs and the question of an optimal size and structure of the assortment arises. Whether a reduction of a large assortment could pay given the cost savings involved has been analyzed in a number of studies. The findings are mixed. Apparently, a reduction of items in the product categories of a large-scale retailer will not necessarily reduce sales, the number of buyers, and profits. The results depend on the preference of consumers for the choice of a food store (Briesch et al., 2009) and, thus, on the number of items offered in the product categories, and on the availability of key products and product attributes, such as brands and flavor (Boatwright and Nunes, 2001). Due to cross-effects between categories, it is also necessary to distinguish between impacts on category sales and total sales. Sloot et al. (2006) elaborate additionally that it matters to distinguish between short- and long-run impacts of a changing reduction of the assortment. In the short run, substantive losses of category sales may occur as former buyers of delisted items reduce their purchases. In the long run, however, they identify only a weak effect on sales since new buyers will arise and compensate for lost category sales.

There is evidence that impacts of a reduction in assortment might be different on online and offline markets. Borle et al. (2005) analyze impacts of a large-scale assortment reduction on consumer retention with a model that considers sales both at the store and the category level. On the basis of data from an online grocer, the authors derive a clearly negative impact on shopping frequency as well as on purchase quantity. The change in

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the shopping frequency dominates the overall effect. Apparently, there are stronger arguments for a large assortment on online than on offline markets. This fits to recent findings saying that multichannel retailers may benefit from complementarities between brick-and-mortar stores and online stores given differential costs, e. g. in stockholding (Bhatnagar and Syam, 2014; Mkansi and Nsakanda, 2019).

Toporowski and Lademann (2014) survey the marketing literature on assortment, pricing, and retail site locations in food retailing and conclude that research focused "primarily on analyzing the effects of operational decisions" (ibid., p. 131). Given the German situation where discounters and full-range retailer compete intensively, they characterize competition between the two main retail formats as a "trade-off between the benefits of price and time on the one hand and selection and service on the other" (ibid., p. 131). This illustrates that it is necessary to look at the marketing-mix between different instruments to analyze and understand competition in grocery retailing. The linkages between assortment and pricing have been neglected in the literature and comparative statistical information on assortments and prices of major retailers are lacking, too. Some information on these neglected issues have only recently been covered in some case studies for individual food groups. They will be surveyed briefly in Section 2.3. Then, first findings from a new research project will be presented in Section 3 concerning assortments and pricing on the German online market for foods and beverages.

2.3 Retailers' Assortments and Pricing in Germany: Recent Empirical Studies

Märker (2016) and Weitzel (2017) analyzed the assortments of selected brick-and-mortar stores of various retail chains for the food groups chocolate products and salty snack products respectively. Both studies indicate that the assortment strategies of retailers are very closely related to the average price level charged for their products. The retail stores vary strongly in terms of their breadth and depth of the product assortments as well as their price levels. The law of one price does not hold for identical products across retailers, but the different assortment strategies are also a reason behind differential prices. As expected, discounters offer a rather limited assortment with low average prices. Hard discounters with a high share of private labels (Aldi and Lidl) range below soft discounters with a higher share of national brands (Netto and Penny) in terms of average prices. Among supermarkets, two retailers with a deeper assortment of brands (Rewe and Tegut) are characterized by a higher average price level in the two food groups relative to their competitors. Apart from the breadth and depth of the assortment, other assortment indicators affect pricing, too. Differential shares of private as opposed to national labels and positioning of the products in the store are cases in point.

When mean prices for a category of chocolate products (salty snacks) offered by a retailer are explained in a multiple regression, we get the results of Table 2. Determinants of the mean prices are the number of products offered in the respective category by that retailer as well as dummy variables for three of the four product categories. Table 2 shows that the variation of (logarithms of) prices can be explained well by these few variables; the corrected coefficients of determination are 0.74 and 0.73 respectively and the F values are highly statistically different from zero. The most remarkable result for our purpose is that the average price in a food category rises ceteris paribus with the number of products carried in that category, i. e. with the depth of the assortment. Average prices vary, as expected, between most of the product categories as well.

Additional multiple regression analyses by Märker (2016) and Weitzel (2017) indicate that there is a lot of heterogeneity behind the assortment effect at the individual product's level. Prices of individual chocolate products (salty snacks) are determined by the names of the brands and retailers and by other indicators of the retailer's assortment, such as the placement in the store.

The study by Erdmann (2019) refers to the online market for foods. Prices for a basket of 20 products in three food groups of the category "confectionary" are compared across online retailers. With descriptive and inductive statistics, it could be shown that the price level fell with the overall number of products offered, but it increased with the depth of the retailers' confectionary supply. Apparently, it is possible for very specialized retailers of confectionary to charge higher prices for defined standard brands.

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In our empirical analysis, it is planned to concentrate on the German online market for foods and to go beyond the case-study level. A broad overview of the linkage between breadth and depth of assortments on the one hand and the average price level will be provided for food and beverages which are supplied by online food retailers.

Table 2: The influence of assortment breadth and product type on prices of chocolate products and salty snacks (dependent variable: ln *PRICE*)

Regressors	Estimated coefficients	
	Chocolate products	Salty snacks
Constant	0.84***	0.51***
	(0.00)	(0.07)
Number of products (*n*)	0.004***	0.010***
	(0.00)	(0.00)
Categories of chocolate products (benchmark: chocolate bars):		
Tablets	- 0.28	
	(0.20)	
Pralines	0.99***	
	(0.20)	
Others	0.49*	
	(0.20)	
Categories of salty snacks (benchmark: non-sweet pastries):		
Chips		- 0.12
		(0.09)
Nuts		0.37***
		(0.08)
Extruded snacks		0.25**
		(0.08)
Adj. R^2	0.735	0.734
F	25.26***	25.19***

Notes: Robust standard errors are reported in parentheses under coefficients. ***, **, * refer to statistical significance at the 99.9% -, 99%-, and 95%-levels.
Source: Authors´ computations with data from Märker (2016) and Weitzel (2017).

3 Retailers' Assortment Strategies and Food Prices: Statistical and Econometric Evidence for the German Online Market

In the following, the link between prices and the number of products within product categories (the depth of assortment) as well as the number of categories in each product group (an approximation for search costs) is analyzed for eight major retailers in Germany that sold food and beverages using online channels in 2019. Those include AllyouneedFresh, AmazonFresh, Bringmeister, Edeka24, Gourmondo, MyTime, Real, and Rewe. The data (product identification numbers, product labels, their retailer-specific category allocation, prices) were collected for the entire Food and Beverages assortment on each retailer's webpage on October 1, 2019. In case regional outlets were available, data collection took place for Berlin. Each item sold on the internet is treated as individual product, any possible overlap in assortments across retailers is ignored for the reasons of simplicity and limited relevance to our research agenda. Due to the same reasons, if a product is available in different sizes, each variation is treated as an individual product in our sample. Table 3 provides an overview of the number of products available and the number of end categories (the last-level product group that an item is affiliated with in the structure of assortment) these products are assigned to.

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Real, Rewe and Gourmondo had the largest assortment of foods and beverages available, selling over 15,000 products each, while the assortments of Edeka24, MyTime and AllyouneedFresh were below 10,000 products. At the level of individual retailers, these products are assigned to differently specified product categories, derived with various degrees of detail. For instance, in order to find some Parmesan cheese at Rewe, the consumers should click their way through a three-level hierarchy: Fresh and Refrigerated -> Cheese and Cheese Substitutes -> Hard Cheese. At AmazonFresh the way will be longer: Foods and Beverages -> Eggs and Milk Products -> Cheese -> Packed Cheese -> Hard Cheese -> Parmesan. As a result, often the number of end categories will also be higher in the case of AmazonFresh. In this example, Hard Cheese (at Rewe) and Parmesan (at AmazonFresh) will be counted as respective end categories that were considered in Table 3.

Table 3: Number of products and product categories in the sample

Retailer	Number of products			Number of end categories		
	Total	Foods	Beverages	Total	Foods	Beverages
AllyouneedFresh	4,902	3,650	1,252	267	214	53
AmazonFresh	12,287	10,858	1,429	471	441	30
Bringmeister	11,042	9,004	2,038	562	488	74
Edeka24	5,978	4,614	1,364	147	92	55
Gourmondo	15,700	6,380	9,320	238	161	77
MyTime	7,691	6,415	1,276	268	221	47
Real	18,655	14,373	4,282	490	382	108
Rewe	15,669	12,829	2,840	292	248	44

Source: Own compilation.

Figure 1 visualizes the distribution of 91,924 products in our sample across retailers and between foods and beverages.

Figure 1: Foods versus beverages in the assortments of the selected retailers

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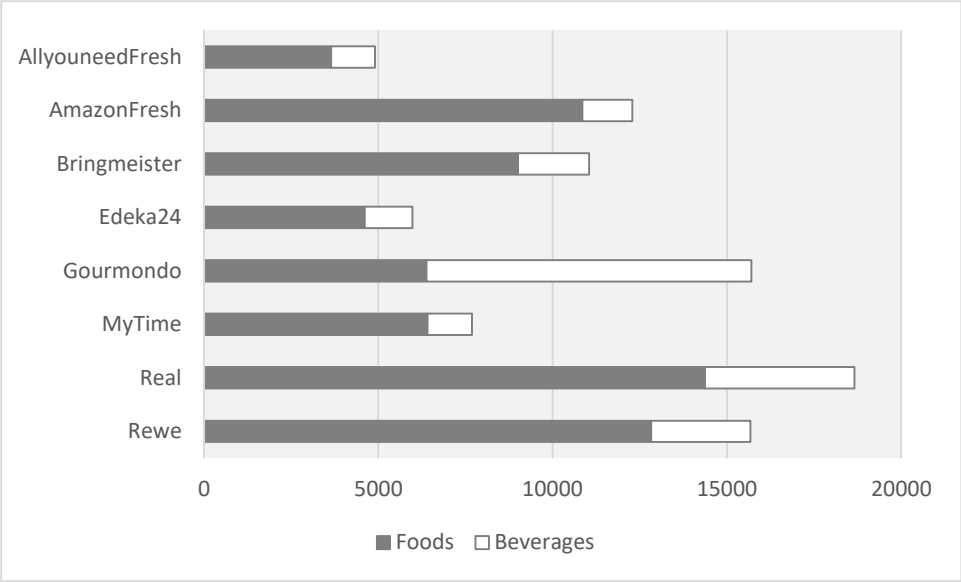

Source: Own computations and presentation.

To facilitate the comparison of individual retailers' assortments while providing more detail on the products than simply splitting them between Foods and Beverages, the products were assigned into the following 20 aggregated subcategories (Table 4):

Table 4: Product group classification

Foods	Fruits and Vegetables Breakfast Dairy Products Meat and Meat Products Fish and Seafood Products Coffee, Tea and Cocoa Bread and Bakery Spices	Oil, Vinegar and Dips Pasta, Rice and Lentils Sweets and Chocolate Salty Snacks Convenience Frozen International Other Foods
Beverages	Alcohol-free Beverages Beer	Wine Spirits

Source: Own presentation.

The number of products in the subcategories are reported in detail in Appendix 1, and Appendix 2 shows the average prices per product group for each online retailer.

The correlation analysis suggests a positive and relatively strong link between the number of products and average product prices for Beverages (0.66), while the connection between the number of products and the average prices for Foods (-0.02) is rather weak.

Correlations between prices and number of products (product categories) in individual sub-categories, however, reveal a certain heterogeneity between individual product categories within those aggregated groups (Figure 2). Individual correlations vary a lot, from negative correlation coefficients (e.g. Dairy) to highly positive ones (e.g. Wine).

Figure 2: Individual correlations between the number of products and mean prices

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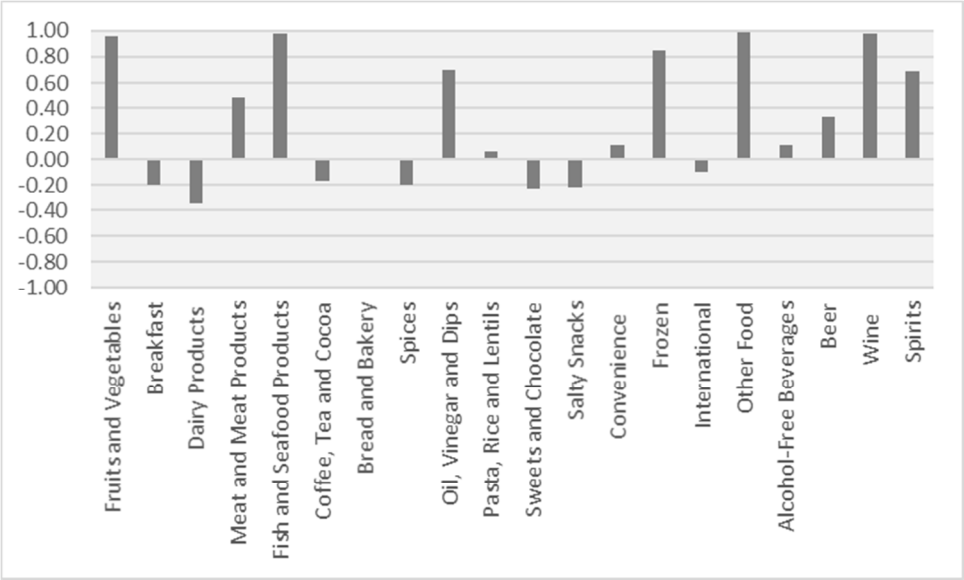

Source: Own presentation.

If we additionally look into the link between the number of categories that retailers use to present their products, more negative correlations show up (Figure 3). This result could be suggesting that more precision in assigning foods and beverages into categories is not necessarily helpful for consumers and is not associated with a possibility to set higher prices for retailers. It is important to note that the number of categories here does not refer to the breadth of assortment. It only reports how many subgroups each of our 20 aggregated product categories is divided into at each retailer's level. As such the number of categories serves for us as an approximation of search costs. For instance, two retailers could have an equal number of Fruits and Vegetables in their assortment but a different degree of product presentation within this group: while one would list all the products within the aggregated category Fresh Fruits and Vegetables (the number of end categories equals 1 in this case), the other could divide the group first into Fruits and Vegetables and then those into more detailed end groups, e.g. Apples, Pears, or Cabbage (the number of end categories in this case equals the sum of the most detailed categories). If browsing through the product groups in search of a particular product is associated with increasing cognitive burden via e.g. higher search cost, this might be linked to a negative price effect.

Figure 3: Individual correlations between the number of product categories and mean prices

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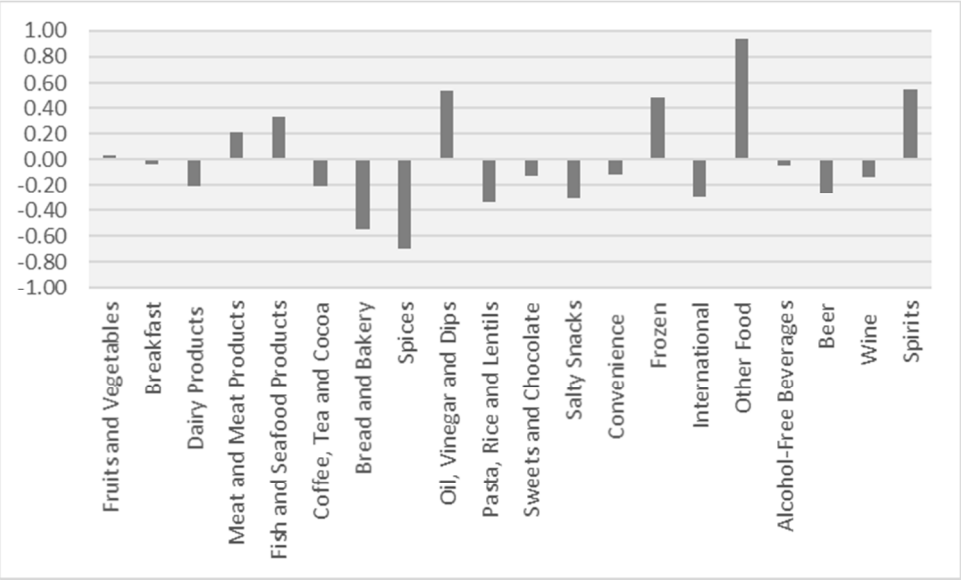

Source: Own presentation.

In order to investigate causalities rather than correlations, we estimate an econometric model additionally. Prices of single products at the level of the individual retailer are determined by the depth of the store's assortment, while the retailer- and product-category-specific characteristics are controlled for using the following specification:

(1) $Price_{ijk} = \alpha + \beta Depth_{jk} + \gamma Category_{jk} + \omega_k + \mu_j + e_{ijk}$

$Price_{ijk}$ is the price of the product i of a product group j at the retailer k, $Depth_{jk}$ of assortment is the number of products in the product group j at the retailer k, $Category_{jk}$ is the number of subcategories in the product group j at the retailer k, all expressed in the logarithmic form so that the coefficients related to these variables can be interpreted as elasticities. ω_k is a vector that includes the full set of fixed effects for the retailers and μ_j is a vector of fixed effects for product categories (first product category is always left out as a reference group). Edeka24 has been chosen as a benchmark for the retailer-specific fixed effects since it has the smallest total assortment (when also non-food products are considered) both in terms of products and product groups. Therefore, we expect to see positive coefficients at the other retailers' variables if it is also the overall assortment of the retailer ($Breadth$ of the assortment) that has a positive impact on its price levels, not only extended product availability within each category. Our data, however, do not allow to separate this assortment-wide scale effect from other retailer-specific characteristics that might also be captured by the fixed effects. This needs to be taken into account when interpreting the outcomes. Estimation results are reported for Foods and Beverages in Table 5 with fixed effects and the $Depth$ variable (Model 1) and with the *Category* variable additionally (Model 2).

Table 5: Retailer-specific and assortment effects on prices

Variables	Model 1				Model 2			
	Foods		Beverages		Foods		Beverages	
C	-0.09	*	-1.20	***	-0.08	*	-0.87	***
	(0.04)		(0.09)		(0.04)		(0.09)	
$AllyouneedFresh$	0.36	***	-0.03		0.40	***	-0.03	
	(0.01)		(0.03)		(0.01)		(0.03)	

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$AmazonFresh$	0.08	***	0.32	***	0.10	***	0.13	***
	(0.01)		(0.03)		(0.01)		(0.03)	
$Bringmeister$	0.09	***	0.06	*	0.12	***	0.09	***
	(0.01)		(0.03)		(0.01)		(0.03)	
$Gourmondo$	1.20	***	0.24	***	1.21	***	0.18	***
	(0.01)		(0.03)		(0.01)		(0.03)	
$MyTime$	0.10	***	-0.41	***	0.11	***	-0.49	***
	(0.01)		(0.03)		(0.01)		(0.03)	
$Real$	-0.01		-0.57	***	0.01		-0.49	***
	(0.01)		(0.03)		(0.01)		(0.03)	
$Rewe$	0.35	***	0.20	***	0.35	***	0.10	***
	(0.01)		(0.02)		(0.01)		(0.02)	
$Depth$	0.10	***	0.34	***	0.12	***	0.40	***
	(0.01)		(0.01)		(0.01)		(0.01)	
$Category$					-0.04	***	-0.23	***
					(0.01)		(0.01)	
Adj. R-squared	0.34		0.51		0.34		0.51	
Observations	68,123		23,801		68,123		23,801	

Notes: Robust standard errors are reported in parentheses below the coefficients. ***, **, * refer to statistical significance at the 99,9%-, 99%-, and 95%-levels. Edeka24 is the reference group for retailer-specific fixed effects. All equations also include product-category fixed effects (not reported). The first category in the group is the reference category, i.e. Fruits and Vegetables for Foods, and Non-alcoholic Beverages for Beverages.

Source: Own computations.

In both groups, a higher average number of products available in each subcategory leads to higher prices: The $Depth$ coefficients are positive and statistically significant. For Beverages the effect is larger (0.34) than for Foods (0.10). The positive impact of assortment depth on prices seems to hold also when we control for the complexity of category organization within retailers (Model 2). The estimates for product- and retailer-fixed effects and the overall quality of the models remained largely unchanged. The estimate for the $Depth$ variable is somewhat larger in Model 2. The $Category$ variable has a negative sign for both groups and, thus, the positive effect of a larger assortment on prices is partially offset by a negative effect related to higher search costs that arise from higher complexity of category structure.

Most retailers sell their products at a higher average price than Edeka24 for both Foods and Beverages, which might be an additional sign that larger (total) assortments and higher prices are linked. Only Real and - to a slightly lower extent - MyTime reveal somewhat lower prices for Beverages, while the other retailers have higher price levels in both groups. The highest discrepancy is between Edeka24 and Gourmondo, i.e. the most expensive retailer in our sample, across and in most individual product categories. Rewe, AllyouneedFresh for Foods, and AmazonFresh for Beverages follow.

4 Discussion and Implications

We can conclude from the preceding analysis that retailers' assortments strongly affect prices of foods and beverages on the German online market. Firstly, the depth elasticity of the price level is positive, statistically significant, and in the inelastic range. Apparently, more options to choose in the relevant product category raise the price level under ceteris-paribus conditions. Secondly, the category elasticity of the price level is statistically significant, too, but its sign is negative. A more differentiated design of the online store, which is associated with higher search costs of consumers, seems to lower the retailer's price level. Thirdly, more assortment effects may be hidden in the retailer-specific effects which are in most cases statistically significant.

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Such assortment characteristics, that are not explicitly considered in the estimated model, are the breadth of the overall assortment or the share of private labels carried.

One result from case studies on individual online markets has been that identical foods tend to be priced higher by pure online traders than by multichannel retailers. Tentatively, our results on average price levels for eight major retailers suggest a similar result. Compared to the benchmark retailer Edeka24, i.e. a multichannel retailer, several pure online retailers such as Gourmondo or AmazonFresh were characterized by a higher average price level for foods as well as for beverages. According to the retailer-specific effects in Table 5, AllyouneedFresh ranged above Edeka24, too, in terms of food prices.

It is a strength of the large dataset that the overall price level could be described statistically for the whole Food and Beverages assortments of major online retailers in Germany and explained with econometric models. To our knowledge, there are no comparable results available at this aggregate level.

Of course, if the analysis is focused at such an aggregate level, this may limit interpretability in detail. One case in point is that we do not study pricing for identical foods across retailers. We compare average prices charged by retailers for their respective assortments. Thus, a higher price level compared to the benchmark Edeka24 can imply two things: (i) that other retailers sell their products with a certain price premium, i.e. that a deviation from the law of one price for identical products occurs; and/or (ii) that the assortments contain different products, qualities and varieties and that higher prices stand for a retailer's assortment capturing a larger share of higher-priced products. Direct conclusions from higher average prices to deviations from the law of one price and to market-power effects are not possible. Here, complementary case studies are needed in future research to deal with the market-power question explicitly.

It has to be borne in mind, too, that higher prices at our level of aggregation are not necessarily reliable success indicators for retailers' market performance. As our dataset does not include quantity information, it is not possible to derive conclusions for market volumes, market shares and profitability without additional information. A retailer A with a higher average price of his product assortment compared to retailer B may or may not have higher profits. Recent anecdotal evidence underlines this important point. In early 2020, two of the main eight online retailers included in the empirical study, i. e. Gourmondo.de and AllyouneedFresh.de, had to leave the market (Randler, 2020). These two pure online retailers were characterized by positive retailer-fixed effects in the models of Table 5 and realized a higher overall price level than the benchmark retailer Edeka24. There is a need to go beyond price levels in analyzing success of online retailers in future research.

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Appendix 1: Number of products in individual subcategories across online retailers

	Allyouneed-Fresh	Amazon-Fresh	Bringmeister	Edeka24	Gourmondo	MyTime	Real	Rewe
Fruits and Vegetables		204	174			109	321	186
Breakfast	344	1,107	809	751	205	284	824	1,320
Dairy Products	45	1,309	991	29	175	728	1,749	797
Meat and Meat Products		533	765	17	605	323	400	423
Fish and Seafood Products		66	34		181	31	60	31
Coffee, Tea and Cocoa	479	719	590	493	402	555	836	1,417
Bread and Bakery	273	655	742	480	80	610	1,401	1,106
Spices	260	685	713	502	405	384	1,425	1,067
Oil, Vinegar and Dips	212	1211	525	484	1,764	353	946	1,516
Pasta, Rice and Lentils	258	518	426	337	305	191	467	674
Sweets and Chocolate	1,232	924	899	548	593	879	1,578	1,946
Salty Snacks	61	562	249	24	114	169	222	181
Convenience	386	1,257	1,218	828		1,073	2,062	1,526
Frozen		1,108	649			702	961	133
International	98		220		330	24	1,028	506
Other Food	2			121	1,221		93	859
Alcohol-free Beverages	386	506	905	311	237	423	1,746	149
Beer	351	179	324	39	249	113	434	1,158
Wine	313	453	580	644	6,289	437	1,188	674
Spirits	202	291	229	370	2,545	303	914	1,509

Source: Own computations.

Appendix 2: Average prices per product group for individual online retailers

	Allyouneed-Fresh	Amazon-Fresh	Bringmeister	Edeka24	Gourmondo	MyTime	Real	Rewe
Fruits and Vegetables		2.21	1.87			1.78	2.64	1.96
Breakfast	4.30	3.40	3.03	2.68	6.10	2.91	3.15	4.90

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Dairy Products	1.79	1.79	2.76	1.65	10.51	2.30	1.59	2.12
Meat and Meat Products		3.79	7.37	2.41	23.70	3.06	2.66	3.45
Fish and Seafood Products		5.76	2.38		61.66	2.32	3.33	3.08
Coffee, Tea and Cocoa	5.00	4.92	4.88	5.23	16.02	5.01	4.51	7.41
Bread and Bakery	4.08	2.28	1.70	1.86	3.58	2.14	1.91	6.23
Spices	2.61	3.17	2.29	1.76	8.54	3.28	2.49	4.22
Oil, Vinegar and Dips	4.45	3.51	2.83	2.31	9.39	2.25	2.40	4.83
Pasta, Rice and Lentils	2.84	2.31	2.12	2.02	5.95	1.88	1.94	3.83
Sweets and Chocolate	2.93	2.15	2.53	1.67	9.42	2.52	2.40	3.53
Salty Snacks	2.20	1.83	2.09	1.62	5.34	1.95	1.88	3.59
Convenience	2.26	2.22	2.42	1.96		1.71	1.94	3.02
Frozen		3.76	3.62			3.85	3.61	2.54
International	3.43		2.19		6.78	2.59	2.45	
Other Food	3.12			2.87	24.61		5.05	12.81
Alcohol-free Beverages	2.21	5.57	5.29	3.56	5.05	1.83	3.61	4.91
Beer	5.02	9.33	9.75	2.03	5.41	1.93	5.75	9.27
Wine	10.12	7.86	8.30	6.93	41.37	4.68	6.24	12.98
Spirits	22.75	26.86	15.91	17.42	38.59	15.11	14.70	31.62

Source: Own computations.

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