Buyer Power and Innovation of Quality Products: Empirical Evidence from the German Food Sector.

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Working Paper FE 0307

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July 2003

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Abstract: The last couple of decades have seen an increased retail concentration around the world, particularly in Europe. Views on the welfare implications of this severe change are controversial. Consumers might benefit because larger stores (owned by larger retailer chains) offer more product choices. On the other hand, there is concern that buyer power may force manufacturers "to reduce investment in new products or product improvements" [1].

This paper's aim is to analyse whether retailer power affects food manufacturing firms incentives to invest in innovation of high quality food products. On the basis of a formal model, we find that retailer market power reduces upstream firms incentives to introduce new products. This proposition is tested empirically on the basis of firm level data from a survey of food manufacturing firms carried out in 2002 in Germany. Results of multinomial logit model show a moderate and negative impact of retailer market power on innovation of regular quality products. No such negative impact is observed for premium quality products. Producers of premium products thus seem to more effectively resist retailer market power in product innovation

Keywords: Retailer market power, innovation, product quality, multinomial logit model.

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1 The authors gratefully acknowledge financial support from the Stiftung Schleswig-Holsteinische Landschaft (project 2000/02, BA207/7110).

1. Introduction

The last couple of decades have seen an increased retail concentration around the world, particularly in Europe. In 1992, the top ten grocers in Europe accounted for 27.8 per cent of the market, but for 36.2 per cent only five years later[2]. Views on the welfare implications of this severe change are controversial. Consumers might benefit because larger stores (owned by larger retailer chains) offer more product choices under more convenient conditions. Further, they could use their buying power to obtain lower prices from suppliers which could then be passed on to consumers. On the other hand, there is concern that powerful retailers might exert their market power in the product market and raise consumer prices. For example, Dobson and Waterson pointed out that a food basket in the highly concentrated UK food retailing costs 45%-points more than in the comparatively low concentrated U.S. food retailing[3]. In addition, it has repeatedly been hypothesized that buyer power may force manufacturers "to reduce investment in new products or product improvements, advertising and brand building"[1]. Similarly, a recent FTC report suggests that consumers "could be adversely affected by the exercise of buyer power in the long run, if prices to suppliers are reduced below the competitive level and if the suppliers respond by under-investing in innovation or production" [4].

This paper aims at analysing whether buyer power affects upstream incentives to invest in product innovation. Special attention is given to the quality of product introduction. It is argued that vertically product differentiation provokes that prices and margins may not be stripped down that much [5,6], so that under-investment in premium products might be less than in regular quality products. Following, the question if retailers' market power has a different impact on producers' incentive to invest in superior quality products than in regular quality products is to be tested empirically.

Particular emphasis will be given to the food sector for three reasons. Firstly, as Clarke et al. emphasize, among all areas of retailing, food retailing stands out to have experienced the most significant changes in market structure during the last decades[2]. Secondly, because of the size and importance of food retailing, these changes will have the greatest impact on consumers. Finally, the food sector is particularly interesting because of the large number of innovations per year. According to Madakom 32.478 new products have been introduced into the German food market in year 2000[7].

The paper is organized as follows. We discuss the relationship between buyer power and innovation incentives in a theoretical model in Section 2. Data and the empirical evidence is reported in Section 3. Section 4 summarizes and concludes.

2. The Model

The impact of retailer power on the rate of product innovation in manufacturing can most easily be investigated in a model based on Sullivan[8]. The author develops a model of product innovation in a vertically related market by investigating separately the behaviour of retailers and manufacturers. In the following, we do not discuss the full model in detail but focus on retailers only and modify Sullivan's model by introducing imperfect competition.

We assume retailers to act competitively on the product market but to have monopsonistic power with respect to input markets (manufacturers). The retailer's problem is to decide how many new products to accept (X) from manufacturers and to determine the quantity of each product (q) and thus the total store quantity ($Q = qX$). In period t, the retailer decides to take X_t new products without knowing, whether or not this product will be successful in the market. If the product is successful, it can be sold for two periods, if it is not successful, it can only be sold in the first period but will not be accepted by consumers in the second period. The fraction of successful products, ρ, is treated as deterministic. In the following, we argue that premium products are more attractive to the consumer, hence premium quality increases the fraction of successful products. This was shown empirically by McNamara et al.[9]. Thus, ρ increases with product quality.[2] The total number of products offered by a retailer in period t thus is, $X_t^T = \rho X_{t-1} + X_t$ but only $\hat{X}_t = \rho(X_{t-1} + X_t)$ are products attractive to consumers. If the retailer offers a large number of attractive products, consumers are willing to pay a higher price for products at a store. Formally, consumer demand is represented by the inverse demand function $P(\hat{X})$, with $P_{\hat{X}} > 0$ and $P_{\hat{X}\hat{X}} < 0$, where $P_{\hat{X}}$ and $P_{\hat{X}\hat{X}}$ represent the first and second derivative of $P(\hat{X})$, respectively.[3]

A retailer faces two sorts of costs: operating costs K and costs associated with purchasing the product from the manufacturer W. Operating costs are increasing in the number of new products accepted as well as in the total store quantity: $K_X > 0, K_Q > 0, K_{XX} > 0, K_{QQ} > 0$.[4] Due to monopsonistic market power, input prices are not given but vary with the quantity of products purchased: $W_Q > 0$.

The retailers profit function for the two periods t and t+1 is:

$$\pi = [P(\hat{X}_t) - W_t(Q_t)] - K(X_t, Q_t) + [P(\hat{X}_{t+1}) - W_{t+1}(Q_{t+1})] - K(X_{t+1}, Q_{t+1}) \quad (1)$$

Profit maximisation implies choosing X and Q such that the following first order conditions must be satisfied:

$$\frac{\partial \pi}{\partial X_t} = \rho Q_t P_{\hat{X}}(\hat{X}) - K_X + \rho Q_{t+1} P_{\hat{X}}(\hat{X}_{t+1}) = 0 \quad (2)$$

$$\frac{\partial \pi}{\partial Q_t} = P(\hat{X}_t) - W_{Q_t} Q_t - W_t(Q_t) - K_Q = 0 \quad (3)$$

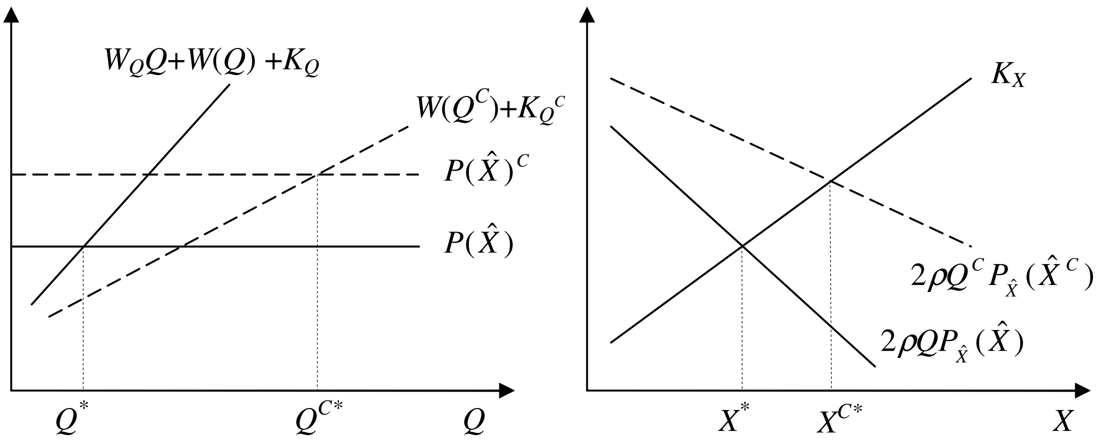
The following diagram illustrates this choice of X and Q in a steady state situation ($\hat{X}_t = \hat{X}_{t+1}, \quad Q_t = Q_{t+1}$).

Diagram 1: The retailer's optimal X and Q

[2] Clearly, product quality has many different dimensions and cannot easily be captured and represented by a single parameter. Here we refer to "quality" as the consumers' subjective satisfaction with the product purchased motivating him to buy the product again next period. Alternatively associating higher durability with higher quality clearly lead to the opposite result.

[3] Shopping at a store with a small number of products increases the chance that one of the desired products is not available, in which case the consumer must either buy a less-than-optimal brand or visit another store. Offering a larger number of products may further satisfy consumer's taste for variety. Thus $P_X > 0$. $P_{\hat{X}\hat{X}} < 0$ implies that the reduction in search costs from an additional product is declining in the number of products. Note that the probability that an additional product will be in the consumer's optimal bundle is smaller when the number of products is large. Secondly, adding another product to a fixed amount of shelf space makes it more difficult for a consumer to find the product in the store ("in store search costs").

[4] When many new products are added to the store, it is more difficult to rearrange the shelves and manage additional products, which implies $K_{XX} > 0$.



With respect to the total store quantity, the retailer will choose Q such that output price $P(\hat{X})$ equals total marginal costs. Total marginal costs include marginal operation costs K_Q as well as marginal costs associated with purchasing products from manufacturers ($W_Q Q + W(Q)$). Similarly, the optimal number of products chosen is also determined by the intersection of marginal costs K_X and marginal revenue ($2\rho Q P_{\hat{X}}(\hat{X})$). The marginal revenue curve is downward sloping since $P_{\hat{X}\hat{X}} < 0$.

Diagram 1 also allows to compare Q^* and X^* with a situation where the retailer does not have monopsonistic power (Q^{C*} and X^{C*}). In a competitive market, the marginal costs of total store quantity will be lower (since WQ = 0) which increases the optimal quantity ($Q^{C*} > Q^*$). An increase in Q shifts the marginal revenue curve in the second part of diagram 1, which again raises the optimal number of products ($X^{C*} > X^*$). This process is reinforced by the fact that an increase in X further raises the consumers willingness to pay ($P(\hat{X})^C > P(\hat{X})$).

Modelling the manufacturer's behaviour does not add anything important to the model. We can conclude that retailer market power reduces the demand for new products compared to a competitive retailer market. The basic argument is that concentration among buyers leads to a strategic reduction in purchases with the aim of reducing prices. This lowers manufacturers profits and reduces incentives for product innovation.[5] Increasing unit costs are the primary source of buyer power in this model. Additional arguments supporting a relationship between buyer power and suppliers profits and innovation have been suggested. Katz stresses that larger buyers can more credibly threaten to integrate backwards thereby exerting more pressure on a supplier[11]. Scherer and Ross argue that a large buyer's purchasing order is more likely to break up potential collusion between suppliers[12]. Within the framework of bilateral negotiations between suppliers and downstream firms, Inderst and Wey consider a large buyer's ability of threatening to withdraw his demand. If negotiations fails, suppliers with a fixed capacity in the short run will have difficulties in selling their output[13]. Finally, market power of downstream firms might also allow them to force upstream firms into contractual arrangements such as signing exclusive supply contracts. Stefanides has shown that these contracts will reduce upstream innovation in that the foreclosed suppliers incur the disadvantages of low-scale production and are discouraged from innovating[14].

With respect to the impact of product quality ρ, one should distinguish two different effects. First, the incentive to innovate is higher for quality products. This can be seen in Diagram 1. An increase in ρ shifts the marginal revenue curve $2\rho Q P_{\hat{X}}(\hat{X})$ to the top

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[5] For a recent summary of the empirical literature linking market concentration to buyer and supplier profitability see Ellison and Snyder[10].

right increasing the optimal number of new products. Given the costs of innovating, it is more attractive to do so if the product can be sold for two periods (high quality) as opposed to one period only.
The second effect refers to the impact of retailer market power on innovation in food manufacturing. Here, the results from the theoretical model are inconclusive as an increase in ρ would shift the marginal revenue curve in the monopsony as well as in the competitive equilibrium. Applying the implicit function theorem to equation (2) suggests that these two effects exactly cancel out so that there is no difference in the importance of retailer market power for regular and high quality products.
One might however speculate that product quality not only influences the consumers' willingness to purchase products repeatedly but could also influence other parameters of the model. In particular, it seems plausible that high quality products might improve producers bargaining power towards retailers. Whether higher product quality actually mitigates the impact of retailer market power on innovation will be investigated in the next section.

3. Data and Empirical Evidence

For this purpose we conducted a survey among food industry firms in Germany in spring 2002. Aim was to consider the companies' competitive environment, the determinants of product innovation activities and new product success. Special attention was given to the introduction of superior quality products.
We mailed a questionnaires to 539 companies in food manufacturing listed in the „Presse-Taschenbuch Ernährung", a handbook on food industry which is published by the Federation of German Food and Drink Industries (BVE) [15]. From 539 questionnaires, 119 (22 %) were returned. For further analysis only 88 questionnaires could be used due to data restrictions. Dataset consists of companies of all sectors of food industry, federal states and size categories. The majority of respondents belong to meat processing, brewery and dairy sector. Least companies are from malthouse, condiments or coffee and tea processing. Most of the respondents are small- and medium-sized companies (63 firms, 71.59%), however firm size ranges from 3 persons employed up to 8500. Thus, sample is a good representation of the German food industry.

As endogenous variable we use a dummy variable for innovation activity at different product quality levels (QP). QP can take the values 0, 1 and 2.

$$QP = \begin{cases} 0, & \text{if } NNP = 0 \\ 1, & \text{if } NNP > 0 \text{ and } TPREM < 5 \\ 2, & \text{if } NNP > 0 \text{ and } TPREM = 5 \end{cases}$$

where *NNP* is the number of new or notedly improved products introduced in the period 1999-2001 and *TPREM* is the extent of firm's picking up the premium trend. *TPREM* was reported on a scale from 1 (not important) to 5 (very much important). Thus, dummy variable is set equal to 2 if the firm reported to have had innovative activity and stated a very high importance of picking up the premium trend (TPREM=5). If the firm has launched a product but evaluated the picking up of premium trend less than "very much important" (TPREM<5), dummy variable takes the value 1. If the firm has not launched an innovative product between 1999 and 2001 at all, dummy variable is set equal to zero. Of 88 firms, 20 (22.73%) reported the launch of new products with superior product quality, 54 firms (61.36%) with regular product quality and 14 firms (15.91%) did not show any innovative activity.

The definition and descriptive statistics of all variables used is reported in Table 1.

Table 1: Definition and descriptive statistics of variables used (n = 88)

	Mean (Std.Dev.)	**Minimum Maximum**
Market share (*MAS*): market share in firm's main pillar in year 2001 measured on the following scale: (1) if the share is ≤1%; (2) if the share is between 1% and < 5%; (3) if the share is between 5% and < 10%; (4) if the share is between 10% and < 20%; (5) if the share is ≥20%.	3.0795 1.4160	1 5
Export share (*EXP*): percentage of total sales in year 2001 generated from exports, in %	9.6636 11.7382	0 60
R&D activity (*RD*): company's share of total sales spent on average on research and development on the following scale: (0) if the share is 0%; (1) if the share is between > 0% and < 0.25%; (2) if the share is between 0.25% and < 0.5%; (3) if the share is between 0.5% and < 0.75%; (4) if the share is between 0.75% and < 1%; (5) if the share is between 1% and < 1.5%; (6) if the share is between 1.5% and < 2%; (7) if the share is ≥ 2%.	2.0795 1.8707	0 7
Brand strategy (*BRANDS*): evaluation of the importance of brand strategy in the company on a scale from 1 (unimportant) to 5 (very important).	3.8295 1.2431	1 5
Dummy variable for retailer market power (*RMP5*). Respondents were asked to evaluate retailers' market power on a scale from 1 (very low) to 5 (very high). The dummy variable is set equal to 1 if the respondent characterizes retailer market power to be very high, and is set equal to zero otherwise	0.4773 0.5023	0 1
Competitive intensity (*COMP*). Respondents were asked to rank the degree of competition in their own industry on a scale from 1 (very low) to 5 (very high).	3.2841 0.7871	2 5
Firm size (*LABOR*). Number of people employed	494.4545 1117.4017	3 8500
Adaptation flexibility (*FLEX*): evaluation of the company's adaptation flexibility on a scale from 1 (very low) to 5 (very high)	3.4886 0.9346	2 5
Investment rate (*INVEST*): % share of total sales spent in year 2001 on investment	5.8097 6.9364	0 50
Market size (*SIZE*): industry sales in real terms in billion EUR in year 1999.*	13.8442 11.0904	0.9469 38.2765
Market growth (GR): Average growth rate of industry real sales between 1995 and 1999, in %. *	1.2767 6.4814	-11.7983 28.3127

* data source: aggregated 4-digit data of production survey provided and published by German Federal Statistical Office, data for years 1995-1999.

In the empirical model we aim at explaining the firms' decision between the three alternatives: no innovation (QP=0), product innovation at regular product quality (QP=1), and product innovation at superior product quality (QP=2). We assume that firm utility U_{ij} associated with alternative j ($j = 0,1,2$) for firm i is $U_{ij} = \alpha_j + \beta_j^{'} X + \varepsilon_{ij} = Z_j + \varepsilon_{ij}$, where X is a matrix of firm and market characteristics, β_j is a vector of parameters and ε_{ij} are factors of disturbance. If the firm makes choice j in particular, we assume that U_{ij} is the maximum among the J utilities: $\Pr ob(U_{ij} > U_{ik})$ for all other $k \neq j$. If the J disturbances ε_{ij} are independent and identically distributed with Weibull distribution, $F(\varepsilon_{ij}) = \exp(-e^{-\varepsilon_{ij}})$, the probability for a specific choice j can be computed as $\Pr ob(QP = j) = \frac{e^{Z_j}}{1 + \sum_{j=1}^{j} e^{Z_j}}$, which leads to what is called a multinomial logit model. The log-likelihood for estimating the parameters β_j is $\ln L = \sum_{i=1}^{n} \sum_{j=0}^{j} d_{ij} \ln \Pr ob(QP_i = j)$. The restricted log-likelihood is $\ln L_o = \sum_{j=0}^{j} n_j \ln(\frac{n_j}{n}) = \sum_{j=0}^{j} n_j \ln p_j$, where p_j is the sample proportion of observations that make choice *j*. [6] The results of the multinomial logit model analysing the incentive to innovate at different product quality levels of 88 enterprises in German food industry in 2002 is reported in Table 2.

Table 2: Results of Multinomial Logit Model (n=88)

Explanatory Variables	regular quality product (QP=1)		premium quality product (QP=2)	
	Parameter	(t-Value)	Parameter	(t-Value)
Constant	-7.8370 *	-1.698	-16.6954 ***	-3.030
Market share *MAS*	1.8211 **	2.084	2.1543 **	2.356
Export share *EXP*	-0.1553 ***	-2.602	-0.2020 ***	-2.860
R&D activity *RD*	0.9352 *	1.920	1.1623 **	2.261
Brand strategy *BRANDS*	0.7880	1.422	1.9919 ***	2.968
retailer market power *RMP5*	-2.5581 *	-1.670	-2.0041	-1.195
Competitive intensity *COMP*	-0.0087	-0.010	-0.1416	-0.152
Firm size *LABOR*	0.0010	0.797	0.0013	0.998
Adaptation flexibility *FLEX*	2.0744 *	1.919	2.8977 **	2.545
Investment rate *INVEST*	-0.1092	-1.588	-0.2150 **	-2.031
Market size *SIZE*	-0.1288 *	-1.897	-0.2046 ***	-2.630
Market growth *GR*	-0.1105	-0.672	-0.1103	-0.652
Log likelihood function		-44.6138		
Restricted log likelihood (β=0)		-81.7391		
Likelihood ratio test (DF)		74.2505 (22)		

Actual	Predicted 0	1	2	Total
0	10	4	0	14
1	4	45	5	54
2	1	9	10	20
Total	15	58	15	88

Remarks: *** significance level = 1%; ** significance level = 5%; * significance level = 10%; DF refers to the degrees of freedom. Outcome QP=0 is the comparison group.

As the likelihood ratio test reports, estimation model is statistically significant below the 1%-level. The predictive power of the model is high: From the total number of 88 observations 73.86% are correctly classified by the econometric model. In the three categories, 71.43% of the "zeros", 83.33% of the "ones" and 50% of the "twos" are correctly classified. A comparison of the two models indicates that the parameter estimates for the various variables are very similar.
At sample means, probability to introduce a regular quality product is 87.90%, to launch a superior quality product is 11.60% and probability of no innovation is 0.05%. Thus, regular (premium) product quality is of major (minor) importance.

Study's main attention is to investigate the impact of German food retailers' market power on innovation incentive. Therefore we asked interviewed companies to give an evaluation of the retailers' market power on a scale from 1 (retailer market power is very low) to 5 (retailer market power is very high). Nearly half of the respondents (47.73 per cent) affirm that retailers' market power is high and very high, only 13.63 per cent report retailers market power to be low and very low. For econometric analysis we

[6] For more details on multinomial logit model see Greene[16]. For an application in the innovation research area see Cabagnols and LeBas, who analysed the distinguishing determinants of probability for product, process and combined product & process innovations in France[17].

define a dummy variable (*RMP5*) which is set equal to 1 for firms reporting a very high retailer's market power, and is set equal to zero otherwise. The theoretical model described in section 2 suggests a negative relationship between retailers' market power and innovation in the upstream industry. The present study actually reveals a statistically significant and negative impact on the probability to innovate with regular product quality, which implies that retailers' market power impedes new product introductions. In markets with retailers market power reported to be „very high" the probability to innovate with regular product quality is 83.47%, therewith by 7.19%-points less than in markets with buyer power reported to be „high" or less than high.[7] On the probability to innovate with superior quality products (premium products), however, buyer power does not show a statistically significant impact. This result implies that oligopsonistic power of the retailers has less impact on the producer of premium goods. As quality is a means to differentiate and add identity to the product which appeals directly to the consumer, it gives some countervailing power to manufacturers. Thus, the producer of premium goods might resist the increasing retailers' market power, margins are not stripped down and, hence give an incentive to innovate.

Is the negative impact of market power in the downstream market on firms' innovation incentive mitigated if manufacturing firms also are concentrated and powerful (countervailing power)? According to Neo-Schumpeter-hypothesis II, there is a high innovative potential of powerful firms because these firms a) have sufficient financial resources and accumulation of human capital, b) can realize economies of scale in producing innovations as well as c) have a strong incentive to establish market barriers to entry due to product innovation ('efficiency effect'). Conversely it can be argued that firms with low market power undertake innovation to withstand the pressure of competition and "steal consumers" from competitors. Increasing competitive intensity forces to react quickly in order to remain competitive whereas firms with market power deter from product innovation since the new product would partially "steal consumers" from their own (profitable) old product ('replacement effect'). Finally, a number of authors argue that innovation is discouraged by both, too much or too little competition, and occurs when the degree of competition in an industry is in an intermediate range [18,19,20,21]. The existing empirical literature reports mixed results. Whereas some authors find a positive relationship [22,17,23], others suggest a negative relationship between different measures of market power and innovative activity [24,25,26,27,28]. This study uses different proxies for firm's market power. Table 2 suggests that firms with a large market share (*MAS*) report a significantly higher innovation incentive for both regular and premium product innovation. The parameter estimates of *MAS* are positive and significantly different from zero. A firm with a market share of 10% has compared to a firm with 5% market share[8] a by 3.38%-points lower probability to innovate with regular product quality (84.72%) but a by 3.87%-points higher probability to launch a premium product (15,19%)[9]. Results give support to the argument that powerful firms

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[7] To give evidence on the strength of impact on innovation probabilities $\Pr ob(QP = j)$ elasticities ε were computed using sample means and estimated coefficients of exogenous variables *X*: $\varepsilon = \frac{d \Pr ob(QP = j)}{dX} * \frac{X}{\Pr ob(QP = j)}$. Changes in innovation probabilities subject to changes in *X* are visualized in Appendix 1.

[8] Firm's market share on the stated scale is in class 3 resp. 4.

[9] Although signs for estimated parameter are positive in both equations, signs of elasticities are different: A one per cent increase of MAS lowers the incentive for innovation with regular quality products but increases the probability for premium product innovation. This initially uncommon appearing effect however is plausible as firms have to decide whether to choose alternative j=0,1 or 2, and the sum of the

have a strong incentive to establish market barriers to entry due to product innovation. As product quality can be seen as a means to deter market entry[10] the strong effect of market share on premium quality innovation is plausible.
Firms have also been asked to evaluate the "degree of competition" in their primary product market. Again, firm's response patterns are indicated from 1 (intensity of competition in industry is very low) to 5 (intensity of competition in industry is very high). Including this variable *COMP*, however, does not contribute to the explanatory power of the model. No significant relationship can further be observed between a variable indicating the existence of predatory pricing strategies or 'price wars' and innovation. Summarizing, there is at least some evidence in favour of the argument that firms with a larger market share are more likely to innovate. Their market power restrains the negative effect of retailer market power on innovation incentive, especially on the incentive to launch a premium quality product.

Study also looked at the impact of firm size on innovation probability. According to Neo-Schumpeter-hypothesis I, it is to emanate from a positive relationship between firm size and innovative activity due to better accouterment for introducing new products. Large companies, it is argued, would have an advantage in raising funds for risky innovation projects as they can cover capital requirements to a considerable proportion from own funds due to higher liquidity and have easier access to loans. Also large firms are able to spread fix costs over a large sales volume, thus reduce unit costs of production. Innovations would thus be more profitable in big companies. Further, large firms can undertake several innovation projects at the time and thereby spread R&D risk [29,30,31]. On the other hand it is argued that small enterprises have a higher innovation activity which might be due to their advantage of lower complexity in corporate structure. Further more small and medium-sized firms produce only such know-how they use in short-term [31], thus R&D activity is more efficient than in large companies [32]. Small firms also have a closer contact to the consumer and are stronger exposed to competitive pressure than large companies, which provokes innovate behaviour [33]. Empirical evidence for a negative impact of firm size on innovative behaviour give Wittkopp[28], Acs and Audretsch[24] and McNamara et al.[9]. In present study coefficient of firm size measured as number of people employed (*LABOR*) shows a positive sign, however, impact is not statistically significant different from zero.
Table 2 reports a significant and positive impact of company's share of total sales spent on R&D, represented by variable *RD*. Thus, probabilities to innovate with regular resp. premium quality preoducts increases with R&D activity. This result is not surprising as R&D can be seen as an investment in innovation. Interviewed companies have reported that R&D expenditure is mainly utilized for developing new products (52.51% of expenses) as well as the joint development of products and processes (31.40%). Also empirical literature shows a positive impact of R&D on innovation [34,35,23,9]. If a firm spends 0,25% of its total sales on R&D and increases this share by 0,25%-points up to 0,5%[11], the probability to launch a regular quality product decreases by 2.22%-points, however the probability for premium product innovation increases increases by 2.55%-

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probabilities for theses j choices is 100%. As $\Pr ob(QP=0)$ in the considered area is rather steady, an increase of $\Pr ob(QP=2)$ comes along with a decline of $\Pr ob(QP=1)$.

[10] Van Witteloostuijn and Van Wegberg[36] argue that product quality innovation is associated with sunk costs (e.g. in terms of R&D expenses) which act as market barriers to entry.

[11] This would mean a change of R&D activity on the stated scale from 2 to 3.

points to 13.96%. Apparently, particularly the development of a superior quality product affords more intense R&D activity[12].
Moreover, the ability to recognize and react flexible to changes in market condition (e.g. consumer needs) is an important requirement for product innovation [37,38]. Thus, the positive and statistically significant impact of adaptation flexibility (*FLEX*) reported in Table 2 is not astonishing.[13] Compared to firms with medium flexibility those with high reported flexibility have a by 7.46%-points lower probability to introduce regular quality products into the market (83.12%). The incentive to innovate with premium products, however, increases by 8.72%-points to 16.71%, therewith doubles. As demand for high-quality products increases with growing consumer income[6] firms operating flexible have in particular a high incentive to introduce premium products.

Further on, we tested the influence of embarking on brand strategy[14] on the incentive to innovate. Branding can be identified as a means of differentiating products from competitors' products, which allows for the development of imperfect competition, and thereby gives a competitive advantage. Producers with strong brand power may be able to resist retailers' increasing buyer power[3], attain higher retail prices and higher consumer prices (double marginalisation).[15] Consequently, branding is associated with higher profits provoking innovative behaviour. Therefore, we assume a positive impact of brand strategy (*BRANDS*) on innovation propensity, which is confirmed by regression analysis reported in Table 2. Coefficient of BRANDS is positive, however only in the regression of premium quality products impact differs statistically significant from zero at the 1%-level. We might argue that both, product quality and a strong brand are means for product differentiation so that branding for premium quality products has a higher impact on profits than for regular quality products. Consequently, firms with brand strategy have an higher incentive to produce premium quality products than less brand strategic firms. Higher propensity is quantifiable: Firms reporting brand strategy to be „very important" have a probability to launch a premium product of 35.01%, which is 2,52 times (21.13%-ponits) higher than for firms reporting brand strategy to be important (13.88%)[16]. Altogether, changes in the importance of brand strategy have the highest impact on the incentive to launch a premium product.

To control for international competition, we included the ratio of exports to firm sales (*EXQ*) in regression. A strong international orientation might allow firms to flee from competitive pressure on domestic markets, thus attainable profit and incentive to innovate is higher. However, because of the large (domestic and foreign) sales market we might argue that the firm already attains satisfiable profits with its established products, so that there is no incentive to innovate. This might apply especially to superior quality products: As the development of new premium products is associated with high expenditure (e.g. R&D, investment) and the firm gains high profit margins with its existing high quality products, incentive to innovate is low. Following we can

[12] E.g. to optimise production process, taste, packaging, convenience attributes. A positive relationship between R&D expenses and product quality was also stated by Van Witteloostuijn and Van Wegberg [36].

[13] Similar results report Cabagnols and LeBas[17].

[14] A brand can be defined as "a name, term, sign, symbol, design or a combination of these, which is used to identify the goods or services of one seller or group of sellers and to differentiate them from those of competitors" [39].

[15] In this respect, Mills shows that own-labels allow food retailers to limit the extent of double marginalisation in the food chain, and thus are able to combat the market power of food manufacturers[40].

[16] This would mean a change of BRANDS on the stated scale from 4 to 5.

assume a negative impact of foreign activity on the propensity to innovate[17], in particular on premium product innovation. This assumption is confirmed by present study. The parameter estimate for *EXQ* in Table 2 is negative and significantly different from zero at the 1%-level which implies that firms with high export orientation have a lower innovation propensity than firms which mainly focus on domestic markets. To illustrate, a firm with an export share of 20% has compared to a firm with 10% export share a by 2.06%-points higher probability to introduce a regular quality product (90.09%), but a by 4.01%-points lower probability to do so with premium products (7.34%). Seemingly, given high innovation expenditure and already satisfying profits in a large sales market, international orientated firms are afraid of innovating with superior product quality.
Theoretical models lead one to expect innovation to be positively related to market size and growth. In section 2, market size is represented by *P*(*X*). The optimal store quantity *Q* increases with *P*(*X*) which again shifts the marginal revenue curve in the second part of Diagram 1 upwards and increases the optimal number of products X*. Our expectation of a positive relationship between market size (*SIZE*) and innovation is not fulfilled in the empirical analysis however. In contrast, the present study underlines earlier empirical results on a negative relationship between market size and innovative activity[24,41,9]. In large markets, profits generated from existing products are satisfying so that firms don't face the necessity to invest in risky innovation projects. Small (niche) markets, however, give an incentive to innovate as firms are able to differentiate, attain a competitive advantage and thus, generate high profits. In a rather large market with 20 billion sales volume firms have a by 6.55%-points higher probability to launch a regular quality product (91,29%) than firms in a medium-sized market with 10 billion sales volume. However, the probability to launch a premium product in the larger market is by 7.4%-points lower than in the smaller market and with 7.56% probability almost halved. Apparently, smaller (niche) markets provide a particular opportunity for premium products. In addition to market size study also tested the impact of future market potential on the incentive to innovate. The present study uses past industry growth between 1995 and 1999 (*GR*) as a proxy for future demand potentials. It was assumed that in large and growing markets firms have an incentive to produce innovative products, as they face a good potential to place their new products. This positive relationship is supported by Schneeweiss[43] and Zellner[44]. On the other hand, it is argued that especially in stagnant markets or in times of cyclical decline firms have a high incentive to innovate in order to prevent imminent economic losses. This was shown empirically by Herrmann et al.[45]. However, present study reveals no significant relationship between market growth and innovation propensities at all.

Finally, we controlled for the influence of the investment rate on innovative behaviour. On the one hand we can argue that investments (in production lines, i.e. process innovation) offer possibilities to produce a new product so that a positive relationship would be expected. On the other hand we might think that a firm which has had high investment expenditure afore concentrates on its existing products rather than investing immediately in another risky new product innovation (which would possibly be associated with more investment expenditure). Thus, we emanate from a negative relationship between investment expenses and innovation propensity, which is supported empirically by present study. Present study reveals a negative impact of

[17] A negative relationship between foreign trade and innovation has also been found by Traill and Meulenberg[42] and Weiss and Wittkopp[23].

investment rate (*INVEST*)[18] on product innovative behaviour, however only the impact on premium innovation is statistically significant different from zero. Apparently, the incentive to innovate with premium quality is low if the firm has had high investment expenditure afore. An explanation is that the decision to produce a premium product is associated with major changes in production process which are associated with high future investment expenditure[19], so that the incentive to launch a premium product is low. For example, a firms spending 7 per cent of total sales in investment has a by 1.03%-points lower probability to launch a premium product (10.36% probability) than a firm with 6% investment share (11.39%).[20]

Finally, we have to note that most of the marginal effects of exogenous variables resp. their elasticities don't show statistical significance (exceptions are FLEX, SIZE and BRANDS). This might be due to the fact that the probability to launch a regular quality product accounts for 87.90% at sample means, thus is very high. Corresponding to this probability for premium product innovation is quite small, accounting for 11.60% at sample means. Therewith, we are located at the flat tails of a cumulated logit probability function. Here, a change in exogenous variables causes only minor changes in the probability, so that marginal effects are not statistically significant, although exogenous variables had significant impacts on the propensity to innovate U_{ij}. Insofar, our results are explainable, even though missing statistical significances of marginal effects resp. elasticities are unsatisfying. Hence, estimation results should be interpreted with caution.

4. Summary

Rapidly growing concentration ratios in European food retailing raise concerns about the welfare implications for consumers. On the one hand, consumers might gain if lower input prices for retailers are passed on to consumers. In the long run, however, retailer power might force manufacturers to reduce investment in new products which would reduce consumer welfare. The relationship between downstream (retailer) market power and upstream (food manufacturing) product innovation is the focus of this paper. On the basis of a formal model, we find that retailer market power reduces upstream firms incentives to introduce new products. However, we might argue that this impact differs between product qualities: Retailers' market power reduces the incentive for premium product innovation less than for regular product quality innovation. This proposition is then tested empirically.

Analysis is based on firm level data from a survey of food manufacturing firms carried out in 2002 in Germany. The results of a multinomial logit model give weak support to the proposition of a negative effect of retailers' market power on product innovation incentive in food manufacturing. This negative impact of market power in the downstream market is further mitigated if manufacturing firms also have some market power (countervailing power). Premium product innovation is unaffected by retailers'

[18] Note that firms were not asked to specify their investment costs or investment's aim. Thus, investment might mean introducing productive processes for saving resources or producing new products (process innovation) but also putting up new buildings.

[19] Shaked and Sutton emphasize that increases in quality involve increases in fixed and/or variable costs[46].

[20] In this respect we have to allude to a basic question: Does product innovation afford a new process and thus investment expenses, or does a process innovation (i.e. investment) offer product innovation possibilities? However, to map the relationship between product and process innovation and possible temporary effects in detail, we would need a) more information on investment expenses and b) time series data which are not available for present study.

market power. This implies that premium product qualities might be a suitable strategy to avoid retailers' oligopsonistic pricing pressure. Further, we find firm's expenditures in R&D and firms flexibility to be significantly and positively related to incentives to launch products with regular resp. superior quality. Brand strategy only effects the incentive for premium product innovation, but impact is distinctive. Moreover, present study reports a negative effect of the firms international orientation and domestic market's size on innovation incentives.

There has been considerable debate over the appropriate policy treatment towards buyer power. As our results are weak and, hence should interpreted with caution, we can not underline the necessity to incorporate long-run implications with respect to product innovation into competition policy considerations.

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Appendix

Appendix 1: Changes of innovation probabilities subject to changes in various exogenous variables.