Asymmetric Cost Pass-Through?
Empirical Evidence on the Role of Market Power, Search and Menu Costs

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Abstract

We estimate cost pass-through rates based on data for store-level retail prices and wholesale costs. The data allows us to identify heterogeneity in cost pass-through across retailers and relate it to underlying explanatory factors such as retailer market power, measures of consumer search and menu costs. Results from a threshold-error-correction-model clearly provide empirical support for the 'rockets and feathers' phenomenon. In contrast to much of the literature which explains the 'rockets and feathers' phenomenon as a result of retailers' market power, we find contrary find that the degree of asymmetry between costs and prices is negatively related to a measure of market power.

Keywords: Asymmetric Cost Pass-Through, Market Power, Menu Costs, Search Costs, Milk, Food Retailing, Germany

JEL codes: C32, D21, L11, L81

1. Introduction

An asymmetric adjustment of prices to cost increases and decreases (asymmetric cost pass-through, '*aCPT*')[1] has been observed for many agricultural and energy markets (see Frey and Manera (2007), Eckert (2013) or Perdiguero-Garcia (2013) for recent surveys of the field). Different explanations for an *aCPT* have been proposed in the literature, e.g., non-competitive markets (market power), costs of price adjustment (menu costs and 'mistake costs'), product-specific differences in costs of stock-outs, and search costs.

While there is ample evidence on incomplete and asymmetric price transmission (*aCPT*), the existing empirical studies do not allow to identifying the main cause for *aCPT* based on the different explanations offered in the literature. Much of this literature focuses on one product market only using time series data and implicitly assuming competition within this market to be global. 'Unless important changes in market power are known to have occurred within the study period, this sort of analysis provides no basis for comparing price transmission under conditions of more and less market power because there is no variation in the 'treatment variable'' (Meyer and von Cramon-Taubadel, 2004, p. 588).

The present analysis goes beyond previous research by comparing the cost pass-through rates for a large number of different brands and retailers. The empirical model is based on a comprehensive data set comprising a long panel of store-level retail prices and wholesale costs for up to 90 different brands of milk sold in 327 retail stores across Germany. The richness of the data allows us to identify heterogeneity in pass-through across retailers and relate it to underlying explanatory factors such as retailer market power, measures of consumer search and menu costs, and product characteristics.[2] In a two-stage procedure, we first estimate coefficients

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[1] The existing literature uses the terms 'vertical price transmission' and 'cost-pass-through' (CPT) interchangeably to characterize the impact of factor price (cost) changes on downstream product prices (Misra et al., 2010). We will use the term 'cost-pass-though' (CPT) or 'asymmetric cost-pass-through' (aCPT) in the present analysis.

[2] Previous investigations of the milk market have found evidence of asymmetric pass-through. Kinnucan and Forker (1987) observe pricing asymmetries in retail prices of dairy products (fluid milk, cheese, butter, and ice cream) in the US, with larger and speedier reactions when farm prices are increasing. Serra and Goodwin (2003) find evidence for aCPT in dairy products in Spain. Chavas and Mehta (2004) analyze the butter market in the US for the period 1980 to 2001. They find strong support for asymmetry in the adjustment of retail prices, with a stronger reaction when confronting wholesale price increases compared to wholesale price decreases. Fernandez-Amador et al. (2010) observe significant asymmetries in the vertical price transmission mechanism between

of the threshold-error-correction-process. The estimated coefficients are used to construct dependent variables in regressions to investigate the impact of our measures of market power, menu- and search costs.

2. Literature

According to Meyer and von Cramon-Taubadel (2004) two explanations for an *aCPT* are predominantly used in the existing literature: non-competitive markets (market power) and menu costs. The first hypothesis states that retailers may exert market power by raising prices more rapidly in response to a cost increase than by cutting prices in response to a cost decrease. Borenstein et al. (1997), for example, argue that 'prices are sticky downward because when input prices fall the old output price offers a natural focal point for oligopolistic sellers' (p. 324).

The second hypothesis relies on costs related to adjusting quantities and prices. Menu costs imply a lagged response to cost shocks (Ball and Mankiw, 1994). Supply adjustment costs (including menu costs) can also explain asymmetries in price adjustment if these costs are asymmetric with respect to an increase or a decrease in output quantities and/or prices.[3] Levy et al. (1998), however, cast some doubt on this asymmetry in menu costs: 'given the structure of the price change process, the cost of labor used, the cost of preparing and delivering price tags, and the cost of in-store managerial time are not likely to be higher for price increases than price decreases' (p. 113).[4] The authors also explore one specific component of the costs of price adjustment – the so-called 'mistake costs' (i.e. costs associated with mistakes that occur in the price change process) - that may have an asymmetric effect on price adjustment. According to

producer and consumer prices of milk products in Austria using monthly data for the period from January 1996 to February 2010.

[3] The model of Ball and Mankiw (1994) uses inflation as an explanation for asymmetric price transmission. Firms increase prices to correct for accumulated and anticipated inflation. However, transmission of negative shocks would be less necessary as inflation would already have adjusted the prices. This model, however, does not explain any differences in *aCPT* between products within an economy.

[4] He et al. (2013) argue that the form of the pricing asymmetry in a model with menu costs critically depends on the shape of the consumer demand curve. If the demand function is convex, a firm is more likely to change its price in response to a negative cost shock and less likely to change its price responding to a positive cost shock. A concave demand function has the opposite effect. Similarly, Meyer and von Cramon-Taubadel (2004) conclude: 'In summary, … , attempts to explain APT [asymmetric price transmission] based on adjustments costs lead to ambiguous and sometimes contradictory results, with some authors providing arguments for positive APT, and others for negative' (p. 590).

Levy et al. (1998), costs associated with these mistakes will be low if they favor the customers, but they can be very high if the mistakes favor the store, since the store may lose reputation and customers' goodwill and may even face legal problems. The authors argue that 'the asymmetric effects of the mistake cost component of the price adjustment costs may indeed deter price increases more often than price decreases' (p. 113).

Retailers' incentives to adjust prices asymmetrically to cost increases and decreases can also differ between products. Ward (1982) suggests that retailers of perishable products might hesitate to raise prices for fear of reduced sales leading to spoilage. This would lead to negative *aCPT*. Ward's explanation is challenged by Heien (1980), who argues that 'changing price is not a problem for perishables, but for items with a long shelf life, price changing is costly both in terms of time to put on new labels and in goodwill lost' (p. 15).[5] More specifically, *aCPT* can be the result of households' unequal costs of maintaining relatively high or low inventories. For products that are more expensive to store in the household (perishable products), the costs of experiencing a stock-out at the retailer will be particularly high. To ward off a stock-out of these products, firms may lower their own prices at a slower rate than the decline in upstream prices. A cost reduction will thus be passed on to consumers more slowly than cost increases, which implies a positive asymmetry in cost pass-through rates for perishable products. For products that can be stored more easily in the household, the degree of asymmetry in cost pass-through rates should be smaller.[6]

More recent studies provide additional arguments for *aCPT* based on consumer search costs (see Tappata, 2009 and Lewis, 2011). Tappata (2009) argues that rational consumers will search less when prices are falling as compared to when they are rising. Therefore, prices are slower to adjust in a downward direction. While Tappata (2009) assumes symmetric learning by consumers, Yang and Ye (2008) focus on asymmetric learning: 'When a positive cost shock occurs, all the searchers immediately learn the true state; the search intensity, and hence the prices, fully adjust in the next period. When a negative cost shock occurs, it takes longer for non-searchers to learn the true state, and the search intensity increases gradually, leading to

[5] Similarly, Rotemberg (2009, 2010) argues in a formal model in which firms internalize the cost-related regret that consumers experience when prices change unexpectedly: 'Price changes can trigger consumer regret. If a good is storable and people notice an increase in its price, they are likely to regret not having purchased earlier, while they regret not having waited if they see a price decline (Rotemberg, 2009, p. 1).

[6] Slonim and Garbarino (2009) show that the direction and strength of the asymmetry depend on the product's stockability (i.e., the number of units of the product a consumer will carry) and the strength of the reference price (loss aversion) effects.

slow falling of prices' (Yang and Ye, 2008, p. 547). In Cabral and Fishman (2012), firms experience heterogeneous cost shocks and consumers search sequentially. Consumers' willingness to search is low (high) when they observe small (large) price variations. Thus, firms' incentives to pass cost shocks to final prices differ depending on the size of these shocks. When cost changes are small, sellers increase prices moderately without losing customers but do not reduce prices. The opposite asymmetry occurs when the cost change is large. The following sections aim at examining cost pass-through rates empirically.

3. Data and Model Specification

The empirical analysis uses weekly retail prices of 90 different brands of milk (one-liter tetra-packs, with 3.5 percent of fat) from 327 grocery stores for the period from 2005 to 2008. The data are obtained from Symphony IRI Group (SIG, 2011). In total 917 individual price time series are available. The price series include price promotions ('sales'), i.e. significant temporary price reductions that are unrelated to cost changes (Hosken and Reiffen, 2001). To receive unbiased and efficient cost price transmission estimates because of sales' prices, we eliminate all price promotions from the retail price series and replace sales prices with the regular prices prior to the sale (see Loy et al., 2014).[7]

The retail milk market is particularly suited for studying cost pass-through rates for several reasons. Milk is a frequently purchased product and an important category for both consumers and retailers. In periods of high retail prices as well as during sporadic outbreaks of price warfare, milk prices have been the subject of continuing interest to retailers and dairy farmers, as well as to consumers and government agencies. Secondly, due to the short shelf life and high perishability of milk, it is difficult for food processors, retailers and consumers to stockpile and hold large inventories in periods of low prices. While the missing information on retailer inventories is a major concern for many empirical studies of cost pass-through rates, retailer inventories are less likely to be an important issue with milk. Finally, in contrast to most retail settings, where wholesale costs of retailers are unobservable to researchers, wholesale prices for milk are accurate measures of input costs (see for more details Loy et al., 2014). We obtain the wholesale prices for milk from an industrywide collection of dairy sales revenues conducted by the BMELV based on a legal regulation (various issues). These revenues from sales to the

[7] We also checked the impact of excluding promotional prices by running models with the original series. The results show only small differences, the main conclusions remain unchanged. Results are available from the authors upon request.

retailers include transportation costs to the retail stores and reflect buying in prices of retailers. The pasteurization and homogenization involved in processing raw milk is highly standardized, with negligible differences across firms and locations, which justifies using the same wholesale price for each retailer and each brand. We further interviewed a dozen market experts (CEOs of major dairy companies in the German market) who confirmed that wholesale prices of milk cover the costs of production, packaging and transportation to the retailer and are representative (with only minor differences of a few Eurocent per liter) for all dairies.

For each price series (brand of milk sold at one retailer), we estimate a restricted bivariate three-regime-threshold-error-correction-model, which allows asymmetric price responses. The estimation procedure considers the proper lag length, tests for threshold co-integration and the number of thresholds (for details see Holm et al., 2012). Equation 1 shows the cost pass-through model.[8]

$$\Delta p_t^R = \alpha_0 + \delta^- I_t^1 \mu_{t-1} + \delta^0 I_t^2 \mu_{t-1} + \delta^+ I_t^3 \mu_{t-1} + \sum_{j=1}^{k} \alpha_j \Delta p_{t-j}^R + \sum_{j=1}^{k} \beta_j \Delta p_{t-j}^W + v_t \qquad (1)$$

Changes of the retail price $\left(\Delta p_t^R\right)$ depend on changes of the wholesale price $\left(\Delta p_t^W\right)$ and deviations from the long-run price-cost-equilibrium $\left(\mu_{t-1}\right)$[9], which is separated by indicator variables $\left(I_t^1, I_t^2, I_t^3\right)$ into three regimes. By estimating Equation (1) for each individual product (brand of milk sold at a specific store), we obtain estimates for lower and upper regime error-corrections $(\delta^-;\ \delta^+)$. From the parameter estimates δ^+ and δ^-, we can derive a natural measure for the speed of the cost pass-through (*sCPT*) as well as for the asymmetry of the cost pass-through (*aCPT*), which are calculated as follows: $sCPT = \frac{|\delta^+ + \delta^-|}{2}$ and *aCPT*$= \delta^+ - \delta^-$.

In a second step, we investigate the relationship between differences in *sCPT* and *aCPT* between the 917 products (brands sold in different stores) and our measures of market power, menu- and search costs. We follow previous studies (Connor and Peterson, 1992 and Barsky et

8 Two thresholds (θ^-, θ^+) are estimated following the procedure by Chan (1993). The indicator variables are defined according to the regimes separated by the thresholds: if $\mu_{t-1} < \theta^-$, then $I_t^1 = 1$, else $I_t^1 = 0$. If $\mu_{t-1} > \theta^+$, then $I_t^2 = 1$ else $I_t^2 = 0$ and $I_t^3 = 1 - I_t^1 - I_t^2$.

9 In the first step, a linear price cost equilibrium is estimated for every retail price. The error term of this estimation reflects the deviations from the long run price cost equilibrium.

al., 2003) by using the relative markup between average individual retail and wholesale prices (i.e. the Lerner Index *LI*) as our measure of market power[10].

Our measure of menu costs (*MC*) is obtained from estimation results of the threshold-error-correction model. The inner regime of the threshold-error-correction-mechanism captures smaller deviations from the long-run cost-price-equilibrium. Due to adjustment costs these small deviations need to cumulate in time before they are passed on to retail prices. Over the range of the inner regime, retail prices may not change at all. A greater range, thus, indicates higher menu costs. We thus define $MC \equiv \theta^{+} - \theta^{-}$.

While search models have played an important role in economics ever since the seminal article by Stigler (1964), empirical evidence on the importance of search costs is scarce due to the obvious difficulties in measuring these costs.[11] In the context of multi-product retailers, Richards et al. (2014) argue that search costs can be proxied by the number of products offered by the retailer. In the present analysis, we follow Richards et al. (2014) and use the number of stock-keeping units of the product under study in the grocery store (the number of different milk brands) as our measure of consumer search costs (*SC*).

We also control for the type of milk (fresh versus 'ultra-high temperature'), the organizational structure of the food processor (cooperative versus non-cooperative), the type of the brand (private label versus national brand), and the type of the retail channel (discounter versus non-discounter). These variables are included in the matrix $\boldsymbol{X}$ in equation (2).

$$sCPT_i = \alpha_0 + \alpha_1 LI_i + \alpha_2 MC_i + \alpha_3 SC_i + \boldsymbol{X_i \gamma} + \varepsilon_i$$
$$aCPT_i = \beta_0 + \beta_1 LI_i + \beta_2 MC_i + \beta_3 SC_i + \boldsymbol{X_i \delta} + \epsilon_i \tag{2}$$

In equation (2), subscript i refers to the different products (brands in different stores), $\alpha_0, \alpha_1, \alpha_2, \beta_0, \beta_1, \beta_2,$ $\boldsymbol{\gamma}$ and $\boldsymbol{\delta}$ and are parameters to be estimated and ε as well as ϵ are assumed to be i.i.d. error terms.

4. Results and Conclusions

Time series unit root, co-integration, and threshold co-integration tests are applied to each of the 917 price series. Furthermore, we use panel tests for unit roots and co-integration. Granger-

[10] Note that this margin does not cover marginal cost of retailing; our measure thus represents an upper bound for retailers' markup on marginal costs. Connor and Peterson (1992) and Barsky et al. (2003) measure market power in a similar way by calculating the difference between national brand and private label prices.

[11] Some authors (Brown and Goolsbee (2002) and Tang et al. (2010), for example) have attempted to understand the nature of search costs by comparing the degree of price dispersion between online and traditional retail markets, for example. Since milk is not sold online, this measure cannot be used in the present context.

causality tests suggest that wholesale prices are exogenous. All procedures indicate non-stationary behavior of price series and co-integration between wholesale and retail prices. The cost pass-through processes indicate non-linear behavior that is modeled by a three-regime-threshold-error-correction-mechanism. Nearly all (99 percent) of the steady state price-cost-equilibria (average margin or a zero deviation from it) lie within the range of thresholds ($[\theta^-, \theta^+]$). On average, 150 out of 208 observations (75 percent) belong to the inner regime. The lower threshold is on average -3.5 Eurocent per liter; the upper one is 5.8 Eurocent per liter. The adjustment coefficient estimates (δ^0) for the inner regime ($\theta^- \leq \mu_{t-1} \leq \theta^+$) are small, the average is -0.04. The parameter estimates for δ^0 are not significantly different from zero in 92 percent of cases. In the vast majority of cases, adjustment coefficients for the outer regimes (δ^-; δ^+) are absolutely larger than the coefficients for the respective inner regime. The estimates for the lower regimes (δ^- for $\mu_{t-1} < \theta^-$) are larger in absolute terms than the ones for the upper regime (δ^+ for $\mu_{t-1} > \theta^+$). The average rate of decay for a below average margin (δ^-)[12] is -0.32 compared to -0.12 for δ^+. Furthermore, the parameter estimates for δ^- are significantly different from zero in nine out of ten cases, while the estimates for δ^+ are significantly different from zero in 62 percent of all cases (see more details in Loy et al., 2014).
In a second step, we investigate the impact of our measures of market power, menu- and search costs on the speed ($sCPT \equiv \frac{|\delta^+ + \delta^-|}{2}$) as well as the asymmetry ($aCPT \equiv \delta^+ - \delta^-$) of cost pass-through rates.[13] Table 1 reports descriptive statistics of all variables used in equation (2); Table 2 show the dependent variable estimation results.
Following Lewis and Linzer (2005) we apply OLS with robust standard errors (in columns (1) and (3) of Table 2) and WLS.[14][15] To consider the potential problem of endogeneity of the Lerner

[12] This refers to margins that are smaller than the lower threshold.

[13] The parameter estimates suggest positive asymmetries for most products (brands in different stores). We exclude estimates that indicate no asymmetries or negative ones. This reduces the sample by 7 percent; the number of observations for the second step is reduced to 857. The exclusion of these estimates does not change the main results of our empirical analysis.

[14] The OLS version of the dependent variable regression indicates heteroscedasticity.

[15] In the two-stage procedure, we estimate all coefficients of the CPT model for each individual retail price series separately. As an alternative, one could also estimate the model in a one-step panel model. However, a panel model places strong restrictions on individual CPT processes: all CPT model parameters are the same for all individual series. The efficiency gain of the panel model comes at the costs of placing model parameter restrictions. We decided on the most flexible form, in particular because the number of observations in time is quite large for our sample (t = 208).

Index (*LI*) and our measure of menu costs (*MC*), we employ the instrumental variable approach suggested by Lewbel (2012) in columns (2) and (4).[16] Table 2 suggests that the parameter estimates between the OLS and the IV approach are very similar. In fact, employing a Hausman test does not reject the same set of estimates for OLS and Lewbel's instrumental variable approach. Thus, endogeneity appears not to be an issue here.

Table 2 reports a negative parameter estimate for the Lerner index (*LI*) which is significantly different from zero at the 99%-level in all four estimation models. Prices adjust more slowly where price-cost margins are higher (columns 1 and 2). This finding is in line with the theoretical arguments and the empirical evidence (for the gasoline market) reported in Borenstein and Shepard (2002), for example. The estimation results reported in columns (3) and (4) suggest that the (positive) asymmetry between the adjustment coefficients of the outer regimes (δ^-, δ^+) decreases with an increase in the Lerner Index (*LI*). Retailers adjust prices to cost increases more quickly than to cost decreases for products (brands in individual stores) where the markup on wholesale prices is small. For products with a larger markup on wholesale prices, the asymmetry of price adjustments with respect to cost shocks is significantly smaller.

The parameter estimate for our measure of the magnitude of menu costs (*MC*) is negative and significantly different from zero in columns (2), (3) and (4). Larger menu costs are associated with a slower speed of price adjustment (column (2)). Column (3) and (4) suggest that the positive asymmetry in cost pass-through rates tends to be smaller in markets where menu costs are important. This finding is consistent with – although not a formal test of – the existence of 'menu costs' since this type of price adjustment costs would indeed more often produce price increases than price decreases (Levy et al., 1998).

Our measure of consumer search costs (*SC*), i.e. the number of different milk brands offered in the retail store, has a significant and negative impact on the speed of price adjustment to cost changes: prices adjust more sluggishly to cost changes in stores with many different brands (high consumer search costs). The impact of *SC* is significantly different from zero at the 10% level only in columns (3) and (4). Our results thus do not provide empirical support for the recent theoretical literature on asymmetric cost pass-through (*aCPT*), as they do not suggest a positive impact of search costs on pricing asymmetries.

We further find that non-cooperative brands and private labels adjust prices more quickly to cost changes than cooperative and/or national brands. However, no significant differences in

[16] A prerequisite for this procedure consists in the fact that the endogenous variables (*LI* and *MC*) show heteroscedastic errors, which is the case for both variables. Sargan's test of overidentification is not rejected (α=0.202); thus, we employed proper instruments.

the asymmetry of cost pass-through rates are suggested for these variables in Table 2. We find a higher speed (columns 1 and 2) but less asymmetry (columns 3 and 4) in the price adjustment to cost changes for ‘ultra-high temperature’ (UHT) milk. Discounters do not pass on costs more quickly compared to other retailers but they tend to adjust more asymmetrically: the value of *aCPT* is significantly higher for discounters than for all other retailers in columns (3) and (4).

In summary, our results confirm Peltzman’s (2000) argument which suggests that ‘ … attributing asymmetries to imperfect competition is unlikely to be rewarding’ (p.468). In contrast to much of the existing literature which explains the ‘rockets and feathers’ phenomenon as an apparent result of retailers exercising market power, we find the opposite result: the degree of asymmetry in prices is negatively related to market power (decreases with the Lerner-Index). Furthermore, we observe a significant relationship between the asymmetry in the cost pass-through rates and our measure of menu costs while our measure of search costs does not account for observable differences in *aCPT*-rates between products. The ‘rockets and feathers’ observation may better be explained by differences in the costs associated with stock-outs; stock-outs can lead to a loss of consumer purchases and goodwill. If these costs of experiencing a stock-out for consumers are larger for perishable products (i.e. fresh milk), retailers will adjust prices for these products more quickly upwards than downwards. This is consistent with our finding of a significantly smaller degree of *aCPT* for UHT milk as opposed to fresh milk.

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6. Tables

Table 1: Descriptive statistics

	Obs.	Mean	Std. Dev.	Min.	Max.
Asymmetry	857	0.219	0.145	0.003	0.828
Speed	857	0.223	0.147	-0.000	0.607
Non-Cooperative Dairy	857	0.360	0.480	0	1
UHT-Milk	857	0.669	0.470	0	1
Discounter	857	0.076	0.265	0	1
Private Label	857	0.331	0.470	0	1
Lerner Index	857	0.340	0.124	0.086	0.538
Menu Costs	857	0.094	0.045	0.001	0.288
Search Costs	857	7.540	2.863	2	14

Remarks: Asymmetry = Difference of error correction response (δ+ - δ-); Speed = Average speed error correction response (|δ+ + δ-|)/2; Lerner Index = (Ø retail price - Ø wholesale price)/Ø retail price; Menu Costs = Range of thresholds (range of inner regime); Search Costs = # stock-keeping units.

Source: Own calculations based on SIG (2011) using Stata (2011).

Table 2: Estimation results of second-stage estimation model (dependent variables are the speed and the asymmetry of cost pass-through rate)

	Dependent Variable is $sCPT \equiv \frac{\lvert\delta^{+}+\delta^{-}\rvert}{2}$				Dependent Variable is $aCPT \equiv \delta^{+} - \delta^{-}$			
	Parameter Value	(t-ratio)	Parameter value	(t-ratio)	Parameter value	(t-ratio)	Parameter value	(t-ratio)
Estimation Method	OLS (1)		IVreg (Lewbel, 2012) (2)		OLS (3)		IVreg (Lewbel, 2012) (4)	
Explanatory Variables								
Constant	0.491	(16.31) ***	0.503	(13.95) ***	0.507	(15.09) ***	0.513	(12.15) ***
Lerner Index (*LI*)	-0.803	(-11.54) ***	-0.756	(-8.56) ***	-0.638	(-7.77) ***	-0.619	(-5.52) ***
Menu Costs (*MC*)	0.008	(0.13)	-0.274	(-2.25) **	-0.317	(-3.33) ***	-0.437	(-2.86) **
Search Costs (SC)	-0.004	(-3.97) ***	-0.004	(-3.92) ***	-0.003	(-1.84) *	-0.003	(-1.83)*
Non-Cooperative Dairy	0.050	(6.49) ***	0.046	(5.84) ***	-0.006	(-0.49)	-0.008	(-0.58)
Private Label	0.082	(4.75) ***	0.080	(3.95) ***	-0.003	(-0.17)	-0.005	(-0.22)
UHT-Milk	-0.015	(-2.31) **	-0.014	(-2.21) **	-0.031	(-3.56) ***	-0.031	(3.58) ***
Discounter	0.012	(0.97)	0.016	(1.09)	0.035	(2.15) **	0.039	(2.37) **
# of observations	857		857		857		857	
R-squared	0.705		0.699		0.396		0.396	
Adj. R-squared	0.703		0.697		0.391		0.390	

Remarks: We report White's heteroskedasticity-consistent standard errors. Asterisks denote statistical significance in a t-test at 1 per cent (***), 5 per cent (**) or 10 per cent (*) levels. The reference category is a national brand of fresh milk, produced at a cooperative dairy, sold at non-discounters in Central Germany. Estimates for the WLS procedure result similar estimates. These are available from the authors upon request. The Hausman-test shows that both estimation procedures result in the same set of estimators. For *sCPT* the chi2(7) = 11.55 (p-value = 0.12) and for *aCPT* the chi2(7) = 1.22 (p-value = 0.99)