The Pass-Through of Commodity Prices to Consumer Prices of Selected Products

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This contribution analyzes the pass-through of various commodity prices to consumer prices of selected products in Austria. For this purpose, consumer price microdata for the period from 1996 to 2009 are mapped to the underlying disaggregated commodity prices. The duration and extent of the pass-through are found to vary considerably across products. While changes in crude oil prices turned out to have a quite substantial and quick effect on the consumer prices of super gasoline and diesel, the pass-through was rather weak for bread (bread rolls) and meat (beef steak). Of all products analyzed here, natural gas had the slowest price response, as its retail price is still partly government-controlled in Austria.

Since the introduction of euro banknotes and coins in January 2002, the pass-through has increased significantly for most products under review, but we cannot infer a clear casual relationship from this result as other factors might also be responsible for the observed increase in the pass-through. In addition, the pass-through to retail prices is found to be stronger for cost hikes than for cost cuts for fuel and meat products (notably beef steak). This confirms the result of an asymmetric pass-through for fuel products found in earlier studies.

JEL classification: E11, C33
Keywords: pass-through, micro prices, commodity prices, consumer prices

For the purpose of this study, the pass-through is defined as the change in consumer prices that can be attributed to a prior change in commodity prices. The speed and extent of the pass-through is determined by the stages of the pricing chain (producer prices are affected more quickly than consumer prices) and by the structure of the downstream production and distribution chain (it matters whether a product is processed further, and through which channels it will be sold).

Insights into the pass-through are relevant from a monetary policy perspective, as it can serve as an additional measure of price rigidities, providing further insights into how long it may take for macroeconomic shocks to affect inflation. Analyzing the pass-through is also relevant from a structural policy perspective, as it sheds light on the influence of the structural characteristics of the retail market (e.g. different pass-through according to product groups, regions, types of sales outlets) on the transmission of shocks.

This contribution provides an empirical investigation of the extent of, and lag in, the transmission of international commodity prices (e.g. of wheat, milk, meat, crude oil and natural gas) to the prices of selected consumer goods in Austria. The analysis includes only products (i) that contain the respective commodities in large proportions and (ii) whose prices closely depend on the underlying commodity prices. The following food and energy products were chosen: pork cutlet, beef steak, whole milk, eggs and bread rolls as well as super gasoline, diesel fuel, natural gas and firewood. In addition to estimating the extent and duration of the pass-through to the retail prices of these products, I analyze the potential impact of the introduction of euro cash in Austria and the effect of three other factors on the pass-through: region, type of outlet and sign of the adjustment (after a cost hike or cut).

Refereed by:
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1 Pass-Through of Commodity Prices at the Microlevel – Theoretical Considerations

So far, the pass-through of commodity prices to consumer prices has not been studied extensively for Austria. Fritzer et al. (2008) compare various subaggregates of HICP food price components with the corresponding subcomponents of the producer price index, but their analysis is purely descriptive. The Eurosystem's Structural Issues Report 2011 (ECB, 2011) also uses macrodata to estimate the pass-through of import and producer prices to the consumer prices of nonenergy industrial goods and food. Due to a lack of adequate data, though, Austria is not covered in the analysis on food prices. Fernández-Amador et al. (2010) focus on the Austrian dairy market and find considerable asymmetry in the pass-through of price changes to consumer. Most studies available to date – also at the international level – rely on disaggregated macrodata to analyze the pass-through. Microdata have been used only rarely for this purpose.[2]

Microdata are advantageous in that they allow for a more accurate mapping of consumer prices to the underlying commodity prices than aggregated price indices do. In addition, estimations based on microdata make it possible to control for heterogeneity. At the same time, it is important to be aware of the fact that estimates of the long-term pass-through based on microdata will likely be lower than estimates based on macrodata, for a number of reasons. First, price rigidities at the microlevel may delay the transmission of price changes to the consumer level for several months (see Rumler et al., 2011, for evidence on Austria). Second, consumer goods are relatively far away from commodities along the production chain. Therefore, commodity prices have a much larger impact on producer prices than on consumer prices, which they affect only indirectly and with a lag (Hahn, 2003). And finally, the pass-through to consumer prices is, by definition, smaller than the exchange rate pass-through to import prices, as the cost share of commodities in the final product is usually below 100%, and changes in commodity prices thus only affect part of the product's input cost.

According to the relevant literature, the extent of the long-term pass-through to consumer prices depends above all on the structure of the retail industry. While the degree of competition plays a crucial role, the sign of the correlation between competition and the price pass-through is as yet unclear (section 3.3). The common assumption is that the transmission of cost shocks to consumer prices is stronger in a competitive environment, given that businesses find it much harder to absorb such a shock when profit margins are small.

Other determinants of the pass-through are the tax structure, macroeconomic developments and the type of cost shock we look at. For instance, a quantity tax causes the pass-through of commodity prices to decline, whereas the VAT does not affect it at all. In addition, we can expect pass-through to be higher when economic conditions are favorable and inflation is elevated, as companies are more likely to pass on price increases in that situation than in a low inflation environment. Finally, empirical evidence shows that different types of shocks have different effects on

[2] *Exceptions are Cao et al. (2011), Berner (2011) and Gopinath et al. (2010), who use microdata to analyze the exchange rate pass-through for Canada, Germany and the U.S.A., respectively.*

costs and that the extent of the pass-through to consumer prices varies accordingly. According to Hahn (2003), consumer prices in the euro area are affected the most by import price shocks (excluding crude oil), followed by exchange rate shocks and oil price shocks.

For data reasons, this contribution analyzes only the role of the degree of competition (albeit indirectly) and of macroeconomic developments.

2 Empirical Approach

2.1 Data: Consumer Price Microdata Are Mapped to Commodity Prices

To estimate the commodity price pass-through to consumer prices, I map price changes at the microlevel[3] with changes in the underlying commodity prices. I choose only consumer products whose prices are highly dependent on commodity price developments and which can be clearly assigned to the underlying commodity (e.g. milk). It is also important for the selected products to be as homogeneous as possible such that product characteristics are not the main explanatory factor of different price developments.

Another factor in the choice of products was the availability of the respective commodity price data at the producer level. Based on these criteria, above all food and energy products qualified for this analysis. The food commodity prices were taken from Statistics Austria's database of producer prices for agricultural and forestry products, which covers monthly price data for a wide range of agricultural products and their subcategories from 1998. The energy commodity prices are based on international crude oil and natural gas prices. A total of nine consumer products are used in this analysis: pork cutlet, beef steak, eggs, whole milk and bread rolls as well as super gasoline, diesel fuel, natural gas and firewood. A list of the individual products and the corresponding commodities as well as details on data availability and data sources can be found in table 1A of the annex.

For each of these products, I compiled a panel of monthly price observations for the period from 1996 to 2009, based on data from various sales outlets in 20 cities and towns across Austria.[4] The total number of observations ranges from 27,000 (eggs) to around 3,000 (natural gas).

2.2 Estimation Method: Panel Regression with Random Effects

I use a microeconometric panel regression with random individual effects to estimate the commodity price pass-through to consumer prices for each product. The magnitude of prices changes at the microlevel is explained by contemporaneous and lagged developments in the underlying commodity prices and other control variables. I estimate the following general linear model for each of the nine products $j = 1,...,9$:

$$\Delta p_{jit} = \alpha_j + \sum_{\tau=0}^{n} \beta_{j\tau} \Delta ppi_{jt-\tau} + \gamma_{j1} X_{jit} + \\ + \gamma_{j2} Y_{jt} + \gamma_{j3} Z_t + \varepsilon_{jit} \quad (1)$$

where Δp_{jit} denotes the log difference of consumer prices for product j in retail outlet i for the period from t to $t-1$, Δppi_{jt} stands for the log difference of the

[3] *The data stem from the CPI/HICP price survey compiled by Statistics Austria and were provided in anonymized form.*

[4] *Amstetten, Baden, Bregenz, Dornbirn, Eisenstadt, Feldkirch, Graz, Innsbruck, Kapfenberg, Klagenfurt, Krems, Linz, Salzburg, St. Pölten, Steyr, Villach, Wels, Vienna, Wolfsberg, Wiener Neustadt.*

commodity price mapped to product j (in line with table 1A in the annex) for the period t to $t–1$, and ε_{jit} is an i.i.d. error term which includes random individual effects. Vectors X_{jit}, Y_{jt} and Z_t contain control variables that are either product-specific and thus observed for each product at the microlevel (X_{jit}), or product-specific but observed over time only (Y_{jt}), or the same for all products and observed over time only (Z_t). Examples of these variables are dummies for the city or town in which the price observation was made (X), a dummy for prices observed since the introduction of euro cash in Austria in 2002 (Y) and the aggregate inflation rate to control for macroeconomic developments (Z).

In this model, the estimator for the long-term pass-through (LTPT) of the relevant commodity prices to the consumer prices of product j is defined as the sum of the coefficients of the contemporaneous and all lagged commodity price changes:

$$LTPT_j = \sum_{\tau=0}^{n} \hat{\beta}_{j\tau} \qquad (2)$$

with the long-term pass-through being estimated for both six and twelve lags, that is, $n = 6$ and $n = 12$. This choice was made to account for product-specific differences in the price adjustment frequency and the assumed differences in the duration of the pass-through. Fuel prices, for instance, are adjusted very often, so that the pass-through is most likely completed after six months. In contrast, the price of natural gas is adjusted much less frequently, and the pass-through can be expected to take longer. The results presented below confirm differences in the duration of the pass-through.

For reasons of data availability, I use different estimation periods for the individual products. Data on the commodity prices associated with food products and firewood are available from 1998; the estimation horizon is therefore from January 1998 to December 2009 for these products (with the exception of eggs, for which producer prices are available only from 1999). For super gasoline and diesel, the estimation horizon is January 1996 to December 2009. Given the shorter availability of the import price index for natural gas, the estimation period for this product is January 1999 to April 2009.

3 Results

3.1 Pass-Through Is Fastest for Fuel and Strongest for Eggs, Firewood and Fuel

In addition to contemporaneous and lagged commodity price changes, the base specification includes only the aggregate inflation rate as a control variable. It serves to control for the macroeconomic environment and has a similar effect in the estimation as time-fixed effects. Table 1 shows the estimation results for the specification in which the pass-through is assumed to take six months at most, while table 2 shows the results for twelve months.

The results highlight that the duration of the pass-through varies across products. Both the level of significance and the size of the coefficient provide information on the duration of the pass-through. For super gasoline and diesel, for instance, the pass-through of crude oil prices is completed already after the second month, even though the subsequent lagged values are still significant. The long-term pass-through after six months is thus hardly different from that after twelve months. In contrast, for natural gas, further lags are also significant, and the long-term pass-through rises from 0.15 after six months to 0.27 after twelve months.

Table 1

Estimation Results for the Base Specification (6 Months)

Product	Pork cutlet	Beef steak	Eggs	Whole milk	Bread rolls	Super gasoline	Diesel	Natural gas	Firewood
C	–0.002 ***	–0.001 *	0.001	0.005 ***	0.003 ***	–0.010 ***	–0.011 ***	0.002	0.002 *
ΔPPI	0.036 **	0.001	0.068 ***	0.153 ***	0.008 *	0.117 ***	0.101 ***	0.029	–0.055
ΔPPI(–1)	0.105 ***	0.032	0.047 ***	0.039 ***	0.009 **	0.158 ***	0.171 ***	0.007	0.235 ***
ΔPPI(–2)	–0.022	0.007	0.008	0.002	0.000	0.027 ***	0.045 ***	0.003	0.100 *
ΔPPI(–3)	0.035 *	0.005	0.001	–0.085 ***	–0.003	–0.009 ***	0.038 ***	0.068 ***	0.008
ΔPPI(–4)	0.086 ***	–0.027	0.008	0.052 ***	–0.002	–0.020 ***	–0.021 ***	0.002	0.087 *
ΔPPI(–5)	0.018	0.028	0.009	0.141 ***	0.006	–0.033 ***	–0.019 ***	0.081 ***	0.047
ΔPPI(–6)	0.009	0.046 **	0.048 **	–0.038 ***	0.004	–0.009 ***	0.017 ***	–0.039 **	0.015
ΔHICP (yoy)	0.179 ***	0.166 ***	0.038	–0.188 ***	–0.018	0.658 ***	0.739 ***	0.000	–0.080 *
LTPT	0.266 ***	0.091 ***	0.189 ***	0.264 ***	0.023 ***	0.230 ***	0.332 ***	0.152 ***	0.438 ***
Observations	15,444	15,104	19,158	16,517	16,697	12,542	12,556	1,803	3,954
Groups	136	138	265	230	376	106	106	35	58
R^2	0.08	0.2	0.05	0.02	0.01	0.44	0.55	0.04	0.07

Source: Author's calculations.

*Note: *** significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. LTPT stands for long-term pass-through.*

The extent of the pass-through, too, varies considerably by product. After twelve months, the long-term pass-through was strongest for eggs (0.47) and energy products like firewood (0.44) and diesel fuel (0.33). The fact that these values are below 0.5 confirms the expectation mentioned in section 1 that the pass-through should be substantially below 100% in an analysis based on microlevel consumer data. The long-term pass-through was

Table 2

Estimation Results for the Base Specification (12 Months)

Produkte	Pork cutlet	Beef steak	Eggs	Whole milk	Bread rolls	Super gasoline	Diesel	Natural gas	Firewood
C	–0.002 **	–0.001	0.002 ***	0.002 ***	0.004 ***	–0.009 ***	–0.013 ***	0.005 ***	0.002 *
ΔPPI	–0.003	0.001	0.086 ***	0.163 ***	0.010	0.122 ***	0.104 ***	0.042	–0.070
ΔPPI(–1)	0.119 ***	0.023	0.069 ***	0.013	0.012 ***	0.153 ***	0.174 ***	0.018	0.227 ***
ΔPPI(–2)	–0.032	0.033	0.033 **	0.012	0.003	0.018 ***	0.041 ***	0.016	0.121 **
ΔPPI(–3)	0.032	–0.021	0.030 **	–0.083 ***	–0.001	–0.003	0.046 ***	0.080 ***	0.003
ΔPPI(–4)	0.069 ***	–0.030	0.026	0.045 ***	–0.006	–0.025 ***	–0.026 ***	0.010	0.055
ΔPPI(–5)	0.022	0.051 **	0.025	0.122 ***	0.006	–0.030 ***	–0.016 ***	0.083 ***	0.037
ΔPPI(–6)	0.012	0.039	0.059 ***	–0.043 ***	0.006	–0.016 ***	0.007 **	–0.022	0.041
ΔPPI(–7)	–0.041 **	–0.036 *	0.040 **	–0.003	–0.002	0.048 ***	0.052 ***	–0.047 ***	–0.110 *
ΔPPI(–8)	–0.008	0.043 *	0.024	0.035 **	–0.003	–0.020 ***	–0.029 ***	–0.065 ***	–0.043
ΔPPI(–9)	–0.008	–0.059 **	0.034 **	–0.062 ***	0.004	–0.035 ***	–0.031 ***	0.068 ***	–0.076
ΔPPI(–10)	0.020	0.012	0.021	0.019	0.000	–0.036 ***	–0.018 ***	0.024	–0.044
ΔPPI(–11)	0.003	0.071 ***	0.018	–0.031 **	0.006	0.030 ***	–0.027 ***	–0.009	0.083
ΔPPI(–12)	0.002	–0.021	0.008	–0.056 ***	0.014 ***	0.030 ***	0.006 **	0.070 ***	0.048
ΔHICP (yoy)	0.206 ***	0.160 ***	–0.098 ***	–0.059	–0.031	0.602 ***	0.916 ***	–0.209 ***	–0.042
LTPT	0.187 ***	0.105 ***	0.472 ***	0.132 ***	0.049 ***	0.236 ***	0.283 ***	0.268 ***	0.273 **
Observations	14,643	14,296	17,904	15,183	13,305	11,908	11,922	1,593	3,657
Groups	136	137	222	228	367	106	106	35	58
R^2	0.12	0.15	0.06	0.14	0.06	0.73	0.86	0.07	0.1

Source: Author's calculations.

*Note: *** significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. LTPT stands for long-term pass-through.*

lowest for bread rolls (0.05) and beef steak (0.1). While the low pass-through for bread rolls is in line with expectations (given the manufacturing steps required to process wheat into bread), the result for beef steak is rather surprising, especially in light of the much stronger pass-through for pork cutlet (0.27). All in all, the results show that the pass-through is relatively strong for products with a close link to the underlying commodity (e.g. eggs, firewood or fuel) and rather weak for products with further processing stages (e.g. bread products).

3.2 Pass-Through Has Increased Following the Introduction of Euro Cash

To test for the impact of the introduction of euro cash in January 2002 on the commodity price pass-through, I included a dummy variable for the post-introduction period and interaction terms between this dummy and the contemporaneous and lagged commodity price changes. If the interaction terms taken together are significant, this would indicate that the adoption of the euro had a statistically significant influence on the pass-through. The results are summarized in tables 2A and 3A of the annex; only significant results are reported, together with the sign of the effect (+ or –).

The results show that the pass-through of crude oil prices to the retail price of super gasoline and diesel was significantly stronger after the introduction of euro cash (for both estimation horizons). The same goes for beef steak. For eggs, whole milk and firewood, however, the commodity price pass-through increased significantly for only one of the two horizons. Since 2002, the pass-through effect has increased at least somewhat for most products under review, and it has not declined significantly for any of them.

Still, based on these results, no conclusive statement can be made about the isolated effect of the euro adoption on the pass-through, as the estimation does not control for a number of possible other factors that might explain the increase in the pass-through after 2002. Such factors can be related to the data collection method or they can be of a purely statistical nature. For instance, ongoing improvements in the collection of data – like taking into account quality changes, better coverage of seasonal products and the inclusion of online prices – may have contributed not only to raising the frequency of price changes (Rumler et al., 2011), but also to an increase in the pass-through observed. In addition, for some products (e.g. energy products), the higher pass-through may be entirely attributable to statistical effects owing to the rise in commodity prices: For products that are subject to a quantity tax, a rise in net prices automatically leads to a higher pass-through, as the fixed tax share in the product's gross price declines. The surge in crude oil prices in 2007 and 2008 may thus have contributed to the rise in the pass-through for super gasoline, diesel and natural gas.[5]

3.3 Stronger Pass-Through of Meat Prices in Smaller Shops

The degree of competition in a market is an important determinant of the extent of the pass-through, but the precise nature of the correlation between the two has not been determined con-

[5] *However, an alternative estimation of the crude oil price pass-through to net prices (instead of gross prices) for super gasoline and diesel confirms the result of a significantly higher pass-through following the introduction of euro cash.*

clusively. Most empirical studies find evidence that more competition leads to a stronger pass-through, as companies are forced to pass on price changes when profit margins are low (Nakamura et al., 2011, for the U.S.A.; Francois et al., 2008, for selected EU countries; Weiss, 1995, for Austria). In contrast, Berck et al. (2009) for the U.S.A. and Bertola et al. (2010) for euro area countries based on survey data both find evidence that the pass-through of cost shocks is stronger in low competition markets. Their explanation is that companies find it easier to pass on cost changes in such an environment. When competition is strong, by contrast, they aim at reducing cost factors (e.g. labor costs) instead of raising prices.

This contribution can provide only an indirect analysis of the link between competition and pass-through, as no competition measures are observed at the microlevel. The data used here contain information on the type of outlet in which the products were sold. It seems plausible that competition is stronger in larger sales outlets, e.g. supermarkets or discounters, than in small shops. The data on food products cover the following types of sales outlets: retail warehouse, supermarket, discounter, corner shop, specialist store (e.g. butcher's shop) and market (e.g. farmers' market).[6]

The estimation period for this analysis is shorter, as Statistics Austria started collecting the relevant data only in 2006. I included additional dummies for the different types of sales outlets and interaction terms between the types of outlets and the producer price changes. The results are summarized in tables 4A and 5A of the annex. They show that the pass-through for meat products (pork cutlet and beef steak) is significantly stronger in corner shops than it is in supermarkets. In addition, there are indications that the pass-through for meat products is weaker in discounters than in supermarkets; these results are, however, not observed consistently across both estimation horizons. By contrast, the pass-through for eggs seems to be significantly stronger in (typically large) retail warehouses and discounters than in supermarkets and, even more so, specialist shops. For the other products under review, no clear pattern emerged regarding the type of shop. This means that also the evidence from this analysis is mixed: While the pass-through for meat products turned out to be stronger in small shops than in supermarkets, it was the other way around for eggs.

3.4 Limited Regional Differences in the Pass-Through

Another estimation focuses on potential regional differences in the commodity price pass-through in Austria. For this purpose, I included additional dummy variables for the 20 cities and towns listed in footnote 4 as well as interaction terms between them and the commodity price changes (using the same approach as with the types of sales outlets). The results show hardly any regional differences in the pass-through of food prices (tables 6A and 7A of the annex). Only in two towns (Feldkirch and Krems) was the pass-through for pork cutlet and eggs significantly lower than in Vienna. The results for fuel products are often inconsistent across the estimation horizons (six and twelve months) – with the exception of Bregenz, where the pass-through for

[6] *Such an analysis is not feasible for energy products, as the respective data cover only one or a few types of sales outlets.*

super gasoline and diesel was significantly weaker than in Vienna. In most cities and towns under review (except Salzburg, Graz and Klagenfurt), the pass-through for natural gas was significantly stronger than in Vienna.

3.5 Asymmetric Pass-Through for Fuel and Beef Steak

The model framework I used is also suited to analyzing a widely-discussed question: Is the pass-through of cost hikes significantly stronger than that of cost cuts? I reestimate the base specification with an additional dummy for commodity price hikes and interaction terms between them and the commodity price changes. If the interaction terms taken together turn out to be significant, this means that the pass-through of commodity price hikes is significantly higher than that of commodity price cuts.

The results suggest that the pass-through is indeed asymmetric for super gasoline and diesel (tables 8A and 9A in the annex). Companies in this industry obviously pass on higher costs more readily than they pass on cost savings. While the pass-through seems to be asymmetric for beef steak, too, it is not for the other meat product under review (pork cutlet).

Earlier studies have already pointed to asymmetry in the pass-through for fuel (PVM Vienna, 2005; BWB, 2008; Jaenicke, 2010). However, the interpretation of this result must take into account that, for the reasons listed in section 1, the long-term pass-through is far from complete for fuel products (0.33 for diesel and 0.23 for super gasoline).[7] This implies that the slightly stronger pass-through of cost hikes is likely attributable also to factors other than fuel retailers' pricing policies, such as the existence of stronger downward price rigidities.

4 Conclusions

A microeconometric analysis of the commodity price pass-through to the consumer prices of nine selected products in the period from 1996 to 2009 shows that both the duration and extent of the pass-through vary rather widely by product. The long-term pass-through is strongest for eggs and firewood, followed by super gasoline and diesel fuel, whereas it is very low for bread rolls and beef steak. As expected, the effect is stronger for products whose consumer prices are largely determined by the associated commodity prices, and it tends to be weaker when cost-intensive processing steps are involved. The duration of the pass-through is shortest for fuel products (around two months) and longest for natural gas (whose price is still partly controlled by government in Austria). The results also show that the extent of price rigidities at the microlevel plays an important role in determining the duration of the pass-through.

The estimated extent of the pass-through also varies over time but, for most products, it has been significantly higher since the introduction of euro cash in Austria. However, without further analysis, it is impossible to conclude whether the rise in the pass-through over time has indeed been caused by the adoption of the euro or whether other factors might have contributed as well.

The estimation of the pass-through by the types of sales outlets gave mixed results. For meat products, the pass-through effect was significantly stron-

[7] *In an alternative estimation based on net prices, the long-term pass-through amounts to 0.62 for diesel fuel and 0.55 for super gasoline.*

ger in corner shops and markets than in supermarkets and discounters, which would support the disputed hypothesis that the pass-through is relatively stronger in a less competitive environment. The opposite is true for eggs, however, which would lend credence to the (likewise controversial) counter-hypothesis.

An analysis of the pass-through by geographical location revealed hardly any systematic differences between the 20 cities and towns under review. The only exception is natural gas, for which the pass-through is significantly higher in most cities other than Vienna. Maybe the breakdown by 20 different locations is too detailed to provide meaningful results, as the number of variables in the regression increases by 280. Limiting this breakdown to just a few regions or city size categories might yield more conclusive results in future analyses.

Regarding the symmetry of the commodity price pass-through, it turns out that companies are more inclined to pass on price hikes than price cuts in the case of super gasoline and diesel as well as beef steak, which confirms the results of earlier studies for fuels. Still, the long-term pass-through is far from complete for both gross and net fuel prices. Therefore, the slightly stronger pass-through of price hikes can also be attributable to factors other than fuel retailers' pricing policies.

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Annex

Table 1A

Mapping of CPI Products to Underlying Commodity Prices

Consumer product	Data available from	Associated commodity prices	Data available from	Data source
Lean pork cutlet	Jan. 1996 to Dec. 2009	Pork (grades S – P)	Jan. 1998 to Dec. 2010	Agricultural and forestry producer prices (Statistics Austria)
Beef top loin steak	Jan. 1996 to Dec. 2009	Beef: average of young bulls (grades E – P) and cows (grades E – P)	Jan. 1998 to Dec. 2010	
Eggs	Jan. 1996 to Dec. 2009	Eggs: average of free-range (large) and barn (medium) eggs	Jan. 1999 to Dec. 2010	
Whole milk	Jan. 1996 to Dec. 2009	Cow's milk (3.7% fat and 3.4% protein)	Jan. 1998 to Dec. 2010	
Bread rolls	Jan. 1996 to Dec. 2009	Soft milling wheat (12.5% minimum protein content)	Jan. 1998 to Dec. 2010	
Super-grade gasoline	Jan. 1996 to Dec. 2009	Crude oil (UK Brent)	Jan. 1996 to Dec. 2010	ECB Statistical Data Warehouse
Diesel	Jan. 1996 to Dec. 2009	Crude oil (UK Brent)		
Natural gas	Jan. 1996 to Dec. 2009	Import price index, subindex natural gas	Jan. 1999 to April 2009	Import price index (Statistics Austria)
Firewood	Jan. 1996 to Dec. 2009	Firewood (softwood)	Jan. 1998 to Dec. 2010	Agricultural and forestry producer prices (Statistics Austria)

Table 2A

Effect of the Euro Adoption on the Pass-Through (6 Months)

Product	Pork cutlet	Beef steak	Eggs	Whole milk	Bread rolls	Super gasoline	Diesel	Natural gas	Firewood
Euro Effect		+		+++		+++	+++		

Source: Author's calculations.

Note: +++, ++, + denote an increase in long-term pass-through after the changeover to the euro (at the 1%, 5% and 10% level of significance, respectively); –––, ––, – denote a decline in the long-term pass-through after the changeover to the euro (at the 1%, 5% and 10% level of significance, respectively).

Table 3A

Effect of the Euro Adoption on the Pass-Through (12 Months)

Product	Pork cutlet	Beef steak	Eggs	Whole milk	Bread rolls	Super gasoline	Diesel	Natural gas	Firewood
Euro Effect		+	+++			+++	+++		++

Source: Author's calculations.

Note: +++, ++, + denote an increase in long-term pass-through after the changeover to the euro (at the 1%, 5% and 10% level of significance, respectively); –––, ––, – denote a decline in the long-term pass-through after the changeover to the euro (at the 1%, 5% and 10% level of significance, respectively).

Table 4A

Effect of the Type of Sales Outlet on the Pass-Through (6 Months)

Product	Pork cutlet	Beef steak	Eggs	Whole milk	Bread rolls
Reference group: Supermarkets					
Retail warehouse			++		
Discounter	––		++		
Corner shop	+++	+++			n.a.
Specialist shop	–		–––		
Market					

Source: Author's calculations.

Note: +++, ++, + LTPT is stronger than in supermarkets (at the 1%, 5% and 10% level of significance, respectively); –––, ––, – LTPT is lower than in supermarkets (at the 1%, 5% and 10% level of significance, respectively). LTPT stands for long-term pass-through.

Table 5A

Effect of the Type of Sales Outlet on the Pass-Through (12 Months)

Product	Pork cutlet	Beef steak	Eggs	Whole milk	Bread rolls
Reference group: Supermarkets					
Retail warehouse			++	–––	–––
Discounter		–––			
Corner shop	+++	+++		+	n.a.
Specialist shop		–	–––	––	–––
Market					

Source: Author's calculations.

Note: +++, ++, + LTPT is stronger than in supermarkets (at the 1%, 5% and 10% level of significance, respectively); –––, ––, – LTPT is lower than in supermarkets (at the 1%, 5% and 10% level of significance, respectively). LTPT stands for long-term pass-through.

Table 6A

Effect of the City on the Pass-Through (6 Months)

Product	Pork cutlet	Beef steak	Eggs	Whole milk	Bread rolls	Super gasoline	Diesel	Natural gas	Firewood
Reference city: Vienna									
Eisenstadt	– –							+++	
Linz						– – –		+++	
Salzburg						– –	– – –		– –
Graz									– –
Klagenfurt			– –			– – –	– – –		–
Innsbruck	– – –		–	+		++		+++	
Bregenz						– –	– – –	+++	
St. Pölten		++						+++	
Steyr								+++	
Kapfenberg						+++		+++	
Villach						+++	+++	++	
Dornbirn	– –						– – –	+++	– – –
Wr. Neustadt				+++		+++	++	n.a.	
Wels			+++					+++	
Wolfsberg			– –					+	
Feldkirch	– –		– –			– – –	– – –	n.a.	
Krems	– – –		– – –					n.a.	
Amstetten	–					– –		n.a.	– –
Baden	– – –					+++	++	n.a.	– –

Source: Author's calculations.

Note: +++, ++, + LTPT is stronger than in Vienna (at the 1%, 5% and 10% significance level, respectively); – – –, – –, – LTPT is lower than in Vienna (at the 1%, 5% and 10% significance level, respectively). LTPT stands for long-term pass-through.

Table 7A

Effect of the City on the Pass-Through (12 Months)

Product	Pork cutlet	Beef steak	Eggs	Whole milk	Bread rolls	Super gasoline	Diesel	Natural gas	Firewood
Reference city: Vienna									
Eisenstadt						+++		+	
Linz							+++	+++	
Salzburg									
Graz						+++	++		
Klagenfurt			– –						
Innsbruck			– –			+++		+++	+++
Bregenz						– –	– – –	+++	+
St. Pölten		++	– –			+		++	
Steyr						+	+++	++	+++
Kapfenberg						+++	– – –	+	
Villach									
Dornbirn						– –	– – –	+++	
Wr. Neustadt								n.a.	– – –
Wels						+++	+++	++	++
Wolfsberg			– – –			+	+		
Feldkirch	–		– –				– –	n.a.	+++
Krems	– –		– –			++		n.a.	
Amstetten				–				n.a.	– –
Baden	–							n.a.	++

Source: Author's calculations.

Note: +++, ++, + LTPT is stronger than in Vienna (at the 1%, 5% and 10% significance level, respectively); – – –, – –, – LTPT is lower than in Vienna (at the 1%, 5% and 10% significance level, respectively). LTPT stands for long-term pass-through.

Table 8A

Asymmetric Pass-Through (6 Months)

Product	Pork cutlet	Beef steak	Eggs	Whole milk	Bread rolls	Super gasoline	Diesel	Natural gas	Firewood
Stronger pass-through		+++			– –	+++	+++		

Source: Author's calculations.

Note: +++, ++, + LTPT is stronger for cost increases (at the 1%, 5% and 10% significance level, respectively); – – –, – –, – LTPT is stronger for cost cuts (at the 1%, 5% and 10% significance level, respectively). LTPT stands for long-term pass-through.

Table 9A

Asymmetric Pass-Through (12 Months)

Product	Pork cutlet	Beef steak	Eggs	Whole milk	Bread rolls	Super gasoline	Diesel	Natural gas	Firewood
Stronger pass-through	– – –	++				+++	+++		

Source: Author's calculations.

Note: +++, ++, + LTPT is stronger for cost increases (at the 1%, 5% and 10% significance level, respectively); – – –, – –, – LTPT is stronger for cost cuts (at the 1%, 5% and 10% significance level, respectively). LTPT stands for long-term pass-through.