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# Consumer Prices in German Food E-Retailing: the Impact of the Value Added Tax Cut in 2020

Prix à la consommation dans le commerce électronique alimentaire allemand : l'impact de la réduction de la taxe sur la valeur ajoutée en 2020

Verbraucherpreise im deutschen Lebensmitteleinzelhandel: Die Auswirkungen der Mehrwertsteuersenkung 2020

**Johann Scharnhop and Jens-Peter Loy**

In July 2020, the German government reduced the standard value added tax (VAT) rate from 19 to 16 per cent for six months, and the reduced VAT rate, which applies to everyday products, from 7 to 5 per cent in order to stimulate private consumption and support the economy, which was weakened by the Covid-19 pandemic. A temporary tax reduction can have an income effect or lead to intertemporal substitution. As falling prices due to a VAT reduction increase consumers' real income and encourage them to bring forward future purchases, demand increases (Crossley, Low and Wakefield, 2009). For these effects to occur, it is essential that the VAT reduction is passed on to the consumer through lower retail prices.

The German government called on retailers to pass on the VAT reduction in full to consumers. Several large German food retailers, such as Rewe, Edeka and Lidl, responded to the call by announcing that they would pass on the VAT reduction in full by lowering retail prices. Despite the high concentration of food retailing companies in German, most studies find strong price competition among retailers in this market (Hoffmann and Loy, 2010). Therefore, it can be expected that the retailers' announcement would have an effect on product prices. Under perfect competition, a full pass-through rate of the tax reduction (100 per cent) can be expected (Walters *et al.*, 2014). However, consumers expect different pricing behaviour from retailers. Behringer, Dullien and Gechert (2021) find that the majority of German consumers believe that the VAT reduction will only be partially passed on. An incomplete pass-through increases retailers' margins and profits, limiting the intended effect on consumption (Dullien and Gechert, 2020). Therefore, we empirically tested the pass-through rate of the tax reduction on food prices at major food e-retailers in Germany.

Temporary VAT reduction is a rarely used fiscal measure, so there is little research on its effects on product prices and demand. The largest temporary VAT reduction to date took place in the UK in 2008. To stimulate consumer spending after the financial crisis, the UK government temporarily reduced the VAT rate by 2.5 percentage points for 13 months. Crossley, Low and Sleeman (2014), for example, analysed this reduction and found a complete pass-through at the time of the reduction, which, however, diminished over the reduction period. Beck *et al.* (2021) and Fuest *et al.* (2021) investigated the temporary VAT reduction in Germany in 2020, focussing on the food retail market. They determined pass-through rates of between 76 and 80 per cent for food.


**VAT rates in Germany were reduced from 19 to 16 and from 7 to 5 per cent in 2020 © iStock.com/Imagesines.**



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## Food e-retailing

Although food e-retailing currently only accounts for a small share of total food retail sales, compared to sales in bricks-and-mortar stores, its sales are growing rapidly. In 2019, food e-retailing accounted for only 1.4 per cent of total food retail sales in Germany (HDE, 2021). IFH Cologne (2020) predicts this share to increase up to 9 per cent by 2030. German e-retailing, however, still lags far behind the numbers for the US market. According to Information Resources Incorporation (IRI), the share of e-retailing in the US had already reached 9.5 per cent in 2020 (Roerink, 2021).

> "Die Ergebnisse lassen Unterschiede zwischen den vier E-Retailern erkennen, und zwar sowohl hinsichtlich des Ausmaßes, in dem der Preisnachlass weitergegeben wird, als auch hinsichtlich des Zeitpunkts der Preisanpassungen."

In recent years, several German food retailers, including Rewe and Edeka, have significantly expanded their online offerings and now sell their products through both online shops and traditional stores. In addition, e-retailers such as Amazon have entered the food sector with products such as AmazonFresh. The Covid-19 pandemic accelerated this trend. According to the German E-Commerce Association (Bevh, 2020), online sales in the food retail sector increased by 89.4 per cent in the second quarter of 2020. For reasons of infection control and supply bottlenecks in local retail markets, food e-commerce was increasingly used by consumers to purchase everyday products during the pandemic (Dannenberg *et al.*, 2020).

**Box 1. Method**

A panel model approach with fixed effects was used to estimate the price changes caused by the VAT reduction. It is assumed that all price changes in the period following the announcement of the VAT reduction are caused by the tax cut (A in Figure 1). Two arguments support this assumption.

First, the observation period is relatively short. Second, other studies on the same topic did not find any price effects caused by other factors in the control group (see Beck *et al.*, 2021; Fuest *et al.*, 2021). Dummy variables were introduced to measure the price effects following the announcement of the tax cut. First, we use a dummy variable for each day of the period following the announcement to capture the time course of the reduction (see Figure 1).

Second, we aggregate over the reduction period to determine the overall effect relative to a full transmission in per cent (see Figure 2). We control for price promotions and individual product characteristics in the model estimation for each retailer. The estimates for the product categories are weighted similarly to the procedure to calculate the CPI in order to obtain an aggregate effect for each retailer. The pass-through rate, i.e. the extent to which the tax rate change is translated into lower prices, is determined by comparing the calculated relative price changes with the theoretically expected price change that corresponds to a complete pass-through.

The VAT rate considered here was reduced from 7 to 5 per cent. If the VAT reduction of two percentage points is passed on in full, this means that the price would be reduced by 1.87 per cent, as the following example shows: let the price before tax be 100, then the price including tax would be 107. If the VAT reduction is fully passed on, the price including tax would be 105 after the tax reduction. The price change from 107 to 105 in relative terms equals a reduction of 1.87 per cent.

## Overview of the data used

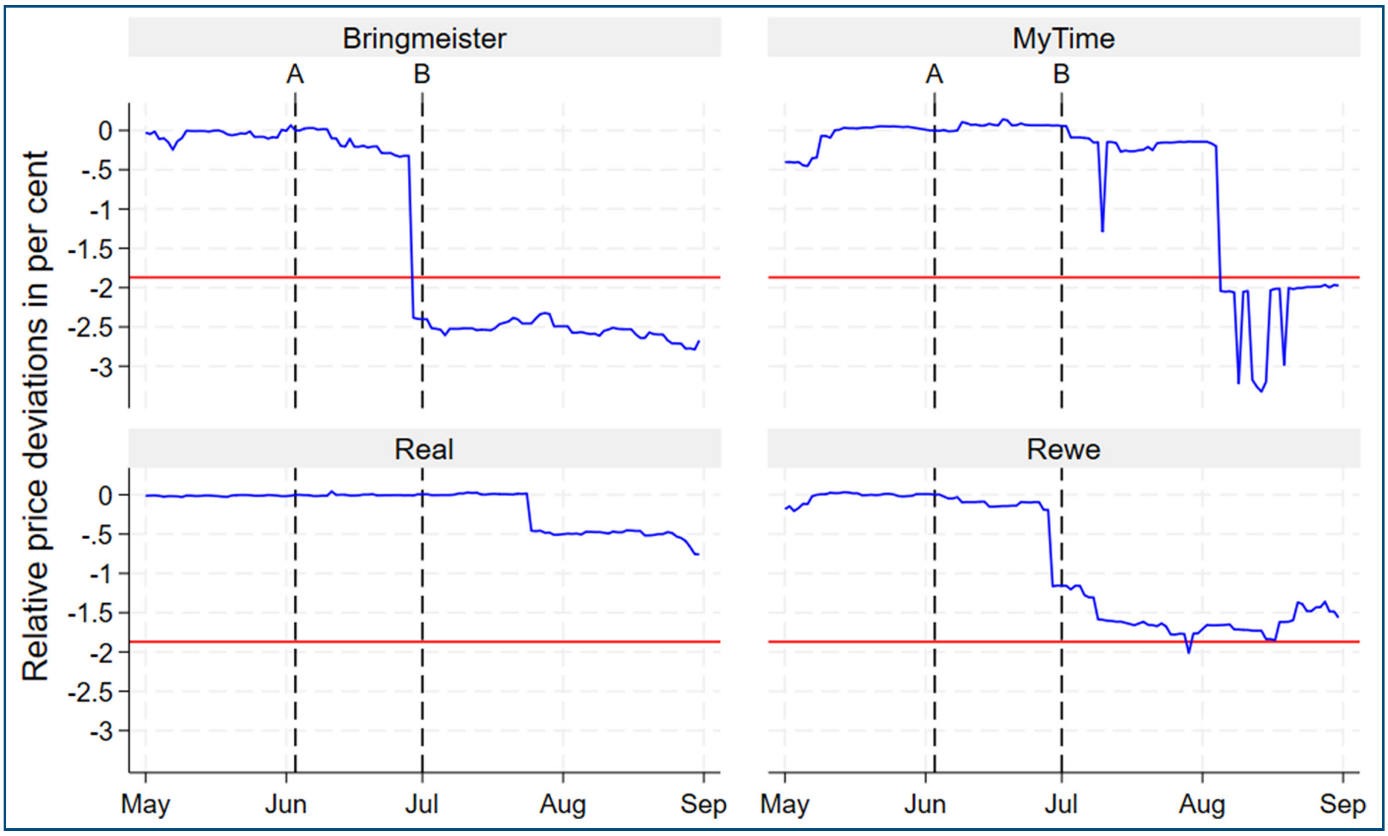
To identify the price effects of the tax reduction, this study used panel data consisting of daily price observations for a broad range of food products collected directly from the websites of large German e-retailing shops (Fedoseeva, 2023). The online stores considered in this study were Bringmeister, MyTime, Real and Rewe. The dataset includes information on product prices, special offers and product categories, and covers the period from first of May to the end of August 2020, which includes the introduction of the temporary tax reduction in Germany in July of 2020. For our study, we consider two months before and after the VAT-rate change. In order to ensure comparability, we homogenise the product categories of each e-retailer based on the categories used to calculate the German Consumer Price Index (CPI) (German Federal Statistical Office, 2019).

The categories under study include bakery products, meat products, eggs and dairy products, and coffee and tea. All categories belong to everyday products and are subject to the reduced VAT rate of 7 per cent before and 5 per cent after the VAT reduction in July 2020. Based on the calculation of the Consumer Price Index for 2019, these categories account for around 44.5 per cent of consumer spending on food and non-alcoholic beverages in Germany (German Federal Statistical Office, 2019) (Box 1).

## Estimation of the effects of the tax reduction

Figure 1 shows the estimated weighted average price development for each e-retailer. The individual e-retailers adjust their prices differently after the VAT reduction. For each day,

**Figure 1: Estimated weighted average price changes across all product categories over time by e-retailer**




*Note*: Blue line: relative average price deviations in per cent compared to day of announcement of VAT reduction for respective retailer. Dotted line A: the day of the announcement of the VAT reduction; dotted line B: the day when the VAT reduction came into effect. Red line: Simulated percentage price deviation for a full transmission of the tax reduction.

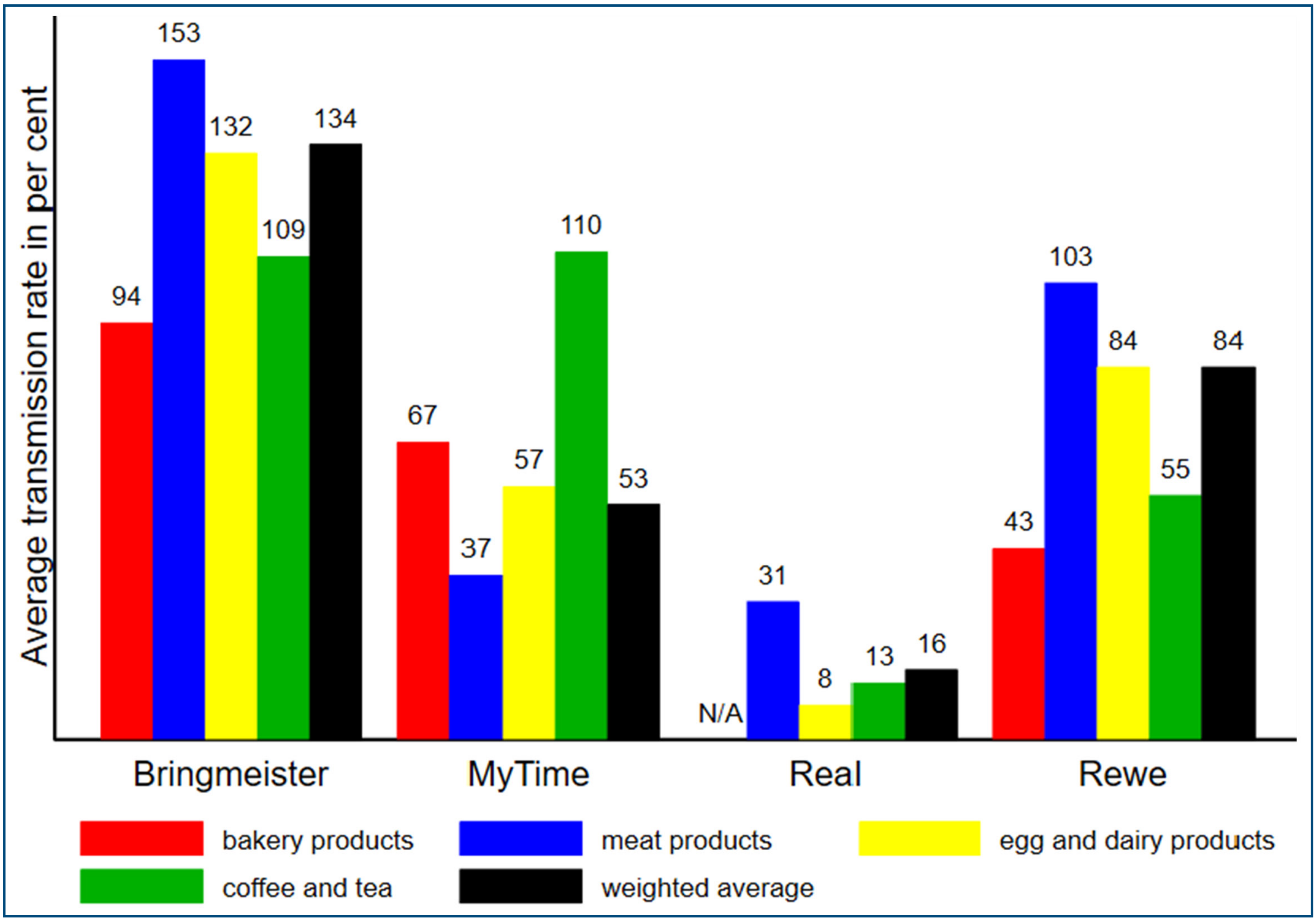
*Source*: Authors' own representation based on data from Fedoseeva (2023).

price deviations relative to the decision day are calculated (dotted line A in Figure 1). Until the day of the announcement and thereafter, the relative price changes are close to zero for all e-retailers. Bringmeister is the only e-retailer to reduce prices slightly after the announcement. After the VAT reduction on 1 July, both Bringmeister and Rewe immediately dropped their prices (dotted line B in Figure 1). More precisely, they cut prices on the first day of the week, two days before the official start of the reduction. At Bringmeister prices fell by 2.5 per cent, which is more than a full pass-through of the VAT reduction of two percentage points. Prices at the Rewe online store fluctuated during the reduction period, first significantly falling and then slightly rising. The largest price difference at Rewe was –1.85 per cent observed on 17 August. Prices at Real showed a delayed adjustment to the VAT reduction, with average prices falling by 0.5 per cent. At MyTime prices initially fell slightly when the tax reduction came into effect, but it was not until the beginning of August that prices fell significantly by 2 per cent. From then on, we observe a full pass-through.

> “Les résultats font apparaître des différences entre les quatre e-retailers, tant en ce qui concerne la mesure dans laquelle la réduction de prix est répercutée qu'en ce qui concerne le moment où les ajustements de prix sont effectués.”

In Figure 2 we look at the average pass-through rates for the reduction period for the individual product categories as well as for the weighted average over all product categories. The e-retailer Bringmeister, which responded the most to the VAT reduction, shows the highest price transmission rate of 134 per cent. For individual products and product categories, we observe significant variations in price transmission. The highest price transmission rate of 153 per cent is found for the meat products category, while the bakery products category shows the lowest rate of 94 per cent. For MyTime, we observe a low and delayed transmission rate of only 53 per cent. The coffee and tea category shows the highest price pass-through rate (110 per cent), while meat products have the lowest (37 per cent). In comparison, the e-retailer Real shows a very low pass-through rate of 16 per cent, with the highest rate in the meat products category of 31 per cent. During the VAT reduction period, the average pass-through rate for the Rewe e-retailing shop was 84 per cent. The meat products

**Figure 2: Average transmission rates for different retailers in per cent for the first two months of the VAT reduction period**




*Note*: Values calculated from linear combinations of the estimated coefficients. German Consumer Price Index weights are used for aggregating over product categories. Bakery products: 6.27, meat products: 18.60, eggs and dairy products: 14.19, coffee and tea: 3.19.
*Source*: Authors' own representation based on data from Fedoseeva (2023).

category shows the highest pass-through rate of 103 per cent, while bakery products have the lowest of 43 per cent, similar to Bringmeister.

Summarising, we find that the online stores reacted to the temporary reduction in VAT by adjusting most retail prices downwards. However, price adjustments differ between stores, products and product categories indicating some strategic pricing behaviour.

## Findings

The e-retailers in this study reduced their retail prices around the time of the introduction of the VAT reduction. The tax reduction overall was largely passed on to consumers by price reductions. The results reveal differences between the four e-retailers, both in the extent to which the reduction is passed on and in the timing of the price adjustments.

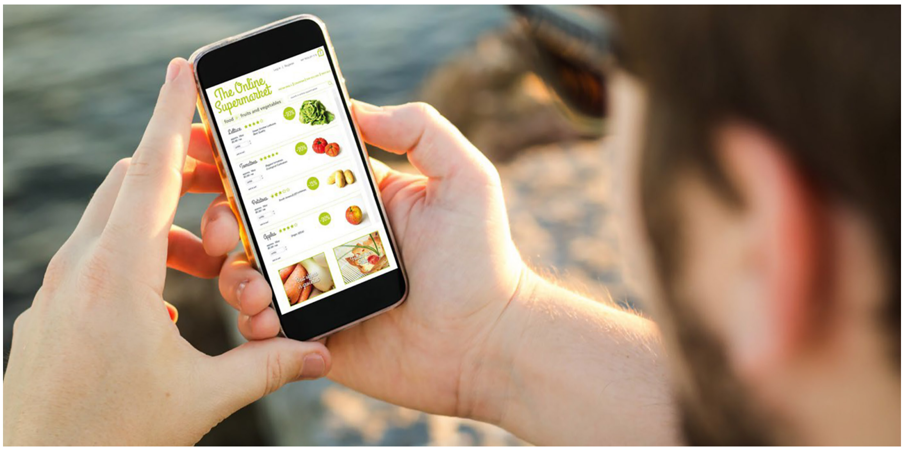
In addition, price adjustments significantly differ across products and product categories. Stores may use price adjustments for promotional purposes and focus on specific products and categories that consumers recognise.

> “The results reveal differences between the four e-retailers, both in the extent to which the reduction is passed on and in the timing of the price adjustments.”

The e-retailer Bringmeister shows the highest pass-through rate, passing on 134 per cent of the VAT reduction. Real, on the other hand, shows the lowest rate of only 16 per cent. The Rewe online shop passed on 84 per cent of the VAT reduction, which is slightly higher than the estimate of Fuest *et al.* (2021) in their study of the Rewe e-retailer. However, Fuest *et al.* (2021) examined a wider range of products. Beck *et al.* (2021) found a similarly high pass-through rate of 76 per cent for the category of Fast-Moving Consumer Goods (FMCG), but the authors primarily study traditional retail outlets and not e-commerce. Bringmeister and Rewe reduced their prices when the tax reduction is introduced. This is in line with the findings of Beck *et al.* (2021). The differences in the pass-through rates and the slightly earlier pass-through at the beginning of the week at Rewe and Bringmeister suggest that the pricing policy of the respective retailer may show some strategic differences.

This study examines the pass-through rates in the first two months of the VAT reduction in Germany 2020. We could not estimate the period of the tax reversal starting in 2021. Fuest *et al.* (2021), however, investigate the period of the subsequent tax reversal and find that the price reduction at the beginning of the tax cut is twice as large as the price increase after the abolition of the VAT reduction. Beck *et al.* (2021) also find that the response to tax cut reversal is different from the initial tax cut.

The results of our study are important in assessing the effectiveness of VAT reductions and complement existing research on the subject. The results show that online grocery retailers pass on the VAT reduction, but not to the full extent. The use of temporary tax reductions is currently the subject of widespread political debate. German politicians and interest groups are discussing the abolition of VAT on 'healthy' food, while Spain has temporarily reduced VAT to 0 per cent on 'basic' food products to ease the economic burden on consumers. The instrument has also been used by the German government for gasoline and gas prices. Temporary VAT reductions are often not fully passed on. Considering the estimated high budgetary costs of 9.6 billion Euro (German Federal Government, 2020), the question remains if this money could have been spent more effectively by other more target-oriented measures.




**Buying groceries online continues to grow in popularity. Shopping can be done conveniently from a mobile phone or computer © iStock.com/milindri.**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# Summary

## Consumer Prices in German Food E-Retailing: the Impact of the Value Added Tax Cut in 2020

## Prix à la consommation dans le commerce électronique alimentaire allemand : l'impact de la réduction de la taxe sur la valeur ajoutée en 2020

## Verbraucherpreise im deutschen Lebensmitteleinzelhandel: Die Auswirkungen der Mehrwertsteuersenkung 2020


In July 2020, the German government reduced the VAT rate for six months in order to stimulate private consumption and support the economy, which had been weakened by the Covid-19 pandemic. It was crucial for the success of the tax cut that retailers passed it on to consumers by reducing retail prices. This article applies a fixed effects estimation model to analyse the price effects of the VAT reduction in grocery e-retailing. It uses price data collected directly from the websites for major food categories of four food e-retailers, Bringmeister, MyTime, Real and Rewe. The tax reduction overall was largely passed on to consumers by price reductions. However, the pass-through rates, i.e. the extent to which the tax rate change was translated into lower prices, varied among the stores, ranging from 16 to 134 per cent, with the highest rate being for Bringmeister. The pass-through rate for Rewe was 84 per cent. Also, the timing of the pass-through varies. The highly divergent pass-through rates were below the expectations of politicians and the announcements made in advance by food retailers, suggesting some strategic pricing within and between stores. For future VAT reduction initiatives, the results of this study and consumers' reactions to price changes should be considered in more detail in order to complete the assessment of the effectiveness of such measures.

En juillet 2020, le gouvernement allemand a réduit le taux de TVA pendant six mois afin de stimuler la consommation privée et de soutenir l'économie, affaiblie par la pandémie de Covid-19. Il est essentiel pour le succès de la réduction fiscale que les détaillants la répercutent sur les consommateurs en réduisant les prix de détail. Cet article applique un modèle d'estimation à effets fixes pour analyser les effets sur les prix de la réduction de la TVA dans l'épicerie en ligne. Il utilise des données de prix collectées directement sur les sites web des principales catégories de produits alimentaires de quatre détaillants en ligne, à savoir Bringmeister, MyTime, Real et Rewe. La réduction fiscale globale est largement répercutée sur les consommateurs par le biais de réductions de prix. Cependant, les taux de répercussion, c'est-à-dire la mesure dans laquelle la modification du taux d'imposition se traduit par une baisse des prix, varient d'un magasin à l'autre, allant de 16 à 134 %, le taux le plus élevé étant celui de Bringmeister. Le taux de répercussion pour Rewe est de 84 %. Le moment de la répercussion varie également. Les taux de répercussion très divergents sont inférieurs aux attentes des responsables politiques et aux annonces faites à l'avance par les détaillants alimentaires, ce qui laisse supposer l'existence d'une stratégie de fixation des prix au sein des magasins et entre eux. Pour les futures initiatives de réduction de la TVA, les résultats de cette étude et les réactions des consommateurs aux changements de prix devraient être examinés plus en détail afin de compléter l'évaluation de l'efficacité de ces mesures.

Im Juli 2020 hat die deutsche Regierung den Mehrwertsteuersatz für sechs Monate gesenkt, um den privaten Konsum zu stimulieren und die Wirtschaft zu stärken, die durch die Covid-19-Pandemie geschwächt war. Entscheidend für den Erfolg der Steuersenkung ist, dass die Einzelhändler diese an die Verbraucher weitergeben, indem sie die Einzelhandelspreise senken. In diesem Artikel wird eine Fixed-Effects-Schätzung verwendet, um die Preiseffekte der Mehrwertsteuersenkung im Online-Lebensmittelhandel zu analysieren. Hierzu werden Preisdaten verwendet, die direkt von den Websites für die wichtigsten Lebensmittelkategorien von vier Online-Lebensmittelhändlern erhoben wurden, darunter Bringmeister, MyTime, Real und Rewe. Insgesamt wird die Mehrwertsteuersatzsenkung größtenteils durch Preissenkungen an die Verbraucher weitergegeben. Die Weitergaberate, d. h. das Ausmaß, in dem sich die Steuersatzänderung in niedrigeren Preisen niederschlägt, variiert jedoch zwischen den einzelnen Geschäften und reicht von 16 bis 134 %, wobei die höchste Rate bei Bringmeister zu verzeichnen ist. Bei Rewe beträgt die Überwälzungsrate 84 %. Auch der Zeitpunkt der Weitergabe variiert. Die stark voneinander abweichenden Weitergaberaten lagen unter den Erwartungen der Politiker und den Vorankündigungen des Lebensmitteleinzelhandels, was auf eine gewisse strategische Preisgestaltung innerhalb und zwischen den Geschäften schließen lässt. Bei künftigen Initiativen zur Senkung der Mehrwertsteuer sollten die Ergebnisse dieser Studie und die Reaktionen der Verbraucher auf Preisänderungen eingehender berücksichtigt werden, um die Bewertung der Wirksamkeit solcher Maßnahmen zu vervollständigen.