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**Dining and Wining
During the Pandemic?
A Quasi-Experiment
on Tax Cuts and
Consumer Spending in
Lithuania**

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**Dining and Wining During the Pandemic?
A Quasi-Experiment on Tax Cuts and Consumer Spending in Lithuania****Prepared by Serhan Cevik¹**

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Abstract

Could temporary tax cuts stimulate consumer spending? Sector-specific measures to the COVID-19 pandemic provides a quasi-experimental variation in consumption patterns to infer a causal effect of tax policy changes. Using a novel dataset of daily debit and credit card transactions, this paper investigates the effectiveness of Lithuania's decision to cut the standard value-added tax (VAT) rate from 21 percent to 9 percent on restaurants and catering services during the pandemic in a difference-in-differences regression framework. I obtain robust evidence that the VAT reduction has had no statistically significant impact on consumer spending on restaurants and catering services, while other policy interventions such as mobility restrictions and vaccination have more pronounced effects. These results have important policy implications in terms of the expected stimulative effect of sector-specific VAT reductions and the effective design of fiscal policy interventions to counter the impact of pandemics during which mobility is highly constrained.

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I. INTRODUCTION

Could temporary tax cuts stimulate consumer spending? Fiscal policy responses to the COVID-19 pandemic provides a quasi-experiment to answer this important question. Over the past three years, the number of COVID-19 cases has reached 769.8 million, resulting more than 6.9 million deaths across the world.² The extensive containment and mitigation measures designed to slow the spread of the coronavirus severely restricted mobility and economic activity and caused the deepest recession in Europe since the World War II era (Coibon, Gorodnichenko, Weber, 2020; Fornaro and Wolf, 2020; Hassan *et al.*, 2020; Ludvigson, Ma, and Ng, 2020; Cevik and Miryugin, 2021; Eichenbaum, Rebelo, and Trabandt, 2021). The unprecedented severity of socioeconomic distress prompted policymakers to implement measures to cushion the consequences of the pandemic and stimulate economic recovery. One of the most popular fiscal policy interventions is the targeted exemptions or reductions in the value-added tax (VAT) rate to boost consumption in sectors such as accommodation, restaurants, and cultural activities that are most affected by the crisis. In this paper, I investigate how consumers in Lithuania have responded to the reduction in the standard VAT rate from 21 percent to 9 percent on restaurants and catering services during the COVID-19 pandemic.³

The VAT is a widely-used type of indirect tax on the consumption of goods and services, accounting for about one-third of total tax revenue in the European Union (EU). Countries decide on the standard VAT rate—ranging from 17 percent to 27 percent in the EU—and tend to establish lists of goods and services that could be exempt from the VAT or subject to a reduced VAT rate.⁴ Although these policy intrusions are a source of economic distortions, policymakers grant product- and sector-specific VAT exemptions and tariff reductions in an effort to advance certain objectives. This practice is also prevalent across the EU including Lithuania, especially with regards to labor-intensive services. The literature on analyzing the consumption response to temporary changes in the VAT rate is nevertheless scant with mixed results, partly because the identification of its effects requires appropriate data (Blundell, 2009; Crossley, Low, and Sleeman, 2014; Harju and Kosenen, 2014; Kosenen, 2015; Agarwal, Marwell, and McGranahan, 2017; Jongen, Lejour, and Massenz, 2018; Benzarti *et al.*, 2020; Büttner and Madzharova, 2021; Cashin and Unayama, 2021; Bachmann *et al.*, 2022; Funke and Terasa, 2022; Gómez-Antonio, del Moral Arce, and Hortas-Rico, 2022).

The reduction in the VAT rate on restaurants and catering services in Lithuania provides a quasi-experimental variation in consumption patterns to investigate the impact of tax policy changes. I use a novel panel dataset of daily point-of-sale (POS) debit and credit card transactions to track consumer spending on thirty-three categories including restaurants and catering and conduct

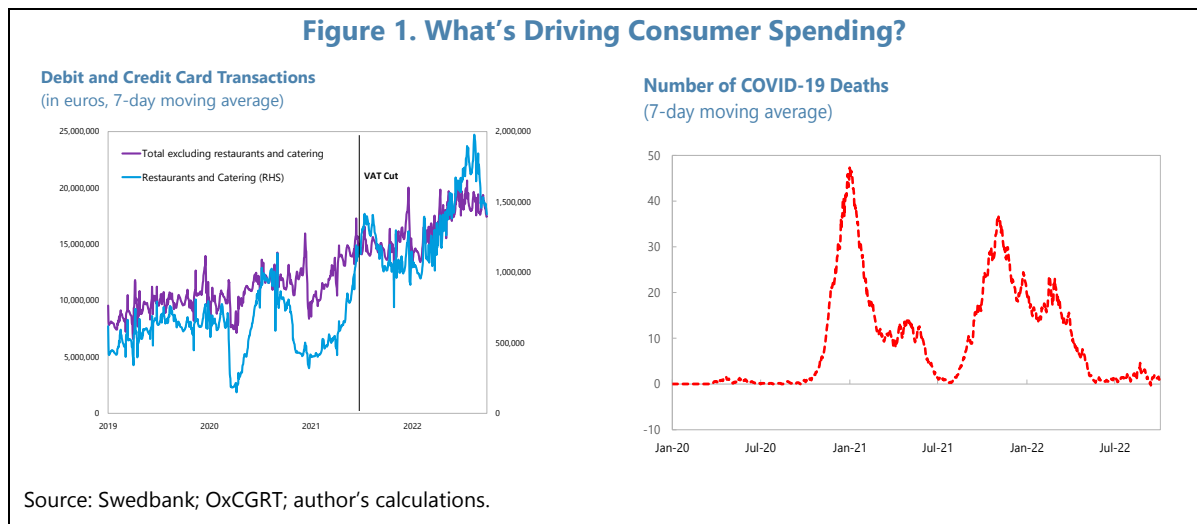
² The latest figures can be found at the WHO COVID-19 Dashboard: <https://covid19.who.int/>.

³ The VAT reduction became effective on July 1, 2021 to last until December 31, 2022 and also covered cultural events, performance acts, and sports-related services. On November 22, 2022, parliament decided to extend the temporary measure until the end of 2023 as a liquidity and support measure for restaurants and catering services.

⁴ The lowest and highest standard VAT rates are in Luxembourg and Hungary, respectively. The average standard VAT rate in the EU is 21 percent.

difference-in-differences estimations to infer a causal effect of the tax policy change. In other words, I compare the outcome of consumer spending on restaurants and catering services following the VAT reduction to other expenditure categories taxed at the standard VAT rate during the COVID-19 pandemic. Before implementing the difference-in-differences regression framework, however, I start with a graphical analysis to depict the evolution of consumer spending on restaurants and catering vis-à-vis other consumer spending categories before and after the VAT cut. As shown in Figure 1, there is no discernible trend difference between consumer spending on restaurants and catering services and aggregate consumption excluding restaurants and catering services after the tax policy change. The rate of change in consumer spending on restaurants and catering services follows a broadly similar pattern after the VAT reduction on July 1, 2021 compared to the rate of change in aggregate spending excluding restaurants and catering services. During this period, there is a significant degree of negative correlation between the spread of COVID-19 and consumer spending on contact-intensive services such as restaurants and catering. This observation is consistent with the empirical evidence provided in Cevik (2022, 2023a) that the COVID-19 pandemic and vaccination efforts have significant effects on consumer spending as measured by debit and credit card transactions in the Baltics.

Has the VAT reduction been an effective stabilization tool? The empirical analysis based on the difference-in-differences approach provides robust evidence that the reduction in the VAT rate on restaurants and catering services in Lithuania—purportedly aimed at alleviating the consequences of the pandemic—has had no statistically significant impact on consumer spending on restaurants and catering services, while other policy interventions such as mobility restrictions and vaccination are found to have more pronounced influence over consumption behavior. I conduct several robustness checks and confirm the insignificant effect of the tax policy change after controlling for the spread of COVID-19 and various government interventions. It should not come as a surprise that I do not find a significant “treatment” effect on consumer spending on restaurants and catering services. First, this finding is consistent with the few other quasi-experimental studies that look at the effect of a VAT cut for labor intensive services (Harju and Kosonen, 2014; Kosonen, 2015). Second, the impact of COVID-19 and



mobility restrictions on consumer behavior is far more important than the VAT reduction in the midst of the pandemic with significant health and economic uncertainty. For that reason, the empirical results presented in this paper have important policy implications in terms of the expected stimulative effect of sector-specific VAT reductions and the effective design of fiscal policy interventions to counter the impact of pandemics during which mobility is highly constrained.

The remainder of this paper is structured as follows. Section II provides an overview of the data used in the empirical analysis. Section III describes the econometric methodology and presents the findings. Finally, Section IV summarizes and provides concluding remarks.

II. DATA OVERVIEW

The use of real-time data has become more prevalent in the literature to evaluate the economic impact of the pandemic (Alexander and Karger, 2020; Baker *et al.*, 2020; Bounie, Camara, and Galbraith, 2020; Carvalho *et al.*, 2020; Chetty *et al.*, 2020; Hacıoğlu, Känzig, and Surico, 2020; Kraenzlin, Meyer, and Nellen, 2020; Cabral *et al.*, 2021; Campos-Vazquez and Esquivel, 2021; Chen, Qian, and Wen, 2021; Dahlhaus and Welte, 2021; Dunn *et al.*, 2021; Kantur and Özcan, 2021; Brinke *et al.*, 2022; Cevik, 2022, 2023a, 2023b; Kapetanios *et al.*, 2022). The empirical analysis presented in this paper is based on a balanced panel dataset of daily observations of debit and credit card transactions, COVID-19 cases, and policy measures. The underlying data used to construct debit and credit card transactions are acquired from Swedbank—one of the largest retail banks in Lithuania accounting for about half of POS transactions. Daily debit and credit card transaction data cover thirty-three spending categories over the period from January 1, 2019 to October 2, 2022.⁵

The use of electronic payments has increased rapidly over the past two decades in Lithuania, with the introduction of advanced payment services, such as contactless cards, and fast-changing consumer habits in favor of non-cash payments. According to the 2022 Payments Market Review by the Bank of Lithuania, about 94 percent of Lithuanians with a payment account used internet banking and 69 percent used mobile payment applications. Estimations based on cash withdrawals indicate that the share of cash payments declined from 88.3 percent in 2006 to 68.5 percent in 2016 and 20.2 percent in 2021. Although the use of non-cash forms of payment has grown at a significant rate, cash is still widely used in transactions in Lithuania, partly because of informal economic activity, which is estimated to account for about 20-30 percent of GDP (Morris and Polese, 2015; OECD, 2018). Therefore, the data used in the empirical analysis may not capture the full extent of consumer spending, especially in service-oriented sectors such as restaurants and catering.

The number of COVID-19 deaths (and infections) is drawn from the Oxford Covid-19 Government Response Tracker (OxCGRT) database and scaled by population. The OxCGRT also systematically collects information on common policy responses governments have taken,

⁵ POS data used in this paper exclude cash withdrawals, but contain both in-person and online transactions.

records these policies on a scale to reflect the extent of government action, and aggregates these scores into a suite of policy indices (Hale *et al.*, 2021). In this paper, I use the following composite policy indices: (i) stringency index and (ii) economic support index. Each of these indices report a number between 0 to 100 that reflects the level of the government's response. While the index is a measure of how many of the relevant indicators a government has acted upon, and to what degree, it cannot say whether a government's policy has been implemented effectively. I also introduce the COVID-19 vaccination rate as an additional control variable, which is obtained from the Our World in Data repository.

Descriptive statistics, presented in Appendix Table A1, indicate considerable heterogeneity across thirty-three categories in debit and credit card transactions over time. The mean value of daily debit and credit card transactions on restaurants and catering services is €870,221 over the sample period, with a minimum of €18,743 and a maximum of €3.6 million, which is as much as consumer spending on food and drinks. The daily number of new COVID-19 deaths (and infections) varies from a minimum of zero to a maximum of 79 (and 15,412), with a mean value of 7 (and 1,245) during the sample period. With regards to health and economic policy variables used in the empirical analysis, the mean value of the stringency index is 37, with a minimum of zero and a maximum of 87, while the mean value of the economic support index is 72, with a minimum of zero and a maximum of 100.

III. EMPIRICAL STRATEGY AND RESULTS

The objective of a temporary VAT cut is to boost the amount of goods and services purchased by reducing the price and encouraging consumers to bring purchases forward. The strength of these effects depends on salience, uncertainty and deflationary expectations, particularly in a recessionary environment shaped by the crisis. The empirical challenge in this context lies in estimating how consumer spending would have evolved had the VAT cut had not been introduced. Some studies attribute any deviation from trend to the tax policy change (Cashin 2011; Cashin and Unayama, 2016). This approach, however, could yield misleading results since consumer spending can deviate from trend because of factors other than the VAT reduction, especially during a pandemic with severely restricted mobility.

In this paper, I quantify the average effect of the VAT reduction on restaurants and catering services in Lithuania during the COVID-19 pandemic using the difference-in-differences method.⁶ This quasi-experimental approach compares the changes in outcomes over time between the "treatment" group (restaurants and catering services) and the "control" group (other consumer spending categories) that remain subject to the standard VAT rate. As a result, the difference-in-differences regression framework allows drawing insights from cross-sectional treatment-control comparisons and before and after the tax policy change for a more robust empirical identification. In line with the difference-in-differences representation, I estimate the following model specification:

⁶ Angrist and Pischke (2008) provide a general overview of the differences-in-differences methodology.

$$spend_{c,t} = \alpha + \beta treat_c + \gamma vat_t + \delta(treat_c * vat_t) + \vartheta X_t + \eta_c + \mu_t + \varepsilon_{c,t}$$

where $spend_{c,t}$ represents consumer spending in category c (as recorded in debit and credit card transactions) at time t ; $treat_c$ is a dummy variable that equals to 1 for restaurants and catering services and 0 otherwise; vat_t is a dummy variable that equals to 1 for all periods after the VAT reduction on July 1, 2021 and 0 otherwise; the interaction variable $treat_c * vat_t$ captures the impact of the VAT reduction on restaurants and catering services; and X_t denotes a vector of control variables including the number of COVID-19 deaths (or infections) as a share of population, health and economic policy measures introduced as a response to the pandemic (the stringency index and the economic support index), and the COVID-19 vaccination rate. The η_c and μ_t coefficients denote the time-invariant category-specific effects and the time effects controlling for common shocks that may affect consumer spending across all categories in a given period, respectively. This approach allows to control for common shocks and develop a more granular assessment. Finally, $\varepsilon_{c,t}$ is an idiosyncratic error term with the usual assumptions. I cluster standard errors at the consumption category level.

The difference-in-differences regression approach identifies the causal effect of the VAT reduction on consumer spending on restaurants and catering services vis-à-vis other consumer spending categories that are not affected the tax policy change. Therefore, the δ coefficient is the outcome of interest in the difference-in-differences model, denoting the interaction term ($treat_c * vat_t$) and measuring the differential effect on how much consumers spend on restaurants and catering after the cut in the VAT rate comes into effect. If the δ coefficient is positive and statistically significant, it would indicate a causal effect of the VAT reduction on consumer spending on restaurants and catering. The treatment and control groups may vary in observable and unobservable characteristics, but the difference-in-differences estimation remains unbiased as long as these differences are broadly constant over time prior to the treatment (a reduction in the VAT rate, in this case), as shown in Figure 1.

Has the tax policy change been an effective stabilization tool? The baseline analysis, presented in Table 1, shows that the VAT reduction has not had a statistically significant effect on how much consumers spend on restaurants and catering services. The estimated difference-in-differences coefficient is positive but statistically insignificant at conventional levels. In other words, consumers have not allocated more money to restaurants and catering services after the government's decision to "temporarily" reduce the VAT rate from 21 percent to 9 percent on July 1, 2021. The magnitude of the estimated δ coefficient is also small—amounting to about 0.3 percent across all specifications of the model. In column [2], I introduce the number of COVID-19 deaths per population and find that the pandemic has a significant negative effect on consumer spending and the δ coefficient remains unchanged statistically insignificant. In columns [3] and [4], I introduce government interventions—in the form of public health measures to contain the spread of the virus and economic support measures designed to assist businesses and households—and find that the stringency of containment measures has a significant negative effect and the extent of economic support schemes has a positive impact on consumer spending on restaurants and catering services. Finally, in column [5], I introduce the COVID-19 vaccination rate as an additional control variable and find that it has a small positive effect on consumer

spending as expected.⁷ After taking account of these additional control variables, the δ coefficient remains statistically insignificant and broadly unchanged in magnitude. I also estimate the model using a control group only comprised of contact-intensive services and obtain similar results. Hence, the difference-in-differences method robustly indicates the VAT reduction has had no discernible positive impact on consumer demand for restaurant and catering services in Lithuania.

The efficacy of the VAT reduction depends on the extent to which restaurants and caterers pass through the price cut to consumers, and the extent to which consumers respond to the consequent price changes. The dataset used in this paper does not contain transaction-level price data to calculate the rate of tax pass-through to prices, but aggregate consumer price statistics provided by the Statistics Lithuania indicate that the price increase in restaurants and catering services was actually higher than the average increase in consumer prices after the VAT reduction—2.2 percent in restaurants and hotels and 1.4 percent in catering services *versus* 0.5 percent on average in July 2021. This pattern of relative price increases remains unchanged three months after the VAT reduction, with 4.3 percent in restaurants and hotels and 3 percent in catering services vs. 2.6 percent in the headline index. There could undeniably be other factors contributing to relative price movements across sectors in the economy, but these aggregate figures are consistent with the estimations showing that the VAT reduction had no significant effect on consumer spending.

Table 1. VAT Reduction and Consumer Spending

	[1]	[2]	[3]	[4]	[5]
Treat*VAT	0.284 [0.060]	0.284 [0.060]	0.284 [0.060]	0.284 [0.060]	0.290 [0.060]
COVID-19 deaths per population		-0.024** [0.003]	-0.022** [0.003]	-0.022** [0.003]	-0.016** [0.003]
Stringency index			-0.010*** [0.001]	-0.010*** [0.001]	-0.010*** [0.001]
Economic support index				0.000*** [0.001]	0.001*** [0.001]
COVID-19 vaccinations per population					0.000*** [0.000]
Number of observations	3,018	3,018	3,018	3,018	3,018
Country FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes

Note: The dependent variable is consumer spending as measured by daily debit and credit card transactions. A constant is included in all specification, and robust standard errors are reported in brackets. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Source: Author's estimations.

⁷ The coefficient on vaccination is smaller when it is included along with other pandemic-related policy variables such as the stringency of containment measures.

I conduct several robustness checks, including the number of COVID-19 infections instead of deaths and other alternative measures of the pandemic. In addition, since time indicators are strongly correlated with the dummy variable for the VAT reduction, I estimate the model without time fixed effects but still including time-varying policy variables for the pandemic response. These estimations, presented in Table 2, yield broadly similar results. Finally, I estimate “placebo” regressions to confirm the validity of baseline results, which depend on the assumption that there are no differential trends from the treatment and control categories of consumer spending prior to the VAT reduction. It is not possible to directly test this assumption due to the lack of information on what would have happened if there was no policy intervention. Therefore, I follow a widely-used approach to indirectly verify this assumption by checking whether the trends prior to the VAT reduction are similar. The graphical diagnostics for parallel trends, presented in Appendix Figure A1, shows no evidence for a violation of the common pre-policy change trend assumption in the baseline setting used in the empirical analysis.

Table 2. VAT Reduction and Consumer Spending: Robustness Checks

	[2]	[3]	[4]	[5]	[6]
Treat*VAT	0.289 [0.060]	0.289 [0.060]	0.290 [0.060]	0.290 [0.060]	0.259 [0.107]
COVID-19 infections per population	-0.002*** [0.000]				
COVID-19 infections		-0.001*** [0.000]			
COVID-19 deaths			-0.006*** [0.001]		
7-day moving average of COVID-19 deaths per population				-0.018** [0.004]	
COVID-19 deaths per population					-0.010** [0.003]
Stringency index	-0.007*** [0.001]	-0.007*** [0.001]	-0.010*** [0.001]	-0.009*** [0.001]	-0.006*** [0.001]
Economic support index	0.006*** [0.001]	0.006*** [0.001]	0.000*** [0.001]	0.001*** [0.001]	0.00*** [0.001]
COVID-19 vaccinations per population	0.000*** [0.000]	0.000*** [0.000]	0.000*** [0.000]	0.000*** [0.000]	0.000*** [0.000]
Number of observations	3,018	3,018	3,018	3,018	3,018
Country FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	No

Note: The dependent variable is consumer spending as measured by daily debit and credit card transactions. A constant is included in all specification, and robust standard errors are reported in brackets. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Source: Author's estimations.

IV. CONCLUSION

Could temporary tax cuts stimulate consumer spending? Fiscal policy responses to the COVID-19 pandemic presents an experimental opportunity to explore this important question. One of the most popular fiscal policy interventions is the specific exemptions or reductions in the standard VAT rate to boost consumption in sectors that are most affected by the crisis. In this paper, I investigate how consumers in Lithuania respond to the VAT reduction from 21 percent to 9 percent on restaurants and catering services during the COVID-19 pandemic, which provides a quasi-experimental variation in consumption patterns to investigate the impact on tax policy changes. I use a novel panel dataset of daily debit and credit card transactions to track consumer spending on thirty-three categories including restaurants and catering services and employ a difference-in-differences methodology to identify the impact of the VAT cut. In other words, I compare the outcome of consumer expenditures on restaurants and catering services following the VAT reduction to other spending categories taxes at the standard rate.

Has the VAT reduction been an effective stabilization tool? The empirical analysis based on the difference-in-differences approach provides robust evidence that the reduction in the VAT rate on restaurants and catering services in Lithuania—purportedly aimed at alleviating the consequences of the pandemic—has had no statistically significant impact on consumer spending on restaurants and catering services, while other policy interventions such as mobility restrictions and vaccination are found to have more pronounced influence over consumption behavior.⁸ I conduct several robustness checks and confirm the insignificant effect of the tax policy change after controlling for the spread of COVID-19 and various government interventions.

It should not come as a surprise that I do not find a significant “treatment” effect on consumer spending on restaurants and catering services. First, this finding is consistent with the few other quasi-experimental studies that look at the effect of a VAT cut for labor intensive services. Second, the impact of COVID-19 and mobility restrictions on consumer behavior is far more important than the VAT reduction in the midst of the pandemic with significant health and economic uncertainty. Accordingly, the empirical results presented in this paper—robust to different specifications—have important policy implications in terms of the expected stimulative effect of sector-specific VAT reductions and the effective design of fiscal policy interventions to counter the impact of crises.

⁸ Reducing the VAT rate from 21 percent to 9 percent on restaurants and catering services is estimated to lower the VAT collection by about €133 million (or 0.2 percent of GDP) in 2022.

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Appendix Table A1. Descriptive Statistics

Variable	Observations	Mean	Std. dev.	Minimum	Maximum
Debit and credit card transactions (€)					
Restaurants and catering services	4,113	870,221	468,112	18,743	3,588,394
Motor vehicles and services	4,113	429,790	213,516	2,112	1,387,624
Travelling and transportation	4,113	260,830	150,354	1,095	840,776
Telecommunications	4,113	102,658	48,779	20	379,146
Sport services	4,113	175,343	87,679	35	486,977
Security services	4,113	22,025	18,995	0	145,858
Religion and charity	4,113	269	424	0	10,182
Photos	4,113	13,532	6,322	6	41,767
Office supplies	4,113	58,736	44,261	0	370,765
Music	4,113	23,813	10,637	0	102,307
Miscellaneous	4,113	1,995,054	1,924,960	132,247	11,800,000
Luxury	4,113	62,568	45,113	0	355,499
Insurance	4,113	43,127	31,337	0	163,998
Legal services	4,113	24,492	17,851	0	105,851
Community agencies	4,113	175,760	92,157	5,532	456,942
Construction and real estate	4,113	17,207	9,468	0	59,842
Financial services	4,113	640,015	308,175	0	2,240,405
Flowers and gardening	4,113	58,637	52,416	231	631,700
Food and drinks	4,113	3,223,457	1,653,542	66,070	8,855,150
Fuel	4,113	1,174,323	647,626	94,725	4,232,528
Government services	4,113	20,202	8,410	0	68,226
Hotels and accommodation	4,113	246,620	168,227	261	847,844
Health services	4,113	745,679	429,349	6,304	2,248,837
Electronics	4,113	418,672	259,072	5,303	1,936,450
Education and hobbies	4,113	113,356	72,001	102	470,452
Clothing	4,113	771,065	455,061	444	2,716,217
Beauty and spa	4,113	227,078	138,859	629	1,151,583
Business services	4,113	140,805	81,121	418	646,329
Cleaning services	4,113	6,553	4,697	58	39,259
Casinos and betting	4,113	34,021	21,464	0	160,115
Airport and airlines	4,113	148,216	116,812	0	664,152
Accessories	4,113	34,942	21,123	0	145,663
Homebuilding and furnishings	4,113	1,140,129	823,706	3,652	4,182,731
COVID-19 deaths	3,018	7	9	0	79
COVID-19 infections	3,018	987	1,874	0	15,412
Stringency index	3,018	37	21	0	87
Economic support index	3,018	53	36	0	100

Source: Swedbank; OxCGRT; author's calculations.

