Cross-Border Shopping: Evidence from Swiss Household Consumption

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Abstract

Cross-border shopping allows purchasing comparable goods at lower prices abroad. Meanwhile, it can reduce domestic consumption, sales, and tax collection. During the Covid-19 pandemic, the Swiss government closed all national borders to mitigate the virus's spread, thereby prohibiting cross-border shopping. I exploit the random timing of this policy using data on 600 million household-level transactions from the largest Swiss retailer to identify patterns in cross-border shopping. I find that grocery expenditures increased by 10-15% in border regions. Households drive for up to 70 minutes to a cross-border location, but the distance decay function is non-linear and marginal costs of traveling become negligible after 40 minutes.

Keywords: economic geography, consumption, consumption access, consumption inequality, spatial competition
JEL-codes: R1, R2, L14.

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1 Introduction

Cross-border shopping has been a growing phenomenon in many countries, particularly along national borders, where consumers are able to purchase goods and services at lower prices from neighboring countries. This activity increases product variety for households living close to the border and pressures domestic prices. At the same time, it may harm local employment, consumption, sales, or tax collection (see, for example, Leal et al. 2010, Knight and Schiff 2012, or Baggs et al. 2018). This paper aims to examine the patterns of cross-border shopping in Switzerland through the temporary border closure during the Covid-19 pandemic to understand consumers' motivations and behaviors better.

On March 16, 2020, the Swiss government declared under the Epidemics Act an *extraordinary situation* to mitigate the Covid-19 pandemic and mandated the immediate closure of all restaurants, bars, entertainment, and leisure facilities. Additionally, the Federal Council announced the closure of the border to all neighboring countries.[1] Before this intervention, crossing the border offered Swiss citizens comparable products at lower prices in Germany, Italy, Austria, or France.[2] All national borders finally reopened in June 2020. Switzerland is a unique case to study cross-border shopping because of two reasons. First, members of the European Union surround it entirely (except for the Principality of Liechtenstein). These countries share a common currency, facilitating comparisons for Swiss households and eliminating exchange rate differences.[3] Hence, the relative attractiveness of these countries for Swiss consumers depends solely on their variety and prices of grocery products. Second, the exact timing of the border closure was random for Swiss residents and Burstein et al. [2022] show that the policy was highly effective, as cross-border shopping shares almost fell to zero until the re-opening.

I use a difference-in-differences framework to identify the causal effect of the border closure on grocery expenditures within Switzerland by comparing households living close to a national border to households residing further inland. The estimated increase in Swiss grocery expenditures measures the magnitude of cross-border shopping in periods of open borders. I use this setting to calculate the distance decay function (the decline in cross-border shopping with distance) and analyze heterogeneities across household characteristics. To this end, I merge the universe of household-linked transactions from the largest Swiss retailer with administrative records on labor market income and household characteristics for the entire Swiss population. This transaction data contains 600 million daily purchases for 2.8 million households in 2020.

[1] Shops selling essential products remained open (including grocery stores and pharmacies), while others had to close. The borders to the Principality of Liechtenstein remained open while crossing between Lichtenstein and Germany or Austria was prohibited. Nonetheless, crossings remained possible for work-related reasons for the 370'000 workers commuting from neighboring countries into Switzerland and the 29'000 Swiss residents working abroad, of which 13'000 are Swiss.

[2] Importation into Switzerland is exempt from VAT for a total value below 300 CHF, as long as certain limits for meat, tobacco, etc. are met.

[3] The CHF/EUR exchange rate was stable throughout this period. Therefore, the border closure was the only shock at the time.

First, I show that the policy increases inland expenditures by 10-15% in border regions. Second, I find that the distance decay function is highly non-linear. The marginal costs of traveling become negligible after 40 minutes such that households still engage in cross-border shopping for up to 70 minutes of driving time. Third, expenditures of larger households increase stronger in response to the policy. At the same time, I find no differences for other household characteristics like income and age. Fourth, the effect vanishes immediately and entirely once the border reopens. Therefore, cross-border behaviors seem to be deeply rooted and resist temporary shocks.

This paper contributes to the previous research on cross-border shopping. Chandra et al. [2014] find that more cars cross unilaterally between the US and Canada if the home currency appreciates and Campbell and Lapham [2004] analyze the response of retailers. Further, Asplund et al. [2007] show that Danish tax cuts reduce alcohol sales in Sweden and Friberg et al. [2022] estimate a hump-shaped demand elasticity for the effect of foreign price changes on store sales at Norway's largest chain. While these papers shed light on broader patterns of cross-border shopping, I use transaction data to analyze individual household behavior and differences in transaction costs. Following a similar approach, Burstein et al. [2022] develop a binary choice model and find substantial welfare gains from cross-border shopping for two counterfactuals: the appreciation of the Swiss Franc in 2015 and the border closure in 2020.[4] I relate to this by studying the latter shock to estimate precisely a causal distance decay function.

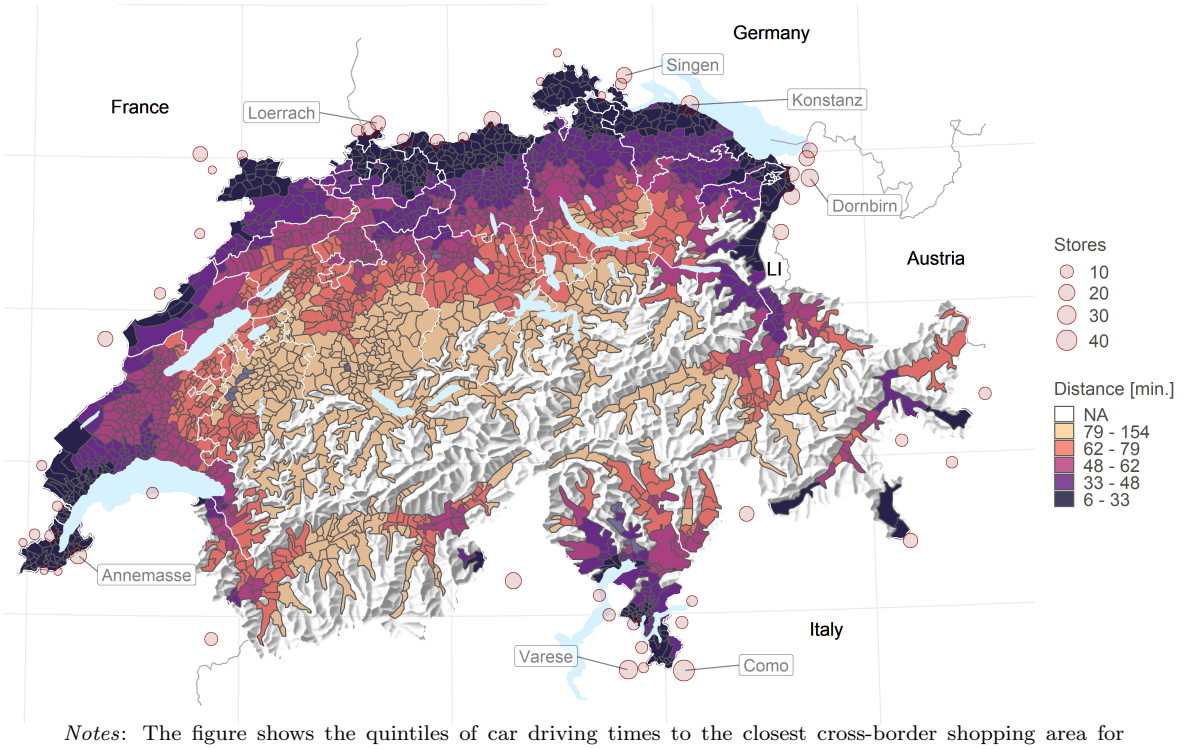
2 Data

I combine unique household-linked consumption data with administrative data on a spatial resolution of 100 × 100 m for the year 2020. The first ingredient for this paper are household-store-linked grocery expenditures collected through the loyalty program of the largest Swiss retailer, Migros. The program allows participating households to record their expenditures for exclusive discounts. The program counts three million registered customers accounting for 85% of Swiss households and captures 79% of total sales at Migros. Migros charges the same prices throughout the country, independently of local purchasing power, wages, and costs. Stores of similar size also generally offer similar goods, except for local products. The data set includes 600 million household-linked purchases and provides information on household characteristics including the location of their residence on the 100×100m grid, the cardholder's age, and gender, and household type.

I enrich the purchase data with individual-level administrative records for the entire Swiss population (roughly 8 million people). The Population and Households Statistics (STATPOP) includes characteristics like gender, age, or marital status. The Old-Age and Survivors Insur-

[4] Burstein et al. [2022] use self-scanned Nielsen Homescan data including domestic and foreign shopping trips for 4'600 Swiss households as in Auer et al. [2021], where they measure the sensitivity of retail prices and import shares to the border and relative prices.

Figure 1: Distance to the closest cross-border shopping area



Notes: The figure shows the quintiles of car driving times to the closest cross-border shopping area for Switzerland on a municipality level. Major cities are marked accordingly.

ance (AHV) adds gross labor market income and contribution periods for every citizen from tax records. I combine the two data sets by identifying unique combinations of households using their grid cell, age, gender, and household form. This approach matches 1.1 million cardholders uniquely to a household, which accounts for 37% of regular customers and 28% of Swiss households.

Finally, I calculate for each household the shortest driving time to a foreign shopping location, where I consider all close cities abroad having at least three stores that would be suitable for cross-border shopping. Figure 1 displays the spatial distribution of these locations, including the number of available stores.

3 Empirical Strategy

I exploit the exogenous policy by comparing households living within a 30-minute car drive (the first quintile) from a cross-border location to those living far enough inland such that they typically don't shop abroad. Hence, I choose a baseline comparison distance of 80 minutes (the fifth quintile) and drop all individuals living within the doughnut area in between to eliminate spillover effects.[5] Figure 1 shows these travel distance bins to the closest foreign

[5]I further check that the average household living 80 minutes from a border location indeed does not respond to the shock. If a fraction of control units would still react to the border closure, my results would provide a

location across Switzerland, resulting in 350'000 treated (31% of the sample) households and 260'000 control units (26%).

I use a difference-in-differences model to estimate the average treatment effect. Since all political regulations, grocery supply adaptations, and consumers' behavioral changes affect both groups equally, I attribute any deviation after the intervention to cross-border shopping (if the parallel trend assumption holds). Therefore, I apply a two-way fixed effects model in an event-study fashion:

$$\ln(Y_{imt}) = \alpha_i + \gamma_t + \sum_{\substack{k=1 \\ k \neq 11}}^{52} \beta_k T_{it}^k + \epsilon_{imt}, \tag{1}$$

where Y_{imt} are the grocery expenditures of household i living in municipality m at year-week t. α_i and γ_t are the unit- and period-specific fixed effects, controlling for unobserved heterogeneity. The dummies T_{it}^k indicate the week of the year 2020 for all households living in a treated area, and β_k are the associated pre- and post-treatment coefficients.[6] Treatment starts in week twelve, and coefficients are normalized to week eleven.

To analyze the effect's decay with distance, I use a static version of the model including travel time:

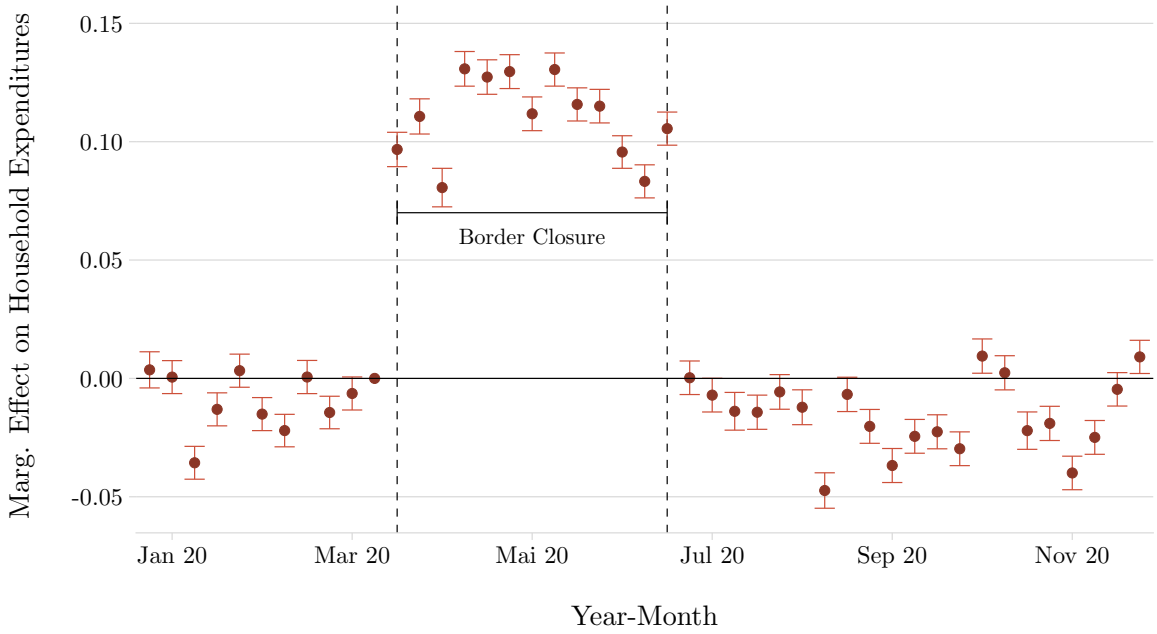
$$\ln(Y_{imt}) = \alpha_i + \gamma_t + \beta_d(D_{it} \times \delta_{im}) + \epsilon_{imt}, \tag{3}$$

where δ_{im} is the binned time household i drives to the closest cross-border location and the dummy D_{it} equals one if a household is in the treatment group and the border is closed. Additionally, I add categorical covariates x_{im} (for example, income bins) to analyze heterogeneities:

$$\ln(Y_{imt}) = \alpha_i + \gamma_t \times x_{im} + \beta_{d,x}(D_{it} \times \delta_{im} \times x_{im}) + \epsilon_{imt}. \tag{4}$$

To allow trends to differ between groups, I compare households to similar units in the control group by including period-group fixed effects. This is essential, for example, if richer households dine out more often. Then, their response will differ from poorer citizens and I must compare households within income groups to estimate heterogeneities correctly.

Figure 2: Dynamic treatment effects



Notes: The figure shows dynamic average treatment effects of the Swiss border closure (March 16-June 15 2022) on domestic household expenditures at Migros stores for different distance bins. We consider all households within 30 minutes of a cross-border store as treated. The control group are all households that are further away from a cross-border store than a 80 min car ride. Standard errors are clustered at the id level. Regression-based on 15 million observations.

4 Results and Discussion

First, I find that the border closure temporarily increases inland grocery expenditures by 10-15% at the border. Figure 2 shows that this shift is immediate, and remains constant as long as the border is impassable. After the reopening, border expenditures immediately drop to the previous level. Hence, Swiss households did not adjust their cross-border shopping patterns through the Covid-19 pandemic and switched back to their old behavior as soon as possible. This suggests that cross-border shopping in Switzerland follows deeply-rooted routines that withstand temporary shocks. There may even be a temporary catch-up effect for some months, as most coefficients in the following periods are below zero. Additionally, I expect no violation of the parallel trend assumption as most pre-treatment coefficients in Figure 2 are close to zero, even if some are significant due to the large sample size.

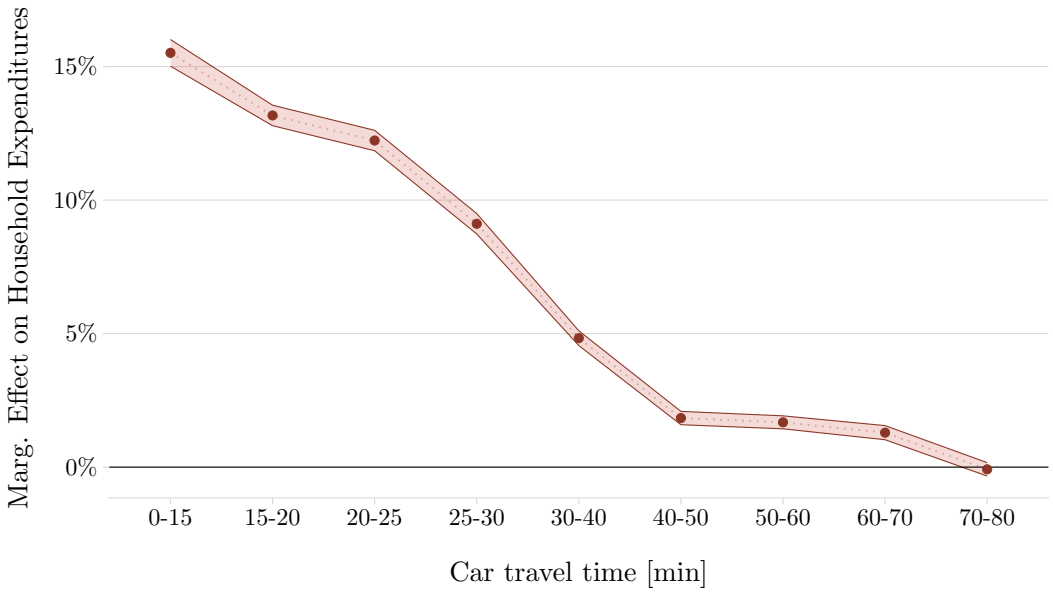
Second, the average volume of cross-border expenditures decreases with distance from the border. Figure 3 shows for households living within 15 minutes from a cross-border city a coefficient of 18%. The effect first declines linearly before flattening out and becomes

lower bound of the effect.

[6]

$$T_{i,t}^{k} = \begin{cases} 1, & \text{if } t = k \\ 0, & \text{otherwise} \end{cases} \tag{2}$$

Figure 3: Decay of the treatment effect with distance



Notes: The figure shows the average treatment effects of the Swiss border closure (March 16-June 15 2022) on domestic household expenditures at Migros stores for different distance bins. The control group are all households that are further away from a cross-border store than an 80 min car ride. Regression based on 16 million observations. Standard errors are clustered at the id level.

insignificant after 70 minutes. Furthermore, these results indicate that after 40 minutes of driving time, the marginal cost of driving longer is negligible for the next half hour.

Third, households may follow different cross-border patterns based on their location and socio-economic characteristics. I observe a stronger response in the Italian- and French-speaking parts, where inland grocery expenditures rose by 28% in the Ticino and 17% in Geneva. In comparison, the effect is around 10% in German-speaking areas. Also, one might expect that poorer households engage in more cross-border shopping as they spend a higher share of their income on groceries and benefit marginally more from the lower prices abroad. Accordingly, their expenditures should react stronger but I find no significant differences for income categories. In contrast, cross-border shopping increases with household size, deviating from the findings in Burstein et al. [2022]. This result is sensible since I find that groceries take up a larger share of income for larger households.

Ultimately, price differences between neighboring countries induce households to shop abroad and generate welfare gains for them. I show that cross-border shopping is an omnipresent and persistent phenomenon in Switzerland, and diverse socio-economic groups are willing to drive long distances to take part in it.

Thus, policymakers should be conscious of negative impacts on retail sales or employment when setting a VAT or taxing fuel.

Declaration of competing interest

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential and the author does not have permission to share the data. Programming files are available upon request.

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A Online Supplementary Material

This supplementary material supports arguments made in the paper, while the paper itself does not directly refer to them. Therefore, these figures can be included in an online appendix.

A.1 Details on the Data Processing

Individual shopping trips are divided into 41 broader categories, including *fruit and vegetables*, *meat and fish*, *milk products*, *household*, and *beauty*. I disregard refunds in the transaction data and those above 2'000 CHF (as they are likely professional customers) and aggregate individual shopping trips into weekly baskets. I delete households who likely moved in my sample period. For the administrative records, I aggregate the exact addresses to the 100 $\times$ 100 meter grid given in the transaction data. The final matched data set then includes 99 million observations. I scrape the car travel times from *search.ch*, the Swiss phone book directory and calculate the shortest driving time from each raster cell on the 100 $\times$ 100 meter grid to a foreign shopping location.

Table A 1 shows descriptives for the final data set. The average household spends 59.7 CHF at Migros in a given week, has 2.93 members and a total income of 97'000 CHF (58'000 CHF if adjusted by the square root of household size). The average household head is 55.3 years old.

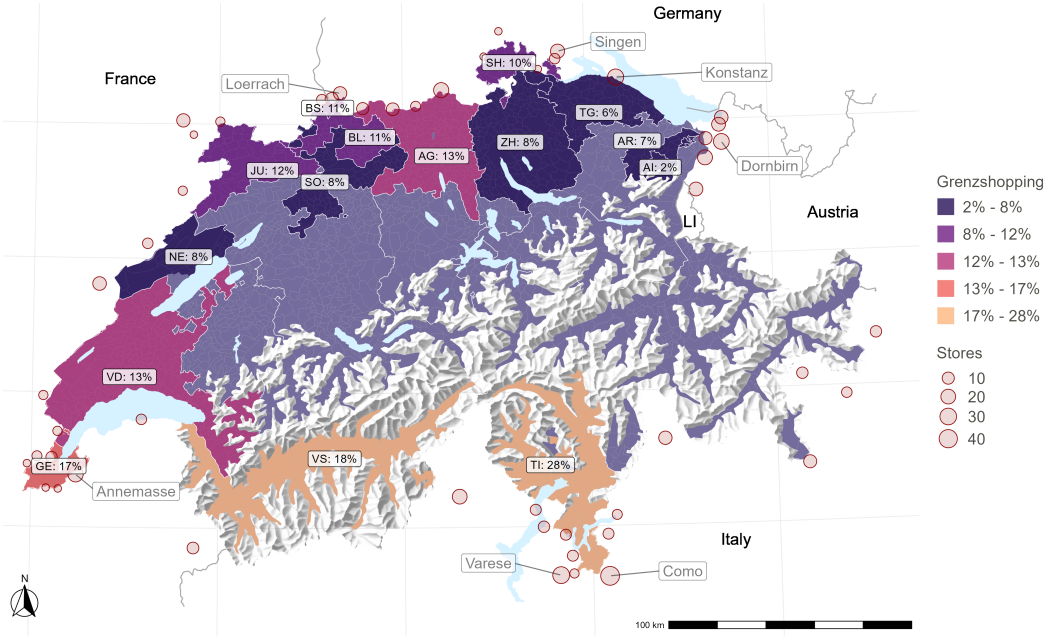
Table A 1: Summary Statistics

	Matched Data				
Variable	Mean	SD	p1	p50	p99
Expenditures	59.7	81.8	1	28.7	345
Income Total	96'988	134'359	0	82'294	442'410
Income Adjusted	57'719	70'446	0	51'721	249'699
Household Size	2.93	6.91	1	2	7
Age	55.3	17.2	23	55	91
Observations	99'182'042				

Notes: The table shows summary statistics for the final data set that could be matched between customers and citizens and that is used in the regressions.

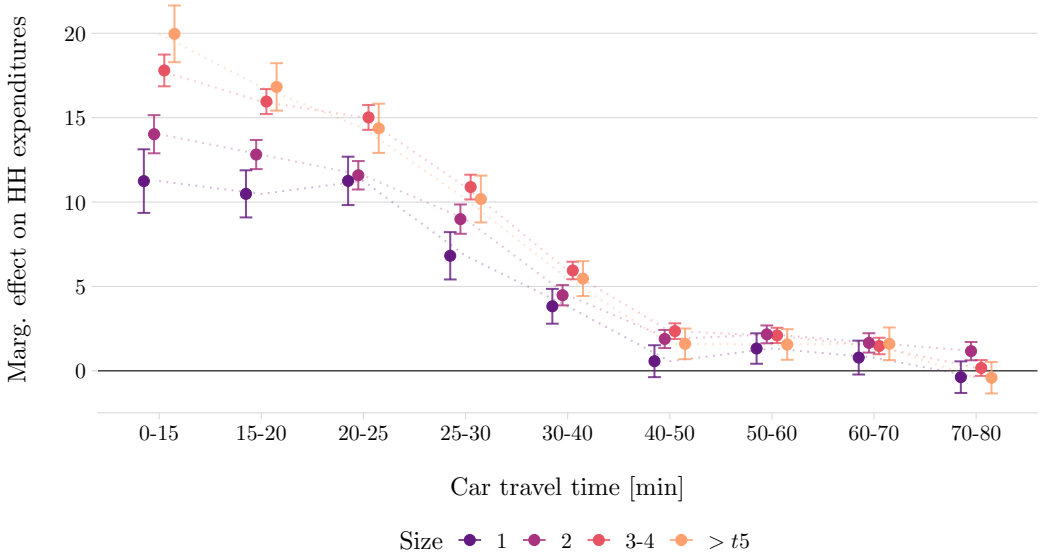
A.2 Additional Figures

Figure A1: Cantonal static ATTs



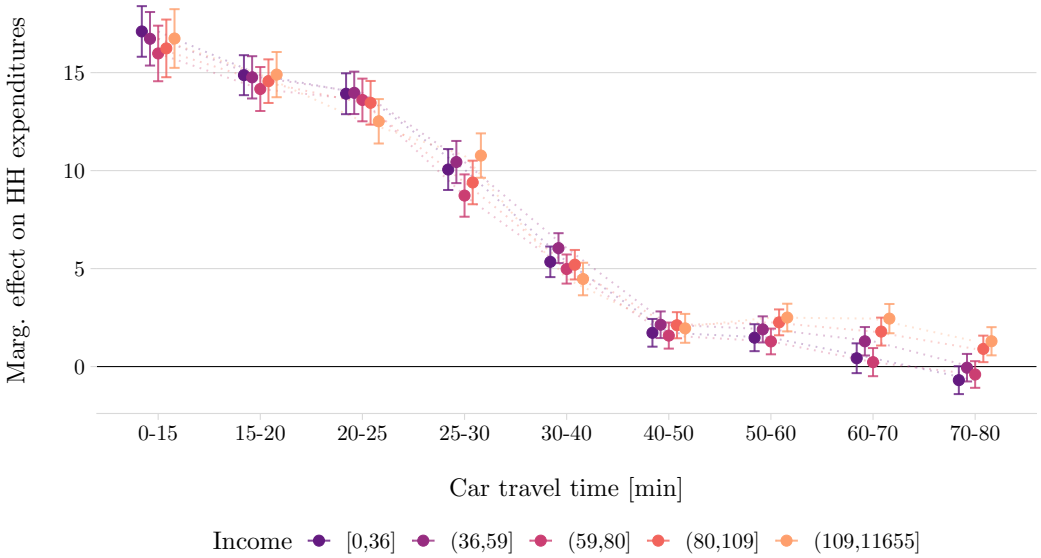
Notes: The figure shows the average treatment effects' geographic variation using difference-in-differences. The treatment group includes all households living within 30 minutes from a cross-border location.

Figure A2: Decay of the treatment effect: By Household Size



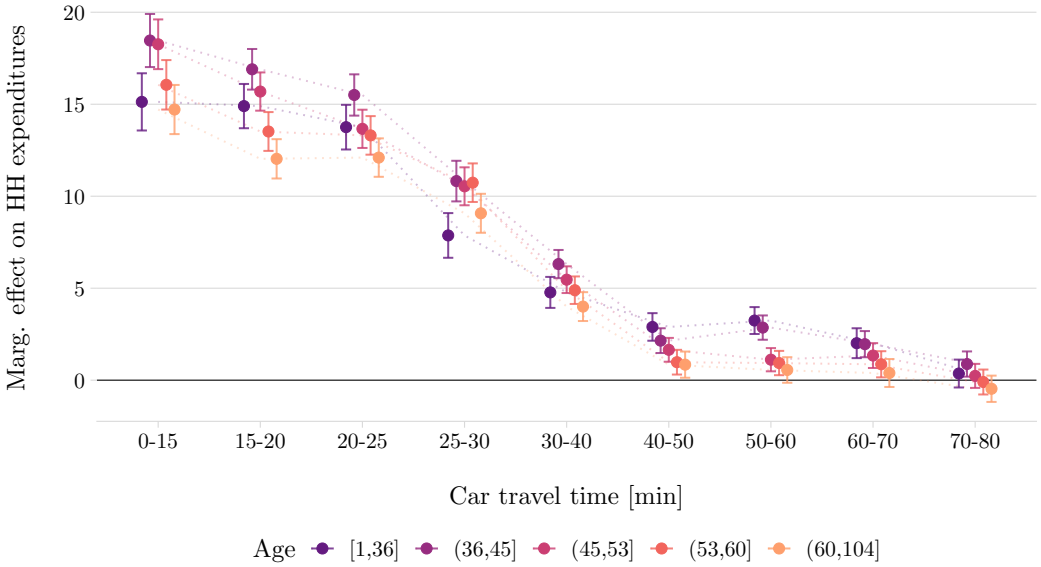
Notes: The figure shows the average treatment effects of the Swiss border closure (March 16-June 15 2022) on domestic household expenditures at Migros stores for different distance bins and household size quintiles. The control group are households that are further away from a cross-border store than a 80 min car ride.

Figure A3: Decay of the treatment effect: By Income



Notes: The figure shows the average treatment effects of the Swiss border closure (March 16-June 15 2022) on domestic household expenditures at Migros stores for different distance bins and income quintiles. The control group are households that are further away from a cross-border store than a 80 min car ride. Annual household income is adjusted by the square root of household size. SEs are clustered at the id level.

Figure A4: Decay of the treatment effect: By Age



Notes: The figure shows average treatment effects of the Swiss border closure (March 16-June 15 2022) on domestic household expenditures at Migros stores for different distance bins and age quintiles. The control group are all households that are further away from a cross-border store than an 80 min car ride. Standard errors are clustered at the id level.