b
UNIVERSITÄT
BERN

CRED
CENTER FOR REGIONAL
ECONOMIC DEVELOPMENT

Cross-Border Shopping: Evidence from Swiss Household Consumption

CRED Research Paper No. 42

Frédéric Kluser

University of Bern, CRED

March 13, 2023

Abstract

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

Key words: economic geography, consumption, consumption access, consumption inequality, spatial competition

JEL classification: R1, R2, L14

CRED
Universität Bern
Schanzeneckstrasse 1
Postfach
CH-3001 Bern

Tel. +41 31 684 37 11
info@cred.unibe.ch
www.cred.unibe.ch

1 Introduction

Cross-border shopping has been a growing phenomenon in many countries, particularly along national borders, where consumers can 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 have adverse effects on local employment, consumption, sales, or tax collection (see Leal et al. 2010, Knight and Schiff 2012, or Baggs et al. 2018). This paper examines patterns in cross-border shopping, analyzing the Swiss border closure during the Covid-19 pandemic to understand consumers' behaviors better. On March 16, 2020, the Swiss government mandated the immediate closure of all restaurants, bars, entertainment, and leisure facilities to mitigate the Covid-19 pandemic. Additionally, the Federal Council announced the closure of the borders to all neighboring countries and upheld this policy until June 2020.[1]

Switzerland is a unique case to study cross-border shopping because of two reasons. First, members of the European Union surround it (except for the Principality of Liechtenstein), allowing Swiss citizens to purchase comparable products at lower prices in Germany, Italy, Austria, or France.[2] 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 domestic grocery expenditures measures the magnitude of cross-border shopping during 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 shopping trips for 2.8 million households in 2020.

First, I show that the policy increases 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

[1] Shops selling essential products (including grocery stores and pharmacies) remained open while other stores had to close. The borders to 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.

[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.

in response to the policy, while I find no differences in income. 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 an appreciation of the US dollar increases the propensity to cross into Canada (and vice versa) and Campbell and Lapham [2004] analyze the retailers' response. 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 in Norway. While these papers shed light on broader patterns of cross-border shopping, I use household-linked transaction data to analyze individual behavior and differences in travel 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. Compared to this study, I analyze the latter shock to estimate precisely a causal distance decay function with high spatial precision.

2 Data

I combine unique household-linked consumption data with administrative data on a 100 $\times$ 100 meter spatial resolution for 2020. The first ingredient for this paper are household-store-linked grocery expenditures collected through the loyalty program of the largest Swiss retailer, *Migros*. This program allows participating households to record their expenditures for exclusive discounts. It counts three million registered customers accounting for 85% of Swiss households and captures 79% of the retailer's sales. 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 contains 600 million household-linked purchases and provides information on household characteristics, including the location of their residence on the 100 $\times$ 100 meter grid, the cardholder's age, gender, and household type.

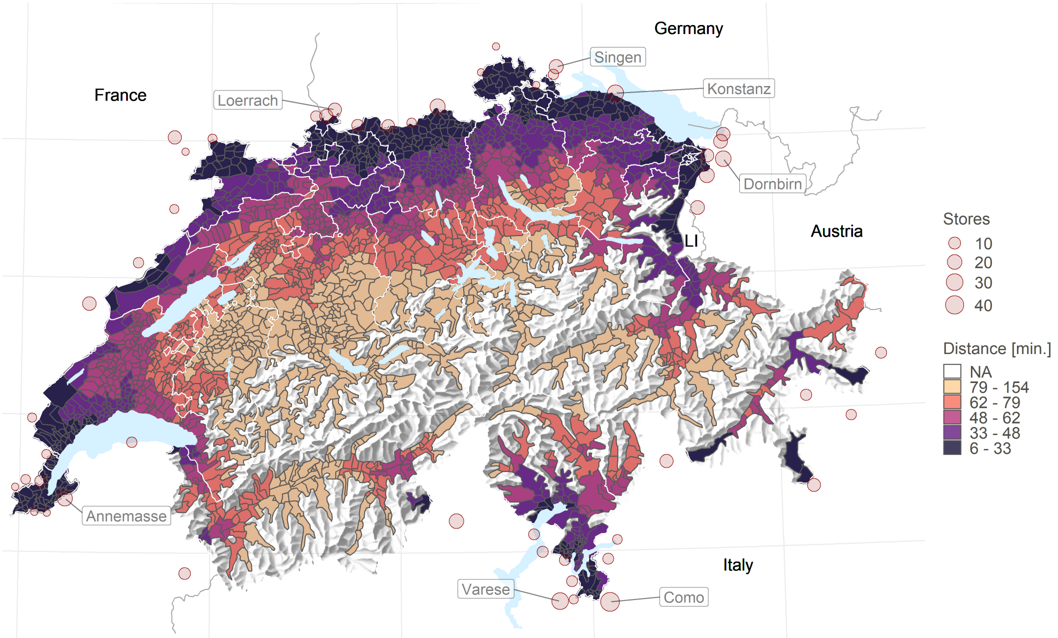
I enrich the purchase data with individual-level administrative records for the entire Swiss population. The Population and Households Statistics (STATPOP) includes individual, and household characteristics and the Old-Age and Survivors Insurance (AHV) adds labor market income for every citizen from tax records. I combine the two data sets on the grid level by identifying unique combinations of households using their grid cell and age. 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 suitable for cross-border shopping.

3 Empirical Strategy

I study the impact of the border closure by comparing households living within a 30-minute car drive from a cross-border location (the first quintile) to those living far enough inland such that they typically don't shop abroad. Hence, I choose a comparison distance of 80 minutes (the fifth quintile) and drop all individuals living within the doughnut area in between to eliminate spillover effects.[4] Figure 1 shows these travel distance bins to the closest foreign location across Switzerland, resulting in 350'000 treated households (31% of the sample) and 260'000 control units. (26%).

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



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

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, I attribute any deviation after the intervention to cross-border shopping. Therefore, I apply a two-way fixed effects model:

$$\ln(Y_{it}) = \alpha_i + \gamma_t + \sum_{k=1}^{52} \beta_k (D_i \times T_k) + \epsilon_{it}, \tag{1}$$

where Y_{it} are the grocery expenditures of household i in week t. α_i and γ_t are the household- and week-specific fixed effects, controlling for unobserved heterogeneity. D_i equals one if household i is in the treatment group, T_k indicates the week of the year 2020, and β_k are

[4] The results are robust if I use alternative comparison distances of 90 or 100 minutes. If a fraction of control units would react to the border closure, my results would provide a lower bound of the effect.

the associated pre- and post-treatment coefficients. Treatment starts in week twelve, and coefficients are normalized to the average in the pre-treatment periods.

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

$$\ln(Y_{it}) = \alpha_i + \gamma_t + \beta_d(D_i \times Post_t \times \delta_i) + \epsilon_{it}, \tag{2}$$

where δ_i is the binned time household i drives to the closest cross-border location. Additionally, I add time-constant categorical covariates x_i (for example, income bins) to analyze heterogeneities in the decay function:

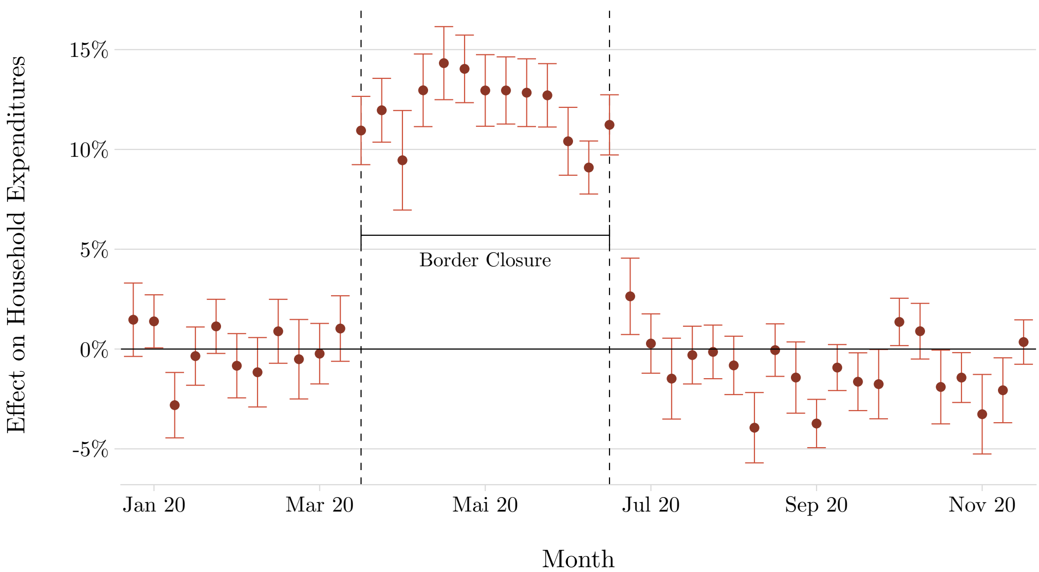
$$\ln(Y_{it}) = \alpha_i + \gamma_t \times x_i + \beta_{d,x}(D_i \times Post_t \times \delta_i \times x_i) + \epsilon_{it}. \tag{3}$$

I include week-group fixed effects to allow for different trends between groups. This ensures that I compare households to similar units in the control group. This is essential, for example, if richer households dine out more often.

4 Results and Discussion

First, I find that the border closure temporarily increases 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, expenditures immediately drop to the previous

Figure 2: Dynamic treatment effects

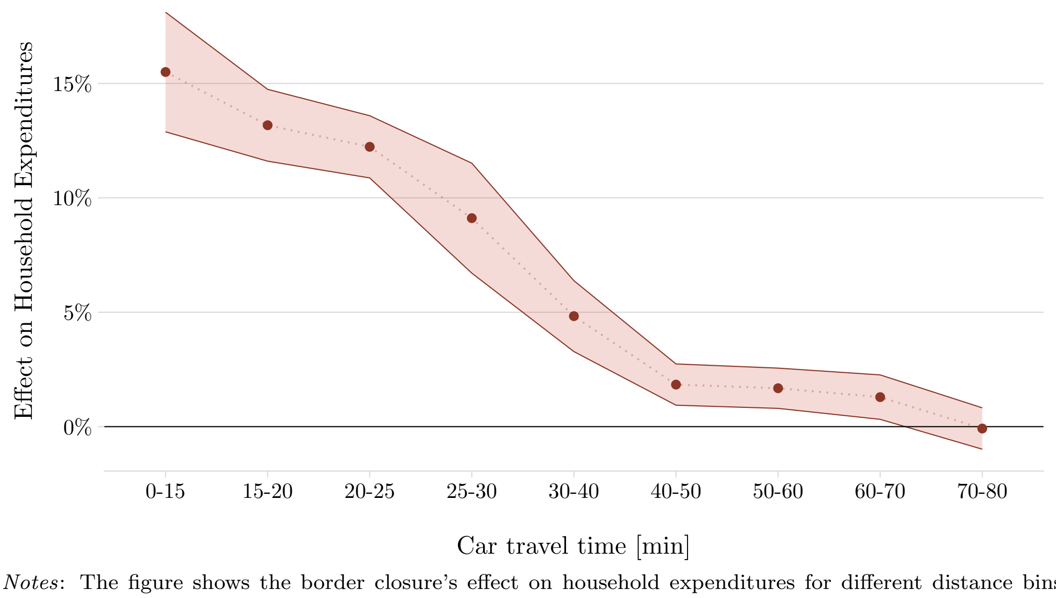


Notes: The figure shows the border closure's effect on household expenditures within a 30-minute car ride from a cross-border store compared to households living further away than 80 minutes. Standard errors are clustered at the zip code level. The regression is based on 17.3 million observations.

level. Hence, 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 follows deeply-rooted routines that withstand temporary shocks. There may even be a temporary catch-up effect, as some coefficients in the weeks after the reopening are below zero. Additionally, I expect no violation of the parallel trend assumption as the pre-treatment coefficients in Figure 2 are insignificant.

Second, I quantify the decay of cross-border shopping with distance by analyzing the effect for larger distance bins. Figure 3 shows that the effect decreases with distance from the border. Households living within 15 minutes of a cross-border destination increase their expenditures by 18% during the border closure. The effect first declines linearly with distance before flattening out and becoming insignificant after 70 minutes. Therefore, these results indicate that after 40 minutes of driving, the marginal costs of traveling are negligible for the next half hour. One potential explanation may be trip-chaining. Shopping abroad generates high fixed costs and consumers can combine cross-border shopping with, for example, visits to leisure activities. Further, average fuel usage falls with distance as drivers can easier maintain a consistent speed over a long trip and consumers may experience reduced congestion if they effectively use highways for longer distances.

Figure 3: Decay of the treatment effect



Notes: The figure shows the border closure's effect on household expenditures for different distance bins compared to households living further away than 80 minutes. Standard errors are clustered at the zip code level. The regressions are based on 26 million observations.

Third, while the transportation and time costs are likely similar between households, consumers may benefit differently based on their socioeconomic and cultural backgrounds. I observe that cross-border shopping increases with household size. Economies of scale likely drive this for larger households, as they spend more money on groceries and consume larger quantities. Hence, buying in bulk at lower prices abroad is particularly attractive for them.

Likewise, one could expect poorer households to engage in more cross-border shopping as they spend a higher share of their income on groceries. Accordingly, their expenditures should react stronger but I find no significant differences between income categories. This may be because bulking is limited for a given household size, especially as I observe the strongest responses for perishable goods, which are harder to store. Finally, I observe stronger effects in the Italian- and French-speaking regions, where grocery expenditures rose by 28% and 17%. In comparison, the effect is around 10% in German-speaking areas. As prices of consumption goods are similar across the neighboring countries, it is likely that cultural differences play a noteworthy role.

5 Conclusion

Overall, price differences between neighboring countries induce households to shop abroad and generate welfare gains for them. I show that cross-border shopping is a widespread and persistent phenomenon in Switzerland, and diverse socioeconomic groups are willing to drive long distances to take part in it. Thus, policymakers should take this into account and be conscious of negative impacts on retail sales, employment, or housing prices through cross-border shopping when setting, for example, 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.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

Marcus Asplund, Richard Friberg, and Fredrik Wilander. Demand and distance: Evidence on cross-border shopping. *J. Publ. Econ.*, 91(1-2):141–157, 2007. doi:10.1016/j.jpubeco.2006.05.006.

Jen Baggs, Loretta Fung, and Beverly Lapham. Exchange rates, cross-border travel, and retailers: Theory and empirics. *J. Int. Econ.*, 115:59–79, 2018. doi:10.1016/j.jinteco.2018.08.008.

Ariel Burstein, Sarah Lein, and Jonathan Vogel. Cross-border shopping: evidence and welfare implications for Switzerland. *Working Paper*, 2022.

Jeffrey Campbell and Beverly Lapham. Real Exchange Rate Fluctuations and the Dynamics of Retail Trade Industries on the U.S.-Canada Border. *Am. Econ. Rev.*, 94(4), 2004. doi:10.1257/0002828042002723.

Ambarish Chandra, Keith Head, and Mariano Tappata. The Economics of Cross-Border Travel. *Rev. Econ. Stat.*, 96(4):648–661, 2014. doi:10.1162/REST_a_00404.

Richard Friberg, Frode Steen, and Simen A. Ulsaker. Hump-Shaped Cross-Price Effects and the Extensive Margin in Cross-Border Shopping. *Am. Econ. J.: Microecon.*, 14(2):408–438, 2022. doi:10.1257/mic.20190302.

Brian Knight and Nathan Schiff. Spatial Competition and Cross-Border Shopping: Evidence from State Lotteries. *Am. Econ. J.: Econ. Polic.*, 4(4):199–229, 2012. doi:10.1257/pol.4.4.199.

Andrés Leal, Julio López-Laborda, and Fernando Rodrigo. Cross-Border Shopping: A Survey. *Int. Adv. Econ. Res.*, 16(2):135–148, 2010. doi:10.1007/s11294-010-9258-z.

A Online Supplementary Material

This online supplementary material supports and deepens some of the arguments made in the paper and provides additional information on the data.

A.1 Details on the Data and Data Processing

Supermarket transaction data:

The grocery transaction data includes the universe of all 600 million shop visits in 2020 at the largest Swiss retailer, *Migros*, which holds a market share of 32.7%. The individual shopping trips in the consumption data are divided into 41 product categories, including *fruit and vegetables*, *meat and fish*, *milk products*, *household*, and *beauty*. I disregard in my analysis refunds in the transaction data and trips above 2'000 CHF (as they are likely professional customers) and aggregate individual shopping trips into weekly overall baskets. I delete households that likely moved during my sample period.

Administrative Data:

For the administrative records, I aggregate the residents' exact addresses to the 100×100 meter grid given in the transaction data. The final matched data set used in the regressions then includes 99 million shopping trips.

Table A 1 shows descriptives for this data set. The average household spends overall 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.

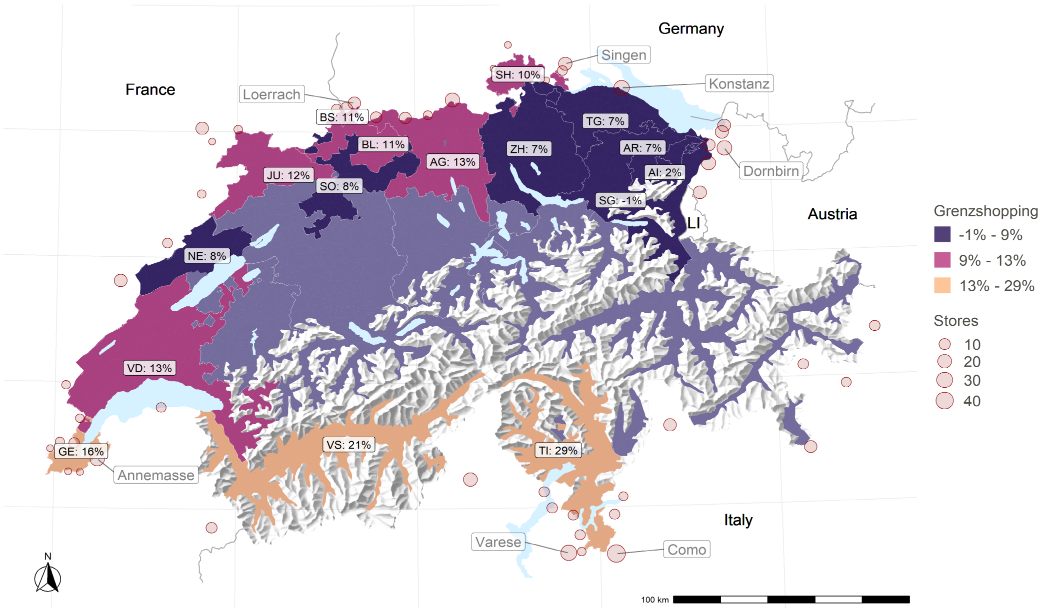
Travel Data:

To calculate travel times from grid cells to foreign shopping locations, I use *search.ch*, the Swiss online phone book directory and mapping service. First, I identify all foreign locations within a Euclidean distance of 20 kilometers to the Swiss borders that have at least three stores suitable for cross-border shopping. Second, I calculate the car travel times from any of the 100×100 meter grid cells to all these foreign locations using again the *search.ch* API. Third, I select for every grid cell the closest foreign shopping location.

A.2 Additional Figures

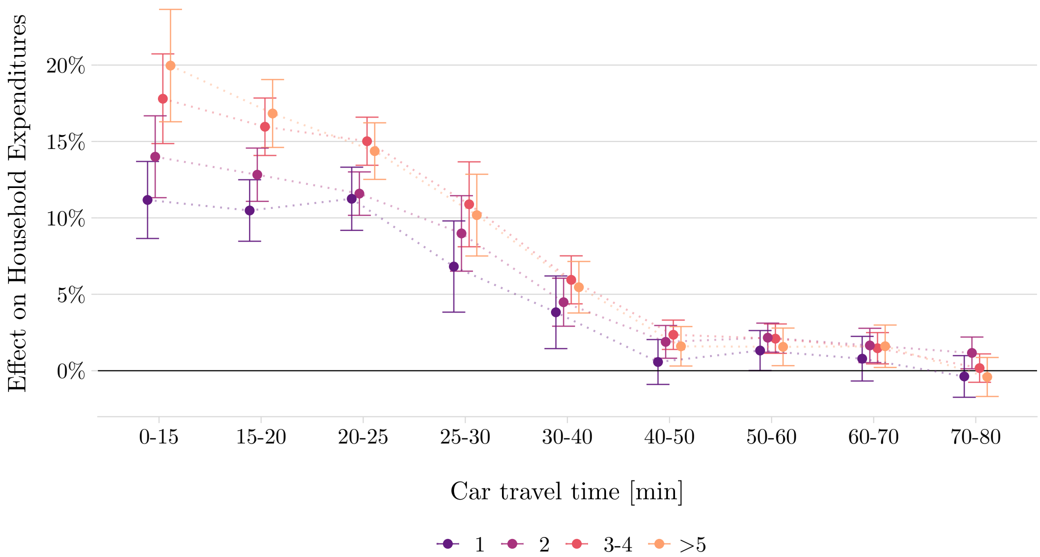
The following figures relate to the results presented in the paper's *Results and Discussion* section.

Figure A1: Cantonal static treatment effects



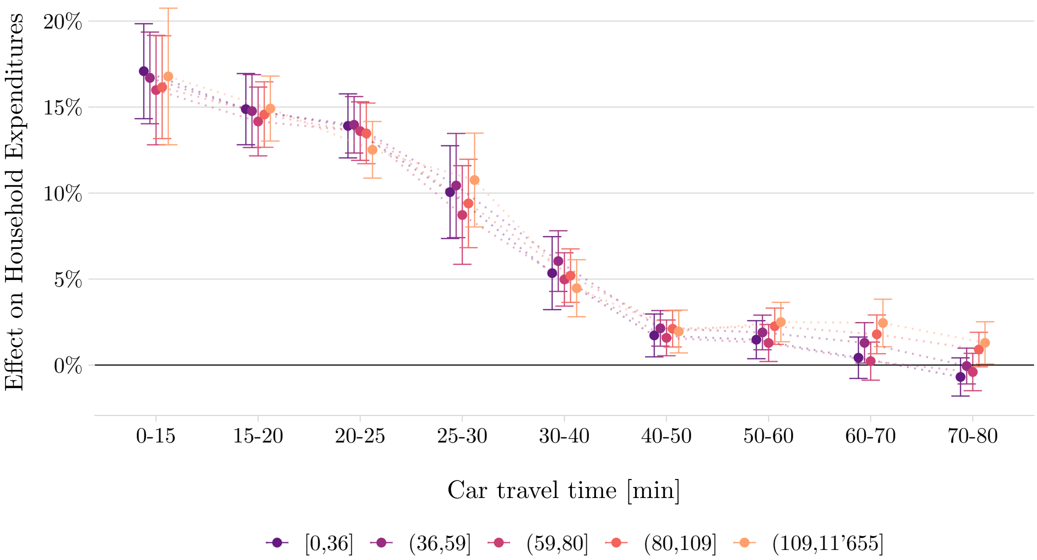
Notes: The figure shows the geographical variation of the border closure's effect on household expenditures within a 30-minute car ride from a cross-border store compared to households living further away than 80 minutes. Standard errors are clustered at the zip code level. The regression is based on 17.3 million observations.

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



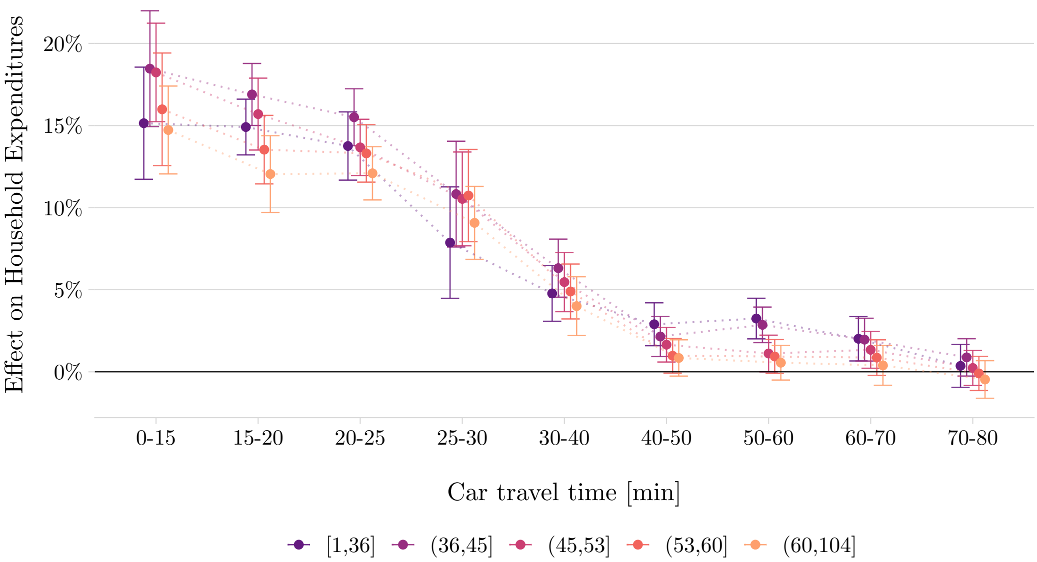
Notes: The figure shows the border closure's effect on household expenditures for different distance bins and household size quintiles compared to households living further away than 80 minutes. Household size is measured by the number of people living in this household according to administrative data. Standard errors are clustered at the zip code level. The regressions are based on 26 million observations.

Figure A3: Decay of the treatment effect: By Income



Notes: The figure shows the border closure's effect on household expenditures for different distance bins and income quintiles compared to households living further away than 80 minutes. Income is measured in 1'000 CHF. Standard errors are clustered at the zip code level. The regressions are based on 26 million observations.

Figure A4: Decay of the treatment effect: By Age



Notes: The figure shows the border closure's effect on household expenditures for different distance bins and age quintiles compared to households living further away than 80 minutes. Standard errors are clustered at the zip code level. The regressions are based on 26 million observations.

Center for Regional Economic Development (CRED)

University of Bern, Schanzeneckstrasse 1, P.O. Box, CH-3001 Bern

Telephone: +41 31 684 37 11

E-Mail: info@cred.unibe.ch

Website: http://www.cred.unibe.ch

The Center for Regional Economic Development (CRED) is an interdisciplinary hub for the scientific analysis of questions of regional economic development. The Center encompasses an association of scientists dedicated to examining regional development from an economic, geographic and business perspective.

Contact of the author:

Frédéric Kluser

University of Bern

Schanzeneckstrasse 1, P.O. Box, CH-3001 Bern, Switzerland

Telephone: +41 31 684 47 92

Email: frederic.kluser@unibe.ch