What Are the Price Effects of Temporary VAT Changes? Evidence from Germany

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Introduction

- Renewed interest in temporary VAT changes as unconventional fiscal policy
  - with perfect passthrough, temporary VAT cut/increase could be used instead of changes in interest rates at the zero lower bound
- This paper: estimate passthrough of VAT cut in July 2020 and VAT increase in January 2021 in Germany
  - use comprehensive scanner data on slow-moving and fast-moving consumer goods
  - highlights the value of micro data for real-time assessment of macroeconomic policies

Policy Change & Resarch Design

- The German federal government reduced the regular VAT rate for goods and services from 19% to 16% and the reduced rate from 7% to 5%
  - Policy was announced on June 3rd 2020 and implemented on July 1st 2020 until January 1st 2020
- Passthrough is uncertain because of the unprecedented nature of the crisis and the unprecedented scale of the temporary VAT reduction

Preview of Resarch Design

- Challenge with cross-country diff-in-diff strategy: any macro shock affecting prices in Germany in July 2020 or January 2021 could conflate the results and bias observed relative price changes in Germany vs. other countries

- Our approach: use micro-data to...

  1. study how the *distribution of price changes* responds to the VAT change

  2. exploit the *precise timing* of the policy change (across months or weeks)

Research Questions and Preview of Results

- How large was the average passthough?
- Is the passthrough heterogeneous (across consumers by socio-demographic groups, manufacturer origin, firm size, product price, etc.)?
- How large was the response of quantities?

Research Questions and Preview

- How large was the average passthough?
  $\mapsto$ **100% for durables, 70% for non-durables**

- Is the passthrough heterogeneous (across consumers by socio-demographic groups, manufacturer origin, firm size, retailer size, product price, etc.)?
  $\mapsto$ **No**

- How large was the response of quantities?
  $\mapsto$ **Appears to be small**

Related literature

- Growing literature on the price effects of temporary VAT cuts
  - UK reform of 2008: high pass-through rates using cross-country comparisons (Crossley et al. 2014)
  - Temporary VAT cut in Germany in 2020:
    - ⋆ 70% pass-through for fast-moving consumer goods (Fuest et al. 2020), and 34–92% passthrough depending on fuel type (Montag et al. 2020);
    - ⋆ survey evidence suggesting that spending on durables increased by 36% for individuals with a high perceived pass-through (Bachmann et al. 2021)

- Broader literature on VAT changes:
  - Belgian reform of 2014 for electricity VAT: full passthrough (Hindriks and Serse 2020)
  - French reform of 2009 for restaurant VAT: only 10% passthrough (Benzarti and Carloni 2019)
  - Finnish reform of 2007 and 2011 for hairdressers: asymmetric passthrough – 50% for cut and 100% for increase (Benzarti et al. 2020)

Roadmap

1. **Data**
2. **Main Results**
3. **Extensions**

Data

- The data is provided by the German marketing company Gfk: covers fast-moving and slow-moving consumer goods in most EU countries
  - Both datasets combined account for approximately 50% of household expenditures on goods and 25% of total household expenditures in Germany

Slow-Moving Consumer Goods (SMCG)

- Slow-moving consumer goods (SMCG): durables
  - Examples: consumer electronics, furniture, gardening, major domestic appliances (e.g., washer), small domestic appliances (e.g., microwave)
  - Dataset covers both online and offline purchases
- Point-of-sale dataset: sample covers 100 million transactions in 2020-2021 in Germany and the Netherlands
- To address potential quality biases, compute inflation using the same outlet-barcodes across consecutive period

Fast-Moving Consumer Goods (FMCG)

- Fast-moving consumer goods (FMCG): nondurable products with barcodes, typically sold at the supermarket
  - Examples: food, beverages, personal care, etc.
  - Data covers both online and offline purchases
- Socio-demographic characteristics (income, age, etc.) for the panel of 30,000 households
- To address potential quality biases, compute inflation using the same barcodes across consecutive periods

Data Coverage, Germany 2020

Table 1: 5-digit ECOICOP categories with available scanner data, spending per 1000 euros

ID	(E)COICOP category	4-digit subcategories						Major source
		#	Weight: all	# goods only	Weight: goods only	# covered	Weight covered	
1	Food and non-alcoholic beverages	61	113.42	61	113.42	61	113.42	FMCG
2	Alcoholic beverages, tobacco and narcotics	14	42.06	14	42.06	13	42.06	FMCG
3	Clothing and footwear	12	51.39	10	50.2	0	0	SMCG
4	Housing, water, electricity, gas and other fuels	25	233.06	9	48.74	2	7.04	SMCG
5	Furnishings, household equipment and routine household maintenance	40	56.93	29	51.41	21	26.33	SMCG
6	Health	14	53.83	6	21.85	1	1.5	SMCG
7	Transport	28	152.19	12	88.45	4	8	SMCG
8	Communications	11	29.59	8	2.92	8	27.16	SMCG
9	Recreation and culture	53	114.19	39	57.86	18	31.71	SMCG
10	Education	6	9.31	0	0	0	0	
11	Restaurants and hotels	6	57.67	2	23.82	0	0	
12	Miscellaneous goods and services	33	86.36	9	19.91	8	32.3	SMCG

The table provides an overview of 5-digit subcategories with available scanner data, taking into account both the fast-moving consumer goods (FMCG) scanner data and the slow-moving consumer good (SMCG) scanner data. Entries in the "Goods only" columns refer to the number (and relative importance) of 5-digit ECOICOP subcategories composed of goods only. For illustration, ECOICOP weights for Germany for the year 2020 are provided.

Roadmap

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Research Design

- Key challenge: macro shocks affecting prices may be correlated with the policy changes
  - Even at monthly or weekly level, there could be correlated macro shocks
  - Perfect passthrough means a monthly price change of -2.52% $(= 1.16/1.19 - 1)$ from June to July 2020
    - ⋆ Price changes of this magnitude are routinely observed in the tails of the price change distribution
    - ⋆ Analysis of average price changes in Germany vs. Netherlands across months/weeks yields unstable results (sensitive to choice of expenditure weights, etc.)

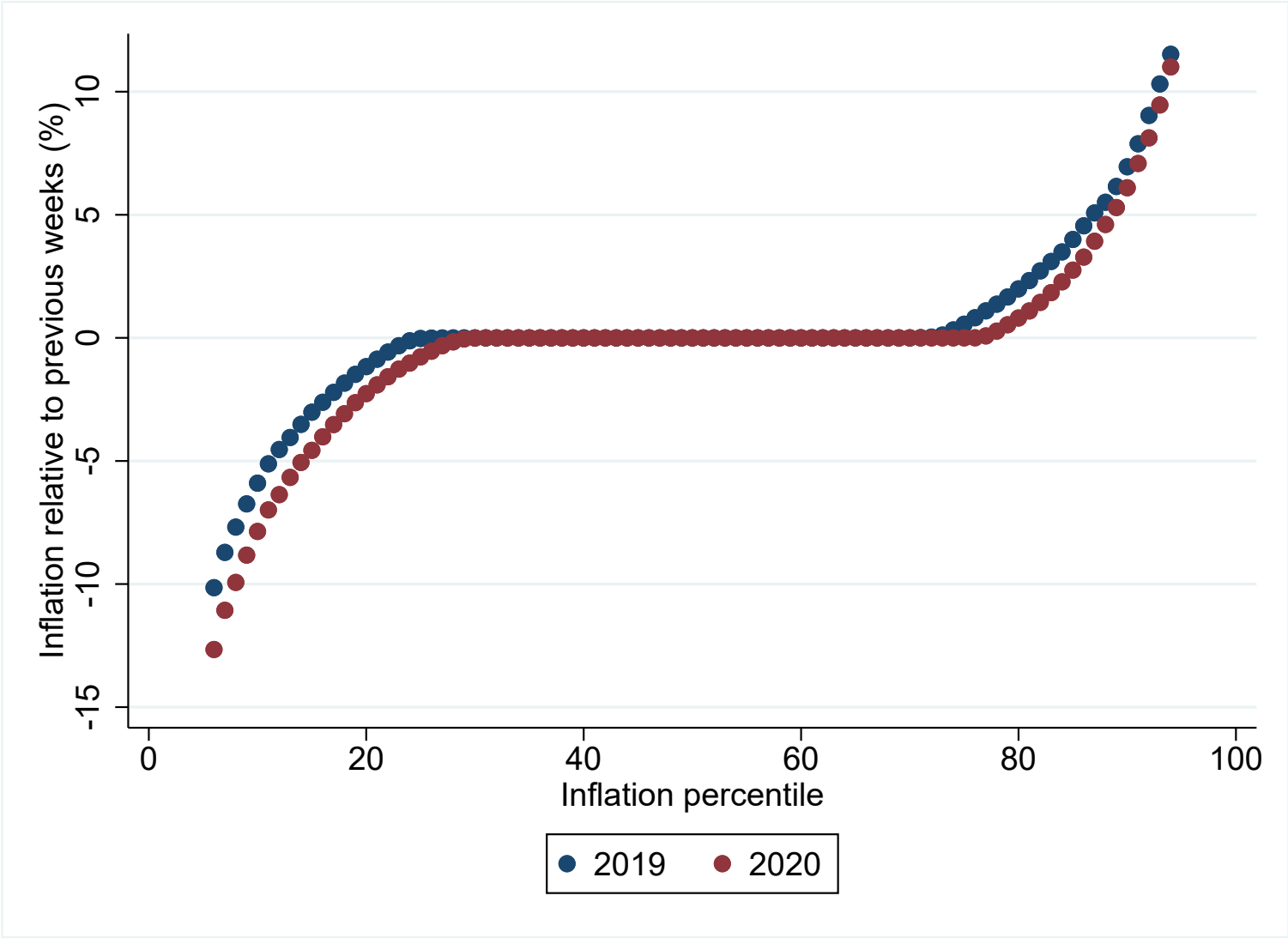
Main Research Design

- Main approach: **exploit the fact that the weekly and monthly price change distributions features zero price change for a large interval**
  - Consistent with menu costs
  - This turns out to be true in all periods and in all countries, except in Germany in July 2020 and January 2021
- Use the Netherlands as main placebo test (similar with other countries)

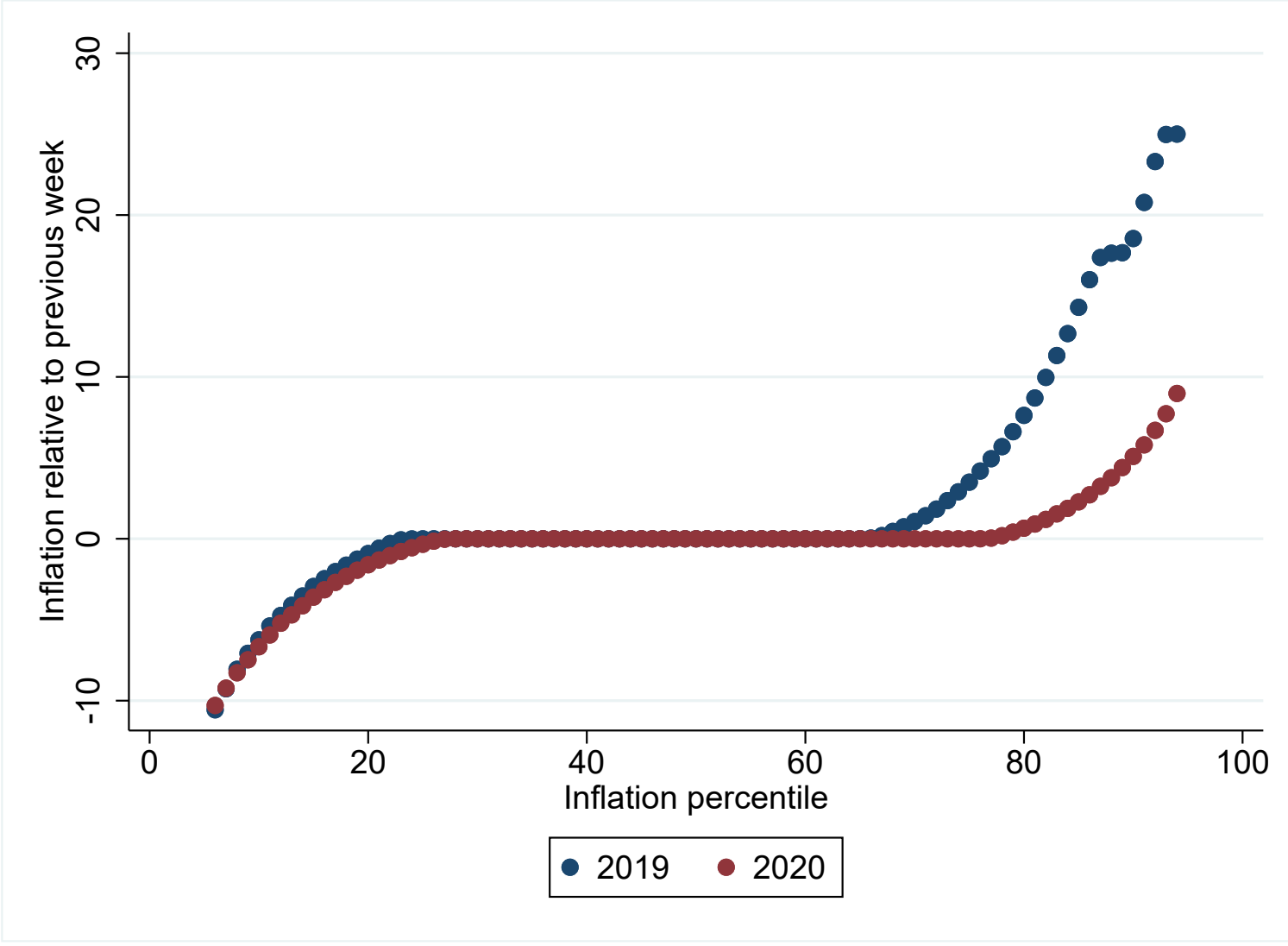
Main Research Design

- Two steps:
  1. **Estimate the range of the price change distribution for which the monthly price changes in the months from January to May 2020 are exactly zero in both Germany and the Netherlands**
     $\Rightarrow$ estimated range is p40-p60
  2. **Plot the price changes in Germany (relative to the Netherlands) in that range from February 2020 to February 2021**
- Implement using continued products, available across months (consider consecutive months or with a lag)
- Analoguous to a regression analysis with precision weighting, in which all weight is placed on observations that show no volatility in the pre-treatment period

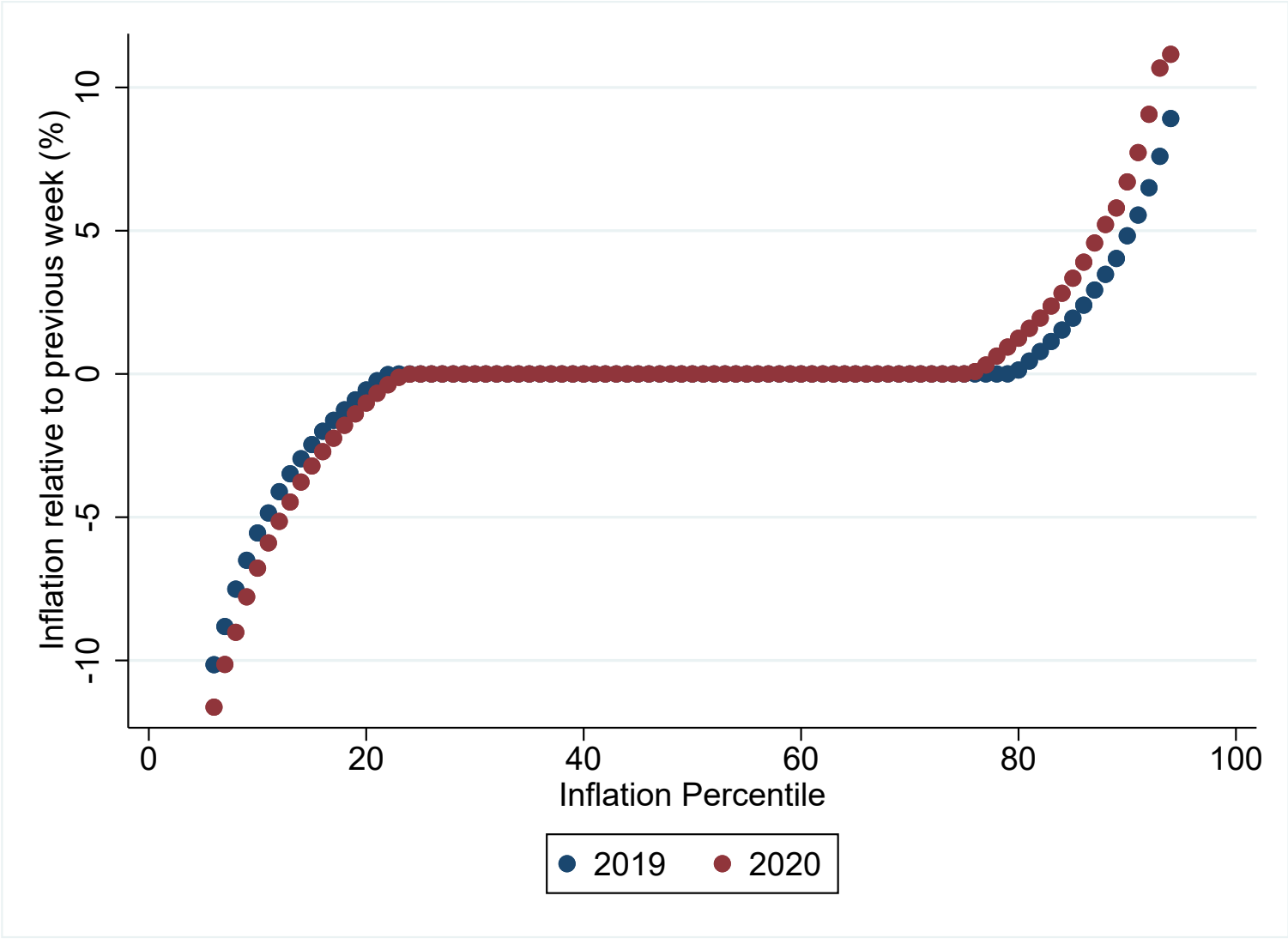
Netherlands Inflation Distribution: SMCG, Week 20



Netherlands Inflation Distribution: SMCG, Week 27 (VAT Decrease in Germany)



Germany Inflation Distribution: SMCG, Week 20



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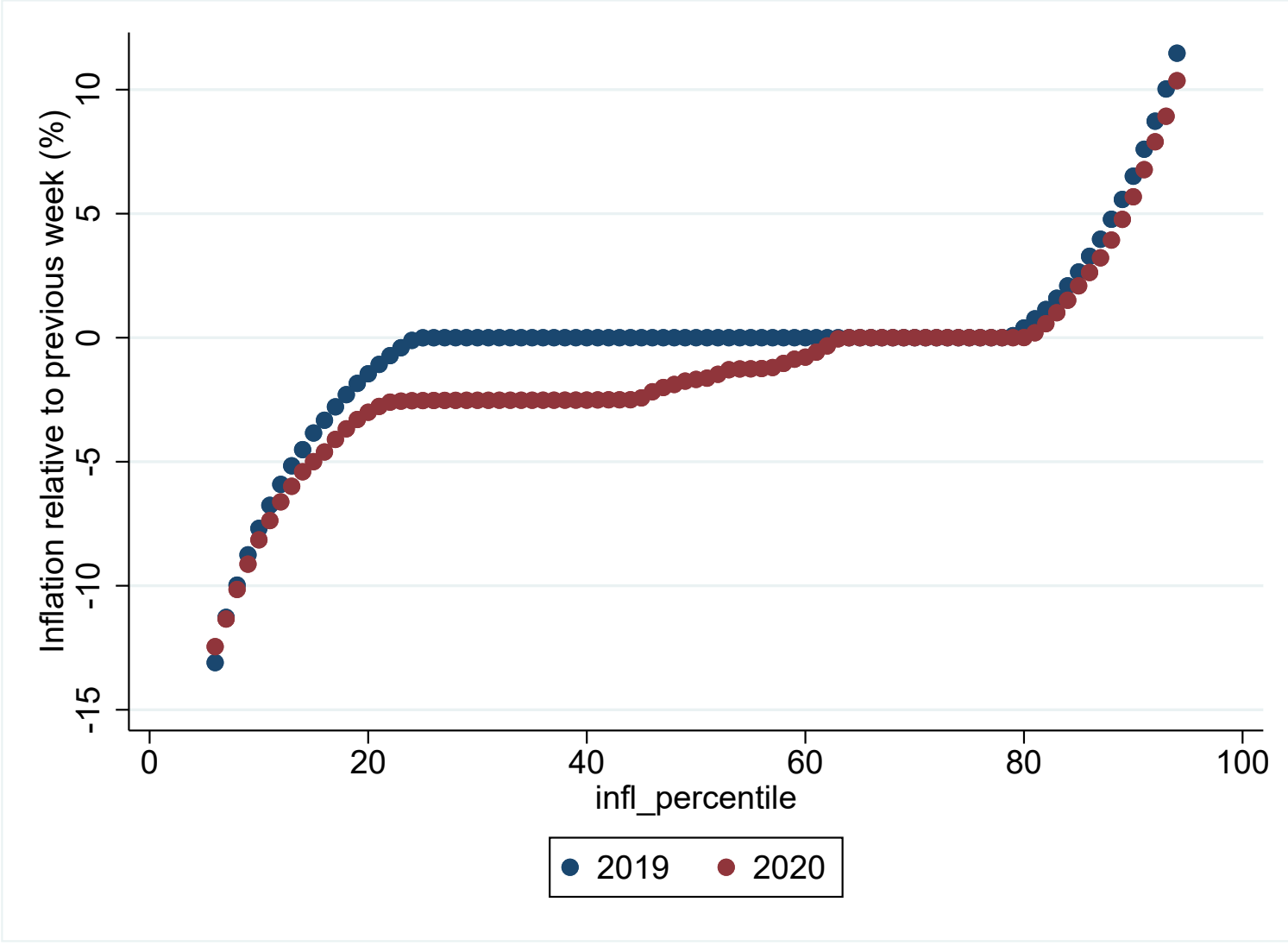
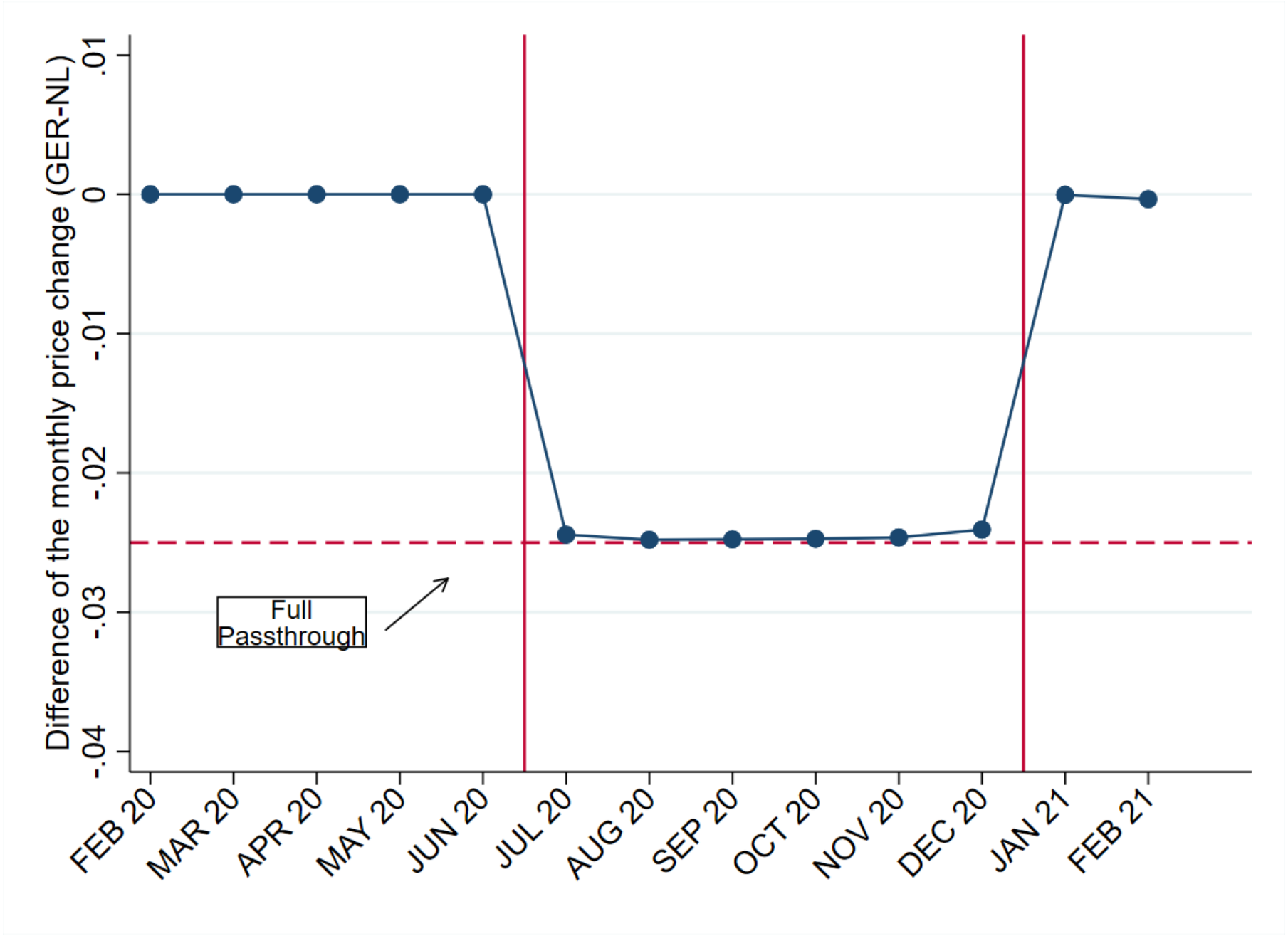


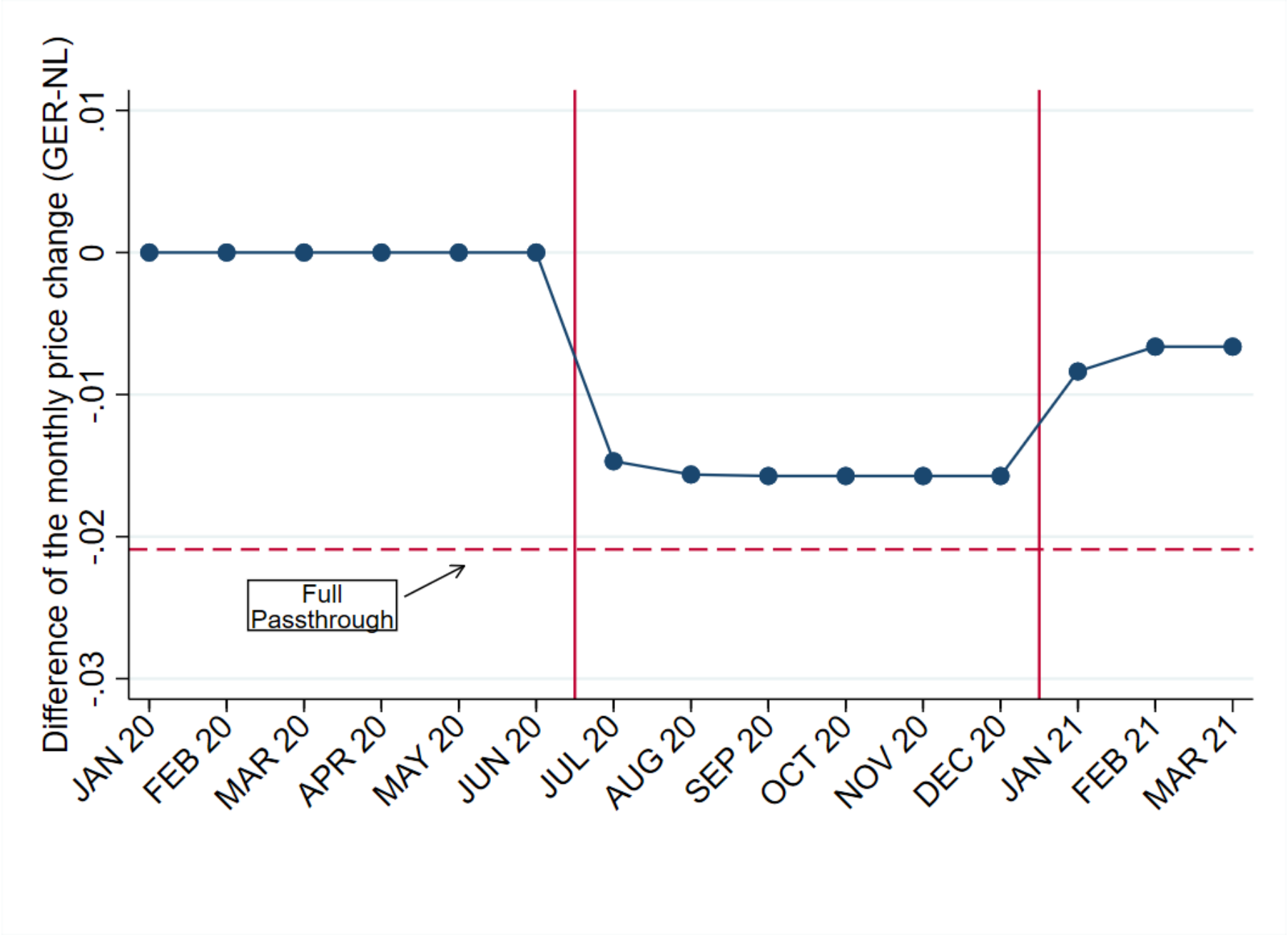
Main Results

- SMCG:
  - perfect passthrough in both July (-2.52%) and January (+2.58%)
- FMCG:
  - 70% passthrough in July (-1.61%)
  - Asymmetric increase in January: cumulative price change remains at -0.70% relative to June 2020

Main Results: SMCG



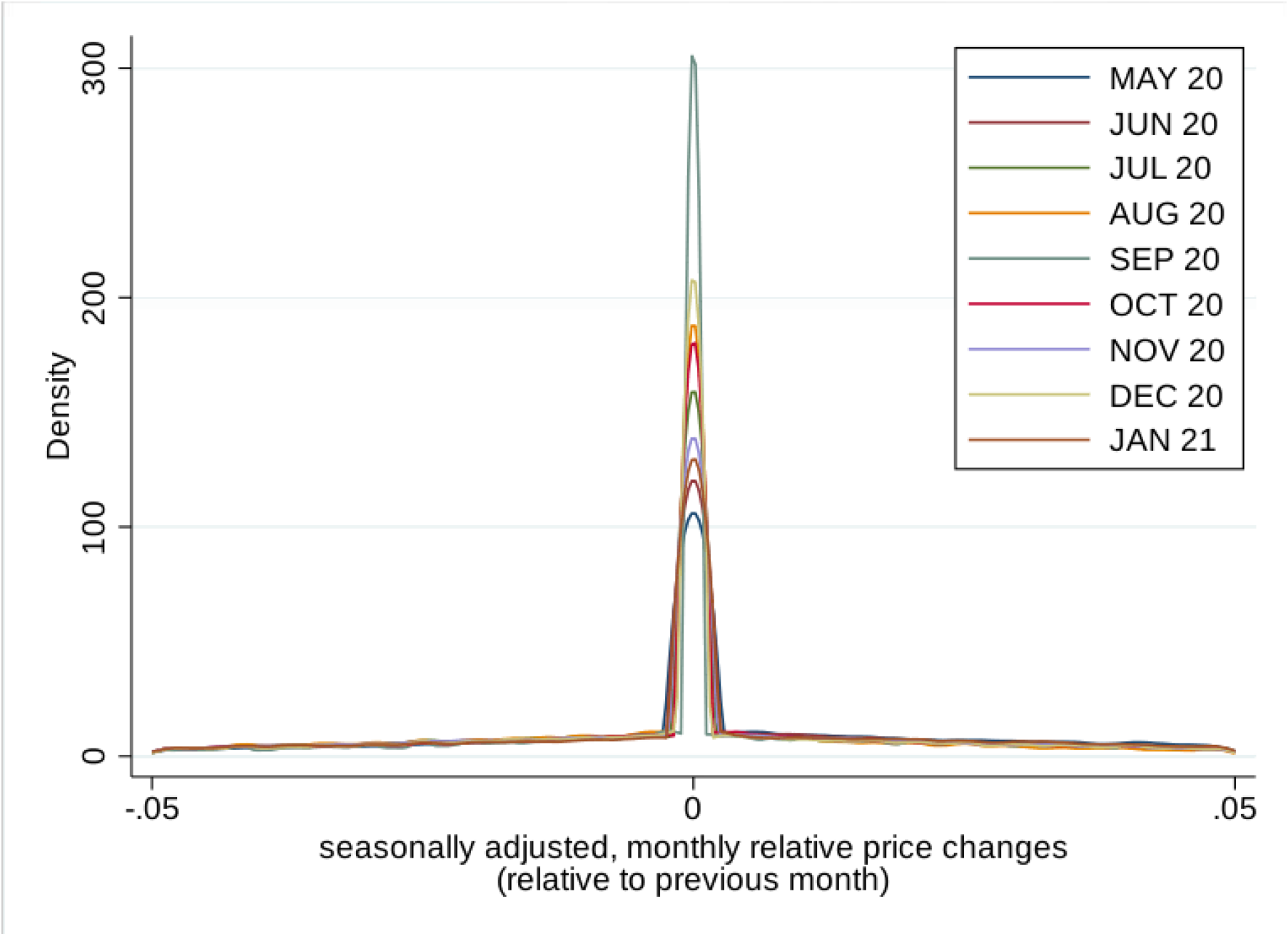
Main Results: FMCG



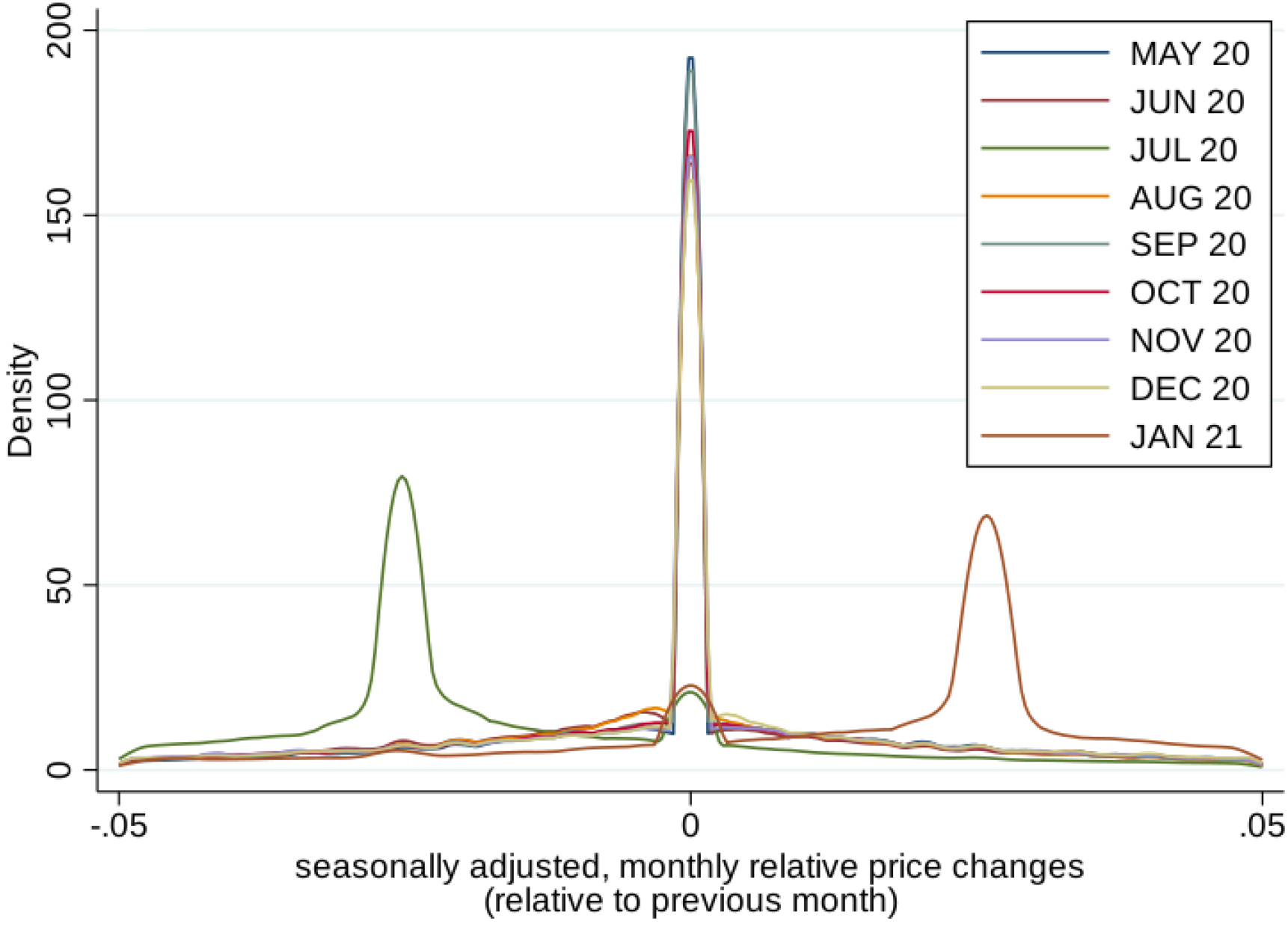
Robustness

- For robustness, use the panel dimension of the data and provide graphical evidence of the effect in a diff-in-diff framework
  - Compute the price change in month t relative to $t-1$ in year T in country c, denoted $\Delta p_{i,t}^{c,T}$
  - To control for seasonality, difference out the monthly price change a year earlier:
    $\widetilde{\Delta} p_{i,t}^{c,T} \equiv \Delta p_{i,t}^{c,T} - \Delta p_{i,t}^{c,T-1}$
  - Compare the distributions of $\widetilde{\Delta} p_{i,t}^{c,T}$ in Germany and in the Netherlands in all months $\Rightarrow$ find an effect only around the policy change

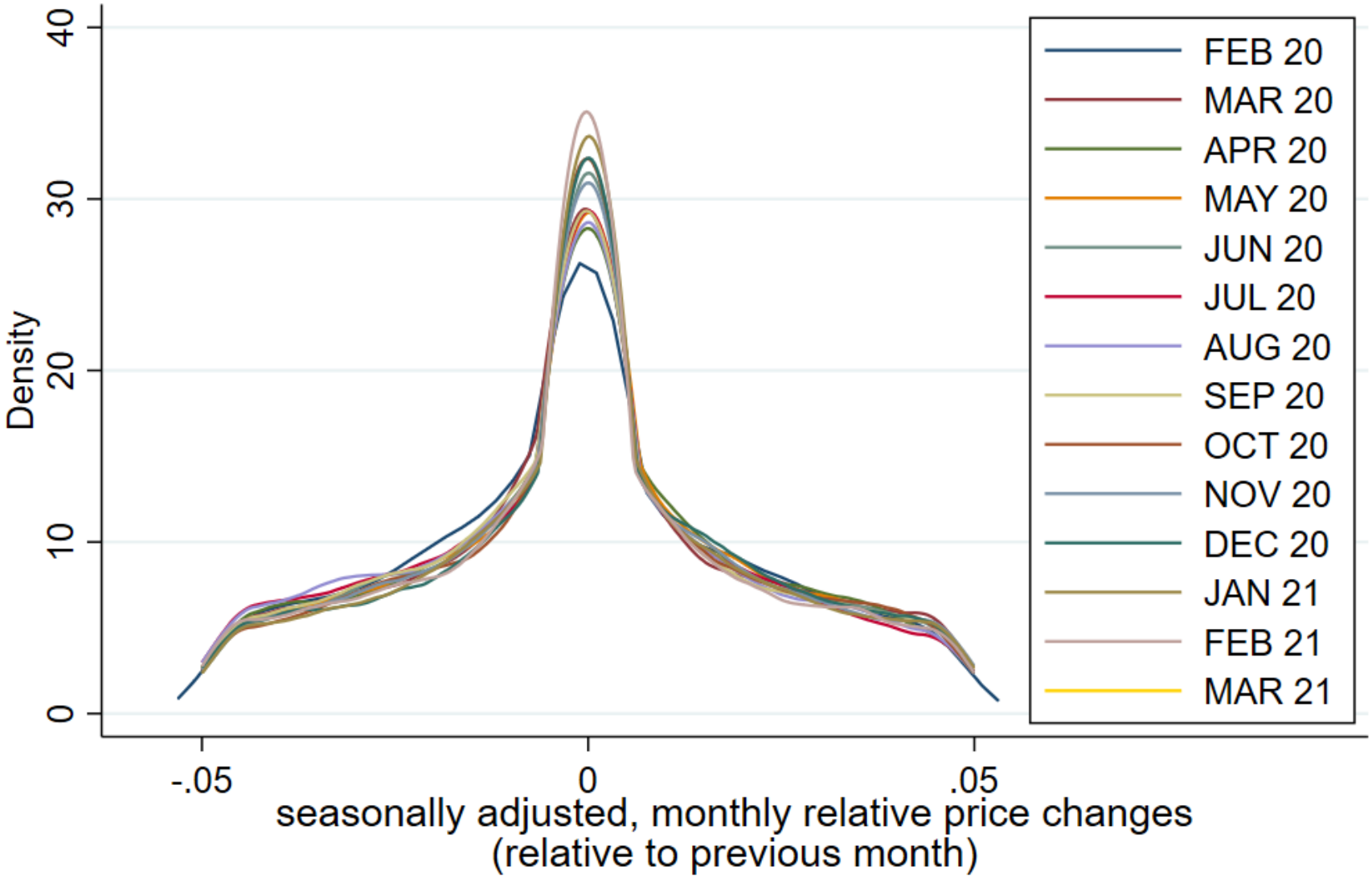
SMCG: Netherlands



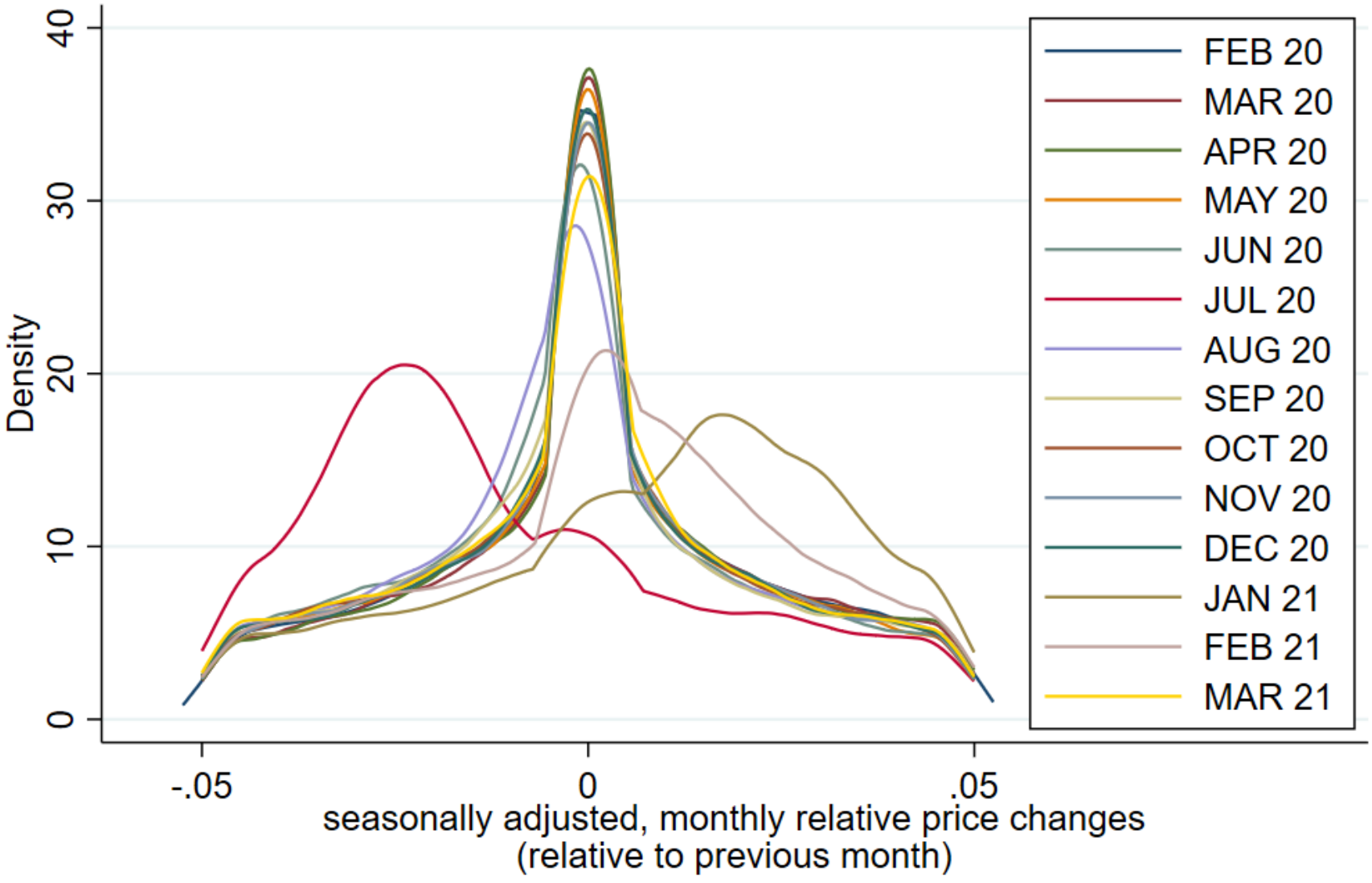
SMCG: Germany



FMCG: Netherlands



FMCG: Germany



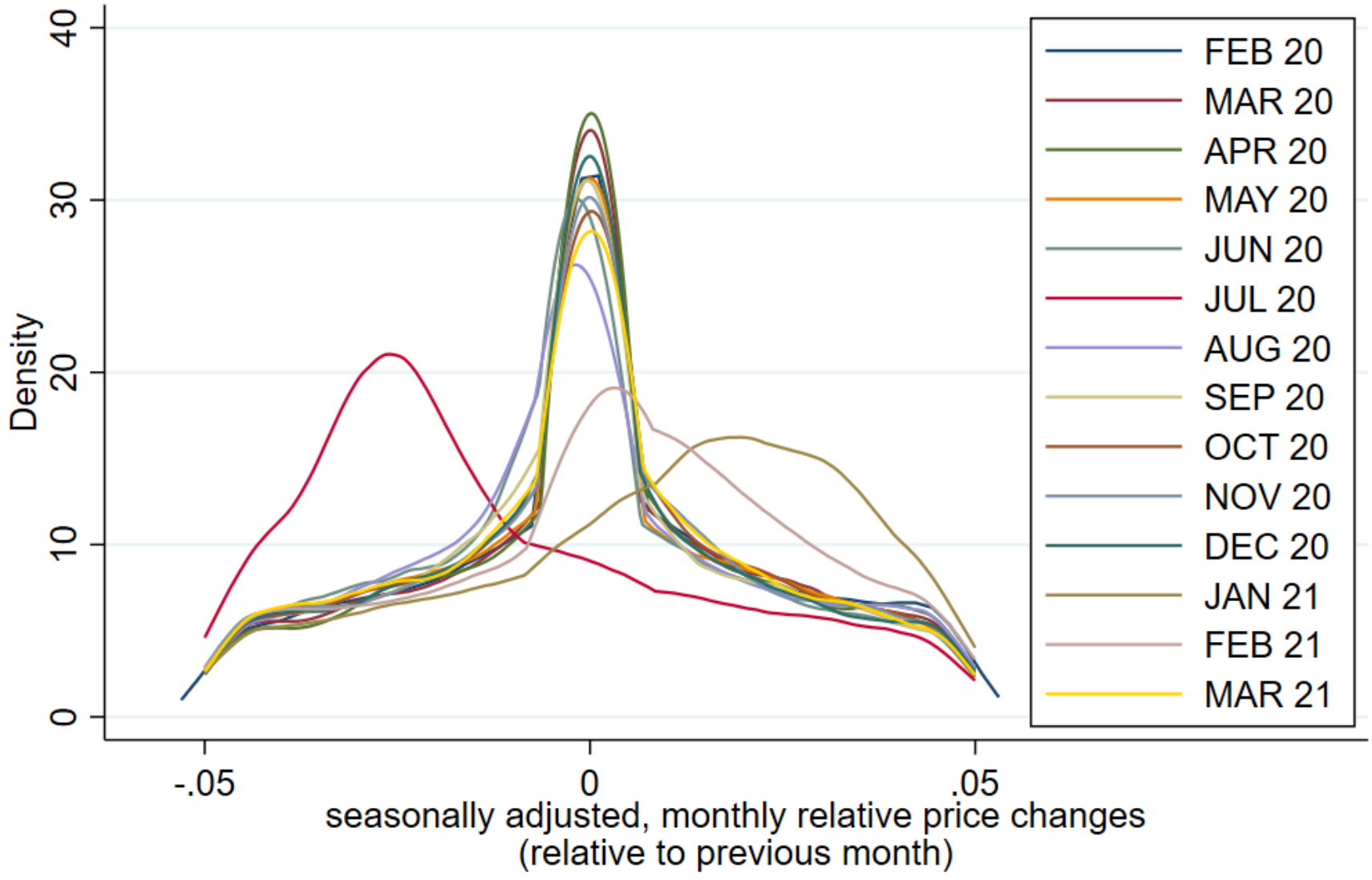
Roadmap

1. Data
2. Research Design
3. **Extensions**
   - Heterogeneity
   - Quantities

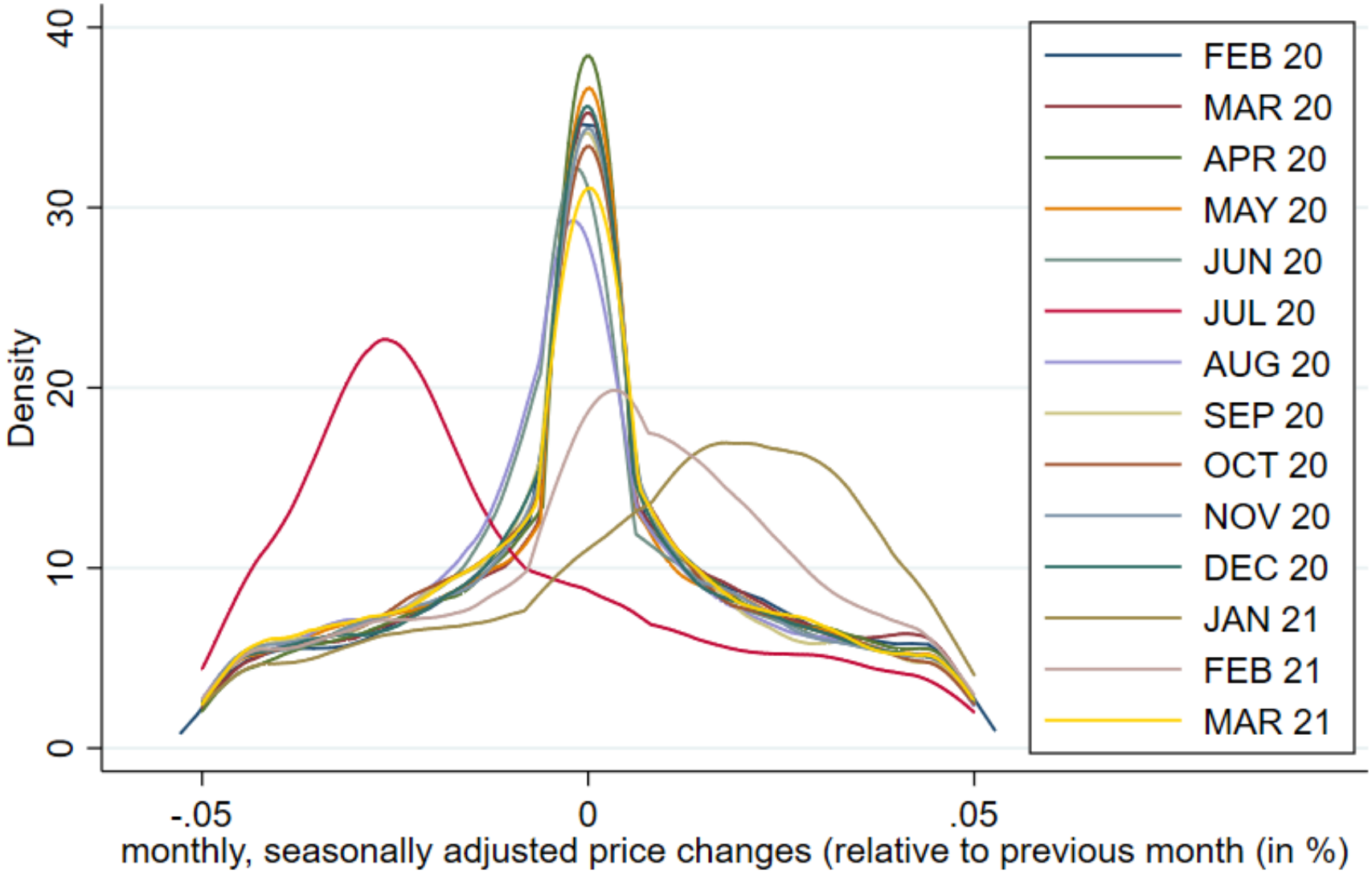
Heterogeneity Results

- We find similar passthrough rates:
  1. across socio-demographic groups within FMCG (high-income vs. low-income)
  2. across product categories within SMCG (imported vs. domestically produced, electronics, etc.)

FMCG: Low-Income Households (bottom third)



FMCG: High-Income Households (top third)



The Response of Quantities

- The 2.5% price decline from June to July should be a strong motive for delaying consumption, especially for expensive durables
  - equivalent to a 30% annualized interest rate from June to July
- Yet, the response of quantities appears to be modest (ongoing)
  - We do not observe large changes in quantities in Germany even in the last week of June, even for expensive durables (e.g., washer)
  - How to reconcile with literature (e.g., survey evidence from Bachmann et al. 2021)?

The Response of Quantities: Conjectures

- Conjectures:
  - Utility loss is small (2.5% savings for a 300-euro washer = 7.5 euros), most consumers may not respond (rational inattention)
    - ⋆ Effect may be larger for larger expenses we don't observe (e.g., cars)
  - But consumers do benefit from the passthrough and may spend more through the period with reduced VAT, due to an "income effect" rather than an "intertemporal substitution effect"
    - ⋆ Transfer is not targeted toward low-income households and unlikely to maximize MPCs (lower passthrough for FMCG suggests overall transfer may be smaller for low-income households)

Conclusion

- Using real-time scanner data on durables and nondurables, establish several results about the impact of the 2020 temporary VAT reduction in Germany:
  - How large was the average passthough?
    $\mapsto$ **100% for durables, 70% for non-durables**
  - Is the passthrough heterogeneous (across consumers by socio-demographic groups, manufacturer origin, firm size, retailer size, product price, etc.)?
    $\mapsto$ **No**
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Appendix

- Euler equation: $u'(c_t) = \beta \frac{1+r_{t+1,t}}{1+\pi_{t+1,t}} u'(c_{t+1})$
- With CES utility: $log \frac{c_{t+1}}{c_t} = \sigma log(\beta) + \sigma (r_{t+1,t} - \pi_{t+1,t})$