

Uneven pass-through of VAT cuts to food prices: Evidence from scanner data

VAT pass-through on Food

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Differentiated VAT schemes in the EU

- ☒ All EU countries apply differentiated VAT schemes
- ☒ ... a standard rate, reduced rates and exemptions
- ☒ **EU legislation** permits reduced rates to e.g.:
 - ☒ foodstuffs, medical products and services, passenger transport, books, newspapers, culture, broadcast, installation of solar panels, social services, etc.
 - ☒ ... typically necessities, positive externalities
- ☒ Economists ask: what is the **pass-through to prices**?

The Slovak VAT scheme before 2016

☒ Standard rate: 20%

☒ Reduced rate: 10%

1. pharmaceutical products, medical equipment (2007)
2. books (2008)

☒ Exemptions: 0%

1. passenger transport
2. selected cultural services, TV broadcast
3. selected sporting facilities
4. medical services

The Slovak VAT reform in 2016

“Basic foods” reclassified to the reduced rate of 10%:

- ☒ Bread
- ☒ Milk and butter
- ☒ Meat, fresh or chilled

A carefully prepared and communicated reform, a few simple product categories

The Slovak VAT reform in 2020

“Healthy foods” reclassified to the reduced rate of 10%:

- ☒ Rolls and buns (fresh bakery 40-50g)
- ☒ Fermented dairy products: yogurts, buttermilk, cream etc.
- ☒ Slovak sheep cottage cheese “bryndza”
- ☒ Selected fruits: apples, pears, and quinces
- ☒ Selected vegetables: 15+ types, typically produced in Slovakia
- ☒ Fruit and vegetable juices with limited added sugar
- ☒ Non-foods: newspapers, magazines, accommodation services

A quickly passed reform before the run-up to elections, wide range of foods

Research questions

- ☒ What is the pass-through of the VAT cuts to *food* prices?
- ☒ What do the short-term dynamics look like?
- ☒ Are there differences across product categories?
- ☒ How do the two reforms compare?
- ☒ How can we explain the heterogeneity?

What drives the pass-through?

According to theory, the PT of VAT changes to prices depends on:

- ☒ **Price elasticities of supply and demand**

- ☒ Substitutes and complements

- ☒ Degree of competition

- ☒ Product differentiation

- ☒ Asymmetry of cuts vs. hikes (warehousing costs)

- ☒ % of the consumption basket concerned

- ☒ Standard rate, reduced rate, or reclassification?

- ☒ Temporary vs. permanent VAT change

Pass-through and price elasticities

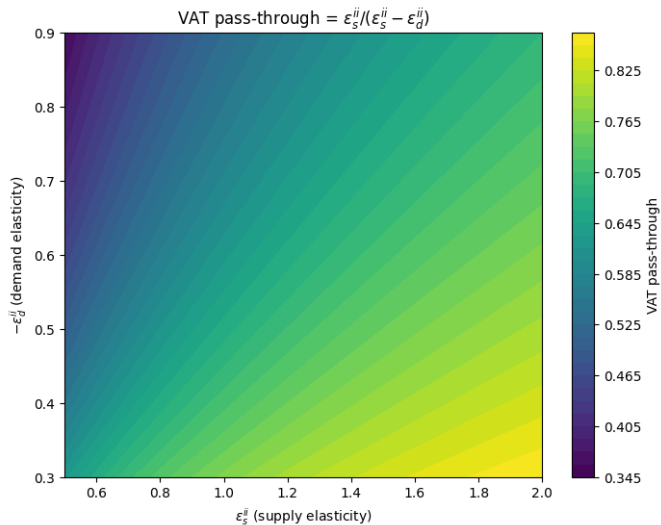
PT as a function of price elasticities of supply and demand of good i :

$$\gamma_i = \frac{\epsilon_s^{ii}}{\epsilon_s^{ii} - \epsilon_d^{ii} - \left(\frac{\epsilon_d^{ij} \epsilon_d^{ij}}{\epsilon_s^{ij} - \epsilon_d^{ij}} \right)} \quad (1)$$

Note: the cross-price term in **red** is typically small, but increases the PT

Expected PT based on realistic price elasticities: 0.4 to 0.8

Pass-through and price elasticities



Empirical literature based on highly granular data

- ☒ Montag et al. (2025, JPE): temporary VAT cut on fuel in DE
 - ☒ The universe of German fuel stations (2020)
 - ☒ PT estimate: 0.4 - 0.8
- ☒ Buettner & Madzharova (2021, AEJ): white electronics in EU-12
 - ☒ Product-level scanner data 2004-2013, mostly VAT hikes
 - ☒ A complete PT was found
- ☒ Buettner et al. (2023): VAT cut on feminine hygiene prod. in DE
 - ☒ Product-level scanner data (2022)
 - ☒ A complete PT was found
- ☒ Bernardino et al. (2025, JPubE): a temp. VAT cut on foods in PT
 - ☒ Prices from online supermarkets
 - ☒ A complete PT was found

Contribution

We contribute to the literature on VAT pass through by:

- ☒ Scarce evidence from product-level scanner data
- ☒ Two distinct permanent VAT cuts in Slovakia
- ☒ Pass through estimates for several food categories
- ☒ Interpreting heterogeneous results by price elasticities and reform design

Scanner data

- ☒ EAN level individual transaction prices (2015-2020)
- ☒ Individual product prices averaged by weeks
- ☒ All stores of a global supermarket chain in Slovakia
- ☒ Prices, VAT charged, purchase frequencies and product categories
- ☒ Pass through estimates by product groups:
 - ☒ Domestic vs. foreign, private vs. other brands
 - ☒ The 2016 cut: bakery, dairy, and meat (472 products)
 - ☒ The 2020 cut: bakery, dairy, fruits, vegetables, and juices (284 prod.)
 - ☒ Selected non-food groceries as the control group (1700+ products)

Empirical Framework

- ☒ A standard diff-in-diff setup with TWFE to estimate the $ATT = \alpha$:

$$\ln Y_{i,t} = \alpha T_{i,t} + \theta_i + \delta_t + \epsilon_{i,t}, \quad (2)$$

$Y_{i,t}$: weekly average prices or purchase frequencies

- ☒ We use the Synthetic Diff-in-Diff (SDID) estimator by Arkhangelsky et al. (2021, AER)
- ☒ allows many treated units (unlike standard Synthetic Control)
- ☒ allows a gap between pre-treatment trends of treated and control (unlike SCM)
- ☒ ensures that pre-treatment trends are parallel (unlike standard TWFE)
- ☒ by optimally selected unit and time weights

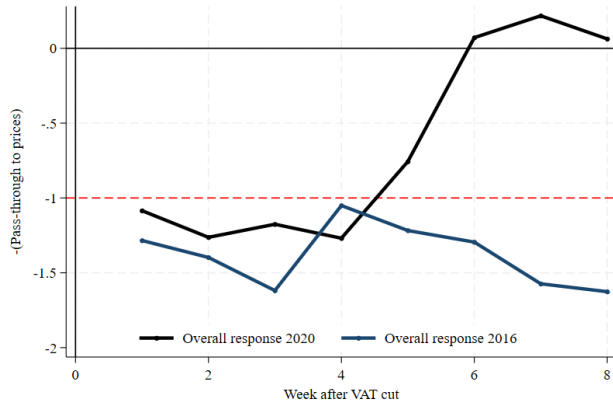
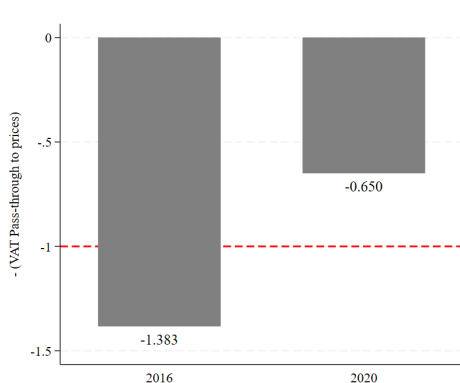
Empirical Framework - dimensions

- ☒ DiD vs SDiD
- ☒ Food Controls vs. Non-Food Controls
- ☒ 8-weeks vs 6-months
- ☒ 2016 vs. 2020

Results - overall

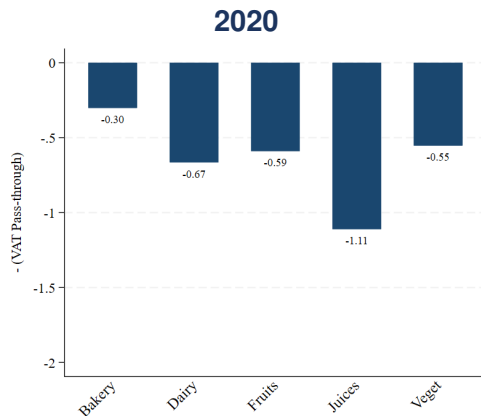
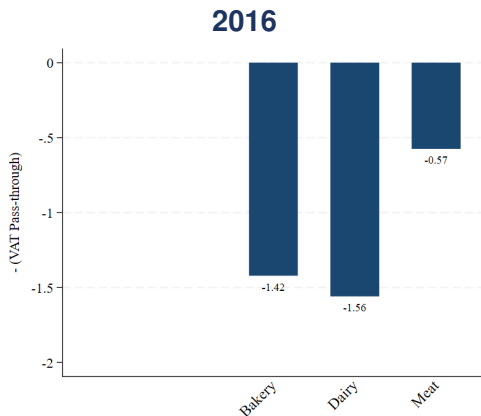
8-weeks VAT pass-through to prices

In 2020, PT is initially complete, but vanishes by week 6



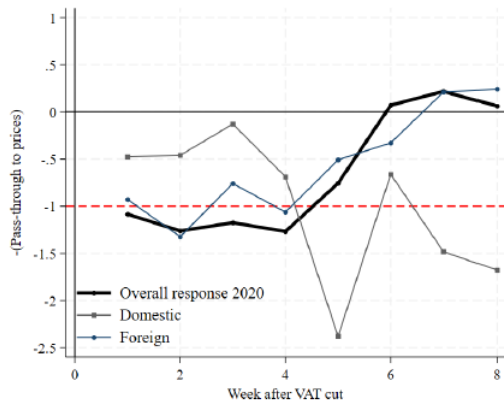
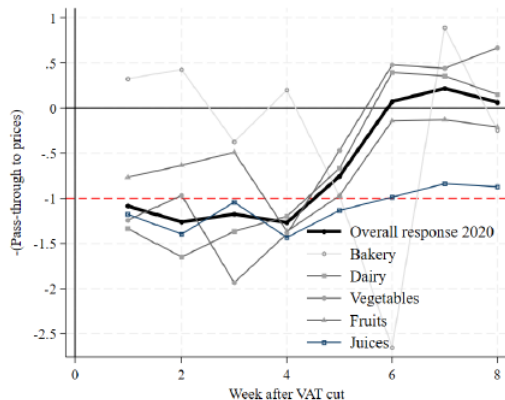
Results - by product types

- Full PT on staples after 2016 VAT cut,
- Lower and varied VAT PT in 2020,
- Targeting, salience, and product characteristics are key determinants.



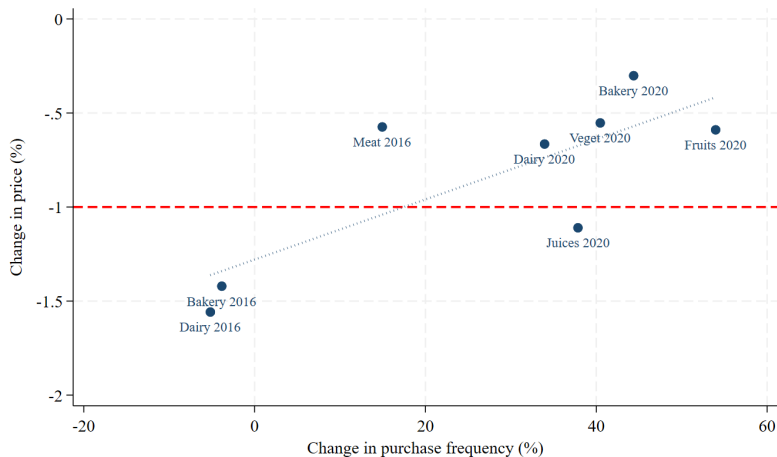
Results - product types, dynamics

- Imported and fresh products accounted for most of the reversal,
- domestic products showed greater PT persistence



Results - PT and quantities

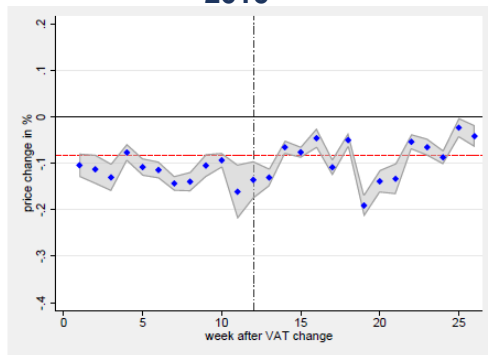
- PT and demand responses are linked, reflecting underlying differences in product demand elasticity



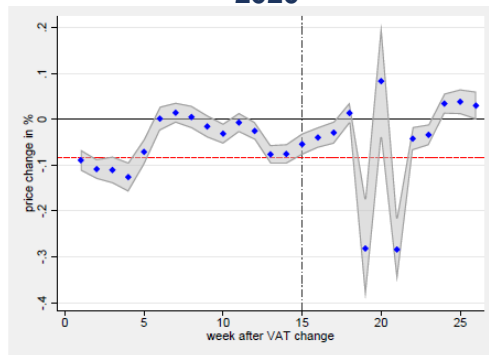
Results - 6 months extended window

- ☒ Longer horizon helps distinguish temporary adjustment from persistent PT.
- ☒ The 2016 reform generated lasting PT, the 2020 reform did not.

2016



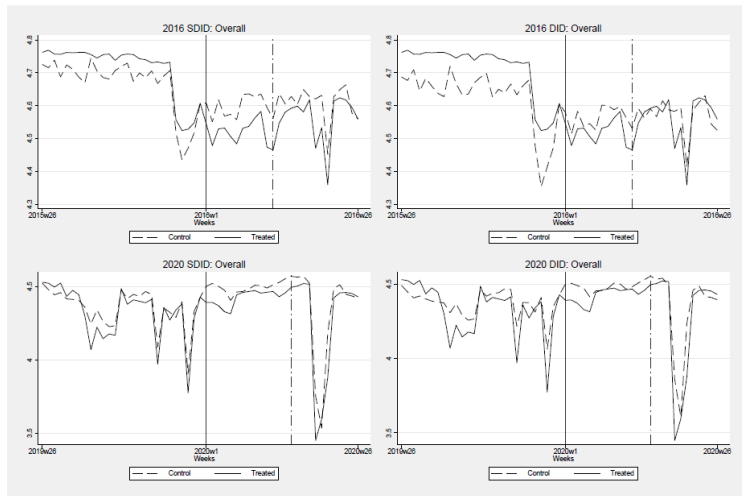
2020



Note: SDiD, pass-through

Results - Parallel trends

- Both posted and transaction prices adjusted, PT driven not only by discounting strategies.
- The persistence of the 2016 effect and the reversal of the 2020 effect are evident in both base and discounted prices



Note: Weekly price changes relative to the pre-reform baseline.

Summary

- ☒ The 2016 reform had a complete and lasting PT
- ☒ The 2020 reform had an initially complete PT ..reverted after 5 weeks
- ☒ Higher PT in products with inelastic demand (bread, milk)
- ☒ Products with stronger quantity responses have lower PT (fruits & veggies), relationship is not deterministic though
- ☒ Specific factors as supply conditions or policy salience seem to shape PT outcomes

Conclusions

- ☒ Substantial PT heterogeneity across products
- ☒ Reform design may matter.
 - ..a few well defined products vs. a complex variety products
- ☒ Price elasticities of supply and demand matter.
 - ..but other market characteristics are also at play
- ☒ VAT reductions provide limited redistributive benefits

Thank you for your attention.

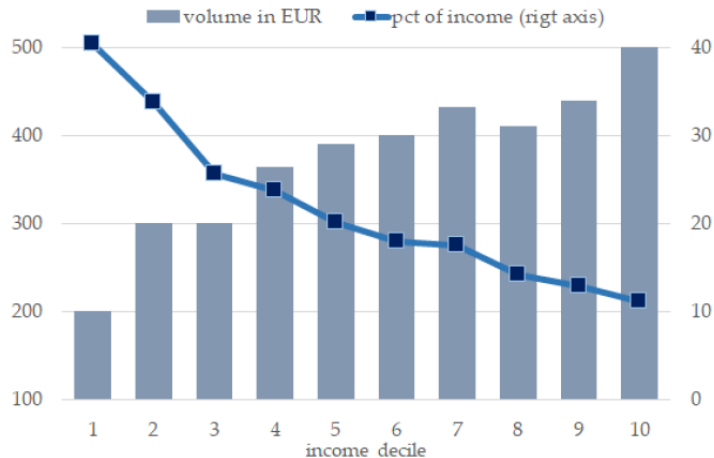
Questions & discussion welcome.

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National Bank of Slovakia July 2026

Budget shares across income groups

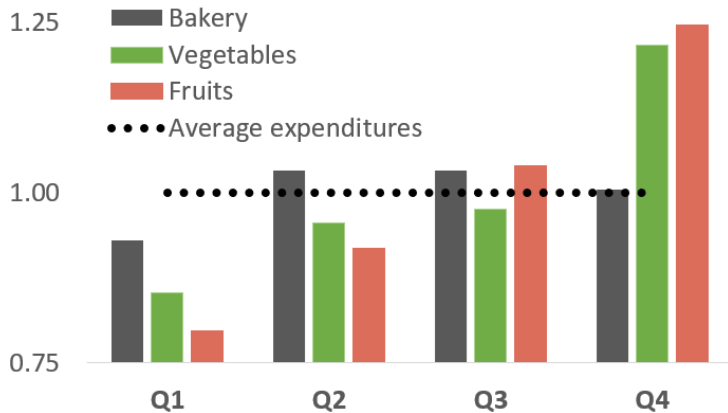
- ☒ Food accounts for a larger share of expenditure among lower-income households, implying stronger welfare effects of food price changes.
- ☒ The importance of staple foods declines with income, making VAT PT on essentials particularly relevant for poorer households.



Source: HFCS 2024

Which foods drive the distributional differences

- ☞ Expenditure on bakery products is relatively stable across income groups, consistent with their role as necessities.
- ☞ Expenditure on fruits and vegetables rises strongly with income - more income-elastic and less essential than staple foods.



Source: Calculations from HBS, 2021. Household size is adjusted using the OECD equivalence scale.