Free the Period?

Evaluating Tampon Tax Reforms using Transaction Level Scanner Data

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Motivation

Figure 1: Röders-Arnold (2019)

- Tampon tax as gender-discriminating tax burden (Crawford and Spivack, 2017)

- half of the population menstruates 450 times in their life, but: many face limited access to period products (UNICEF, 2020)

Motivation

- 1 in 4 report monthly expenses for period products to be a financial burden (for Germany Tschacher et al., 2022)
- 1 in 5 have switched to less suitable products for cost reasons (for UK Plan Int. UK, 2018)
- 1 in 10 have been unable to afford period products (for UK Plan Int. UK, 2018)
- Consuming insufficient period products can lead to health consequences, less participation in society, education, work (Rossouw and Ross, 2021)

$\Rightarrow$ To adress this, policymakers want to lower prices & increase access, but: Does a tax reform on period products serve this purpose?

Research Questions

1 What is the tax-pass-through of VAT reductions on period products?

2 Do volume purchases – "access" – increase after VAT-cuts?

⇒ exploit VAT cuts on period products in several European countries
⇒ study potential for governments to increase access to period products

This Paper

+ contributes to literature on **VAT pass through & heterogeneity of pass-through**
  Kosonen (2015); Hindriks and Serse (2019); Benzarti and Carloni (2019); Büttner and Madzharova (2020); Benzarti et al. (2020)
  - + focuses on price responses, quantity effects, distributional aspects, responses over time
  - + evaluates announcement effects

+ evaluates VAT reforms as means to address **gender based tax discrimination**
  - Research on period poverty often focused on developing world Hennegan et al. (2019)
  - Research on tampon tax repeal for U.S. and Germany finding that tax reduction was fully/over shifted to consumers Cotropia and Rozema (2018); Frey and Haucap (2022)

Preview of Findings

- pass-through of 57% – 119% for countries reducing standard VAT rates

- stronger pass-through for low-income households

- inelastic demand: ambiguous effects on volume purchased

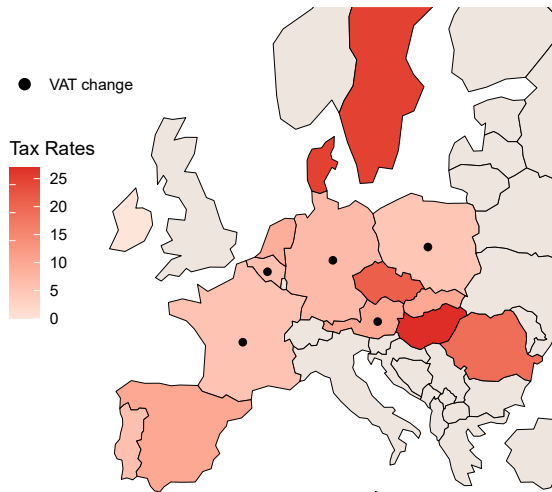- intertemporal substitution

DATA

Variation Across Countries

Figure 2: 2021 VAT Rates imposed on period products across Europe (including countries of estimation sample)

VAT Rates and Reform Dates

	AUT	BE	FR	GER	PL
Announcement Date	12/2020	12/2016	12/2015	10/2019	07/2019
Implementation Date	01/2021	01/2018	01/2016	01/2020	07/2020
Pre-reform VAT rate	20	21	20	19	8
Post-reform VAT rate	10	6	5.5	7	5
Percentage-point decrease	10	15	14.5	12	3

Product Categories included in the VAT reduction					
Pads	✓	✓	✓	✓	✓
Pantyliners	✓	✓	✓		✓
Tampons	✓	✓	✓	✓	✓

Table 1: Tax Reforms on Period Products

Data

- transaction level household scanner data (AiMark)
- 15 European Countries, 5 reforms
- 2014–2021
- Focus on 3 main period products: Tampons, Pads, Pantyliners

- think of a typical observation as a monthly average price per product (barcode):
- a product identifier, the price, the number of units, the volume per unit, the brand, the manufacturer of the product
- a household identifier, socio-economic information on the household

▸ Descriptives

EMPIRICAL APPROACH

Empirical Approach: Mean Impact Estimation

Estimation of VAT pass-through:

$$\ln(y_{ict}) = \kappa + \boldsymbol{\alpha} I_c \mathbb{1}\{t \geq F_c^A\} + \boldsymbol{\beta} I_c \mathbb{1}\{t \geq F_c^R\} + \delta_t + \xi_{ic} + \epsilon_{ict} \tag{1}$$

y_{ict} ... price/quantity of product i in country c in month t

I_c ... Treatment intensity (Δtax) in country c

F_c^A, F_c^R ... Period when policy was announced, implemented

$\mathbb{1}(t > F_c^A)$ ... Dummy $= 1$ for all periods post policy announcement in country c

$\mathbb{1}(t > F_c^R)$ ... Dummy $= 1$ for all periods post policy implementation in country c

δ_t ... time fixed effects, ξ_{ic} ... unit fixed effects (country, barcode)

▸ Identification

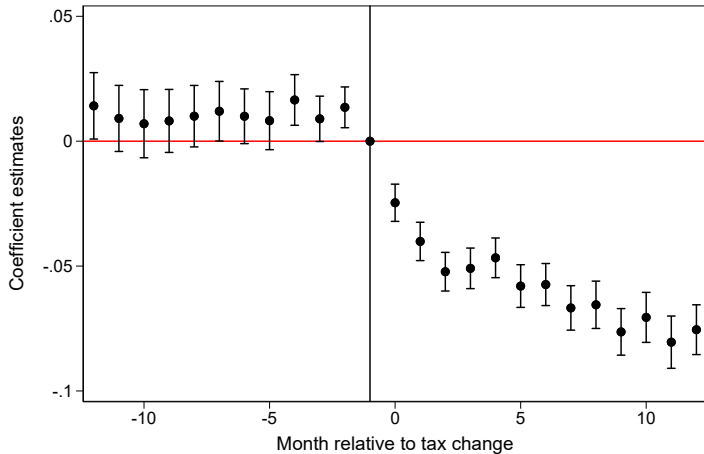R E S U L T S

Results – Dynamics, Event DiD

Figure 3: Differences in prices between reform and control countries relative to the month before reform ▸ Estimation

Results – Difference in Differences

	ln(price)		ln(volume)	
	(1)	(2)	(3)	(4)
ATT($\hat{\beta}$)	-0.588***	-0.553***	0.045**	0.106***
	(0.020)	(0.026)	(0.022)	(0.036)
AAT($\hat{\alpha}$)		-0.046*		-0.081**
		(0.024)		(0.037)
Barcode x Country FE	Yes	Yes	Yes	Yes
Year x Month FE	Yes	Yes	Yes	Yes
Observations	170559	170559	170559	170559
R^2	0.980	0.980	0.904	0.904
Clustered SE	✓	✓	✓	✓

Average effect of VAT reform on prices and volume

▶ Robustness

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Average effect of VAT reform on prices and volume

▸ Robustness

Results – Country Differences

	ln(price)					
	ATT	AUT	BE	FR	GER	PL
ATT($\hat{\beta}$)	-0.553***	-0.926***	-0.561***	-0.475***	-0.676***	-0.165
	(0.026)	(0.089)	(0.047)	(0.041)	(0.051)	(0.136)
AAT($\hat{\alpha}$)	-0.046*	0.060	-0.102**	-0.012	-0.185***	0.539***
	(0.024)	(0.068)	(0.041)	(0.040)	(0.040)	(0.156)
Barcode × Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year × Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	170559	32154	34526	42142	24048	37689
R^2	0.980	0.982	0.978	0.975	0.978	0.984
Clustered SE	✓	✓	✓	✓	✓	✓
Pass-Through						
Price decrease in %		9.93%	9.95%	6.90%	10.33%	
VAT-pass-through	90%	119%	80%	57%	103%	

Table 2: Country specific effects of VAT reform on prices

Results – Low Income Households

	ln(Price)		ln(Volume)	
	(1)	(2)	(3)	(4)
ATT($\hat{\beta}$)	-0.786***	-0.714***	-0.017	0.013
	(0.039)	(0.042)	(0.061)	(0.076)
AAT($\hat{\alpha}$)		-0.122***		-0.052
		(0.042)		(0.088)
Barcode × Country FE	Yes	Yes	Yes	Yes
Year × Month FE	Yes	Yes	Yes	Yes
Observations	39041	39041	39041	39041
R^2	0.978	0.978	0.866	0.866
Clustered SE	✓	✓	✓	✓

Table 3: Effect of VAT reform on prices and volume purchased for low income households, observations are monthly averages per household for each barcode

▸ Middle & High

Results – Summary

We analyse the pass-through of VAT cuts on period products.

Key Takeaways
- Long-run: prices decrease 7-11%
- Close to full pass-through of standard VAT reductions: 90%
- Decrease corresponds to e.g. 45c for a 5€ pack
- Evidence suggests intertemporal substitution but no volume effects $\rightarrow$ inelastic product
- Effects are stronger for low-income households

Policy Implications
- VAT cuts as effective policy to reduce prices on period products BUT the absolute reduction is small

Thanks!

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Descriptive Statistics – The Period Products Retail Market

	Average nr. of purchases	Brands purchased	Manufacturers purchased	Nr. categories	period products/ total expenditure*
Austria	7.2	2.9	2.2	1.7	8.8%
Belgium	8.5	2.8	n/a	1.7	4.7%
France	9.0	3.5	2.2	1.8	4.2%
Germany	8.15	3.0	2.6	1.7	5.4%
Poland	10.1	4.1	3.4	1.9	5.6%

Table 4: Descriptive statistics for households per year in treated countries.
Note: We only included households with at least 3 transactions involving period products per year.
*expenditure includes all fast moving consumer goods

Identification

Estimate causal impact of tax policy $\rightarrow$ Difference in differences

- **Exogeneity:** reforms implemented due to distributional reasons and thus exogenous with respect to market conditions
- **Parallel trends** $\rightarrow$ Event Study
- **No Anticipation:** we control for announcement

- Control group: prices in countries not experiencing a reform
- Exploit variation in the timing of reforms and between countries
- once treated units remain treated

VAT Rates and Reform Dates

Country	standard VAT rate	pre-refrom VAT on period products	VAT on period products	change in pp	announcement date	reform date
Austria	20	20	10	10	Dec 2020	Jan 2021
Belgium	21	21	6	15	Dec 2016	Jan 2018
Czech Republic	21	-	21	-	-	-
Denmark	25	-	25	-	-	-
France	20	20	5.5	14.5	Dec 2015	Jan 2016
Germany	19	19	7	12		Jan 2020
Hungary	27	-	27	-	-	-
Ireland	23	-	0	-	-	-
Italy	22	-	22	-	-	-
The Netherlands	21	-	9	-	-	-
Poland	23	8	5	3	Jul 2019	Jul 2020
Portugal	23	-	6	-	-	-
Romania	19	-	19	-	-	-
Slovakia	20	-	10	-	-	-
Spain	21	-	10	-	-	-
Sweden	25	-	25	-	-	-
United Kingdom	20	5	0	5	Mar 2020	Jan 2021

Table 5: Tax Rates and Policy Changes in Europe, 2022

Robustness – Different Control Groups

	Main	Control: Pantyliners	Control: Hygiene
ATT($\hat{\beta}$)	-0.553***	-0.613***	-0.511***
	(0.026)	(0.055)	(0.030)
AAT($\hat{\alpha}$)	-0.046*	-0.116***	-0.085***
	(0.024)	(0.042)	(0.028)
Barcode × Country FE	Yes	Yes	Yes
Year × Month FE	Yes	Yes	Yes
Observations	170559	7601	62863
R^2	0.980	0.989	0.994
Clustered SE	✓	✓	✓

Table 6: Estimations of VAT pass-through using different control groups. Column (2) only looks at the German sample and uses pantyliners as control group as this period product category is not subject to the reform. Colum (3) uses other hygiene products sold in the same market with similar inputs – toilet paper and paper tissues – as control group.

Descriptive Statistics – The Period Products Retail Market

	Average nr. period products purchases	Brands purchased	Manufacturers purchased	Nr. categories	period products share of total expenditure
AUT	7.2	2.9	2.2	1.7	.088
BE	8.5	2.8	n/a	1.7	.047
CZ	8.8	5.4	4.05	1.8	.073
DK	8.2	3.4	2.5	1.7	.058
ES	8.3	3.5	2.9	2.0	.053
FR	9.0	3.5	2.2	1.8	.042
GER	8.15	3.0	2.6	1.7	.054
HU	8.4	4.3	3.4	1.8	.078
IE	9.9	3.2	2.9	1.8	.037
IT	9.0	4.0	2.7	1.9	.152
NL	9.6	2.9	n/a	1.7	.068
PL	10.1	4.1	3.4	1.9	.056
PRT	7.4	3.3	2.4	1.2	.118
ROU	8.0	3.4	n/a	1.7	.
SE	8.6	2.5	2.1	1.7	.089
SK	9.0	4.2	3.2	1.8	.077
UK	10.0	3.4	3.0	1.2	.037

Table 7: Descriptive statistics for households. Note: We only included households with at least 3 transactions involving period products per year. ◄

Empirical Approach: Dynamics

Estimate VAT pass-through over time:

$$\ln(y_{ict}) = \kappa + \alpha \mathbb{1}\{t \geq F_c^A\} + \sum_{j=-12}^{-2} \beta_j L^{-j} D_{it} + \sum_{j=0}^{12} \beta_j L^j D_{it} + \delta_t + \xi_{ic} + \epsilon_{ict} \qquad (2)$$

y_{ict} ... price/quantity of product i in country c in month t

$L^{-j} D_{it}$ ... j-month ahead binary treatment status

$L^j D_{it}$ ... j-month lagged binary treatment status

Results – Country Differences

	ln(Volume)					
	ATT	AUT	BE	FR	GER	PL
ATT($\hat{\beta}$)	0.106***	0.145	0.177***	0.074	0.074	-0.015
	(0.036)	(0.149)	(0.064)	(0.056)	(0.068)	(0.160)
AAT($\hat{\alpha}$)	-0.081**	-0.281*	-0.041	-0.075	-0.002	-0.105
	(0.037)	(0.144)	(0.071)	(0.056)	(0.075)	(0.176)
Barcode × Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year × Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	170559	32154	34526	42142	24048	37689
R^2	0.904	0.907	0.902	0.906	0.855	0.910
Clustered SE	✓	✓	✓	✓	✓	✓

Table 8: Country specific effects of VAT reform on purchase volume

Results – Middle & High Income Households

	ln(Price)		ln(Volume)	
	(1)	(2)	(3)	(4)
ATT($\hat{\beta}$)	-0.733***	-0.660***	0.105***	0.179***
	(0.030)	(0.034)	(0.037)	(0.049)
AAT($\hat{\alpha}$)		-0.117***		-0.120**
		(0.028)		(0.050)
Barcode × Country FE	Yes	Yes	Yes	Yes
Year × Month FE	Yes	Yes	Yes	Yes
Observations	92091	92091	92091	92091
R^2	0.983	0.983	0.909	0.909
Clustered SE	✓	✓	✓	✓

Table 9: Effect of VAT reform on prices and volume purchased for middle & high income households, observations are monthly averages per barcode