

CROSS-CATEGORY EFFECTS OF A FREQUENCY REWARD PROGRAM PROMOTING CONSUMPTION OF FRUIT AND VEGETABLES

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Introduction

- **Loyalty reward programs** are an key part of the life of consumers (Dorotic et al. 2014; Stourm et al., 2015; Stourm et al. 2020; Taylor and Neslin 2005).
 - Normally reward regular in-store spend
- Increasingly, loyalty programs are used to promote goods linked to personal or societal improvements.
 - Walgreens provide a cash bonus worth up to \$2 if consumers successfully achieve lifestyle goals (Kekes-Szabo 2021).
 - The airline Quantas awards points to consumers who purchase carbon offsetting (Stourm et al. 2020).
 - H&M give “Conscious points” for purchases in their “Conscious” line – products made from more sustainably-sourced materials (e.g., organic cotton), or for recycling clothes (Kekes-Szabo 2021).



The Zdravoljupci (Health lovers) Campaign

- **Loyalty program promoting Fruit & Vegetables (F&V) sales** at a Croatian retailer.
 - Leading grocery retailer in Croatia by market share (20%)
 - ~500,000 customers a day; 700 stores; 10,000 employees.
- **9 weeks: August 23rd – October 28th, 2018.**
- **Shoppers receive points for**
 - buying specific F&V
 - buying specific grocery (non-F&V)
 - every 50 Croatian Kuna spent (circa \$7.32).
- Points can only get a **toys (of 7)**, at an additional cost:
 - 20 points + 50 HRK; or
 - 50 points + 10 HRK (circa \$1.48).

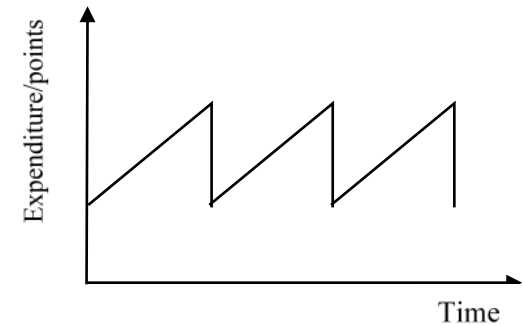


How Frequency Rewards Programmes (FRPs) work

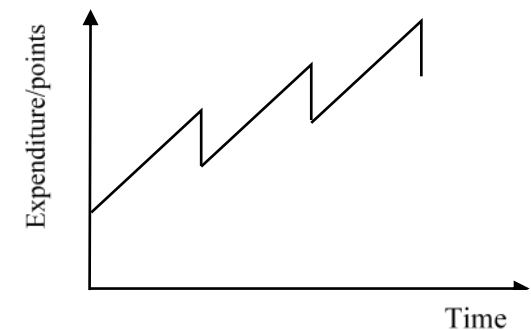
- FRPs reward consumers based on their engagement.
- They operate via two mechanisms.
 1. **Points pressure mechanism:** customers increase expenditure and/or purchase rate during the promotion to accumulate points.
 2. **Rewarded behavior mechanism:** long-term impact of the promotion – consumers increase expenditures/purchase rate after earning a reward.

These only matter for customers interested in the reward.

A) POINTS PRESSURE



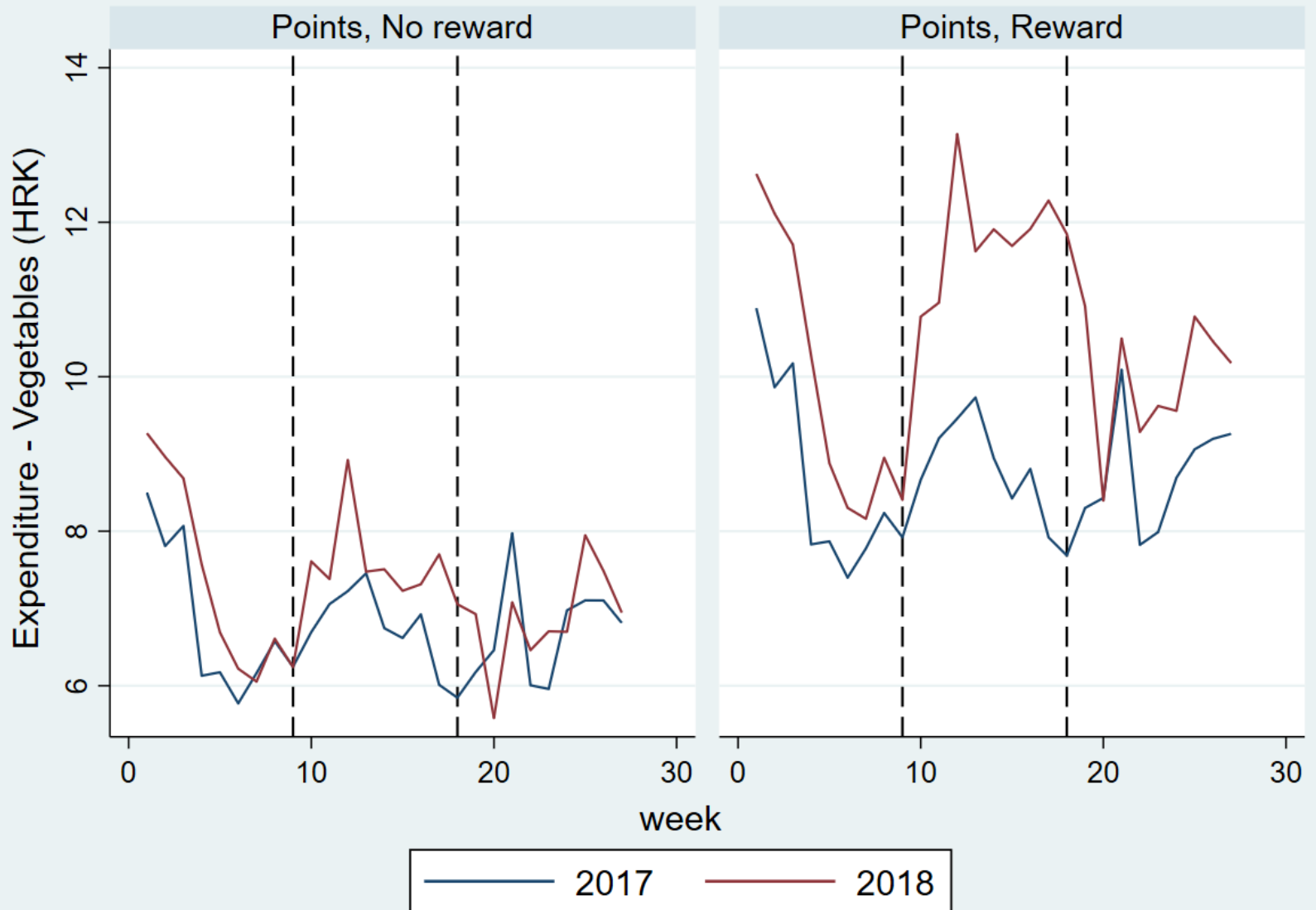
B) POINTS PRESSURE + REWARDED BEHAVIOR



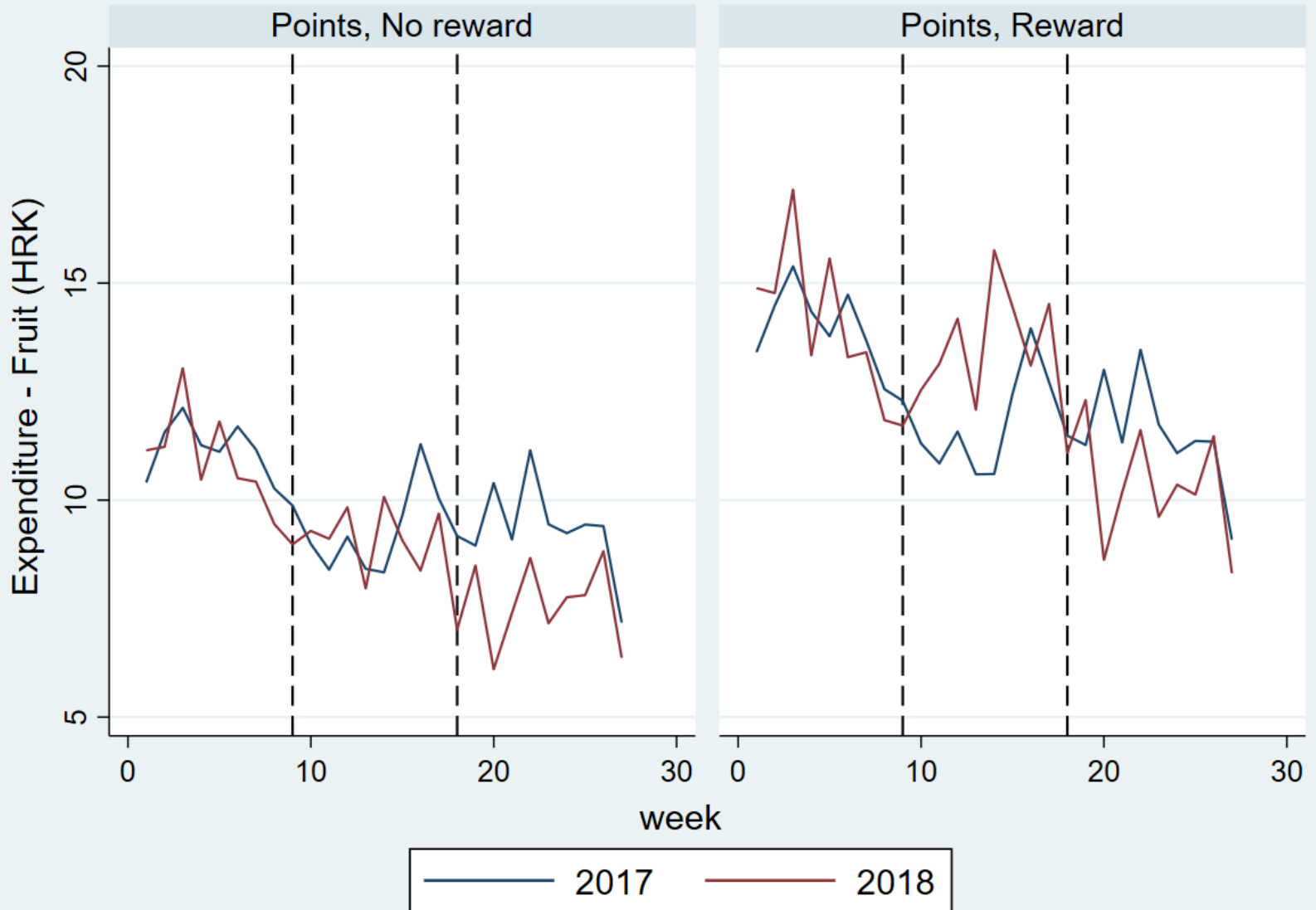
Loyalty card data. N = 268,343 consumers

- Periods – three 9-week periods, 2 year (2018: campaign; 2017: no campaign)
 - 9 weeks prior to the intervention (weeks 1-9);
 - 9 weeks of intervention (weeks 10-18);
 - 9 weeks post-intervention (weeks 19-27).
- Expenditure data (weekly expenditures, aggregated at period level).
 - Fresh fruit;
 - Fresh vegetables;
 - Dried F&V;
 - All other foods; and
 - Total food.
- Toys purchased – from 0 to 11 or more.
- Loyalty to the retailer (The trips to Konzum stores in each year).
- Socio-demographic variables
 - gender of the cardholder;
 - age (in bands);
 - County of residence.
- Consumer purchase of promotional campaign books
- Expenditures on good for children and babies

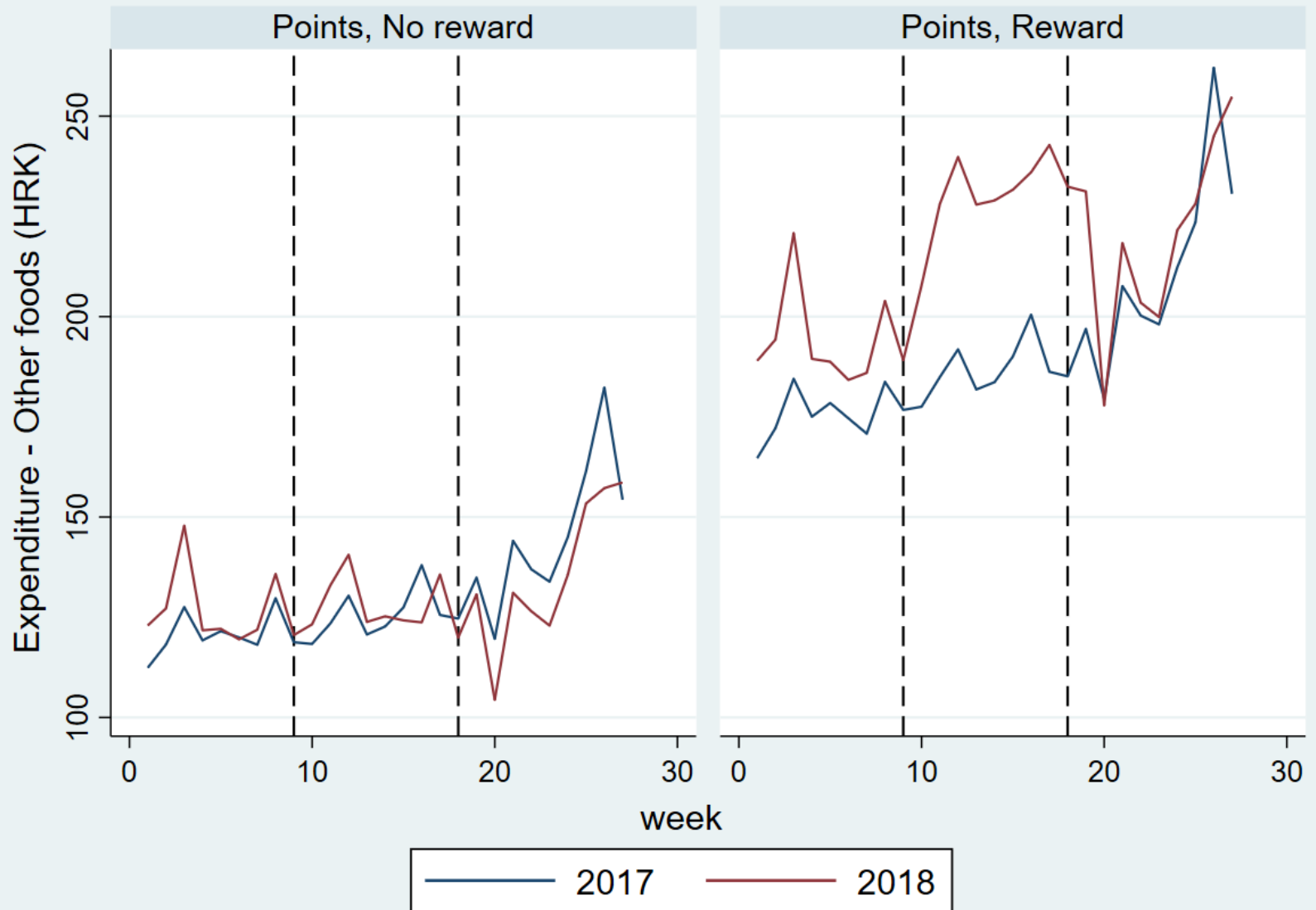
Consumption trends – Vegetables



Consumption trends – Fruit



Consumption trends – Other foods



Who is interested in the reward? Drivers of reward redemption

- Probit regression
 - Dependent: Purchased a toy (vs No)
- The probability of purchasing a toy increases for
 - Female shopper;
 - Age groups 25-44;
 - Who spends on children and babies;
 - Spending more at baseline;
 - With an interest in promotional material (Zdravoljupci books).
- *Reward redemption also varies across county.*

Dependent variable	Probit		
	Reward>0		
	Coefficient	S.E.	Marginal effect
Intercept	-2.2872***	0.0405	
ln(nr of visits)	0.2014***	0.0039	0.0529
Books	1.1894***	0.0263	0.3125
Books x Babies	-0.1485***	0.0305	-0.0390
Babies in household	0.4657***	0.0062	0.1224
Children in household	0.6034***	0.0077	0.1586
Gender: Male	Baseline		Baseline
Gender: Female	0.0909***	0.0069	0.0239
Gender: Others	0.0031	0.0332	0.0008
Age: 18-24	Baseline		Baseline
Age: 25-34	0.3011***	0.0288	0.0791
Age: 35-44	0.2944***	0.0281	0.0774
Age: 45-54	-0.0640**	0.0282	-0.0168
Age: 55-64	-0.0915***	0.0282	-0.0240
Age: 65 or over	-0.3209***	0.0283	-0.0843
Age: not reported	-0.1548***	0.0439	-0.0407
County dummies	Yes		Yes
Observations	268,343		
Pseudo R ²	0.1677		
Log-likelihood	-125490.31		
χ ²	50582***		

Significance is as follows:
 * = 10%; ** = 5%; *** = 1%.

The impact of reward on expenditures – GMM Exponential FE panel regression

	Panel Poisson	Vegetables	Fruit	Dried F&V	Other food	All food
DID	Period 2 x Year 2018	0.0410***	-0.0119***	0.0364***	-0.0302***	-0.0231***
	S.E.	0.0034	0.0029	0.0097	0.0018	0.0018
	Period 3 x Year 2018	-0.0543***	-0.1791***	-0.2728***	-0.1188***	-0.1180***
	S.E.	0.0040	0.0033	0.0099	0.0020	0.0020
DIDID	Reward x Period 2 x Year 2018	0.1412***	0.1407***	0.1820***	0.1501***	0.1492***
	S.E.	0.0075	0.0065	0.0221	0.0039	0.0038
	Reward x Period 3 x Year 2018	0.0570***	0.0490***	0.0336	0.0564***	0.0554***
	S.E.	0.0099	0.0075	0.0230	0.0043	0.0042
	Observations – total	1,610,058	1,610,058	1,610,058	1,610,058	1,610,058
	Observations with sales > 0	1,423,313	1,480,474	593,856	1,609,190	1,610,058
	Consumers	268,343	268,343	268,343	268,343	268,343

- Difference-in-difference-in-difference.
- Reward redemption is not random
- **Propensity Score weighting** approach (Hirano and Imbens, 2001)
 - Based on the probit regression in the previous slide.



Significance is as follows: * = 10%; ** = 5%; *** = 1%.

S.E. refers to the standard errors clustered at the level of the individual consumer.

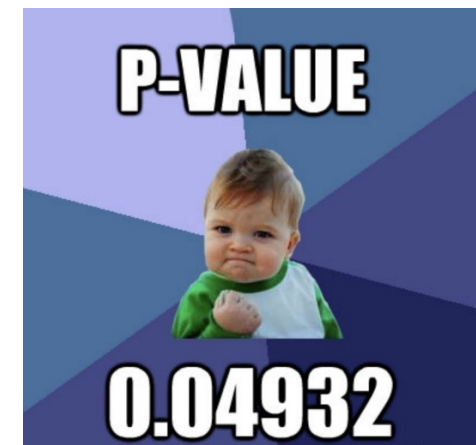
The impact of reward on expenditures – GMM Exponential FE panel regression

	Panel Poisson	Vegetables	Fruit	Dried F&V	Other food	All food
DID	Period 2 x Year 2018	0.0425***	-0.0255***	0.0201	-0.0568***	-0.0461***
	S.E.	0.0060	0.0049	0.0171	0.0031	0.0030
	Period 3 x Year 2018	-0.0603***	-0.1852***	-0.2648***	-0.1255***	-0.1247***
	S.E.	0.0070	0.0053	0.0160	0.0034	0.0033
DIDID	Reward x Period 2 x Year 2018	0.0951***	0.1660***	0.1613***	0.1944***	0.1834***
	S.E.	0.0182	0.0144	0.0499	0.0087	0.0085
	Reward x Period 3 x Year 2018	0.0371*	0.0676***	0.0026	0.0694***	0.0669***
	S.E.	0.0210	0.0158	0.0503	0.0095	0.0094
	Observations	1,610,058	1,610,058	1,610,058	1,610,058	1,610,058
	Observations with sales > 0	1,423,313	1,480,474	593,856	1,609,190	1,610,058
	Consumers	268,343	268,343	268,343	268,343	268,343

- Difference-in-difference-in-difference.
- Reward redemption is not random
- **Endogeneity correction** – using books, books x children, as instruments

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Discussion

- A FRP promoting F&V has an expansionary effect.
 - Non-reward seekers: Vegetables sales: +4%; Fruit sales: -1-2%.
 - Reward-redeemers: Vegetables sales: +10-14%; Fruit sales: +14-17%.
 - All food sales grew for reward redeemers: +15-18%.
- The long-term impact of the intervention differs amongst groups.
 - **Reward-redeemers** spent more in all categories, post-promotion.
 - **Non-reward seekers** spent less on everything, post-promotion.
 - No information on consumers who did not collect any points.
- FRP may have increased F&V consumption or if just shifted to in-store.
- Here, the **purchase** of the reward motivates consumers more than points

Thank you for your attention!

Over 575,000 toys purchased

NAJPOPULARNIJI LIKOVI SU:



**BANANA
BELA**



**JAGODA
JANA**



**BROKULA
BRANKO**

107.566
19%

106.428
18%

99.170
17%

78.890
14%

72.058
13%

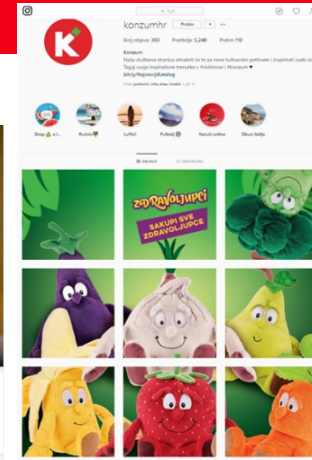
55.820
10%

55.724
10%

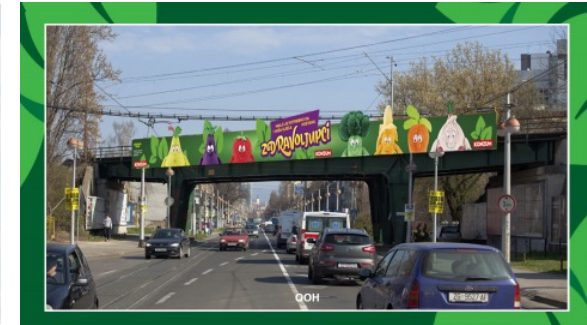


The Zdravoljupci (Health lovers) Campaign

- TV adverts



- Billboards



- Outside of Stores



Entrance door with sticker and poster



Branded trolley house and billboard



Branded trolley house

Overview of the Zdravoljupci campaign – POS materials



Overview of the Zdravoljupci campaign

Seven toys that could be collected:

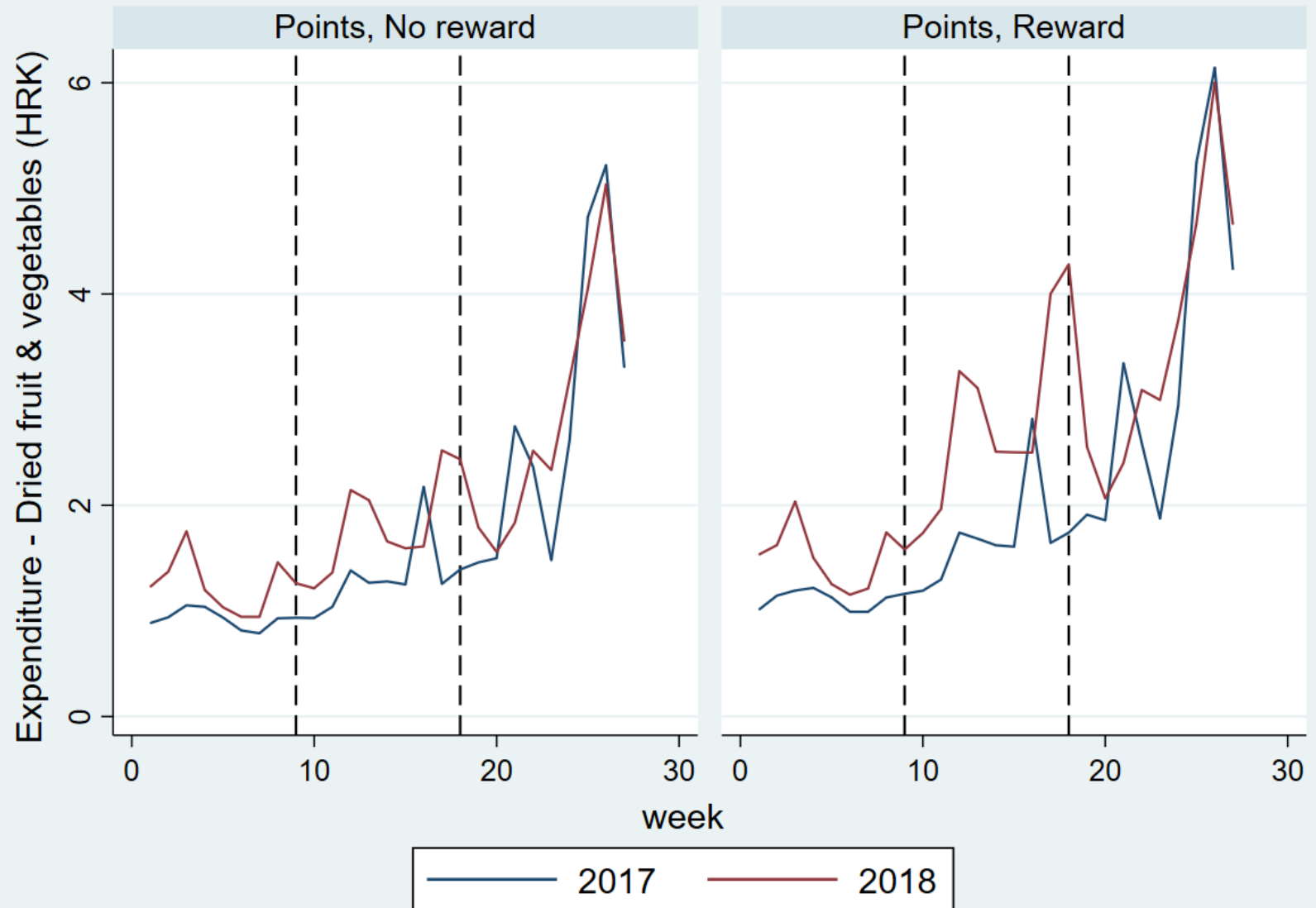
*Banana Bela,
Branko Broccoli,
Jagada (strawberry) Jana,
Mrkva (carrot) Mirko,
Patlidžan (eggplant) Patrik,
Češnjak (garlic) Luka,
Kruška (pear) Klara.*



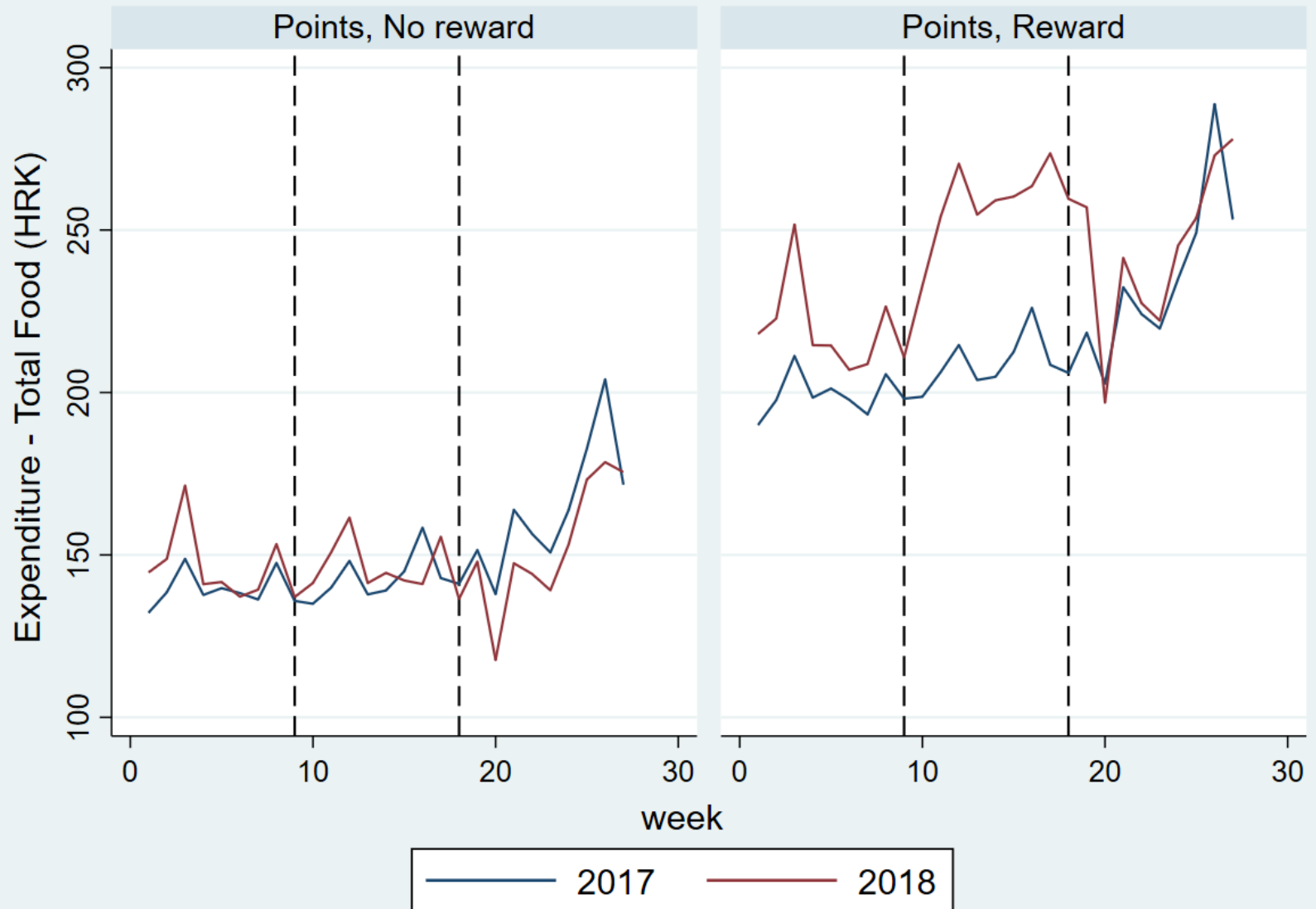
Characteristics of the sample (N = 268,343)

Variable	Category	Total sample	Points, No Reward	Points, Reward	Pearson Chi2
Gender	Male	23.43	24.23	21.03	779.00***
	Female	73.29	72.09	76.91	
	Missing	3.27	3.68	2.06	
Age	18-24	0.99	0.97	1.05	17,018***
	25-34	8.41	6.59	13.89	
	35-44	17.47	13.43	29.60	
	45-54	20.40	20.56	19.92	
	55-64	22.59	23.60	19.54	
	65 +	27.30	31.61	14.34	
	N/A	2.84	3.24	1.65	
Family	Babies >0	47.74	39.89	71.32	19,903***
	Children >0	68.82	61.64	90.39	19,353***
Loyalty	>40 visits in 2018	49.51	44.29	65.19	8782***
Observations		268,343	201,364	66,979	

Results – Consumption trends



Results – Consumption trends



Difference-in-Difference-in-Difference (DIDID) estimator.

- Periods w
 - 1 = pre-promotion; 2 = promotion; 3 = post-promotion.
- Year t
 - 2017, 2018 (The promotion only occurs in 2018).
- Consumer group s :
 - A (CONTROL) = Consumers has points, *does not* buy reward;
 - B (TREATMENT): Consumers has point, buys reward.
- Y_{iswt} = ln(expenditures in a category)
- ATT estimated using a DIDID estimator (panel regression)

$$Y_{iswt} = \alpha_i + G_{is} + S_w + T_t + (G_{is} * T_t) + \gamma(G_{is} * S_w) + \delta_0(S_w * T_t) + \delta_1(S_w * T_t * G_{ig}) + \pi D_{iwt} + e_{iswt}$$

- α_i = individual fixed effects (including group membership G_{is}),
- S = period-specific fixed effects
- T = year-specific fixed effects.
- D = time-varying personal characteristics
- ε = the residuals.



- δ_0 = Points pressure (access to points)
- δ_1 = Rewarded Behavior (reward redemption)

Methodological approach

- **Membership participation is not random** – the decision to purchase a toy depends on the characteristics of the respondent.
- Propensity Score weighting approach (Hirano and Imbens, 2001)
 - We define the propensity score

$$e(x) = P(s = B|X = x)$$

with $0 < e(x) < 1$.

$$G_{is} = g(x_i) + \varepsilon_i$$

- We assume unconfoundedness

$$G \perp (Y(0), Y(1)|x_i)$$

- The resulting propensity scores can be used as weight in the DID regression. Weights:

$$w(x) = \frac{G}{\hat{e}(x)} + \frac{1 - G}{1 - \hat{e}(x)}$$