Labels vs incentives: testing nutritional policies in the lab

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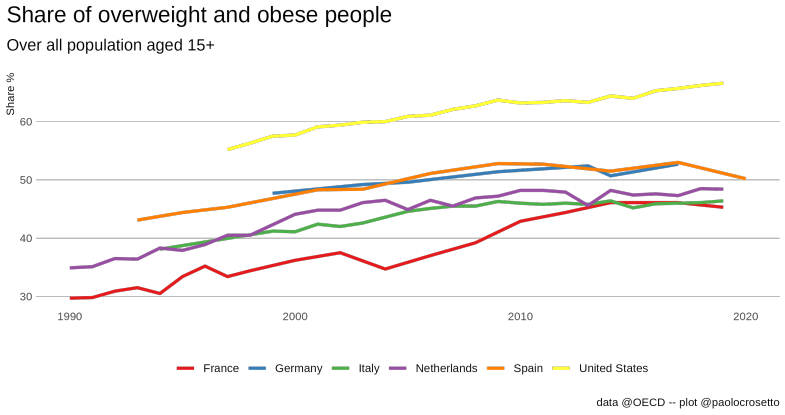
The problem



WHO: medical cost of obesity in the U.S.: $147-210 bln

Policy tools

- Regulation
- Information
- Labeling
- Price policies
- Nudges
- ...

This paper

- Regulation
- Information
- **Labeling**
- **Price policies**
- Nudges
- ...

+

Fat **tax** & thin **subsidy**

Political context: consensus on labels

- Adoption of NutriScore by France (Netherlands, Germany, Spain, ...)
- Label efficacy supported by large studies (RCTs, lab, ...)
- Large discussion within EU on a harmonized labeling scheme

Political context: mounting advice for taxes

- World Bank: strongly tax unhealthy foods (Shekar and Popkin 2020)
- WHO: introduce dietary taxes on unhealthy food of minimum 20%
- India and Mexico tax unhealthy food & beverages (India : tax of 28%).

Methodological challenges

Testing a labeling + price policy in the field can be **costly** and **ineffective**

- Labeling all products is costly
- Large samples required
- Lots of noise – special offers, discounts, availabilities...
- No control on population switching shops
- Little control on implementation
- Which reference period?
- good luck with convincing supermarkets to hand you their pricing policies...

Reality vs. the lab

Why the lab

Building counterfactuals

- explore different scenarios
- integrate preferences in a controlled way
- test over different, controlled populations
- (relatively) cheap!
- (but: external validity?)

Experimental design

General design

- Subjects are asked to **shop** for **two days** for **their household**
- Within our paper and on-line catalog
- **Real** purchases at the end of the experiment
- Just $\sim \frac{1}{4}$ of the products in stock
- chosen + we have it $\Rightarrow$ buy

General design

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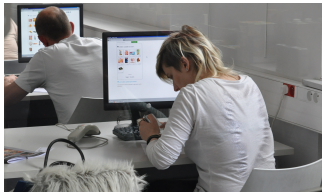
- Within our paper and on-line catalog
- **Real** purchases at the end of the experiment
- Just $\sim \frac{1}{4}$ of the products in stock
- chosen + we have it $\Rightarrow$ buy

- Then, **unannounced**, subjects have to shop a **second** time
- Same products, but we apply a **policy** (label, price, both)
- **One** of the **two** shopping carts is **payoff-relevant**.

Our setup

Paper catalog

Computer interface

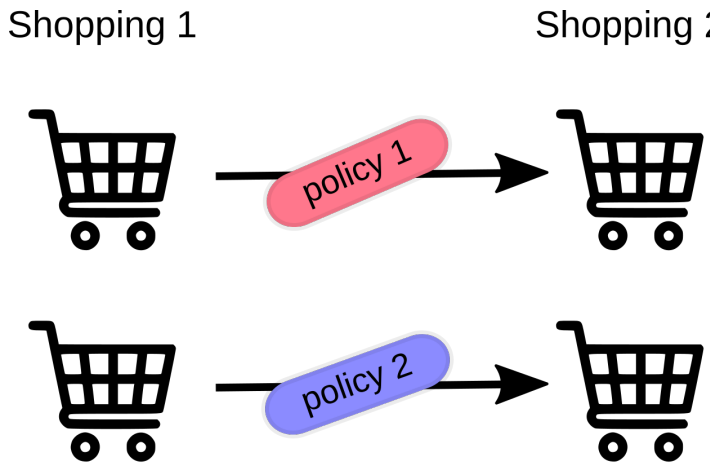


Real products

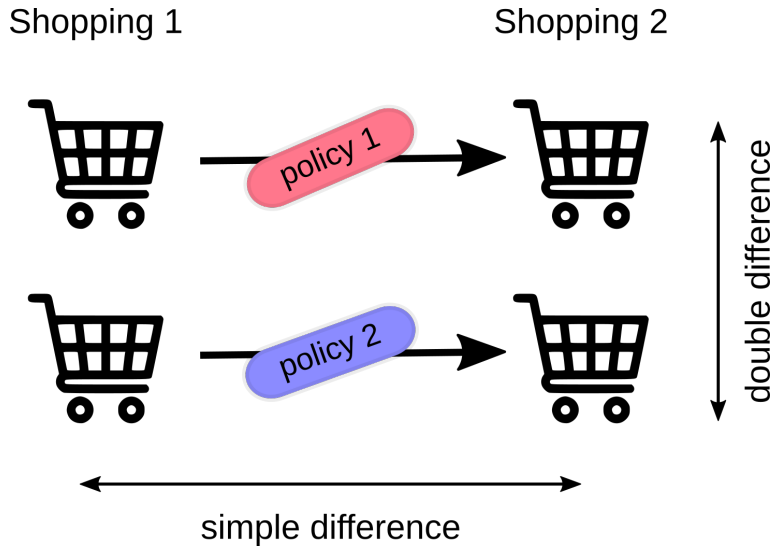
- Consumer preferences matter
- Subjects shop for real in the lab

- $\sim \frac{1}{4}$ of product supply available
- chosen + we have it $\Rightarrow$ buy

General design



Identification: diff-in-diff



Metrics: nutrition

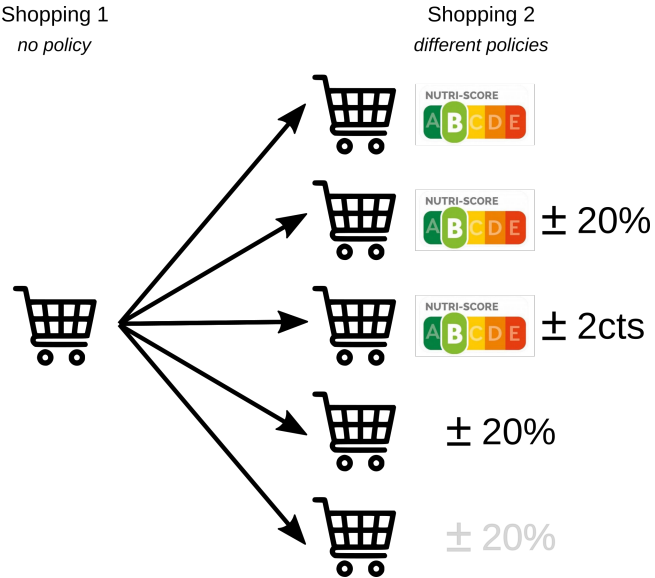
We use the **scoreFSA** normalized by **caloric content**.

For each shopping cart i, for each subject j, for each product p:

$$scoreFSA_{ij} = \frac{\sum_p Kcal_{pij} \cdot FSA_{pij}}{\sum_p Kcal_{pij}},$$

We focus on Δ**FSA**, the *difference* between carts 1 and 2.

Treatments


Shopping 1
no policy
Shopping 2
different policies
NUTRI-SCORE
A B C D E
NUTRI-SCORE
A B C D E
± 20%
NUTRI-SCORE
A B C D E
± 2cts
± 20%
± 20%

A *large* price change: $\pm 10\%$ or 20%

A *small* price change: ± 1 or 2cents

Stimuli

Référence
Sans Nutri-Score
sans Bonus-Malus

Traitement 1
Nutri-Score
sans Bonus-Malus

Traitement 2
Nutri-Score
avec Bonus-Malus explicite
ad valorem
de niveau élevé

Traitement 3
Nutri-Score
avec Bonus-Malus explicite
par unité de
niveau symbolique

Traitement 4
Bonus-Malus implicite
ad valorem
de niveau élevé

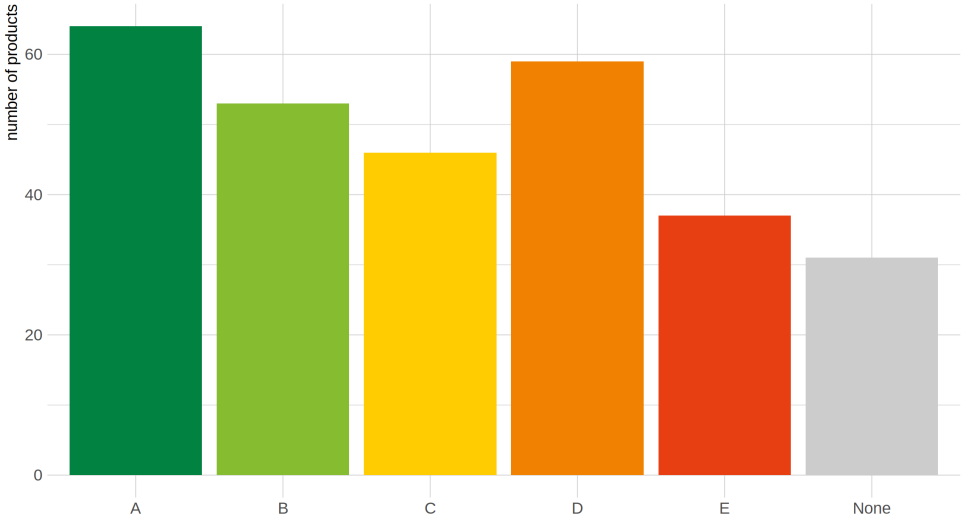
Traitement 5
Bonus-Malus explicite
ad valorem
de niveau élevé

Experimental details

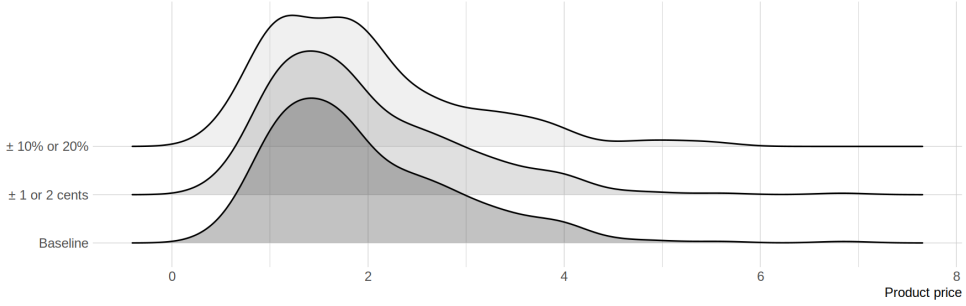
A large and representative catalog

- 290 products
- 37 food categories
- paper catalog
- barcode scanners on the desk
- custom e-shopping interface
- price, quantity, picture (label) up front
- nutritional table and ingredient list available upon clicking

Catalog: NutriScore

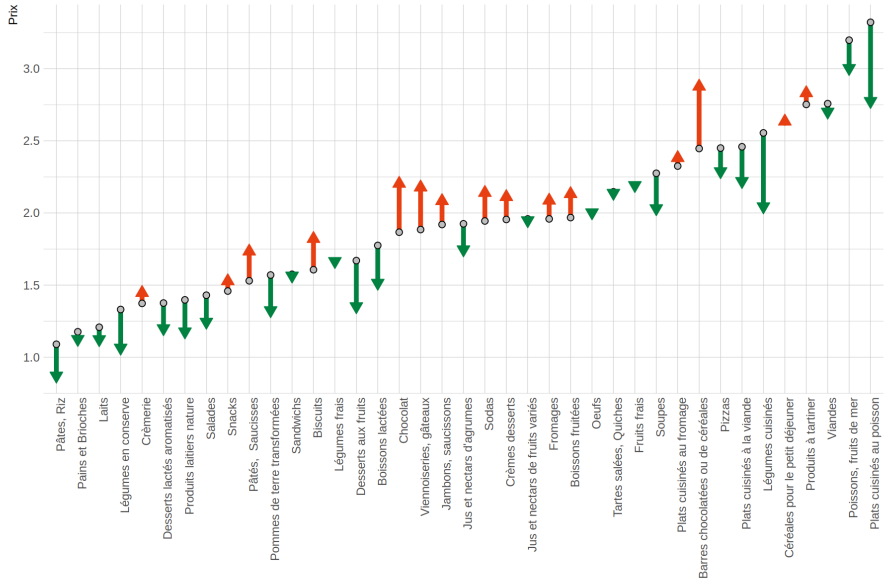


Catalog: Price distribution



	price	p-value
baseline	1.96 (0.96)	
cents	1.96 (0.96)	0.841
percent	1.94 (1)	

Catalog: price changes by microcategory



A large(ish) and representative subject pool

- 386 subjects
- $\sim$ 75 for each of the 5 treatments
- sample issued from the general population
- roughly representative (++women, ++educated)

Sessions & Payoffs

- 25 sessions of $\sim$16 subjects each
- November 2019
- Subjects got 35€ to shop
- A product in 4 is actually sold
- Average expenditure $\sim$7€

Metrics: expenditure

We use the **expenditure** on a basket, normalized by **2000Kcal**.

For each shopping cart i, for each subject j, for each product p:

$$expenditure_{ij} = 2000 * \frac{\sum_p Price_{pij}}{\sum_p Kcal_{pij}},$$

We focus on Δ**Expenditure**, the *difference* between carts 1 and 2.

Metrics: state investment

We use the total amount of subsidies minus the total amount of tax revenue, per consumer.

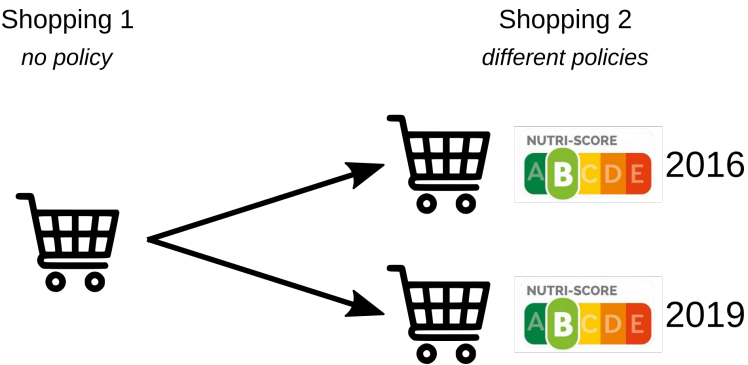
Since consumers had to buy for 2 days, we divide by 2 to get a daily cost.

for each subject j, for each product p:

$$stateaid_j = \frac{\sum_p (tax_{pj} - subsidy_{pj})}{2},$$

(pre-registered) Hypotheses

Replication



Hp: we will *replicate* the 2016 findings re. NutriScore

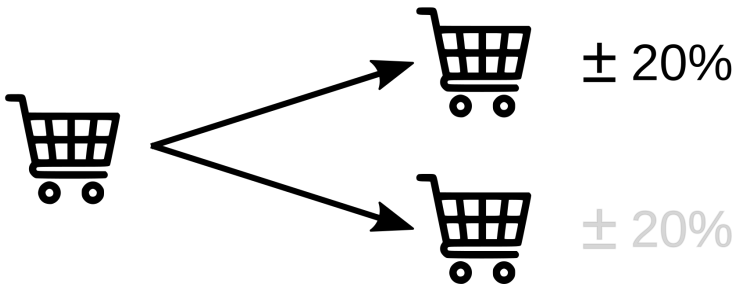
Price salience

Shopping 1

no policy

Shopping 2

different policies



Hp: *salient* price changes have a larger impact

Policy mix additivity

Hp: policies are subadditive: $A \mid B \leq f(A,B) \leq A + B$

Information *vs.* incentives

Shopping 1

no policy

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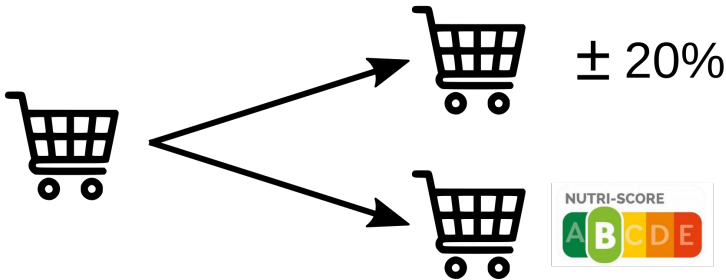
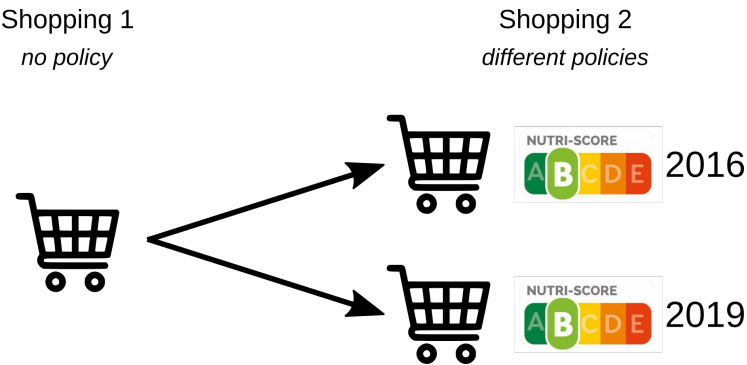


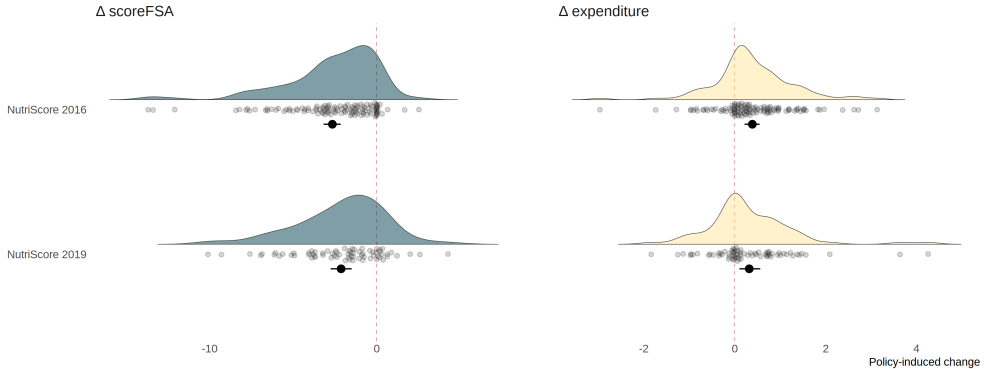
Hp: Labels have a higher impact than prices

Replication

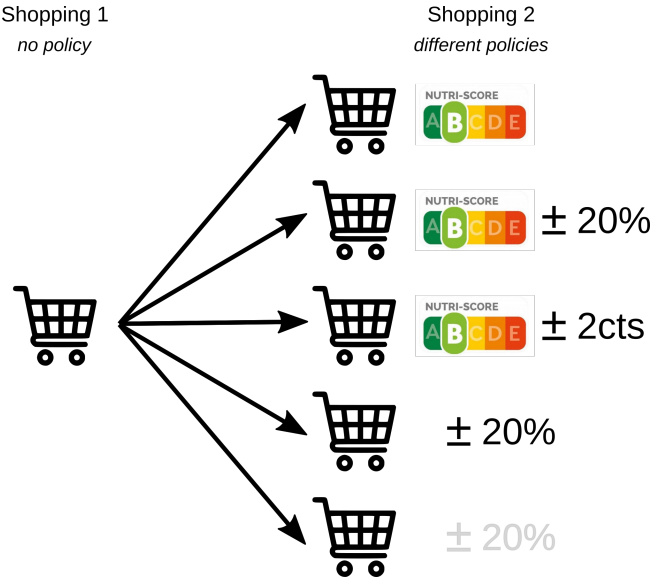


Results: replication

	ScoreFSA				Expediture			
	cart 1	cart 2	difference	p-value	cart 1	cart 2	difference	p-value
NutriScore 2019	3.1 (2.95)	0.97 (3.07)	-2.13 (2.67)	0.205	5.85 (1.64)	6.17 (1.97)	0.32 (0.95)	0.621
NutriScore 2016	4.74 (3.43)	2.09 (3.47)	-2.65 (2.84)		5.24 (1.6)	5.63 (1.65)	0.39 (0.86)	



At a glance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NUTRI-SCORE
A B C D E
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± 20%
NUTRI-SCORE
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± 2cts
± 20%
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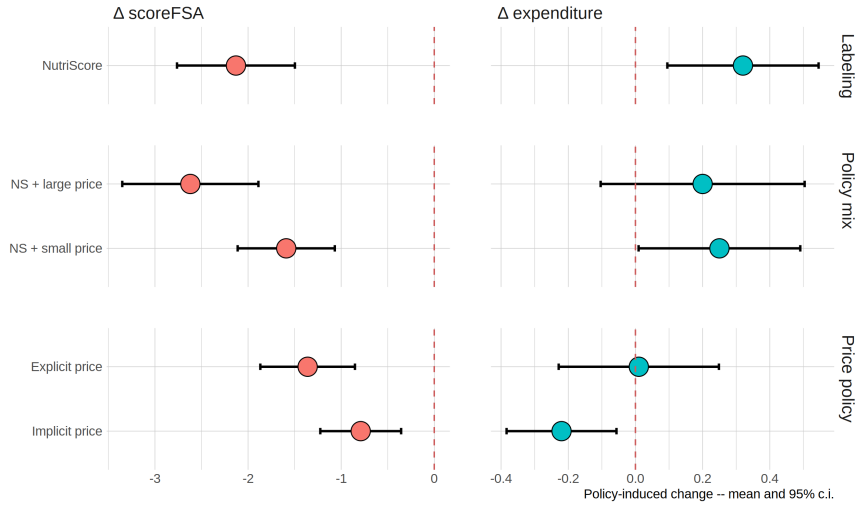
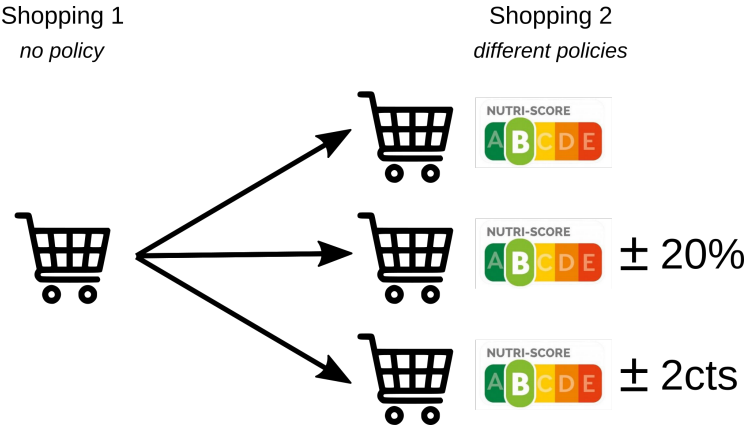
At a glance

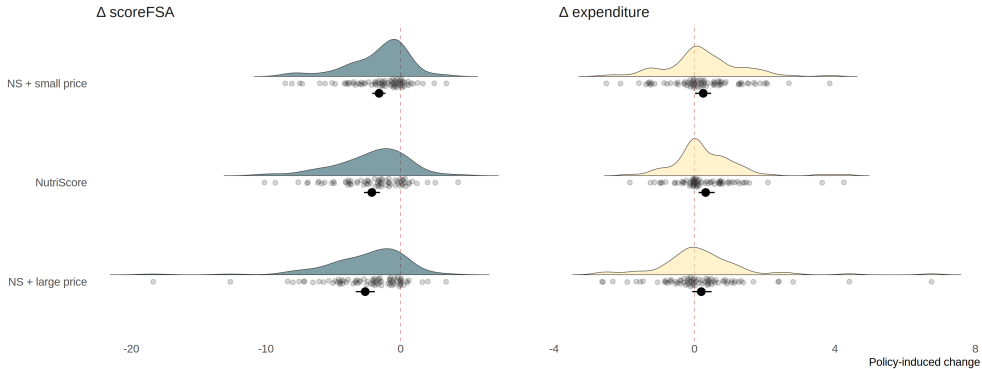

Δ scoreFSA
Δ expenditure
NutriScore
NS + large price
NS + small price
Explicit price
Implicit price
Labeling
Policy mix
Price policy
-3
-2
-1
0
-0.4
-0.2
0.0
0.2
0.4
Policy-induced change -- mean and 95% c.i.

Policy mix additivity



Policy mix additivity overview

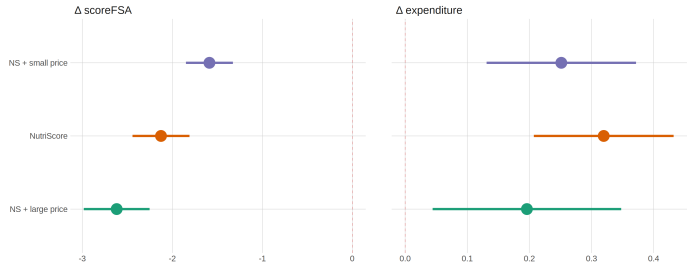
	ScoreFSA				Expediture			
	cart 1	cart 2	difference	p-value	cart 1	cart 2	difference	p-value
NutriScore	3.1 (2.95)	0.97 (3.07)	-2.13 (2.67)	< 0.001	5.85 (1.64)	6.17 (1.97)	0.32 (0.95)	0.006
NS + small price	2.75 (3.34)	1.16 (3.18)	-1.59 (2.3)	< 0.001	6.04 (2)	6.29 (2.02)	0.25 (1.06)	0.028
NS + large price	4.19 (3.37)	1.57 (3.31)	-2.62 (3.23)	< 0.001	5.63 (1.75)	5.83 (2.18)	0.2 (1.34)	0.3



Additivity: tests

comparison	expenditure	scoreFSA
large vs small	0.394	0.020
NS vs large	0.243	0.411
NS vs small	0.851	0.171

Wilcoxon rank-sum p-values



Information *vs.* incentives

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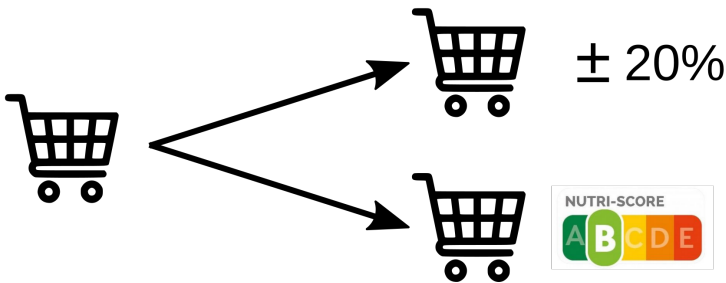
different policies



Information *vs.* incentives overview

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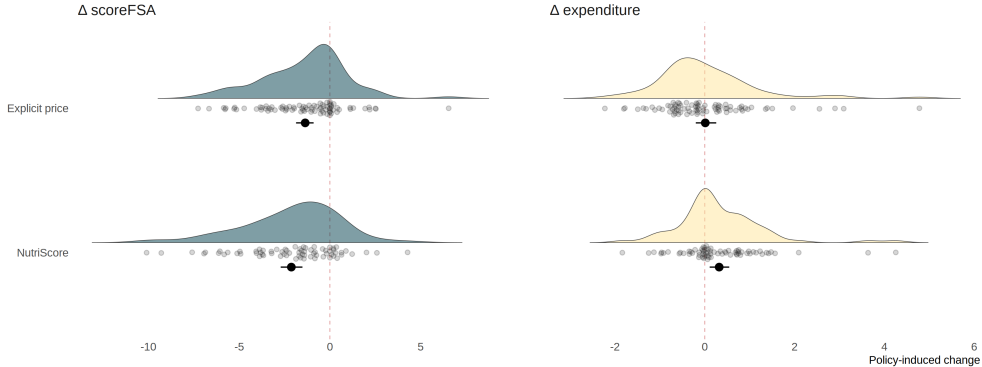
	cart 1	cart 2	difference	p-value	cart 1	cart 2	difference	p-value
NutriScore	3.1 (2.95)	0.97 (3.07)	-2.13 (2.67)	< 0.001	5.85 (1.64)	6.17 (1.97)	0.32 (0.95)	0.006
Explicit price	2.93 (3.48)	1.57 (3.25)	-1.36 (2.32)	< 0.001	5.62 (1.86)	5.63 (1.94)	0.01 (1.09)	0.342

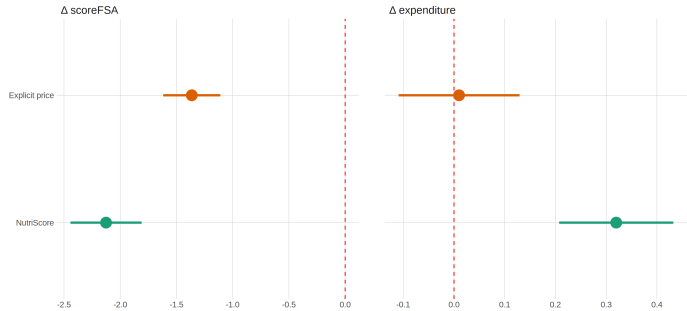
Means (standard deviations) for each variable. P-values from Wilcoxon signed-rank test of the difference between carts 1 and 2.



Information *vs.* incentives: tests

indicator	p.value
expenditure	0.005
scoreFSA	0.099

Wilcoxon rank-sum p-values



Price salience

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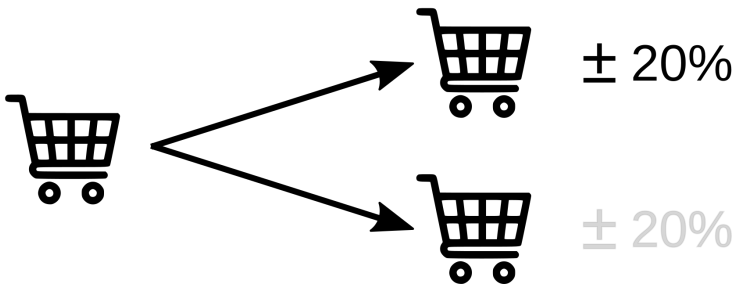
no policy

Shopping 2

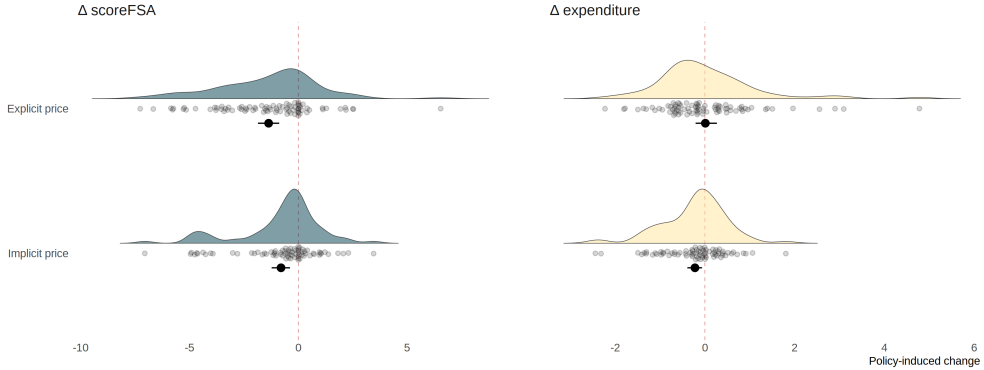
different policies



Price salience overview

	ScoreFSA				Expediture			
	cart 1	cart 2	difference	p-value	cart 1	cart 2	difference	p-value
Implicit price	3.5 (3.51)	2.7 (3.32)	-0.79 (1.89)	0.001	5.56 (1.62)	5.33 (1.45)	-0.22 (0.71)	0.016
Explicit price	2.93 (3.48)	1.57 (3.25)	-1.36 (2.32)	< 0.001	5.62 (1.86)	5.63 (1.94)	0.01 (1.09)	0.342

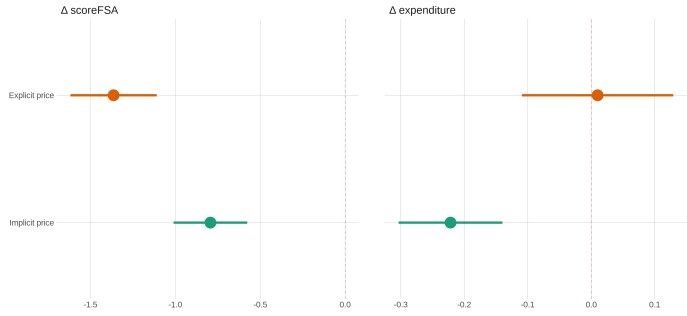
Means (standard deviations) for each variable. P-values from Wilcoxon signed-rank test of the difference between carts 1 and 2.



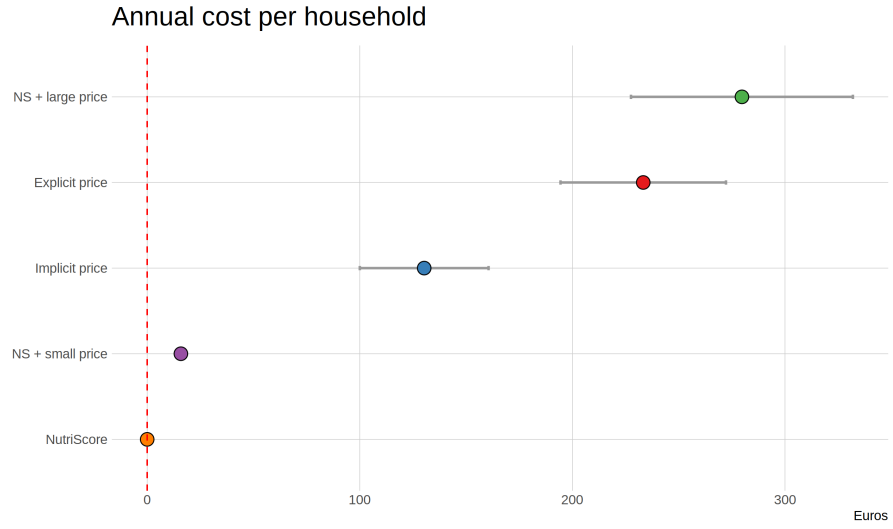
Price salience: tests

indicator	p.value
expenditure	0.564
scoreFSA	0.046

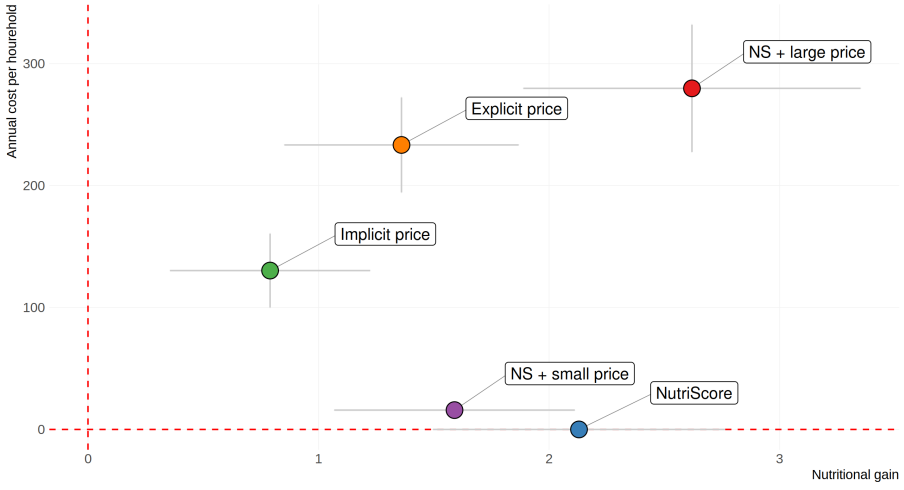
Wilcoxon rank-sum p-values



Welfare analysis: cost for the state



Welfare analysis: trade-offs



What do we learn?

- Nutritional policies are subadditive
- Adding *too small* an incentive reduces the effect of labels (Gneezy & Rustichini)
- Price policies have better be explicit (Chetty et al)
- Labeling appears as more cost-effective than the policy mix
- ...still, it's just the lab!

Merci!