

Vegetarianism

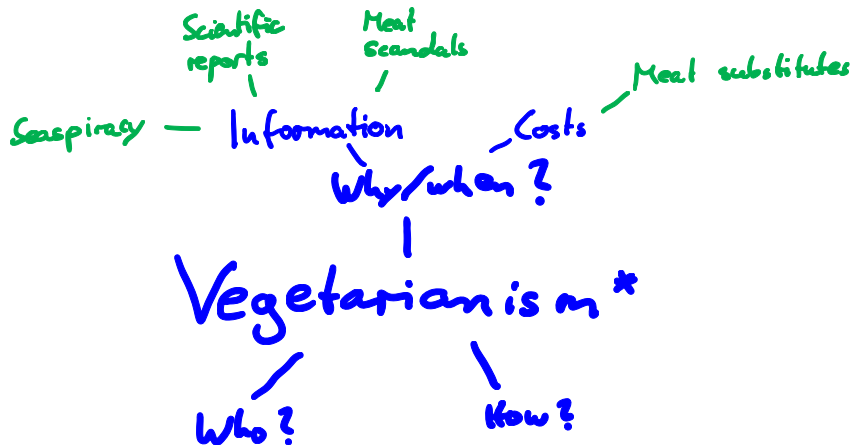
Evidence from Home Deliveries

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Questions



Motivation

Externalities

- Climate change and pollution (6-9 \$/kg)
- Health (1-4 \$/kg)
- Animal welfare

Internalities

- Health (28-120 \$/kg)

Figures for beef from a review by Funke et al. (2021)

Data overview

220M home deliveries in 38 countries from 2016-2021

- **Where from?** Restaurants, supermarkets, anything
- **When?** Exact time of order and delivery
- **What?** All products ordered, with description and categories
- **Where?** Location (coordinates) of order placement and restaurant
- **Who?** Customer identifiers and basic demographics

Countries and orders in 2020

[▶ Over time](#)

Europe & Central Asia

name	Orders100k	Orders
Georgia	101,321	3,763,084
Romania	42,095	8,118,494
Croatia	41,731	1,688,969
Spain	40,169	19,020,785
Portugal	30,402	3,133,189
Ukraine	17,294	7,632,858
Italy	16,814	10,013,571
Kazakhstan	11,041	2,070,800
Poland	9,031	3,427,633
Serbia	4,621	319,260
Moldova	967	25,329
France	259	175,152
Turkey	254	214,664
Kyrgyz Republic	168	11,118

Latin America & Caribbean

name	Orders100k	Orders
Costa Rica	54,554	2,779,089
Ecuador	21,710	3,830,385
Guatemala	14,244	2,401,442
Peru	13,861	4,570,438
Argentina	12,952	5,877,500
Panama	8,720	376,283
Honduras	5,281	523,089
Dominican Republic	4,183	453,874
Puerto Rico	240	7,695
Uruguay	207	7,211
Colombia	0	2

Other

name	Orders100k	Orders
Morocco	6,024	2,223,672
Cote d'Ivoire	3,034	800,560
Kenya	1,439	773,971
Egypt, Arab Rep.	104	107,103
Uganda	26	11,976

Outcomes

[▶ Supermarket](#)

Product data

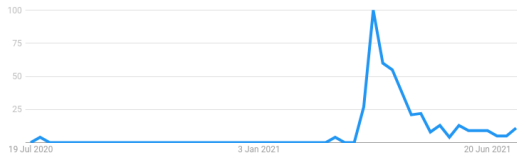
	order_id	product_id	name	quantity	collection_section	collection_name
811	110209044	13078251	Fingers de Pollo	1	Entrantes	Cartas
812	110209044	24647755	Papas fritas clásicas	1	Guarniciones	Cartas
813	110209044	13079717	Back to Burger	2	Burgers	Cartas

Outcomes

- % meat (supervised learning)
- % fish (supervised learning)
- CO₂ emissions (modelling using description and average emissions)
- Ordered plastic cutlery

Seaspiracy

- Popular movie about the negative effects of seafood and plastics on maritime ecosystem
- Shocking images and facts → many stories of people changing their consumption habits
- Netflix release → watched within few weeks after release
- Strategy: DiD, interact with local weather (watch Netflix if it rains)

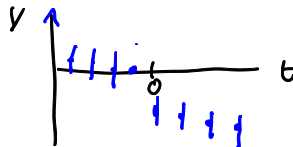


Strategy

$$Y_0 = \sum_{j=-20}^{-2} \beta_j \mathbb{1}(d(o) = j) + \sum_{j=0}^{20} \beta_j \mathbb{1}(d(o) = j)$$

$\underbrace{\hspace{1cm}}$
 order date
 - release date

$$+ \delta_{i(o)} + \delta_{d(o)} + \varepsilon_o$$



Other media events

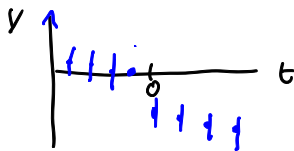
- Scientific news, IPCC reports
- Meat scandals
- TV ads for meat, for substitutes, against animal farming
- ...

Meat substitutes

- Cost of reducing consumptions depends on availability of close substitutes
- Exploit technological innovation – high moisture meat analogues (HMMA): Beyond Meat, Impossible Burger, Meati, ...
- Validation of assumption: plot N restaurants with substitutes over time
- Outcomes: meat/fish/etc consumption at that restaurant, overall consumption, % of orders at that restaurant, overall orders
- Heterogeneity: big restaurant (e.g. McDonalds) = brand loyalty

Fixed effects

$$y_0 = \sum_{j=-20}^{-2} \beta_j \mathbb{1}(d(0)=j) + \sum_{j=0}^{20} \beta_j \mathbb{1}(d(0)=j) \\ + \underbrace{\delta_{i(0)} \times \tau(0)}_{\text{indiv. - resto. FE}} + \delta_d(0) + \varepsilon_0$$

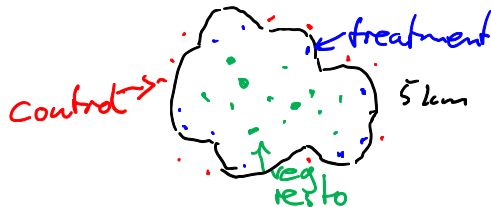


Regression discontinuity

$D_{it} \triangleq$ distance to closest veg.
restaurant

keep if $4\text{km} \leq D_{i(0)t(0)} \leq 6\text{km}$

$$Y_0 = \beta \mathbb{1}(D_{i(0)t(0)} \leq 5\text{km}) + \delta_{i(0)} + \delta_{d(0)} + \varepsilon_0$$



Descriptive statistics

Who

- Number of vegetarian/vegans/flexitarians/... [► Types](#)
- By house value (wealth), money spent (income), number of orders

Where/when

- Geographic spread: countries, states, urban vs. rural
- Trends over time, regional peaks in diet changes

Networks

- Neighborhood effects
- % meat in group orders vs. individual orders
- Exploit lock down measures: when confined to district, must have eaten with people who live close by

Other ideas I

Why/when

- Information: release of books
- Cost: price of meat (supply shortages)
- Fundamental preferences about animal welfare, environment
- Taste, culture
- Social norms, network, peer pressure, influencers
- Psychological: information processing, avoidance; cognitive dissonance, ability; memory
- Salience: eat less meat on Fridays with Fridays for future demonstrations (use local rain as instrument)
- Emotions: eat more meat when local football club loses

Other ideas II

How

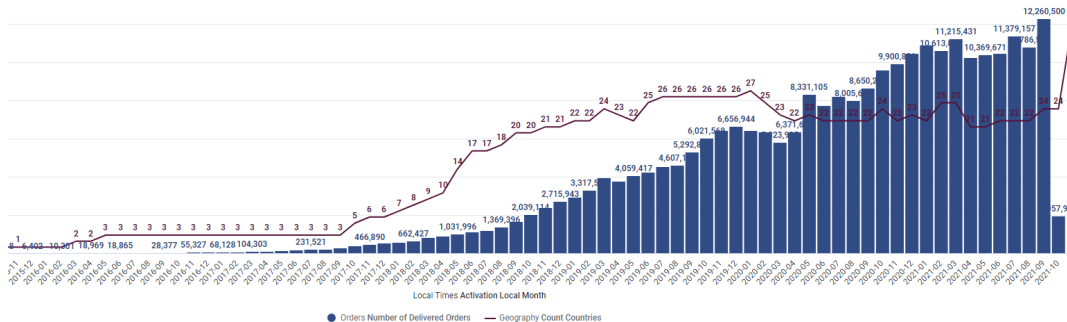
- Learning new taste/options → look at first vs. later reviews after change in diet

Supply

- Positive externalities ⇒ later-than-optimal entry: first local restaurant with veggie options gets bad reviews (lack of knowledge, stigma), then others can offer without paying this cost
- Learning: reviews over time

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Over time



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Supermarket

	order_id	product_id	name	quantity	collection_section	co
755	110206084	1107652691	Roler Preparado De Carne Picada De Vacuno Band...	1	HAMBURGUESAS Y PICADAS	Na
756	110206084	1107652697	Solomillo De Pavo Marinado (Peso Aprox. 600 Gr)	1	PAVO	Na
757	110206084	1107651737	Brócoli Pieza 500 Gr	2	BRÓCOLI, COLIFLOR Y ALCACHOFA	Na
758	110206084	1107651489	DIA Filetes De Merluza Del Cabo Sin Piel Bolsa...	1	PESCADO	Na
759	110206084	1107651485	DIA Anillas De Calamar A La Romana Bolsa 500 Gr	1	CALAMAR Y OTROS CEFALÓPODOS PREPARADOS	Na
760	110206084	1107652732	DIA Lavavajillas Mano Concentrado Botella 1 Lt	1	A MANO	Na
761	110206084	1107651711	DIA Guante Flocado Talla Mediana Bolsa 2 Uds	1	GUANTES	Na

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Types

