







Assessing policies for sustainable diets: Trade-offs and complementarities

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Outline

- Introduction to the complex environment
- Review of (potential) policy instruments for diet sustainability
- Evidence from policy instruments, potential trade-offs and complementarities
- Evaluating and assessing policies
- What to do???

sustainability and diets: an international issue

FAO: sustainable diets

UN: sustainable food systems: it is central policy objective in the UN's Zero Hunger Challenge and an explicit feature of Sustainable Development Goal 2 (SDG 2): 'end hunger, achieve food security and improved nutrition, and promote sustainable agriculture' (but it may affect also SDG1, SDG3, SDG12, SDG13...)

Paris Agreement on Climate Change the new CAP



European Commission's FOOD 2030 policy framework

inducing dietary changes as a mitigation tool: much to do!!

PACC: Percentage of countries addressing food related issues such as diet, health, agriculture, nutrition, food waste and feed in the INDCs/NDCs submitted by October 2018 (Source: Tirado et al.)



a complex environment for diet (food) policies



Multilayered influences beyond personal knowledge and preference alter food choices. Government can consider these influences as potential targets, barriers, facilitators, and effect modifiers of food policies. Ashfin et al., 2014

a complex relation





types of interventions

Typology	examples
Incentive/disincentives through fiscal measure	Taxes/subsidies, income support,
Change the governance of production and/or consumption	Macroeconomic policies, or sectorial policies (e.g. CAP), planning,
Collaboration and shared agreements	Voluntary agreements, certification schemes,
Inform, educate, and promote	Labelling, education programs, media advertising,
Change the context defaults of production/consumption	Changing the choice architecture, nudging, store layouts,

supply-side policies/interventions

- sustainable agriculture diversification
- reducing food loss and improving post-harvest management
- food processing for improved nutrition value
- product reformulation
- bio-fortification

. . . .

- food safety and ways to facilitate market access
- agricultural policies

supply-side policies/interventions

the rationale is to change production practices, to improve the 'sustainability' of the production (mainly environmental), ...

- consider the impact on production costs (price transmission)
- consider the impact on producers' profits (business)
- consider the socio-economic impact (rural environment, employment, ...)
- consider the dynamics in the 'environmental profile' of a food
- consider the possible change in the 'nutritional profile' of food
- consider the availability/accessibility of food
- the effect on dietary patterns?

Agricultural policies (CAP)

roughly 85-90% of the food Europe produces remains within the EU and is consumed or withdrawn in some way internally

Common Agricultural Policy

the effect of CAP greening (2013 reform) (see Gocht et al., 2017)

GHGE aggregate reduction: 0.20%

GHG emissions in reference scenario (kg CO2-equivalent/total ha)

the economic and ecological impacts of CAP greening are rather limited, although some farm types or MS may face greater changes



Greenhouse gas emissions decrease on average by -0.2% in the EU-28, but regional changes vary between -1.7% and +2.4% relative to the reference level

demand -side policies

Supporting more informed choices

(advertising restrictions)

public information campaigns

environmental education

labelling regulations

guidelines

food waste/loss

certification schemes

Changing the environment (market,...

fiscal measures (taxes, subsidies, ...)

regulations of consumption's environments (school, cantines,...)

food reformulation

accessibility

food waste/loss

demand-side policies/interventions

the rationale is to change consumption patterns, to improve the 'sustainability' of the consumption and the nutritional content, for example, eating more plants, or eating less meat, or...

- consider the relation between environmental goals and health (nutrition) goals (e.g., some plant production may have a high water use, or carbon footprint)
- consider the socio-economic impact and the distributional effects
- consider the whole supply-chain

- food waste

it is important to characterise consumption patterns, understand the main drivers, and the difference across populations, the motivations for undesirable practices, investigate how to change consumption,

fiscal measures (taxes, subsidies, ...)

empirical evaluation of taxes and subsidies (or a combination of the two), mainly for nutritional purposes (SSB taxes, fat taxes, ...)

issues:

- considering substitution effects among food categories and/or among nutrients and food components
- sustainable diets vs healthy diets: conflicts?
- statistically significant effects vs actual effects
- feasibility (high tax rate to have effective impacts)
- distributional impacts and regressivity
- the role of the food-supply chain structure: competitiveness?
- tax revenue or ...
- ex-ante evaluation (simulation) vs ex-post evaluation
- other issues?



fiscal measures (taxes, subsidies, ...): some examples



dietary changes:

taxes and subsidies

many empirical studies on fiscal measures on food

the SUSDIET project: why we need a policy to change diets project involving different countries, with the purpose of tackling sustainable diets and the link health-sustainability

SUSFOOD2 ERA-NET the H2020 ERA-net Cofund on Sustainable Food Production and Consumption



SUSDIET PROJECT

SUSFOOD

fiscal measures (taxes, subsidies, ...): some examples

dietary changes:

taxes and subsidies

some background information

the Susdiet project: why we need a policy to change diets



GHGE vs diet quality in self-selected diets



- trade-offs are observed across countries for all indicators: currently, relatively healthy diets are not the most climate friendly
- how can we combine current foods to achieve more healthy diets with lower climate impact?

the Susdiet project: why we need a policy to change diets



diet modelling - method



- imposing the nutritional constraints alone results in an increase in GHGE in most countries and both genders
- it is theoretically possible to reduce GHGE from 62 to 78% for men and from 63 to 75% for women

the Susdiet project: why we need a policy to change diets

how difficult is the dietary change? substitutions within and across food groups



- large dietary shifts are required, even at low levels of GHGE reductions
- compliance with nutritional recommendations and small reductions in
 - GHGE require mainly between-group substitutions
- higher GHGE levels require within-group substitutions
- cross-country heterogeneity in pattern of adjustment



SUSDIET PROJECT

fiscal measures (taxes, subsidies, ...)

the SUSDIET project has simulated the impact of a carbon tax in some EU countries, emphasising analogies and differences among them:

- a) use of a matrix of price and expenditure elasticities obtained with a common methodology (see before)
- b) adoption of a common set of simulation scenarios, exploring also the hypothesis of zero-tax-revenue schemes (with price compensation)
- c) analysis of the changes in the quality of the diets as a result of taxation



fiscal measures (taxes, subsidies, ...)

carbon taxes: scenarios (others: Wirsenius et al., 2011; Thow et al., 2014; Caillavet et al., 2016,

Edjabou and Smed, 2013)

Scheme	Scenario	Food Categories	Ad-valorem rate	Social cost of CO2	
I	Compensated/ Uncompensated	Beef and Veal	20%	0.05/0.015/0.2	
2	Compensated/ Uncompensated	Beef and veal, pork and processed meat, poultry and eggs 20%		0.05/0.015/0.2	
3	Compensated/ Uncompensated	All animal-based products	20%	0.05/0.015/0.2	
4	Uncompensated only	All food products	From 5 to 50%	-	

Note: The social costs of CO2 are expressed in ${\it \in}$ per Kg CO2-eq

unit or excise taxes

- 0.05€ per Kg CO2-eq represents the EU medium term projection of carbon price
- 0.015€ per Kg CO2-eq corresponds to the current average Emission Trading System (ETS) price
- 0.2€ per Kg CO2-eq which reflects the long-term EU projection of carbon price

note: values taken at the time of the simulation



SUSDIET PROJECT

carbon taxes: GHGE emissions reduction







GHGE (uncompensated, all animal based products)



fiscal measures (taxes, subsidies, ...)

carbon taxes: MAR











fiscal measures (taxes, subsidies, ...)

issues

- why do we have differences across countries?
 - matrix elasticities are different: crucial
 - demand specification and estimation (functional form? socioeconomic characteristics, modelling of structural parameters, ..., estimation)
 - data quality (panel data, cross-series, retail data, scanner data, ...)
 - time horizon of the data
 - *point* of evaluation
 - geographical heterogeneity due to country-specific characteristics not accounted for in estimation
 - local habits
 - culture/tradition
 - market environments



other possible effects

distributional effects

- demand models may address heterogeneity issues (micro data) in consumption eating patterns and price responsiveness
- many determinants of eating patterns (age, gender, education, social norms, income,)
- large empirical although not conclusive evidence on this issue (mainly on tax aiming at healthy diets)
- distributional effects, in terms of dietary response? of welfare?
- rebound-effects are possible

distributional effects

 CO_2^a

	Baseline	ENV		ENV-NUT	
	Mean	%	Mean	%	Mean
Modest					
-; 30[3417.04	-8.11	3139.83	-7.45	3162.50
[30; 45[4376.77	-8.18	4018.72	-7.41	4052.56
[45; 60[4406.92	-7.20	4089.64	-6.74	4109.92
[60; +	3689.43	-7.37	3417.51	-6.80	3438.65
Lower-average					
-; 30[3126.17	-8.18	2870.54	-7.52	2891.07
[30; 45[3922.95	-8.23	3600.24	-7.44	3631.12
[45; 60[4064.84	-7.30	3768.20	-6.78	3789.41
[60; +	3574.48	-7.42	3309.22	-6.96	3325.74
Upper-average					
-; 30[2796.39	-7.54	2585.44	-7.02	2599.96
[30; 45[3415.72	-7.76	3150.76	-7.06	3174.71
[45; 60[3828.24	-7.34	3547.10	-6.80	3567.77
[60; +	3373.60	-7.27	3128.40	-6.79	3144.66
Well-off					
-; 30[2829.92	-6.60	2643.00	-6.28	2652.33
[30; 45[2949.80	-7.57	2726.52	-7.05	2741.97
[45; 60[3473.14	-7.08	3227.29	-6.59	3244.40
[60; +	3304.29	-7.18	3067.14	-6.78	3080.32

the highest rate of reduction in environmental impact (CO_2) is **observed for the two lowest income groups** with the youngest, while the most-emitting households are the modest ones with heads in the middle of their lifecycle

ENV: tax on all food groups with animal content ENV-NUT: only on beef, cooked meats, animal fats, cheese and prepared mixed meals.

distributional effects

introducing fiscal measures only on some population targets? (for example, subsidisation programme limited to low-income group....)

other impacts (outcome variables)?

- mortality
- -

other effects?

most of the demand-level analyses assume that **taxes are fully transmitted to price** however this is a 'simplifying assumption'

- we need to account for the price transmission along the supplychain: imperfect pass-through (Cornelsen et al., 2014)
- we need to account for **market interrelations** (ex: the concept of total elasticities, ...): introducing taxes in PE models
- we need to account for strategic behaviour of firms (mainly processing firms and retailers): EIO literature (Bonnet and Requillart, 2013)

other effects? ... other approaches?

indirect effects of taxes (non price effects) for example, **taxes may reinforce efforts to educate consumers** (**signaling**): knowledge of a tax may produce a 'preference shift'

What about farmers?

other effects? ... other approaches?

ex-post evaluation

- data requirement
- quasi-experimental methods (causal inference may be problematic, various techniques such as difference-in-difference, average treatment effect, regression discontinuity designs, instrumental variables, propensity score matching, interrupted-time series, Bayesian synthetic control methods and counterfactual scenario analyses)
- definition of counterfactual
- panel data (balanced/unbalanced)

public (health) education

broadly categorised into four types:

- Public awareness campaigns
- Education in specific settings (i.e., schools)
- Skills training
- Changes to the food environment

provision of information, maybe associated with other initiatives (at the community level, or in workplaces, or in schools)

public (health) education

What do we know? (mainly from health-related studies)

- public campaigns influence people's knowledge and attitudes
- often it is difficult to relate evidence from empirical studies to actual impacts at the population level (in terms of health and/or environmental issues, like GHGE)
- mixed evidence mainly on the long-run effects
- more effective if population's segment at risk is targeted
- small evidence about the cost-effectiveness of such policies
- a reformulation response adopted by the industry
- likely to have public and policy makers' support

product labelling and information

- product labelling as an information tool

What do we know?

- most consumers read nutritional labelling, although important targets are less likely to use it (children, adolescents, obese,...)
- labelling is an important source of information for consumers and can be associated to diet shifts (healthier, more sustainable,...)
- the effectiveness of labels varies greatly across target population groups
- ...however, prices, convenience, taste, and habits are more important determinants
- there are studies also on carbon labeling, but with inconclusive results
- environmental (and ethical) labels communicate that a product is accredited (nutritional labels are not associated with some 'quality' standard)
- does the effect (of information provision) last?

product labelling and information

- certification schemes (sustainability)

What do we know?

- market opportunities for certification schemes are growing
- growth in trade
- sustainable price premia are needed
- product quality and safety may often outweigh the importance of sustainability
- not definitive evidence that certification schemes have positive economic and environmental effects for producers



Fair Trade

Animal Welfare

Rainforest Alliance

Carbon Footprint

food waste

food waste spoils valuable resources used in food production (water, energy, work, money), and produces additional CO_2 in rotting landfills, contributing to climate change

food waste also raises **ethical concerns** as valuable nutrients and calories are removed from the global supply, while nearly 1 billion people are under- or malnourished

food waste and loss is higher for F&V

(the hidden waste: obesity)

a new-paradigm: linear vs circular supply chains



food waste: legislation and policies

grouped as:

- Information and awareness raising campaigns
- Regulation
- Economic (market-based) instruments
- Nudging/change of consumer's choice architecture and
- Voluntary agreements



food waste

some issues/interventions

- measuring food waste
- raising awareness and education campaigns
- date stamps source of information or source of confusion? ('best before', 'use by', 'sell by', 'display until')
- inedible or just unwanted?
 (price reductions may help, use of apps)
- food bank programme
- guidelines (best practices) for food environments (in 2018, the Health ministry in Italy developed guidelines for school, hospital, company,..., canteens to reduce food waste: public procurement)

other interventions/considerations

- short food supply chains reduced transportation costs
- local vs global food supply chains
- green public procurement
- trade policies

some important issues

- trade of virtual water
- the role od trade in carbon footprint
- the role of trade for sustainable development
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other policies (macroeconomic,) affecting general trends

nudging: a complementary set od instruments

understanding what influences human behavior (desires, needs, social norms and values, institutional context, political climate,...)

use behavioural insights to design, implement and evaluate policies

... rational (i.e. utility max) *vs* non-rational (quasi-rational, bounded rationality,...) behavior

nudge: "... any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting the fruit at eye level counts as a nudge. Banning junk food does not". (Thaler and Sunstein, 2008)

nudging: policy tools to influence behaviour

Regulation of the individual	Fiscal measure directed at the individual		Non regulatory and non-fiscal measures with relation to individual		-fiscal n to		
Eliminate and restrict choice	Guide and enable choice						
	Incentives and information				Nudg	ring	
Laws and regulations	Fiscal incentives	Non-fiscal incentives	Provision of information	Simplification and framing of information	Changes to physical environment	Changes to the default policy	Use of social norms

nudging

the good and the bad of nudging good

- 'compatibility' with ideals of free market
- help policy makers to relate complex policy making processes and goals to individuals' daily decision-makings
- guiding citizens' choices (limited rationality)
- bad
- difficulty to design a policy intervention *right* and make sure that what works in a laboratory or intervention environment will produced the desired effect at the population level
- the complexity of implementing nudges at a societal scale has led some to doubt that the scale of the effect may be such to solve society's ills
- nudging has been criticised for placing too much focus on the System 1 type of thinking

nudging and food consumption

Nudge mechanisms used	Applications to food consumption	Evidence of effectiveness
Simplification and framing of information	Provide simplified information and signifiers	Small-scale studies in controlled environments indicate large impact; no large scale studies available; impact seems to vary for different segments of society
Changes to the physical environment	Change visibility and accessibility Influence size	Strong evidence in controlled environments (i.e. canteens; restaurants) Experiments with portion size and package size suggest strong impact
Changes to the default option	Positioning of product choice	Wide use in retailing suggests large impact; few studies available for pro- sustainable nudging
Use of social norms	Provide information about others' behaviour and ideal-type behaviour	Studies suggest effectiveness, particularly when behaviour is publically visible and in cases of uncertainty about appropriate behaviour

nudging

Critical issues for successful policies using nudges

- nudging works better in controlled environments (i.e., where there is a control by an authority, for example in canteens,...), and in public rather than in private contexts
- predispositions to certain nudges may be crucial
- unpredictable response and competing marketing forces
- real-life success of nudging is very limited
- understanding the target audience

policy evaluation and assessment

the concept of policy evaluation and assessment is based on the belief that more 'rational' policy-making can be achieved by applying analytical tools.

- determine the impact of a policy
- ex-ante vs ex-post evaluation
- assessing the relevance of a policy
- choosing among different policies

policy evaluation and assessment

A summary of the important issues

- Efficacy
- Implementation
- Distributional effects
- Unintended consequences
- Reactions

Policy Evaluation

- ex-ante vs ex-post evidence
- ex-ante assessment:

experimental approaches (including pilot policies, stated choice experiments, Virtual Supermarkets, etc.) allow evaluating the efficacy of policies prior to their implementation, through lab-field-natural experiments

- experiments (in controlled environments)
- randomised controlled trials (RCT)
- surveys

- qualitative research
- modeling interventions

key challenge is to know when and how the evaluations on efficacy (i.e. based on randomised samples) can be scaled up to estimate the effectiveness on the populations targeted by the policy

ex-post assessment: based on observational data, that are not collected through randomised designs or that may be affected by selection bias (e.g. selfselections).



Policy assessment: a relevant research issue

the issue of evaluating the effectiveness and the impact of policies

- JPI a healthy diet for a healthy life (DEDIPAC on the determinants of diet)
- SUSFOOD (SUSDIET) SUSFOOD 2
- INFORMAS (International Network for Food and Obesity/noncommunicable diseases Research, Monitoring and Action Support)
- SUSFANS: food systems for health, environements, equity and enterprises
- the PEN project

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the Cochrane grade system for assessing policy recommendations

(note: referred to health impact)

- guidelines are developed by multidisciplinary groups
- they are based on a systematic review of the scientific evidence;
- recommendations are explicitly linked to the supporting evidence and graded according to the strength of that evidence



POL

the (Cochrane) grade system for assessing policy recommendations is a system for rating the quality of a body of evidence in systematic reviews and other evidence syntheses

Key stages in developing recommendations

- Methodological evaluation
- Synthesis of evidence
- Considered judgement
- Grading system

Hierarchy of study types

- · Systematic reviews and meta-analyses of randomized controlled trials
- · Randomised controlled trials
- · Nonrandomised intervention studies
- · Observational studies
- · Non-experimental studies
- · Expert opinion

policy evaluation: methods

type	pros	cons
Experiments	Can establish causality, not only correlation Can provide statistically significant results from a relatively small sample size	Representativeness A laboratory is an unrealistic and artificial environment
Randomised control trials	Core findings can apply to other contexts Can establish causality, not only correlation Allow for observations in natural settings	Very expensive to run at a high level (and to replicate in order to validate results) Results from one location not generalisable to others
Surveys	Representativeness at a high level is feasible Relatively cost effective	Respondents are limited by pre- established options to questions Respondents bias (self-reported)
Qualitative research method	Provide richer, more nuanced data about behaviour Often take place in realistic settings Participants are given freedom to express themselves	Data collected are generally not representative of the larger population Usually have small samples due to the time and cost involved

Assessing policies: Policy Evaluation

for example, INFORMAS has developed a so-called FOOD-EPI (Food Environment Policy Index)

the index consists of two components (Policies and Infrastructure Support), 13 domains and 47 good practice indicators.





Assessing policies: Policy Evaluation

it is used **to assess and process the level of implementation of government policies and actions** to improve the healthiness of food environments (applications in many countries)

a similar approach to include sustainability (not just nutrition)?

- add the 'sustainability' dimension to the tool
- revise domains and good practice indicators
- understand the complementarities of different actions/tools in the computation of the index

(see Dora et al., 2015)

trade-offs between sustainable diets and healthy diets?

some final considerations

- a more integrated policy framework?

sustainable diets involve the entire food systems, non just the final consumption

sectorial policies (ex, CAP), may be less effective

there is a debate: move toward a more integrated approach, able to reconnect different policies in a multi – level and multi dimensional food policy framework: a Common Food Policy?

The focus of a new integrated approach

Quality for European food systems (and diet)

Security (and safety) for the world

Sustainability and mitigation

Circularity of food systems

Consumer-centric policy

People – planet - profit

Food 2030

Food 2030 - a timely EU research and innovation policy built on key Food and Nutrition Security priorities:

NUTRITION for sustainable and healthy diets

CLIMATE smart and environmentally sustainable food system

CIRCULARITY and resource efficiency of food systems

INNOVATION and empowerment of communities







Thank you for your attention!!

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