

How Choice Complexity in Liberalized Markets Hurts the Demand for Green Electricity



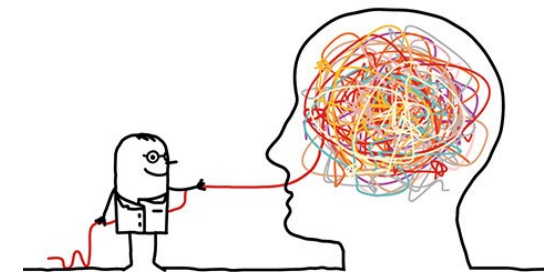
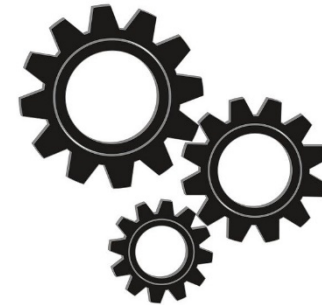
Building Competence. Crossing Borders.

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Manuel.Grieder@zhaw.ch, 22.01.2021, Energieforschungsgespäche Disentis

Introduction

- Liberalization of the household electricity market is “a possible option” in Switzerland
- According to standard economic predictions, liberalization should increase welfare via increased competition and increased consumer choice
- Standard assumptions: full rationality and well-defined preferences
- Behavioral economics perspective:
 - “Too much choice” can be overwhelming, especially when preferences are not clear (Chernev et al., 2015)
 - People are “boundedly rational” and use heuristics to reduce cognitive effort (e.g., Simon, 1997; Gigerenzer & Goldstein, 1996; Payne, 1985)



Evidence from already Liberalized Markets

- Positive effects of liberalization only materialize if consumers make active use of their freedom of choice
- Evidence from already liberalized markets shows that this is often not the case (see also Defeuilley, 2009)
- Example Germany:



Vetragsstruktur von Haushaltskunden 2016
Bundesnetzagentur Bundeskartellamt – Monitoringbericht 2017

What does Liberalization Mean for Consumers?

Current situation in Switzerland (monopolistic market):
A consumer can typically choose between 2 to 6 contracts.








Electricity contracts Stadtwerk Winterthur
(www.stadtwerk.winterthur.ch)

What does Liberalization Mean for Consumers?

Germany (liberalized market):

A consumer can choose between 200 to 400 contracts.

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20 WEITERE TARIFE LADEN			
Alle Tarife laden (228 von 449)			

Example from verivox.de

→ Liberalization leads to a massive increase in the size of the choice set for consumers

→ How do consumers deal with the increased choice?



How Do Consumers React to Increased Choice?

- For a fully rational consumer with unlimited cognitive capacity («homo oeconomicus») increased choice is no problem
 - For real human beings, a larger choice set means that the choice becomes more complex and requires more cognitive effort (Shiloh et al., 2001)
 - To reduce cognitive effort when facing large choice sets, consumers might apply simplified decision strategies (Bettman et al., 1991)
 - In particular, they might reduce the number of decision attributes they consider (Payne, 1976; Timmermans, 1993)
 - In the case of electricity, this means they might
 - focus more on the price
 - and less on environmental attributes
- This could hurt the demand for green electricity

Experimental Design – Basics

- Decision-making experiment
- Experimental design manipulates the choice set size
 - **Small Choice Set** («monopolistic market»): 6 contracts
 - **Large Choice Set** («liberalized market»): 60 contracts
- Implemented different **policy instruments** for fostering the demand for green electricity: *anchor contract (default)*, *prescriptive norm*, *descriptive norm*, *tax on conventional electricity*
- Contracts varied in price and in composition of energy sources
- Cheapest and most expensive contract the same in both choice set conditions
- Average price of contracts the same in small and large choice set conditions

Examples of Contracts

○ Stromvertrag: 54

Energiequelle	Anteil	Herkunft	Preis
Kern	95%	DE	9.20 CHF
Wasser	5%	CH	
Wind	0%		
Solar	0%		

○ Stromvertrag: 41

Energiequelle	Anteil	Herkunft	Preis
Kern	55%	CH	11.50 CHF
Wasser	25%	CH	
Wind	5%	DE	
Solar	15%	DE	

○ Stromvertrag: 28

Energiequelle	Anteil	Herkunft	Preis
Kern	60%	DE	10.30 CHF
Wasser	35%	CH	
Wind	0%		
Solar	5%	DE	

○ Stromvertrag: 59

Energiequelle	Anteil	Herkunft	Preis
Kern	10%	CH	14.60 CHF
Wasser	75%	CH	
Wind	0%		
Solar	15%	CH	

○ Stromvertrag: 3

Energiequelle	Anteil	Herkunft	Preis
Kern	70%	CH	11.30 CHF
Wasser	25%	CH	
Wind	5%	CH	
Solar	0%		

○ Stromvertrag: 39

Energiequelle	Anteil	Herkunft	Preis
Kern	80%	DE	9.70 CHF
Wasser	15%	CH	
Wind	0%		
Solar	5%	DE	

Experimental Set-up – Details

- Online decision-making experiment with a student sample (N = 1'212) and a nationally representative sample of participants (N = 610)
- Each participant received a budget of 22 CHF
 - Needed to buy an electricity contract from this budget
 - Kept the rest as compensation for participation
- Choice of an electricity contract (for 150 kWh)
 - Different electricity sources: nuclear, hydro, wind, solar energy
 - Different origins: Switzerland, Germany
 - Prices between 9 and 16.40 CHF
 - Prices derived from average end-consumer prices for corresponding electricity sources in Switzerland respectively Germany
- To ensure that choice has consequences also in terms of electricity production, experimenters bought certificates of origin corresponding to the choices made by participants

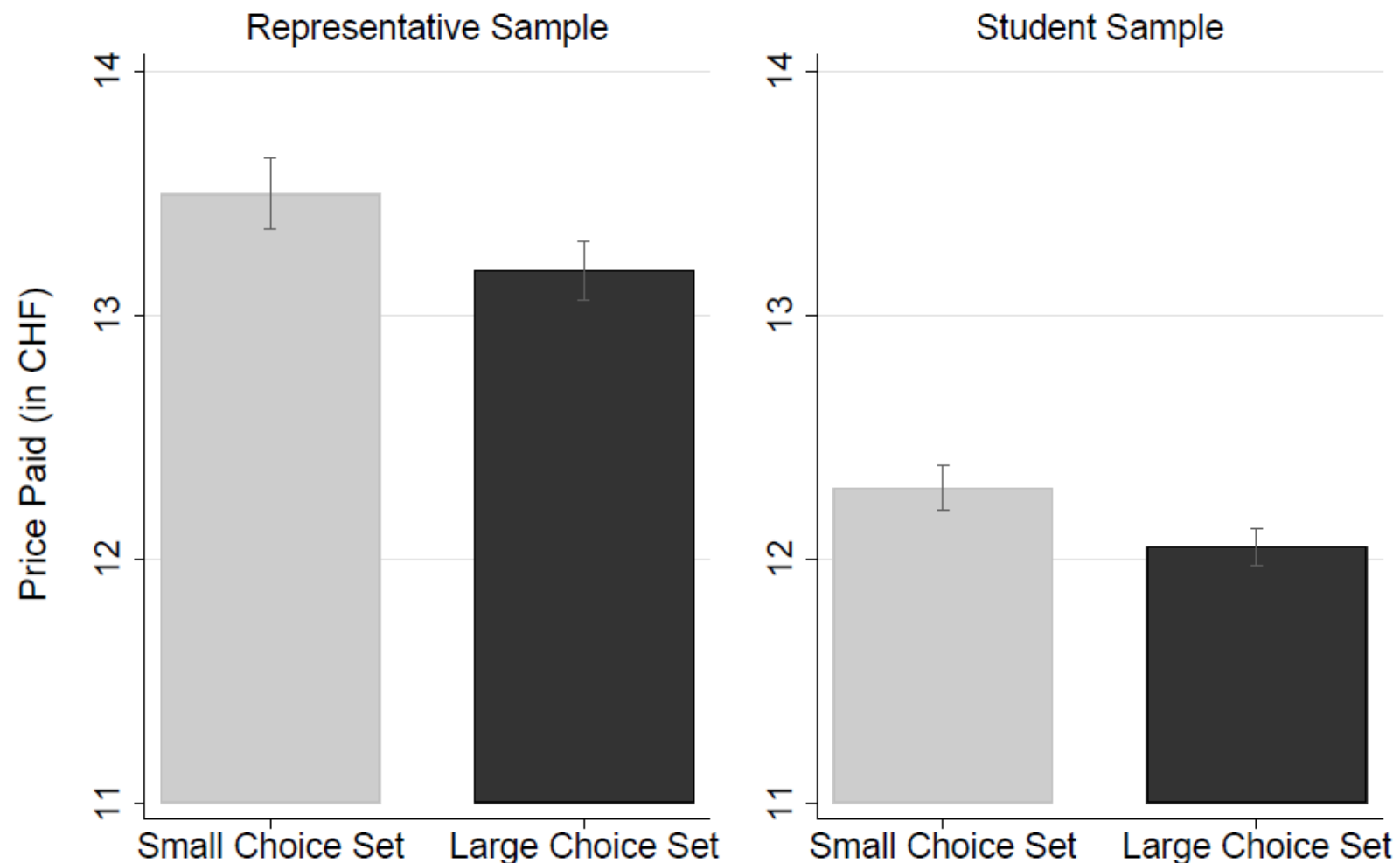
Overview of Samples

- Full design with student sample (N = 1'212)
- Reduced design with representative sample (N = 610)

	Small Choice Set (6 contracts) («Monopoly»)	Large Choice Set (60 contracts) («Liberalized Market»)
Policy Instrument	Baseline	Baseline <i>Representative sample</i>
	Anchor contract (default)	Anchor contract (default)
	Prescriptive Norm	Prescriptive Norm
	Descriptive Norm	Descriptive Norm
	Tax	Tax

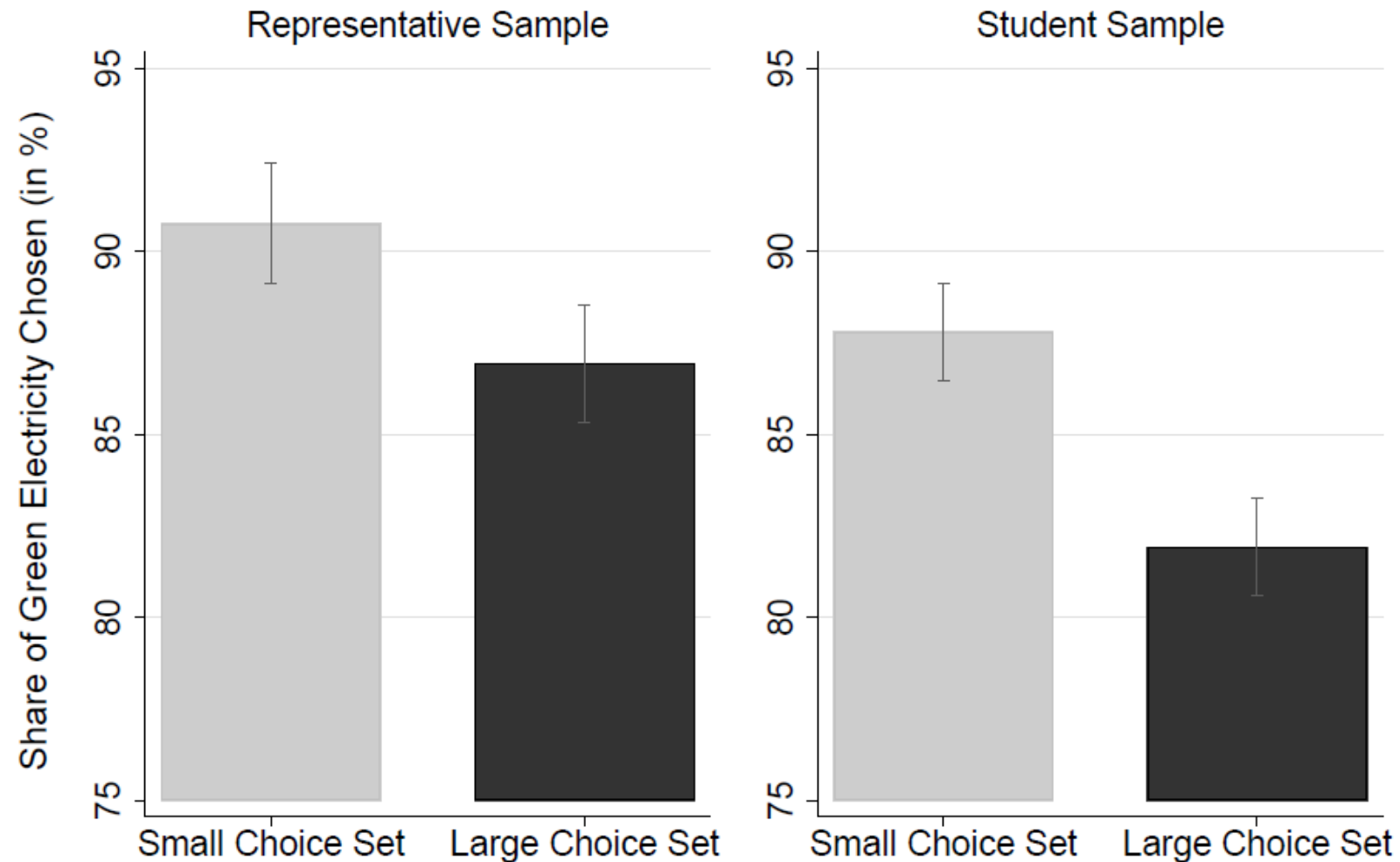
RESULTS

Effect of Large Choice Set: Price Paid



- In the large choice set, participants chose cheaper contracts both in the representative ($p=.097$) and the student sample ($p=.002$)

Effect of Large Choice Set: Green Choices



- In the large choice set, participants chose less green electricity both in the representative ($p=.095$) and the student sample ($p=.043$)

Effects of Policy Instruments

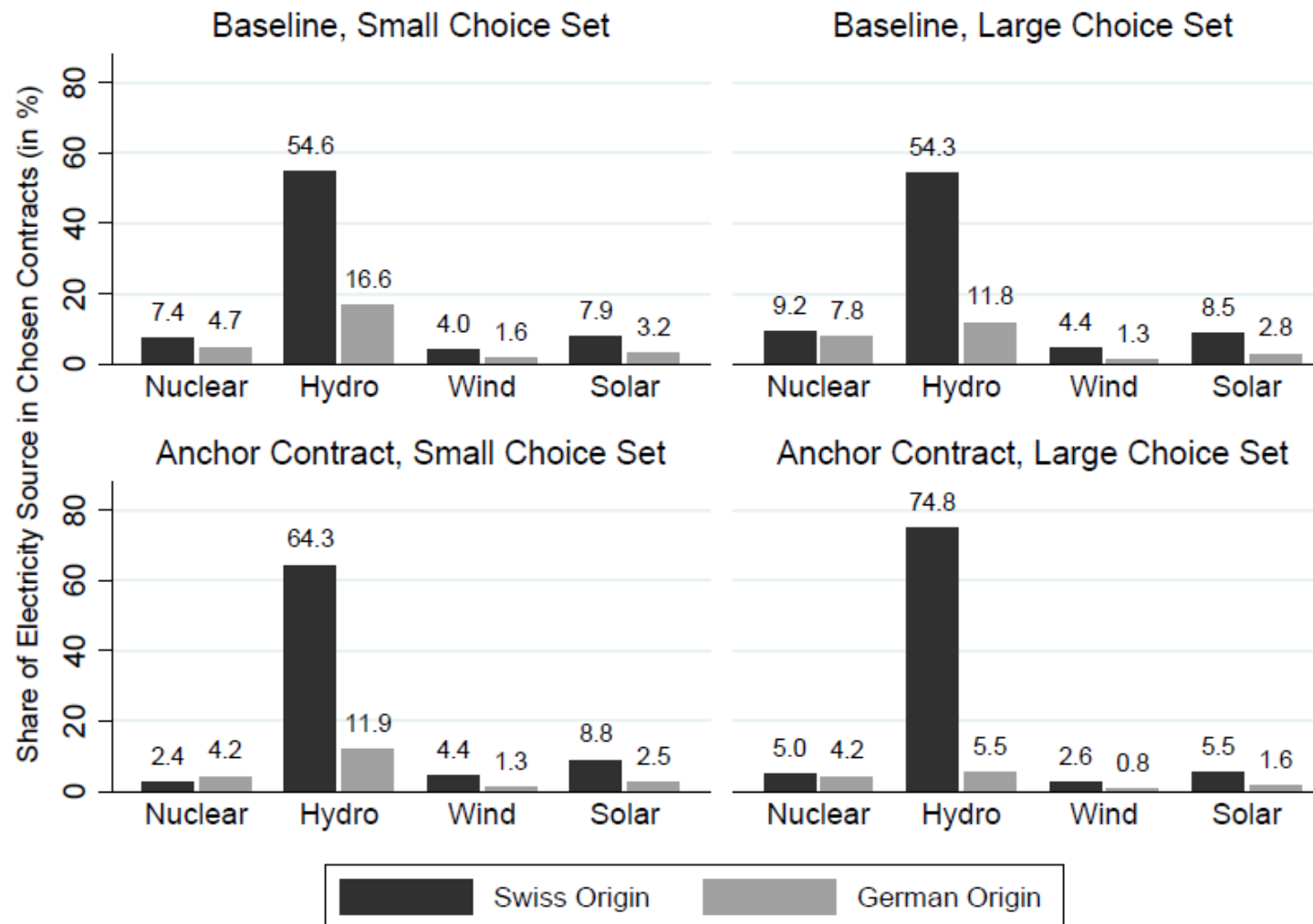
	Share of Green Electricity (in %)	
	(1)	(2)
	Small Choice Set	Large Choice Set
Anchor Contract	1.21 (4.28)	−5.02 (3.74)
Prescriptive Norm	6.32 (4.35)	−0.63 (4.12)
Descriptive Norm	5.11 (4.48)	−12.09*** (4.54)
Tax	16.12*** (3.22)	10.12*** (3.11)
Constant	82.89*** (3.07)	83.63*** (2.40)
R^2	0.029	0.042
Observations	607	605

* $p < .10$, ** $p < .05$, *** $p < .01$

- Behavioral instruments only have directionally positive effects in small choice set
- Descriptive norm even backfires in large choice set
- Tax is the most effective policy instrument
- Tax works both in small and large choice set

Preferences for Domestic vs. Foreign Sources (1)

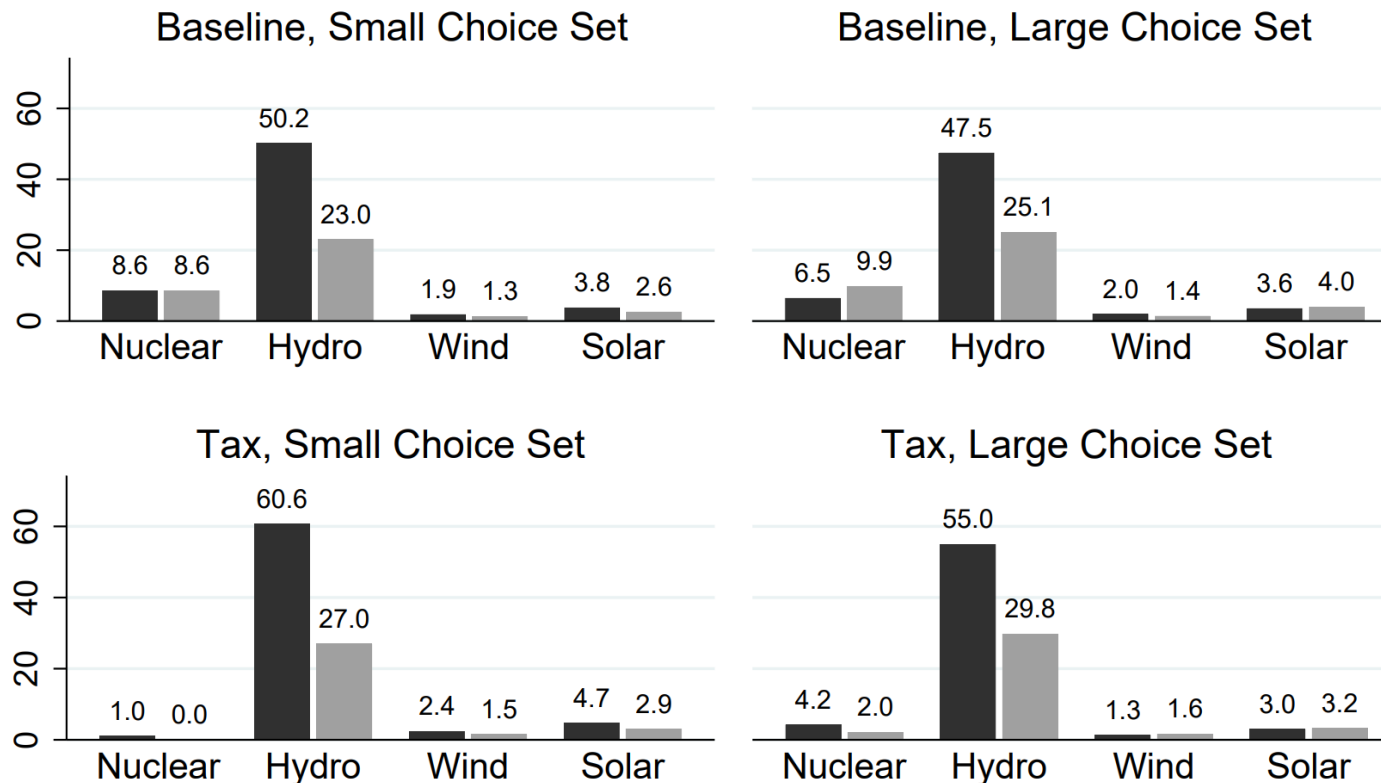
Results from representative sample:



- Clear preference for domestic sources (despite higher prices)
- Swiss hydro is particularly popular
- Anchor contract increases preference for Swiss hydro, particularly strongly in large choice set

Preferences for Domestic vs. Foreign Sources (2)

Results from *student* sample:



- Tax on conventional electricity (0.02 CHF / kWh) also has a positive effect on the demand for Hydro
- But part of the demand shift goes to foreign sources

Summary and Conclusions

- Increase of choice set size (in liberalized market) increases choice complexity and leads to a decrease in the share of green electricity chosen by consumers
- Effect may reduce the profitability of renewable electricity production, which undermines the required transition from conventional to renewable electricity sources
- To counter the effect, comparison platforms could provide simple “environment scores” for different contracts
- Tax on conventional electricity most effectively increases demand for green electricity according to our results
- Behavioral instruments are less effective than tax, and do not seem to work in large choice set condition
- Clear preference for domestic energy sources, despite higher prices

Thank you.



APPENDIX

Prescriptive Norm

Prescriptive Norm

In der Schweiz wird konventioneller Strom vor allem aus Kernenergie hergestellt. Diese Produktion hat den Nachteil, dass der dabei entstehende Abfall sehr gefährlich ist. Zudem hätten mögliche Atomkraftwerkunfälle verheerende Folgen für Mensch und Natur. Ökostrom, hingegen wird aus erneuerbaren Quellen wie Wind, Sonne, Biomasse, Wasser und Erdwärme gewonnen. Erneuerbare Energien haben den Vorteil, dass ihre Nutzung kaum Abfälle oder Schadstoffemissionen erzeugen. Ausserdem regenerieren sich diese Energiequellen immer wieder auf natürliche Art. Das Bundesamt für Energie (BfE) schlägt in der Energiestrategie 2050 deshalb vor, die Produktion und den Konsum von erneuerbaren Energien erheblich zu steigern.

Mit Ihrem Entscheid für einen Stromvertrag, der auf erneuerbaren Energien basiert, leisten Sie somit einen wichtigen Beitrag im Kampf gegen die globale Erwärmung, unterstützen die Energiestrategie 2050 des Bundes und helfen dabei, eine grünere Zukunft für Sie und Ihre Mitmenschen zu gestalten.

Descriptive Norm

Descriptive Norm

Die Auswertung der Stromkennzeichnung 2016 zeigt, dass mit 62 % fast zwei Drittel (2015: 58.3%) des in der Schweiz verbrauchten Stroms aus erneuerbaren Quellen (wie zum Beispiel Wind, Sonne, Wasser und Erdwärme) stammt. 2017 wurden total 15309 GWh/a oder 42.3% des Stroms aus erneuerbaren Quellen (2016: 14'183 GWh/a) in Form von bewusst gewählten Stromprodukten aus erneuerbaren Energien konsumiert. Dies entspricht gut 26% des gesamten Stromverbrauchs. In Bezug auf den privaten Konsum bedeutet dies, dass rund ein Drittel aller Schweizer Haushalte bewusst Stromprodukte aus erneuerbaren Energien bestellt.

Effects of Policy Instruments (1)

