



**UNIVERSITÉ
DE LORRAINE**



BETA
Bureau
d'économie
théorique
et appliquée

Consumer rationality and pricing: an experimental study applied to the water and electricity sectors

FSR conference, june 2020

Alexandre Mayol (Beta, Université de Lorraine)

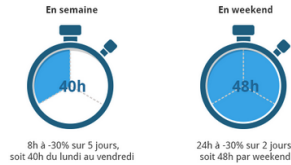
Carine Staropoli (PSE, Université Paris 1 Pathéon-Sorbonne)

What are we talking about?

Vous pourrez bénéficier des -30 %:

- ✓ **En semaine** : selon les horaires fixés localement par le gestionnaire du réseau public de distribution en fonction des conditions d'exploitation du réseau.
- ✓ **Tout le weekend** : du vendredi minuit au dimanche minuit.

Estimer vos économies



Service client: 05 94 28 49 00
 Votre service clientèle: 05 94 25 59 25
 Urgences 24h/24
 PAR COURRIER :
 DIRECTION ET SERVICE TECHNIQUE
 2738 ROUTE DE MONTABO
 BP 5027
 97305 CAYENNE CEDEX
 SERVICE CLIENTELE Ile de Cayenne
 Centre Commercial Kabary Cayenne
 Lundi au Vendredi de 7h15 à 14h00
 ACCUEIL CLIENTELE
 Tél : 0594 28 49 00
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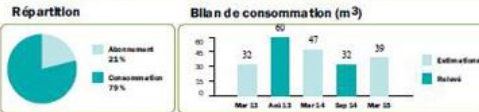
MESSAGES

Vous avez la possibilité de payer votre facture par téléphone au : 0594 31 30 30

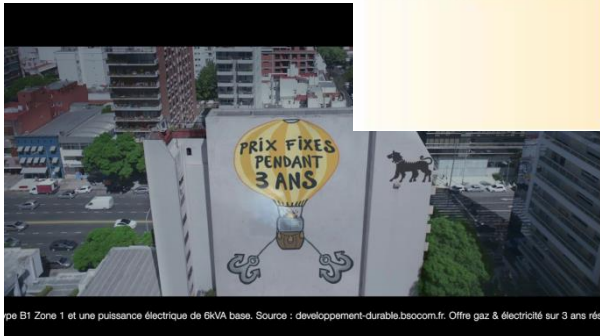
Facture semestrielle - Tarif EAU et ASSAINISSEMENT

FACTURE de Septembre 2014 à Mars 2015		détail au dos
VOTRE CONSOMMATION	39 m³	
PRODUCTION ET DISTRIBUTION DE L'EAU	55,07 €	
COLLECTE ET TRAITEMENT DES EAUX USEES	51,73 €	
ORGANISMES PUBLICS	11,23 €	
NET A PAYER	118,03 €	

Merci de régler cette facture à réception au plus tard le : 21/05/2015
Règlement à réception sans escompte



MADAME AR GLYS
CORTORREAL PERALTA
 Adresse desservie :
 3 EME ETAGE
 106 AVENUE DU GENERAL DE GAULLE
 97300 CAYENNE

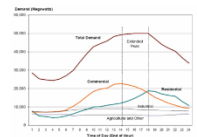
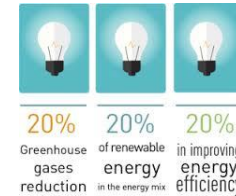


Choisir les Heures Week-End c'est faire le bon choix !

Vous pouvez faire des économies sur votre facture d'électricité en décalant l'utilisation de vos appareils électriques le week-end et les jours fériés, lorsque le prix du kWh est plus avantageux.

EDF
 VERT ÉLECTRIQUE AUTO
 LA NOUVELLE OFFRE VERTE D'EDF
 POUR LA MOBILITÉ ÉLECTRIQUE

Context : multidimensional paradigm shift, *Retail competition, smart meters & climate change*



- **Consume less**
- **Consume « better »** (flexibility, prosumer, renewable sources)

⇒ **Need for new tarif** to send the « right signal » → incite consumer to adopt proper behaviors ↔ « smart consumers »: saving

Diversity of tariffs

Time variant pricing (TVP)

Real-time pricing (RTP)
Time-of-use pricing (TOU)
Variable Peak pricing (VPP)
Critical peak pricing (CPP)
Peak-time rebates (PTR)
Critical Peak Rebate (CPR)
...

Others

Flat tariffs
Two-part tariffs
Tiered Rates

- Increasing-block rate
- Declining block rate

Pre-paid tariff
Pay monthly bill with carryover
Pay monthly bill without carryover
Green tariffs
....

Which one to choose ?

Research questions

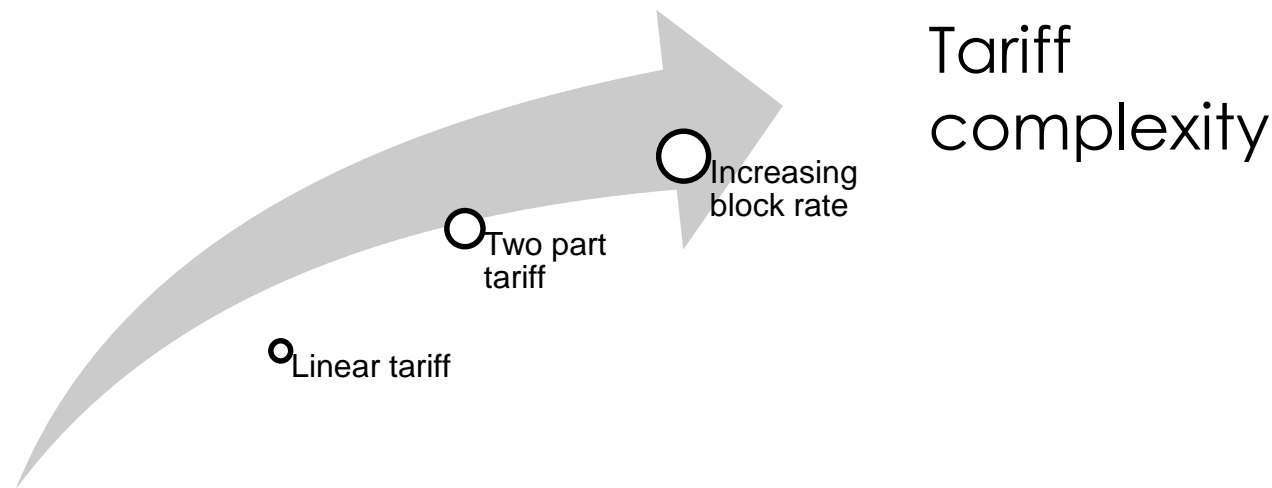
1. How do consumers perceive tariff?
2. How do consumers accept tariff (adapt their behaviors accordingly) ?

→ **Methodology** : field experiment



Our experiment in the lab

1. Assess subjects' attitude toward different tariff (+/- complex)
2. Identify specific biases that may hinder comprehension and acceptability by consumers
3. Disentangle the different motivations for the rejection of more complex tariff
4. Identify a “good effect”: Water vs. Electricity



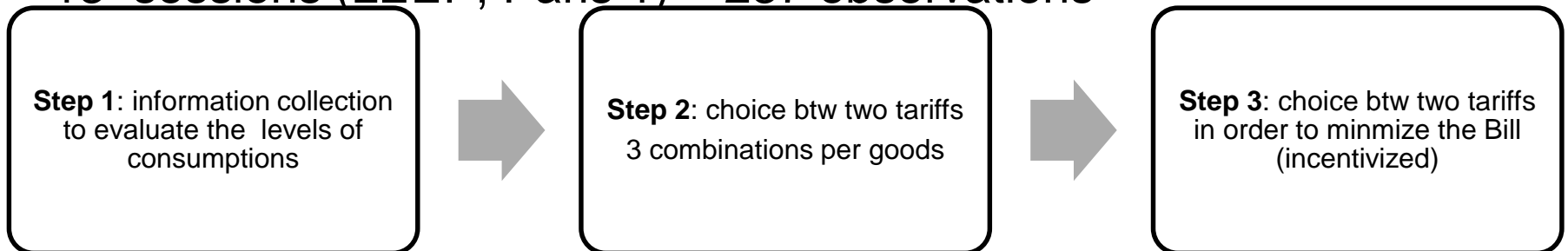
Experimental design

Frame field experiment

- Non standard subjects pool: **representative consumers (electricity & water)**
- Electricity & water framed context of decision with elicitation of subjects' household annual consumptions (KWh/m³)

237 participants

13 sessions (LEEP, Paris 1) – 237 observations



+ Risk elicitation test (Eckel et al. 2012)

+ Rationality test

+ Final questionnaire (choice (qualitative) explanation...)

Conjectures

1. **Subjects prefer simplest tariff** : Lineartariff < two-parttariff < IncreasingBlocktariff
2. **No good effect**: same tariff choice no matter the good
3. **When we incentivize, higher is the preference for the complex tariffs**

Data

Descriptive statistics about the main control variables :

- N = 237
- 47 % in Paris (53% IDF)
- 32 % women / 68 % men
- 37 % tenant / 63 % property owner
- 13,08 % in house (87 % in apartment)

Set of variables

– Control variables:

Table 2 Summary statistics for the control variables

Variable	Mean	Std. Dev.
Owner	0.338	0.474
House	0.131	0.338
Scoreratio	0.671	1.109
Paris	0.473	0.5
nPersons	2.384	1.347
Age	47.245	15.205
Gender	0.321	0.468
Income	4642.308	5121.815

Set of variables

- **Set of variables about the un-incentivised choices :**
 - Score of the number of choices of a type of tariff for water and electricity

Table 3 Summary statistics for the variables of preferences (without incentives)

Variable	Mean	Std. Dev.
pref_progressive_elec	0.219	0.415
pref_two-part_elec	0.232	0.423
pref_linear_elec	0.439	0.497
pref_progressive_water	0.219	0.415
pref_two-part_water	0.346	0.477
pref_linear_water	0.325	0.469
indif_elec	0.042	0.201
indif_water	0.063	0.244

Set of variables

- **Set of variables about the incentivised choices**
:
 - Score of the number of choices of a type of tariff for water and electricity

Table 4 Summary statistics for the variables of preferences (with incentives)

Variable	Mean	Std. Dev.
pref_progressive_elec_p2	0.257	0.438
pref_two-part_elec_p2	0.232	0.423
pref_linear_elec_p2	0.422	0.495
pref_progressive_water_p2	0.257	0.438
pref_two-part_water_p2	0.346	0.477
pref_linear_water_p2	0.3	0.459
indif_elec_p2	0.055	0.228
indif_water_p2	0.034	0.181

Set of variables

- Difference between incentivised and un-incentivised choices :

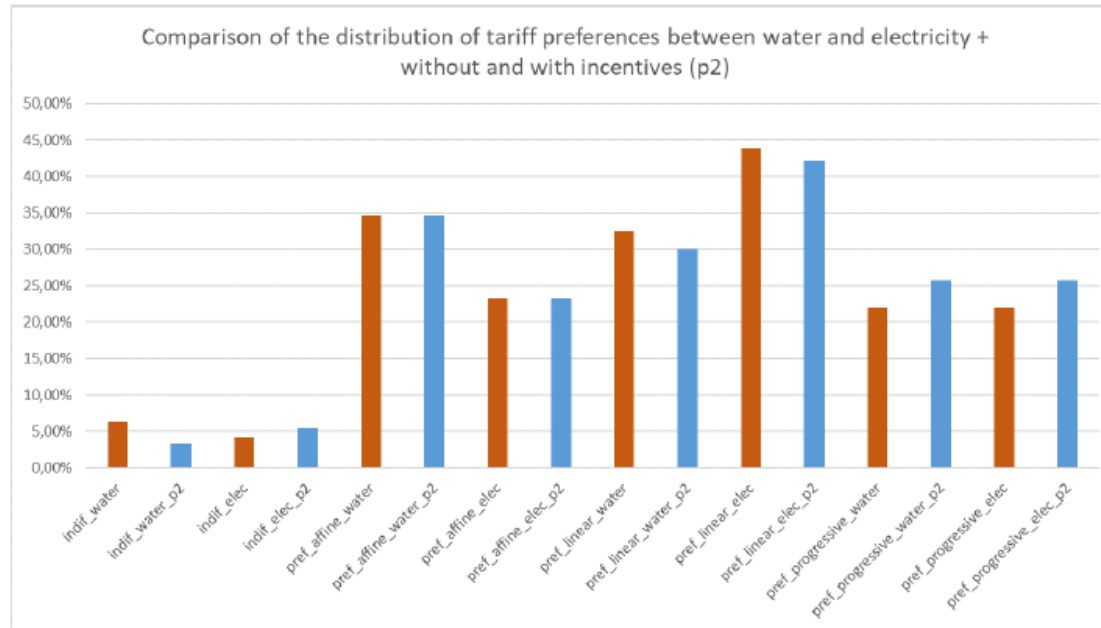


Fig. 3 Number of persons per household.

Set of variables

- **Set of variables about the individual preferences to explain the different choices**

Question	Name of the variable
1. When choosing my prices, I have given priority to...	
1.1. ...the simplicity of the tariff	pref11
1.2. ...predictability of the invoice	pref12
1.3. ...the most financially advantageous.	pref13
2. On a daily basis, you seek to reduce your electricity consumption.	pref2
3. On a daily basis, you want to reduce your water consumption.	pref3
4. What is your motivation to reduce your electricity consumption?	
4.1. Reduce your bill	pref41
4.2. Avoiding waste	pref42
4.3. Participating in the fight against global warming	pref43
4.4. Other...	pref44
5. What is your motivation for reducing your water consumption?	pref5
5.1. Reduce your bill	pref51
5.2. Avoiding waste	pref52
5.3. Participating in the fight against drought	pref53
5.4. Other...	
6. You are willing to accept a decrease in comfort or a change of habit to reduce your water consumption.	pref6
7. You are willing to accept a decrease in comfort or a change of habit to reduce your electricity consumption.	pref7
8. Your effort should result in savings on your bill.	pref8

Table 5 Questions explaining consumer choices and the names of the variables.

Probit models

1. **Model 1** : probit model to explain the main parameters of the un-incentivised choice
2. **Model 2** : probit model to explain the incentivised choice (by including the answers from the part 1)

Results

– Without incentives :

- Good effect (electricity \neq water)
- Less rationality and strong preference for easiest tariffs
- The socio-demographic factors are more significant

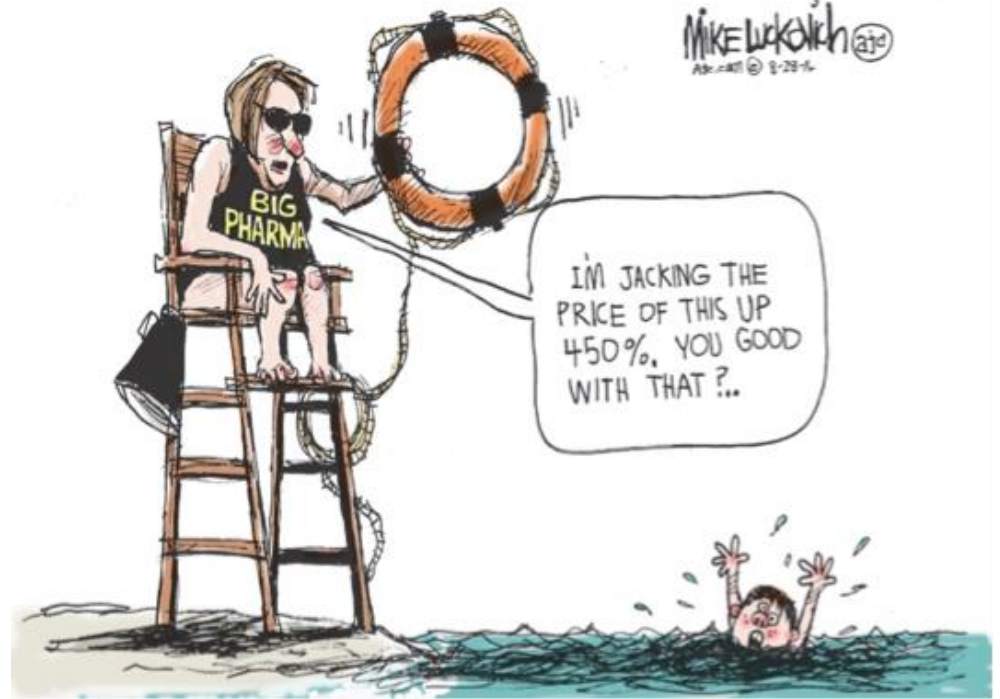
– With incentives :

- better understanding of the tariffs
- More rational choices to minimize the bill
- Decreasing of the « good effect »
- ...but the easiest tariffs always are dominant

Conclusion

- When we encourage the consumer, she improves her rationality
- Tariff design seems like a tool for changing behavior
- The effect diminishes when we help the decision (nudge effect?)
- **But, this effect is partial !**
- **Morality : a “false good idea” ?**

Conclusion



Thanks for your attention !