Flat-Rate versus Pay-per-Use Pricing

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Munich, July 13, 2005

CONSUMERS CAN CHOOSE BETWEEN OPTIONAL TARIFFS – AOL Internet

CONSUMERS CAN CHOOSE BETWEEN OPTIONAL TARIFFS – AOL Phone

AOL PHONE

Tarifübersicht

Tarifname:	AOL Phone® Fun	AOL Phone® FreeWeekend	AOL Phone® Flat
Grundgebühr	0,- €	6,90 €	19,90 €*
Einmalige Einrichtungsgebühr	0,- €	0,- €	0,- €
Gespräche zwischen AOL-Phone-Kunden	0,- ct. / Min.	0,- ct. / Min.	0,- ct. / Min.
Nationale Festnetzgespräche, Mo.-Fr. (pro Min.) 0-24 Uhr	1,5 ct. / Min.	1,5 ct. / Min.	0,- ct. / Min.
Nationale Festnetzgespräche, Sa.-So., sowie bundeseinheitliche Feiertage (pro Min.)	1,5 ct. / Min.	0,- ct. / Min.	0,- ct. / Min.
Nationale Mobilgespräche (pro Min.)	20 ct. / Min.		
Mindestlaufzeit	keine	1 Monat	1 Monat

CONSUMERS CAN CHOOSE BETWEEN OPTIONAL TARIFFS – T-Mobile

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T-Mobile

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Relax Tarife

Einfach, transparent und günstig - mit den neuen Relax-Tarifen[1)] können Sie - ab der ersten Minute entspannt mobil telefonieren. Nutzen Sie jetzt die Vorteile der günstigen Paketpreise mit 50, 100, 200 oder 500 Inklusivminuten mit und ohne Handy.

Ihr T-Mobile Tarif: Relax mit Handy

Tarif	Inklusivminuten	Monatlicher Paketpreis mit Inklusivminuten	Monatlicher Grundpreis
Relax 50	50 Minuten	15,- €/Monat	0,- €
Relax 100	100 Minuten	25,- €/Monat	0,- €
Relax 200	200 Minuten	50,- €/Monat	0,- €
Relax 500	500 Minuten	100,- €/Monat	0,- €

Ihr T-Mobile Tarif: Relax ohne Handy

SuperSpar-Vorteil!

Tarif	Inklusivminuten	Monatlicher Paketpreis mit Inklusivminuten	Monatlicher Grundpreis
Relax 50	50 Minuten	10,- €/Monat	0,- €
Relax 100	100 Minuten	20,- €/Monat	0,- €
Relax 200	200 Minuten	45,- €/Monat	0,- €
Relax 500	500 Minuten	95,- €/Monat	0,- €

Ihr Warenkorb

1. Ihr Gerät
2. Ihr Tarif
3. Ihre Option(en)
4. Ihr Zubehör

Gesamt 0,00 €

Neu

Onlinevorteile

Beratung

- Handyfinder
- Handyvergleich
- Tarifberater

Service & Hilfe

- Qualität von T-Mobile
- Tarifwechsel
- TwinCard

CONSUMERS CAN CHOOSE BETWEEN OPTIONAL TARIFFS – Verizon

1 Select plan minutes

Select	Monthly Home Airtime Minutes	Promotions	Monthly Access	Additional Minutes
○	400	Unlimited IN Calling Plus Unlimited Night & Weekend Home Airtime Minutes	$ 39,99	$0.45
○	500	Unlimited IN Calling Plus Unlimited Night & Weekend Home Airtime Minutes	$ 49,99	$0.40
○	800	Unlimited IN Calling Plus Unlimited Night & Weekend Home Airtime Minutes	$ 59,99	$0.40
○	1200	Unlimited IN Calling Plus Unlimited Night & Weekend Home Airtime Minutes	$ 79,99	$0.35
○	2000	Unlimited IN Calling Plus Unlimited Night & Weekend Home Airtime Minutes	$ 99,99	$0.25
○	3000	Unlimited IN Calling Plus Unlimited Night & Weekend Home Airtime Minutes	$ 149,99	$0.25
○	4000	Unlimited IN Calling Plus Unlimited Night & Weekend Home Airtime Minutes	$ 199,99	$0.20
○	6000	Unlimited IN Calling Plus Unlimited Night & Weekend Home Airtime Minutes	$ 299,99	$0.20

- Domestic long distance is included from the America's Choice Home Airtime Rate and Coverage Area (airtime charges apply).
- Domestic roaming is 69¢/minute (includes long distance charges).

Companies can react (1/2)

verizon wireless

P.O. Box 19769
Irvine, CA 92623-9769

PRESORTED
FIRST-CLASS
U.S. POSTAGE PAID
Santa Ana, CA
Permit No. 459

Applies to wireless number(s) ending with: 4921

Odet Metzer
119 Escondido Vlg. Apt. 9B
Stanford, CA 94305-7111

Offer expires May 31, 2004

CPS0341A

Companies can react (2/2)

Dear Verizon Wireless Customer:

Our records indicate that you may be able to save money each month just by switching your calling plan.

With the Worry Free Guarantee,℠ exclusively from Verizon Wireless, you can change your calling plan at no additional charge. And you won't have to buy a new phone! (New Customer Agreement may be required.)

Please call us toll free at 1-866-396-2444, Monday–Friday 7am–9pm, Saturday–Sunday 8am–6pm PST, to find out how you can make this simple change and start saving. We look forward to hearing from you.

Subject to service agreement and calling plan. Up to $175 early termination fee. Taxes, other charges and restrictions apply.

OBJECTIVES OF TODAY'S PRESENTATION

- Analyze the existence of tariff-choice biases
- Analyze potential causes of tariff-choice biases
- Examine consequences of tariff-choice biases
- Derive implications

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

AGENDA

- **Current evidence on tariff-choice biases: Existence, causes and consequences**
- Empirical studies on tariff-choice biases
  - Analysis 1: Existence of tariff-choice biases
  - Analysis 2: Causes of flat-rate bias (survey data)
  - Analysis 3: Causes of tariff-choice biases (usage data)
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STRONG EVIDENCE FOR FLAT-RATE BIAS AND WEAK EVIDENCE FOR PAY-PER-USE BIAS IN TELEPHONE USAGE DATA

Author	Data	Results on flat rate [illegible]
Train / McFadden / Ben-Akiva (1987)	Telephone usage data of 2,963 households	• Tariff specific constant in logit model shows • preference for flat rate vs. pay-per-use tariff • preference for flat rate for more extended area vs. flat rate for smaller area
Hobson /Spady (1988)	Telephone usage data of 172 single person households	Preference of flat rate [illegible] tariff
Train / Ben-Akiva / Atherton (1989)	Telephone usage data of 520 households	Tariff specific constant in logit model shows preference for flat rate vs. pay-per-use-tariff Tariff specific constant in logit model shows preference for tariff with call allowance vs. tariff without call allowance
Kling / van der Ploeg (1990)	Telephone usage data of 1,456 households, survey data of 860 households	Preference of flat rate vs. pay-per-use-tariff
Mitchell / Vogelsang (1991)	Telephone usage data of 151,000 households from an AT&T tariff experiment (additional control group of 60,000 households)	Consumers with zero usage choose tariff with allowance instead of pay-per-use-tariff 45% of consumers who pay a fixed fee for discounts in the evening and on weekends use less than the breakeven volume between tariffs
Kridel / Lehman / Weisman (1993)	Telephone usage data of households	65% of flat rate customers would save money [illegible] tariff 10% of [illegible]
	Telephone usage data of 2,786 households	• 76% of flat-rate customers would save money in the pay-per-use tariff • 3% of pay-per-use customers would save money in the flat rate • Amount of flat-rate bias is 9.49 USD
Miravete (2002a)	Usage data of 1,542 households from a tariff experiment	6% - 12% [illegible] per-use-tariff 62% - 67% of pay-per-use customers would [illegible] the flat rate

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

FOUR POTENTIAL CAUSES OF THE FLAT-RATE BIAS HAVE BEEN IDENTIFIED

Insurance effect	• Consumers choose flat rate to avoid variation in monthly billing rate
Taxi meter effect	• Consumers enjoy consumption more if it is decoupled from payment
Convenience effect	• Consumers choose flat rate because choice is more convenient than identifying and examining alternative tariffs

Overestimation effect	• Consumers overestimate their own demand, due to
	  • overestimation of minimum and maximum usage,
	  • time inconsistent preferences, self-control/self-discipline

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

WE ANALYZE EXISTENCE, CAUSES AND CONSEQUENCES OF TARIFF-CHOICE BIASES BASED ON TRANSACTIONAL AND SURVEY DATA

Focus today

Objectives	Type of data and subjects		
	Data set 1	Data set 2	Data set 3
	Transactional data	Survey data 1	Survey data 2
	10,882 customers of an Internet Service Provider	241 MBA students	1,078 customers of an Internet Service Provider
(i) Analyze existence of biases	✓	✓	
(ii) Develop and validate scales and measure causes of flat-rate bias		✓	
(iii) Analyze impact of causes on existence of tariff-choice biases from transactional data and validate scales	✓		✓
(iv) Examine consequences of tariff-choice biases	✓		

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

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ANALYSIS 1 FOCUSES ON THE EXISTENCE OF TARIFF-CHOICE BIASES

Objective of Analysis 1

- Validate the existence of flat-rate and pay-per-use bias in the context of Internet access tariff choice and provide results on
  - Relative importance of flat-rate and pay-per-use bias
  - Regularity and time-consistency of tariff-choice biases
  - Amounts consumers with tariff-choice biases pay "too much"

Data

- More than 6 mio. Internet DSL connections for more than 10,000 customers of an Internet Service Provider
- Customers have chosen one of three optional DSL-tariffs which differ with regard to their allowance and fixed fee
- Illustrative example:

	Fixed fee per month (Euro)	Allowance (MB)	Usage fee for additional MB (in Euro)
Tariff 1	5.00	1000	0,015
Tariff 2	12.00	4000	0,015
Flat rate	25.00	unlimited	-

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

EXISTENCE OF TARIFF CHOICE BIASES WILL BE DETERMINED BASED ON TWO CRITERIA

Definition flat-rate bias

- A flat-rate bias exists if consumers prefer a tariff with a higher fixed fee although they would save money in a tariff with a lower fixed fee
- Thus the notion of a flat-rate bias is extended to all tariffs with a higher than optimal allowance and fixed fee

Definition pay-per-use bias

- A pay-per-use bias exists if consumers prefer a tariff with a lower fixed fee although they would save money in a tariff with a higher fixed fee
- Thus pay-per-use bias applies to all tariffs with a lower than optimal allowance and fixed fee

Criteria

- **Criterion 1 - "Overall wrong"**
  Another tariff than the chosen tariff is advantageous if a consumer would pay less in sum over all periods analyzed
- **Criterion 2 - "Always wrong"**
  Another tariff than the chosen tariff is advantageous if the consumer would pay less in each of the periods

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

UP TO 48% OF USERS IN A TARIFF WITH FLAT-RATE BIAS

Users with flat-rate bias
Users in correct tariff
Users with pay-per-use bias

Share of users per tariff

Criterion 1: "Overall wrong"

3 Months		Best Tariff		
		Tariff 1	Tariff 2	Flat Rate
Chosen Tariff	Tariff 1	93.7%	5.3%	1.0%
	Tariff 2	48.1%	43.4%	8.5%
	Flat Rate	19.8%	8.4%	71.8%

N=10882

Criterion 2: "Always wrong"

3 Months		Best Tariff		
		Tariff 1	Tariff 2	Flat Rate
Chosen Tariff	Tariff 1	98.7%	1.2%	0.1%
	Tariff 2	37.6%	61.1%	1.3%
	Flat Rate	17.6%	7.8%	74.8%

N=10882

- **Strong flat-rate bias**
  - Up to 48% of users with a higher than optimal allowance
  - Share of users with bias only slightly decreases from criterion 1 to criterion 2 indicating that for a large proportion flat-rate bias occurs regularly
- **Pay per Use-Bias less important**
  - Up to 9% of users with lower than optimal allowance
  - Share of users with bias strongly decreases from criterion 1 to criterion 2 indicating that only for few users regularity of pay-per-use bias

Analysis of five months shows high time-consistency for flat-rate bias and low time-consistency for pay-per-use bias

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

ANALYSIS OF FIVE MONTHS CONFIRMS RESULTS

Users with flat-rate bias
Users in correct tariff
Users with pay-per-use bias

Share of users per tariff

Criterion 1: "Overall wrong"

5 Months		Best Tariff		
		Tariff 1	Tariff 2	Flat Rate
Chosen Tariff	Tariff 1	94.5%	4.7%	0.8%
	Tariff 2	46.4%	47.8%	5.8%
	Flat Rate	14.3%	12.0%	73.7%

N=7559

Criterion 2: "Always wrong"

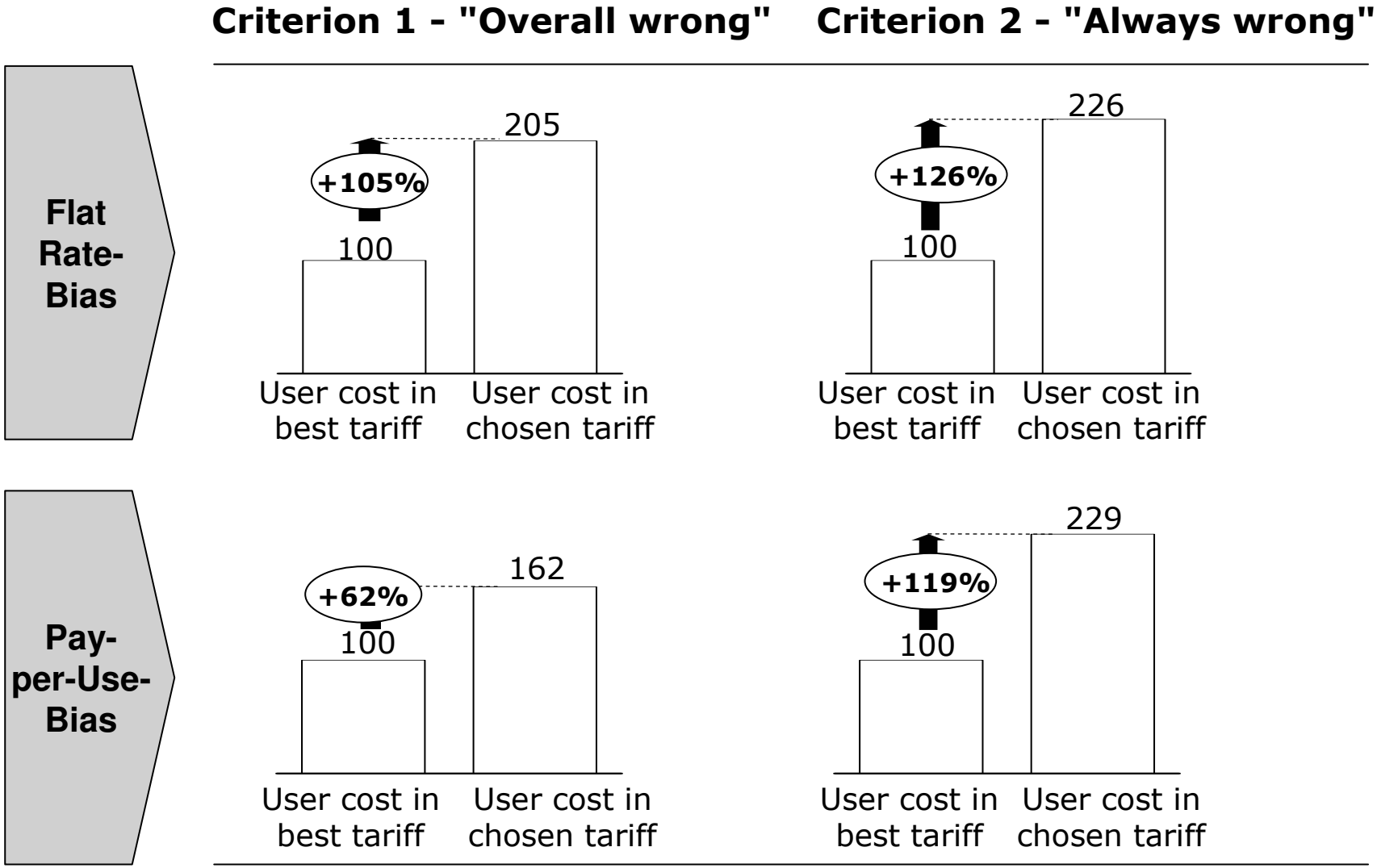
5 Months		Best Tariff		
		Tariff 1	Tariff 2	Flat Rate
Chosen Tariff	Tariff 1	99.6%	0.4%	0.0%
	Tariff 2	29.3%	70.4%	0.3%
	Flat Rate	10.5%	10.5%	79.0%

N=7559

- **Flat-rate bias confirmed**
  - Analysis of five months confirms that large number of users have flat-rate bias
- **Pay-per-use bias strongly reduced**
  - Analysis of five months confirms existence of pay-per-use bias
  - Yet number of people with pay-per-use-bais is trongly reduced and pay-per-use bias nealy vanishes in criterion 2

Source: Research Project "Tariff Choice Biases", Goethe University Frankfurt, Germany

USERS WITH FLAT-RATE BIAS PAY ON AVERAGE 105%-126% MORE, USERS WITH PAY-PER-USE BIAS 63%-111%



Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

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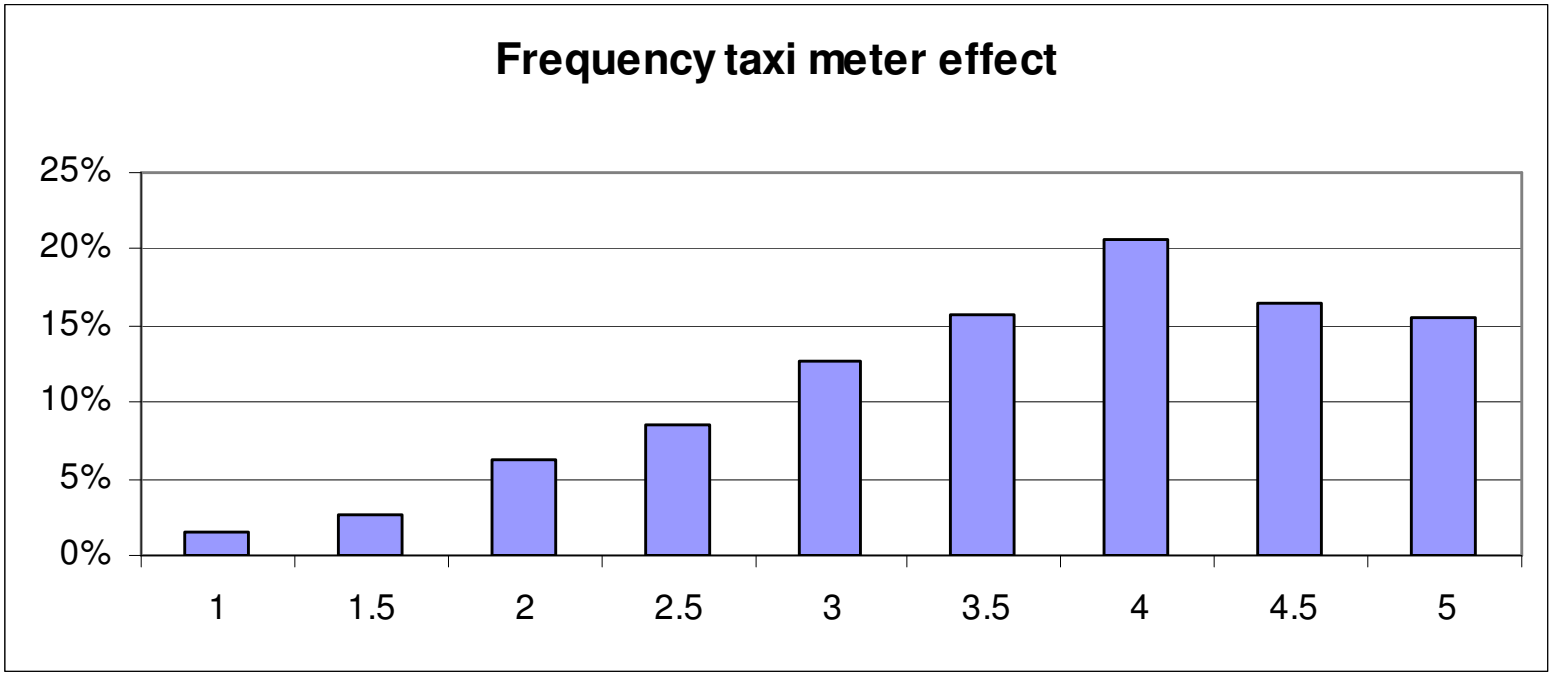
TAXI METER, INSURANCE AND CONVENIENCE EFFECT ARE MEASURED THROUGH MULTI-ITEM SCALES

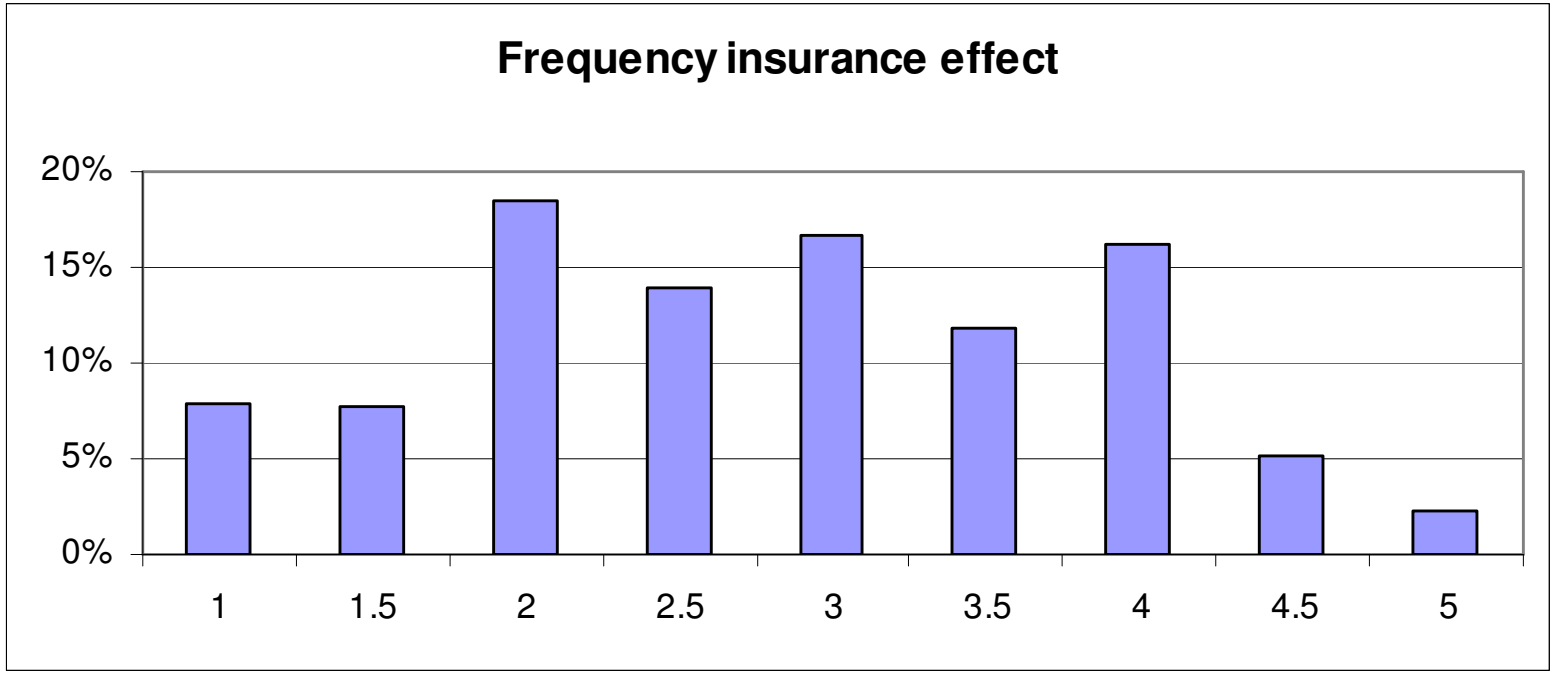
- **Taxi meter effect**
  - The flat rate is great because I do not have to worry about costs
  - I enjoy surfing on the Internet less if my bill increases with every minute
  - Only when I access the Internet with a flat rate, I really have fun surfing
  - I feel more independent when using the Internet when I have a flat rate than a pay-per-use tariff
- **Insurance effect**
  - To be sure that cost for Internet access will never be higher than a fixed fee, I am willing to pay more on average
  - Even if a flat rate is somewhat more expensive, I am satisfied because cost do not exceed a fixed fee
- **Convenience effect**
  - It is not worth the time investment it takes to calculate which tariff is cheapest
  - It takes far too much time to get all information on prices for Internet access
  - The money one can save when looking for a tariff which is cheaper than the tariff one uses right now is not worth it
  - Due to the amount of time it takes to switch to a cheaper tariff, it is not worth doing so

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

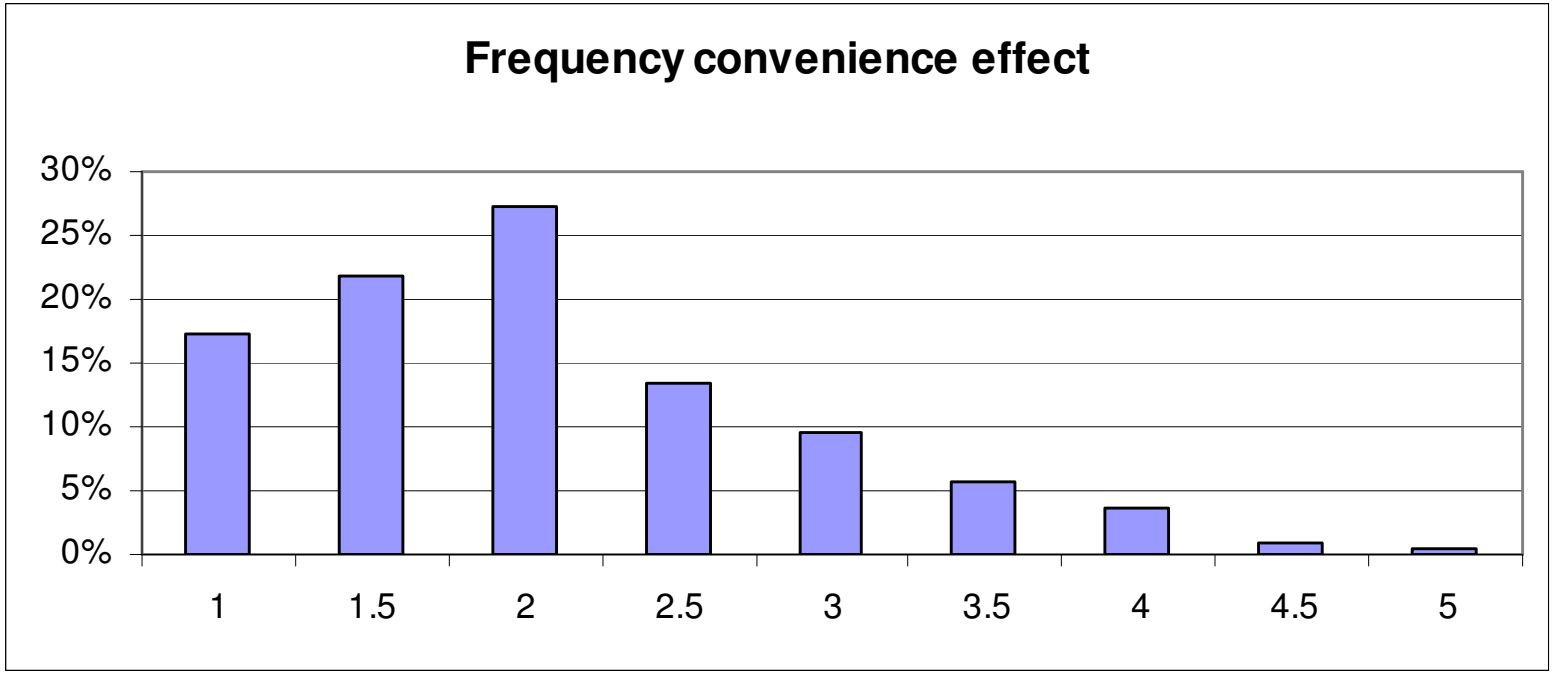
Distribution of Taxi Meter Effect across Consumers



Distribution of Insurance Effect across Consumers



Distribution of Convenience Effect across Consumers



USERS OFTEN OVERESTIMATE THEIR MAXIMUM USAGE

- Users in all tariffs over- or underestimate their usage
  - Users are particularly bad at estimating their maximum usage
  - Users particularly overestimate their maximum usage
- Results complement Analysis 2 that demonstrates that likelihood of flat-rate bias increase with higher maximum and minimum usage

	Tariff		
	Tariff 1	Tariff 2	Flatrate
Average usage			
Strong underestimation (> 1000 MB)	3.0%	11.4%	31.0%
Good estimation (+/- 1000 MB)	87.1%	71.8%	38.0%
Strong overestimation (> 1000 MB)	12.9%	16.8%	31.0%
Maximum usage			
Strong underestimation (> 1000 MB)	4.9%	10.9%	24.1%
Good estimation (+/- 1000 MB)	75.3%	52.1%	44.9%
Strong overestimation (> 1000 MB)	19.8%	37.0%	31.0%
Minimum usage			
Strong underestimation (> 1000 MB)	2.2%	10.9%	31.0%
Good estimation (+/- 1000 MB)	92.7%	79.3%	44.9%
Strong overestimation (> 1000 MB)	7.3%	9.8%	24.1%

N=941

Source: Research Project "Tariff Choice Biases", Goethe University Frankfurt, Germany

TAXI METER, INSURANCE AND OVER-/UNDERESTIMATION EFFECT IMPACT TARIFF CHOICE BIASES

Dependent variable: Existence of flat rate or pay-per-use-bias in criterion 1 ("overall wrong")

Flat rate-bias	Results for coefficients		
Variable	Coefficient	Standard deviation	Odd Ratio
Constant	-4.721 ***	0.553	
Taxi meter effect	0.242 **	0.145	1.273
Insurance effect	0.358 ***	0.131	1.430
Convenience effect	0.098	0.130	1.102
Overestimation effect			
- Average usage	0.116	0.125	1.123
- Minimum usage	-0.125	0.115	0.882
- Maximum usage	0.299 ***	0.069	1.349
Pay-per-use-bias			
Constant	-3.689 ***	0.612	
Taxi meter effect	0.270	0.168	1.310
Insurance effect	0.121	0.155	1.129
Convenience effect	-0.013	0.167	0.987
Underestimation effect			
- Average usage	-0.360 ***	0.162	0.698
- Minimum usage	0.143	0.125	1.154
- Maximum usage	-0.578 ***	0.115	0.561

Results for overall model	
Significance (likelihood ratio test)	0.000
Nagelkerke R^2	27.3%
Correct Classification$^+$	81.9%

** Significant at 0,1

*** Significant at 0,01

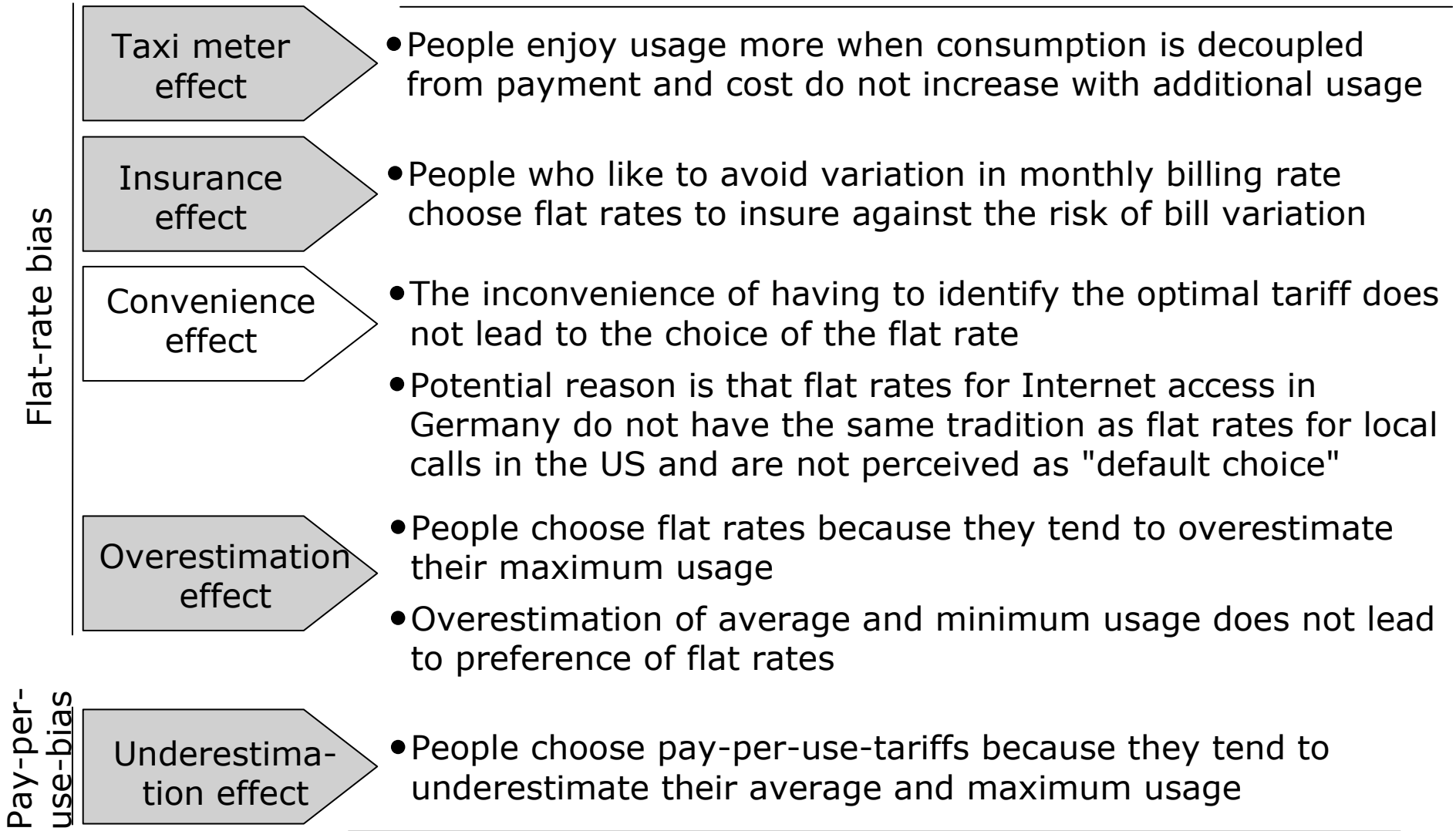
$^+$ Exceeds PPC that is not mentioned due to confidentiality

n = 941

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

THREE CAUSES OF THE FLAT-RATE BIAS HAVE BEEN IDENTIFIED

Causes for tariff-choice biases



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USERS WITH PAY-PER-USE BIAS HAVE EXCEPTIONALLY LARGE CONTRACT CANCELLATION PROBABILITY

Users with flat-rate bias
Users in correct tariff
Users with pay-per-use bias

- Tariff switching

Criterion 1: "Overall wrong"

3 Months		Best Tariff			Sig	
		Tariff 1	Tariff 2	Flat R.	FRB	PPUB
Chosen Tariff	Tariff 1		4.5%	5.0%		***
	Tariff 2	1.1%		2.2%		
	Flat R.	0.0%	4.5%			

*** Difference is significant at 0.01

N=10882

- Customer churn

Criterion 1: "Overall wrong"

3 Months		Best Tariff			Sig	
		Tariff 1	Tariff 2	Flat R.	FRB	PPUB
Chosen Tariff	Tariff 1		7.4%	21.1%		***
	Tariff 2	-0.7%		17.6%		***
	Flat R.	2.1%	0.8%			

*** Difference is significant at 0.01

N=10882

- Tariff switching
  - Users with flat-rate bias not with significantly higher tariff switching probability
  - Users of tariff 1 with pay-per-use bias with slightly higher probability to switch tariffs
- Contract cancellation
  - Users with flat-rate bias not with higher contract cancellation probability
  - Users with pay-per-use bias with exceptionally large contract cancellation probability

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

ESTIMATION OF PROFIT IMPLICATIONS

Short-term profit implication

- Data
  - Usage volume and prices are given
  - Costs are estimated at 2,50 Euro/GB
- Calculation
  - Calculation of profit for real tariff chosen for all customers with flat-rate/pay-per-use bias
  - Based on same usage volume, calculation of profit for cost-minimizing tariff for all customers with flat-rate/ pay-per-use bias
  - Difference indicates additional profits due to tariff-choice biases

Long-term profit implications

- Additional requirements
  - Analysis of long-term profit needs to consider that
    - higher customer churn and
    - customer migration

    can decrease higher short-term profits
- Calculation
  - Customer migration model (Dwyer 1997) allows to consider that higher profits due to "wrong" tariff choice level off over time
  - Customer lifetime value (Gupta/ Lehman/Stuart 2004, Gupta/ Lehmann 2003) takes into account trade-off between higher short-term profits and higher customer churn

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany,

ONLY FLAT-RATE BIAS LEADS TO HIGHER LONG-TERM PROFIT

	Criterion 1		Criterion 2	
	Flat-Rate Bias	Pay-per-Use Bias	Flat-Rate Bias	Pay-per-Use Bias
Short-term profit	141.1%	157.0%	181.7%	283.2%
Long-term profit, discount rate 8%	81.2%	-13.0%	130.0%	-8.1%
Long-term profit, discount rate 10%	86.5%	-8.0%	134.9%	-2.0%
Long-term profit, discount rate 12%	90.8%	-3.4%	138.9%	3.7%
Long-term profit, discount rate 14%	94.5%	0.8%	142.1%	9.1%
Long-term profit, discount rate 16%	97.5%	4.8%	144.9%	14.2%

- Flat-Rate Bias
  - Short-term profit effect clearly positive
  - Long-term profit effect clearly positive
- Pay-per-Use Bias
  - Short-term profit effect clearly positive
  - Long-term profit effect can be negative or positive. Even if positive it is often not far from zero

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

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SUMMARY OF RESULTS - FLAT-RATE BIAS and PAY-PER-USE BIAS

- Flat-rates:
  - Greater enjoyment of usage
  - Insurance against risk of bill variation
  - Overestimation of usage is a cognitive mistake which also causes flat-rate bias
  - Flat-rates have a tariff-specific willingness-to-pay
  - For the provider, the flat rate-bias has clearly positive profit implications
- Pay-per-use rates:
  - Occurs because of an underestimation of usage (cognitive error)
  - consumers tend to correct their tariff choice once they become aware of their cognitive mistake
  - Consumers attribute the "mistake" in tariff choice to the provider which leads to an exceptionally high cancellation rate

Source: Research Project "Tariff-Choice Biases", Goethe University Frankfurt, Germany

Further Information

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