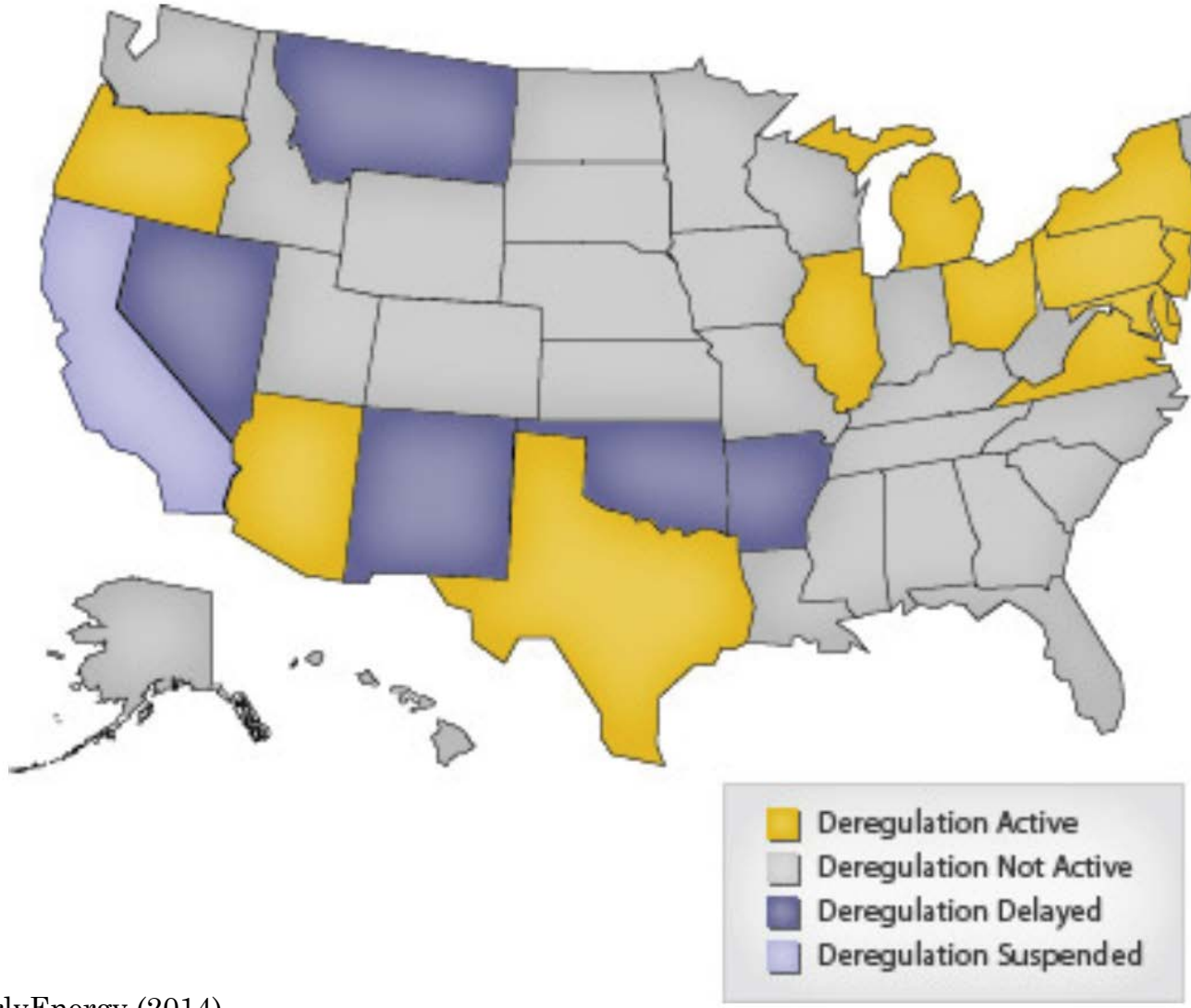
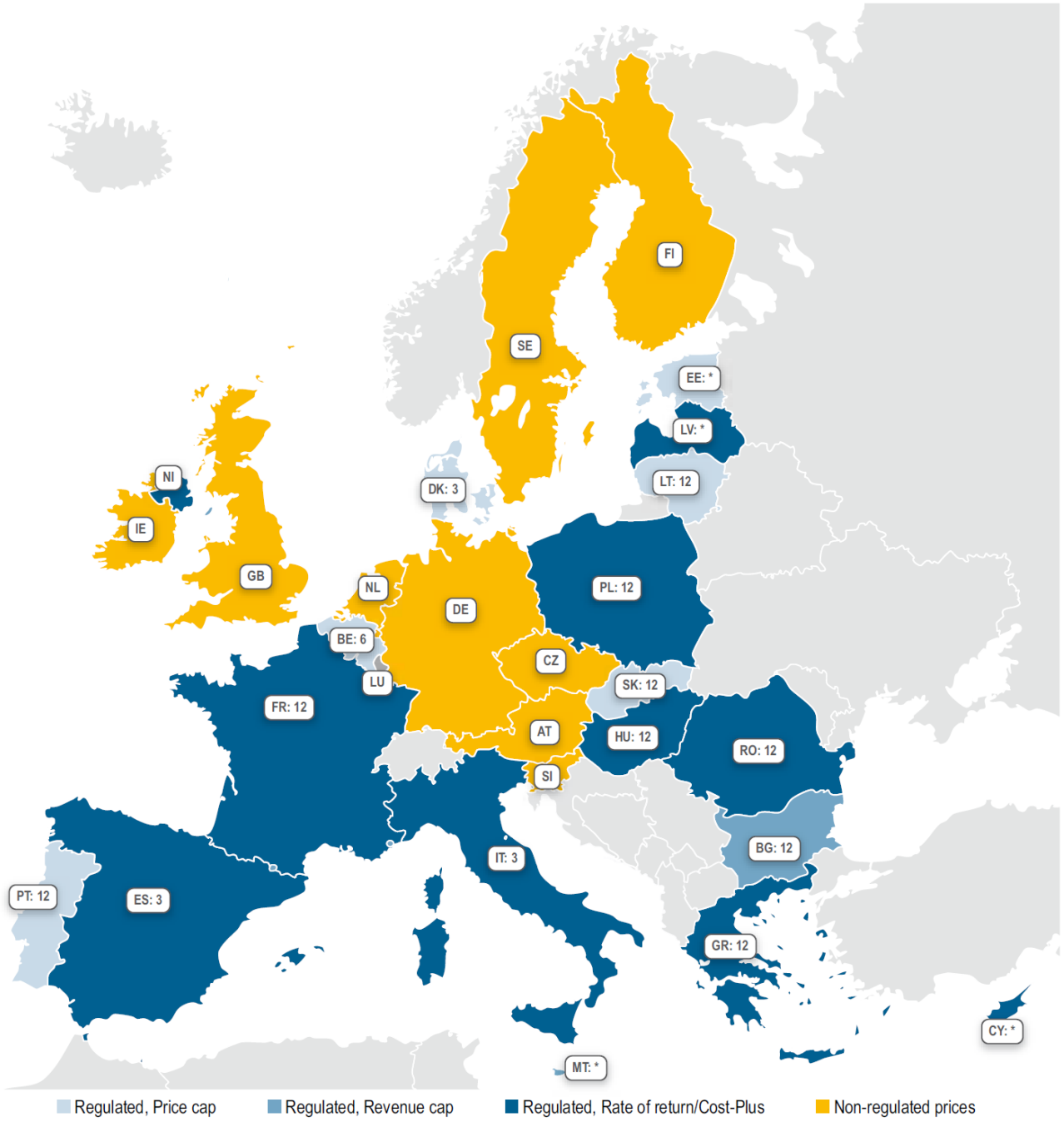
Challenges in Pricing Retail Electricity Efficiently

Steve Puller (Texas A&M and NBER)

There is a Mix of "Deregulated" and Regulated Retail Electricity



Source: ClearlyEnergy (2014)



Source: CEER national indicators database and ACER questionnaire on regulated prices (2013)

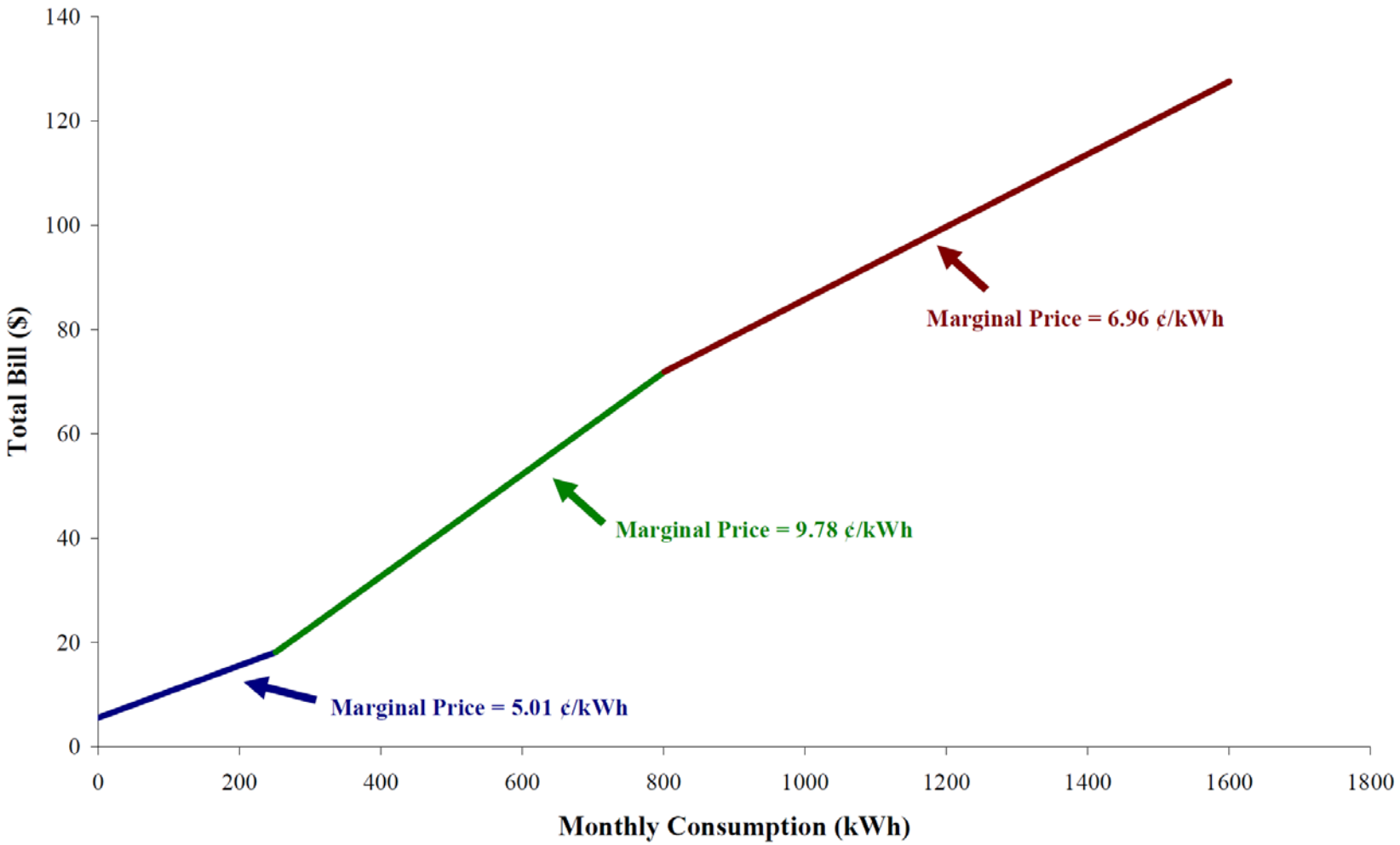
Two Major Themes of My Talk

1. Sending "the right" consumption signals through prices is difficult
   - What signals do (residential) consumers respond to, and what are the implications for how we set tariffs and bill consumers?
     - (These are fundamental complications on top of net metering, incorporating carbon costs…)
2. Opening retail markets to competition can have "growing pains"
   - Consumers face choice frictions
   - Evidence from first four years of retail choice in Texas

Topic #1: Sending the "Right" Consumption Signals

- Textbook prescription
  - Set marginal price equal to marginal social costs
  - Why?
    - If price is too high, then consumers don't use one more kwh even if it is more valuable than it costs
  - Complications:
    - Fixed costs, equity, …
  - "Solution" = Two-part tariff
    - "connection" charge to cover fixed cost and usage charge with marginal price set to marginal cost

Sample Residential Tariff Function



Reliant Residential “Price-to-Beat” in Texas (November 2002)

Front

Duke Energy

Due Date	Amount Due
Mar 23, 2003	$ 175.14

1 Account Number 1212-1212-12-4 10 21

2

For less detailed billing information on your monthly bill, check box on right. ☐

3 $_____ HeatShare Contribution (for Customer Assistance)

4 $_____ Amount Enclosed

5 Current Customer
12345 Your Street
Your City ST 12345-1234

6 PO Box 9001076
Louisville KY 40290-1086

400 00000240764 12121212124 mmddyyyy2 00000244377

Page 1 of 2

Name/Service Address	For Inquiries Call		Account Number
Current Customer 12345 Your Street Your City ST 12345-1234	Duke Energy 7	1-800-123-4567	1212-1212-12-4 8

9 Mail Payments To	Account Information	
PO Box 9001076 Louisville KY 40290-1086	Payments after mmm dd not included Last payment received mmm dd	Bill Prepared on mmm dd, yyyy Next meter reading mmm dd, yyyy 10

Urgent Messages are printed in this section of the bill, with a box around the bill text.

Meter	Number	11 Reading Date From	To	Days	Meter Reading Previous	Present	Usage
Gas	111111111	mmm dd	mmm dd	31	6266	6397	131
Elec	222222222	mmm dd	mmm dd	31	60377	61451 12	1,074

13 **Gas – Residential**

Usage - 131 CCF	
Duke Energy - Rate RS	$92.83
Current Gas Charges	**$ 92.83**

Current Billing

Balance - Previous Bill	$ 140.00
Payment(s) Received	140.00 cr
Balance Forward	**0.00**
Current Gas Charges	92.83
Current Electric Charges	82.31
Current Amount Due	**$ 175.14**

14

15 **Electric – Residential**

Usage - 1,074 kWh	
Duke Energy - Rate RS	$26.29
Quality Electric - Rate 7D	56.02
Current Electric Charges	**$ 82.31**

16 PRICE TO COMPARE: In order for an average residential customer to save money, an electric supplier must offer a price lower than x.xx cents per kWh. Your Price to Compare may be different based on your usage. Visit www.duke-energy.com to calculate your individual Price to Compare or contact Duke Energy for a written explanation.

Due Date	Amount Due	After Mar 23, 2003 Pay
Mar 23, 2003	$175.14	$177.77

17

Duke Energy visit us at www.duke-energy.com

Back

Duke Energy

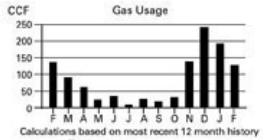
Page 2 of 2

Name	Service Address	Account Number
Current Customer	12345 Your St Your City ST	1212-1212-12-4 18

Explanation of Current Charges

19 Gas Meter # 111111111 CCF Usage - 103 Mmm dd - Mmm dd 31 Days	Duke Energy Rate RS – Residential Service Fixed Delivery Service Charge 20 Usage-Based Charge 103 CCF @ $ x.xxxxxxx Rider MSR-G Gas Delivery Riders Gas Cost Recovery 103 CCF @ $ x.xxxxxxx	$ x.xx x.xx x.xx cr x.xx x.xx	$ xx.xx
	Total Current Gas Charges		$ xx.xx 23
21 Electric Meter # 222222222 kWh Usage - 859 Mmm dd - Mmm dd 31 Days	Duke Energy Rate RS – Residential Srvc 22 Distribution - Customer Chg Delivery Charges Distribution - Energy Chg 859 kWh @ $0.01994900 Rider TCR Delivery Riders Total Delivery Charges Generation Charges Generation - Energy Chg 859 kWh @ $0.04418000 Rider FPP Rider AAC Generation Riders Total Generation Charges	$ x.xx x.xx x.xx x.xx $ x.xx x.xx x.xx x.xx x.xx $ x.xx	$ x.xx $ x.xx
	Total Current Electric Charges		$ xx.xx 24

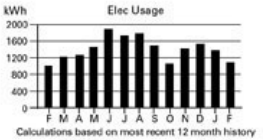
CCF Gas Usage



Calculations based on most recent 12 month history
Total usage: 961
Average usage: 80

25

kWh Elec Usage



Calculations based on most recent 12 month history
Total usage: 16986
Average usage: 1416

	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
Gas	143	87	58	24	38	7	27	17	29	142	238	191	103
Electric	1025	1209	1211	1478	1855	1689	1698	1528	1035	1376	1575	1352	980

Printed on recycled paper and is recyclable

Duke Energy visit us at www.duke-energy.com

Zoom of Back

Duke Energy

Name	Service Address	Account Number
Current Customer	12345 Your St Your City ST	1212-1212-12-4

18

Explanation of Current Charges

Gas Meter # 111111111 CCF Usage - 103 Mmm dd - Mmm dd 31 Days	Duke Energy Rate RS – Residential Service Fixed Delivery Service Charge Usage-Based Charge 103 CCF @ $ x.xxxxxxx Rider MSR-G Gas Delivery Riders Gas Cost Recovery 103 CCF @ $ x.xxxxxxx	20 $ x.xx x.xx x.xx cr x.xx x.xx	 $ xx.xx
	Total Current Gas Charges		$ xx.xx
Electric Meter # 222222222 kWh Usage - 859 Mmm dd - Mmm dd 31 Days	Duke Energy Rate RS – Residential Srvc Distribution - Customer Chg Delivery Charges Distribution - Energy Chg 859 kWh @ $0.01994900 Rider TCR Delivery Riders Total Delivery Charges Generation Charges Generation - Energy Chg 859 kWh @ $0.04418000 Rider FPP Rider AAC Generation Riders Total Generation Charges	22 $ x.xx x.xx x.xx x.xx $ x.xx x.xx x.xx x.xx x.xx $ x.xx	 $ x.xx $ x.xx
	Total Current Electric Charges		$ xx.xx

19 21 23 24

Electricity summary

Electricity account

	Last reading	This reading	Electricity units used	Cost split	Charges
Tariff - Go Save Electricity / Monthly Direct Debit					Meter: S04C26072
24 Hour	13/10/11 27350 Customer reading	13/12/11 28472 Actual	1122 kWh		
24 Hour	13/12/11 28472 Actual	31/12/11 28819 Estimate	347 kWh	first 157 at 16.650p next 1312 at 10.550p	£26.14 £138.42
24 Hour	PC * 31/12/11 28819 Estimate	28/03/12 30372 Actual	1553 kWh	first 158 at 17.710p next 1395 at 14.010p	£27.98 £195.44

Your Supply Number

S	01	801	100	
	17	1494	4591	301

Cost of electricity used this period	£387.98
Monthly Direct Debit Discount	- £40.00
Subtotal (excluding VAT)	+ £347.98
VAT at 5.0% on £347.98	+ £17.39
Total electricity charges this period	**£365.37**

Your meter reading

*** Price Change**
Please note - there's been a price change during this bill period. We've split your fuel usage over the different prices.

How your **Direct Debit** account adds up

Your Direct Debit account	Electricity account
Balance on last bill	£183.69 debit
Payment received with thanks on 24/10/11	£35.00 credit
Payment received with thanks on 23/11/11	£98.00 credit
Payment received with thanks on 23/12/11	£98.00 credit
Payment received with thanks on 23/01/12	£98.00 credit
Payment received with thanks on 23/02/12	£98.00 credit
Payment received with thanks on 23/03/12	£98.00 credit
Account balance before charges	**£341.31 credit**

This bill	Electricity account

80<1523>_S762-PK3352L 17100

Florida Power & Light Company
PO Box 025576
Miami, FL 33102

/ 00 0000000000000000000000000000

Please request changes on the back.
Notes on the front will not be detected.

The amount enclosed includes the following donation:
FPL Care To Share $ _____

B 8 8888 8

AUTO **CO 0000
0 000000

JANE CUSTOMER
123 ANY ST
ANYTOWN FL 33000-0000

Make check payable to FPL in U.S. funds and mail along with this coupon to:

FPL
GENERAL MAIL FACILITY
MIAMI FL 33188-0001

Account number	Total amount you owe	New charges due by	Amount enclosed
12345-67890	**$147.36**	**Nov 08 2010**	**$**

Your electric statement

For: Sep 17 2010 to Oct 18 2010 (31 days)
Customer name: JANE CUSTOMER
Service address: 123 ANY ST

Account number: 12345-67890

Statement date: Oct 18 2010
Next meter reading: Nov 16 2010

Amount of your last bill	Payments (-)	Additional activity (+ or -)	Balance before new charges (=)	New charges (=)	Total amount you owe (=)	New charges due by
156.73	156.73 CR	0.00	0.00	147.36	**$147.36**	**Nov 08 2010**

Meter reading - Meter 5CXXXXX

Current reading	79065
Previous reading	- 77725
kWh used	**1340**

Energy usage

	Last Year	This Year
kWh this month	1620	1340
Service days	29	31
kWh per day	56	43

****The electric service amount includes the following charges:**

Customer charge:	$5.90
Fuel:	$55.08
(First 1000 kWh at $0.038570)	
(Over 1000 kWh at $0.048570)	
Non-fuel:	$66.37
(First 1000 kWh at $0.046990)	
(Over 1000 kWh at $0.056990)	

Amount of your last bill	156.73
Payment received - Thank you	156.73CR
Balance before new charges	$0.00

New charges (Rate: RS-1 RESIDENTIAL SERVICE)

Electric service amount	127.35**	
Storm charge	1.57	
Gross receipts tax	3.31	
Franchise Charge	5.95	
Utility Tax	9.18	
Total new charges		$147.36

Total amount you owe **$147.36**

- Payment received after **November 08, 2010** is considered **LATE**; a late payment charge of **1.50%** will apply and your account may be subject to an adjusted deposit billing.

Format of Mandatory "Facts Label" in Texas

Electricity Facts Label (EFL)

Star Electricity, Inc. d/b/a StarTex Power
CNP Service Area
3 MONTH RESIDENTIAL FIXED RATE
4/30/2014

Electricity Price

Average Monthly Use	500kWh	1,000kWh	2,000kWh
Average price per kWh	12.8¢	9.9¢	9.5¢

This estimated average Price per kWh disclosure is an example and is calculated using: (i) a Fixed Energy Charge of 5.18 ¢ per kWh, (ii) the applicable Transmission and Distribution Service Provider ("TDU") tariff as established by the Public Utility Commission of Texas ("PUCT"), (iii) a monthly Base Charge per ESI-ID of $0.00 (NOTE: A Minimum Usage Fee of $9.95 will apply if usage is less than or equal to 999 kWh in a billing period), and (iv) all recurring charges. This average Price disclosure does not include applicable federal, state, and local taxes or any fees (including gross receipt tax reimbursement) or other non-recurring amounts charged by StarTex Power or a governmental entity. Your actual Price for electricity may vary according to your exact monthly usage and TDU pass-through charges.
Some locations may be subject to a TDU Underground Facilities and Cost Recovery Charge authorized by their city that is not included in this average price disclosure. See your TDU's tariff for a list of cities and authorized charges.

Other Key Terms and Questions

See Terms of Service statement for a full listing of fees, deposit policy, and other terms.

Disclosure Chart

Type of Product	FIXED RATE
Contract Term	3 MONTH(S)
Do I have a termination fee or any fees associated with terminating service?	YES. $100
Can my price change during contract period?	YES, but only for the very limited reasons

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Bill Saliency

- Some bills don't even have sufficient information to determine marginal price!

- Bills tend to display total expenditures and "breakdown of expenditures" more saliently than marginal price schedule
  - Even worse if electric bills combined with gas, water, sewage, …

How Do Consumers Respond to Tariff Function?

- Suppose we observe consumers responding to higher total bill by consuming less, ceteris paribus
  - To what price is consumer responding?
    - Average?
    - Marginal?
    - Ito (*AER*, 2014) exploits spatial discontinuity – results suggest that consumers respond to <u>average</u> price rather than marginal or expected marginal price

Saliency of Retail Energy
Marginal Prices vs. Expenditures

Electricity

Florida Power & Light Company
PO Box 025576
Miami, FL 33102

Please request changes on the back.
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Gasoline

Can Consumers Be Taught to Respond to the Marginal Price?

- Wolak & Kahn (2013) – field experiment
- On-line personalized instruction on how energy-utilizing activities affect monthly bill under non-linear pricing
- One important upshot:
  - Consumers learning they face a higher (lower) marginal price consume less (more)

"Increasing Block Tariffs" Cannot Be Efficient

- Social marginal cost cannot increase as any consumer moves from e.g. 250th to 251st kWh
- Ubiquitous in regulated tariffs
- Don't necessarily go away in "deregulated" markets
  - In Texas (Puller & West, *AER P&P*, 2013)

What Is Ideal Pricing For Residential?

- Working within constraints of…
  - no dynamic pricing for residential
  - bills may or may not be read (on-line bill pay…)
  - all consumers cannot be "trained" about MP

    (i.e. households respond to the average price or marginal price or whatever…)
- Policy levers: tariff function, bill design

How do you set tariffs & design bills…

…to induce consumption closest to what would happen if households consumed where

Marginal Price = Marginal Social Cost?

Retail Choice: Imperfect Regulation Replaced with Imperfect Competition?

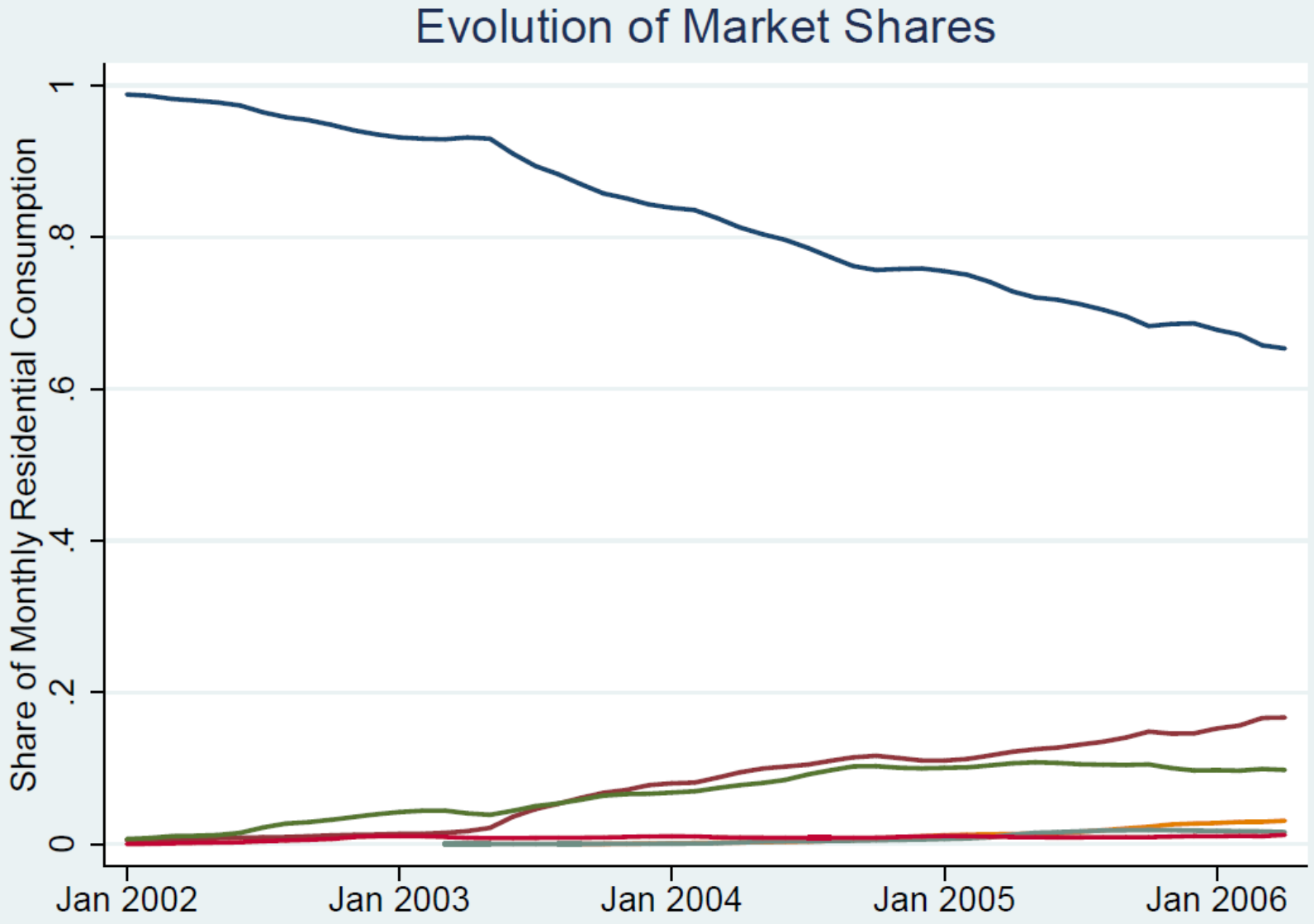
- Regulatory:
  - Fixed distribution costs priced into usage
    - Exacerbated under net energy metering policy
- Retail choice
  - Imperfect competition

Topic #2: The "growing pains" of retail competition

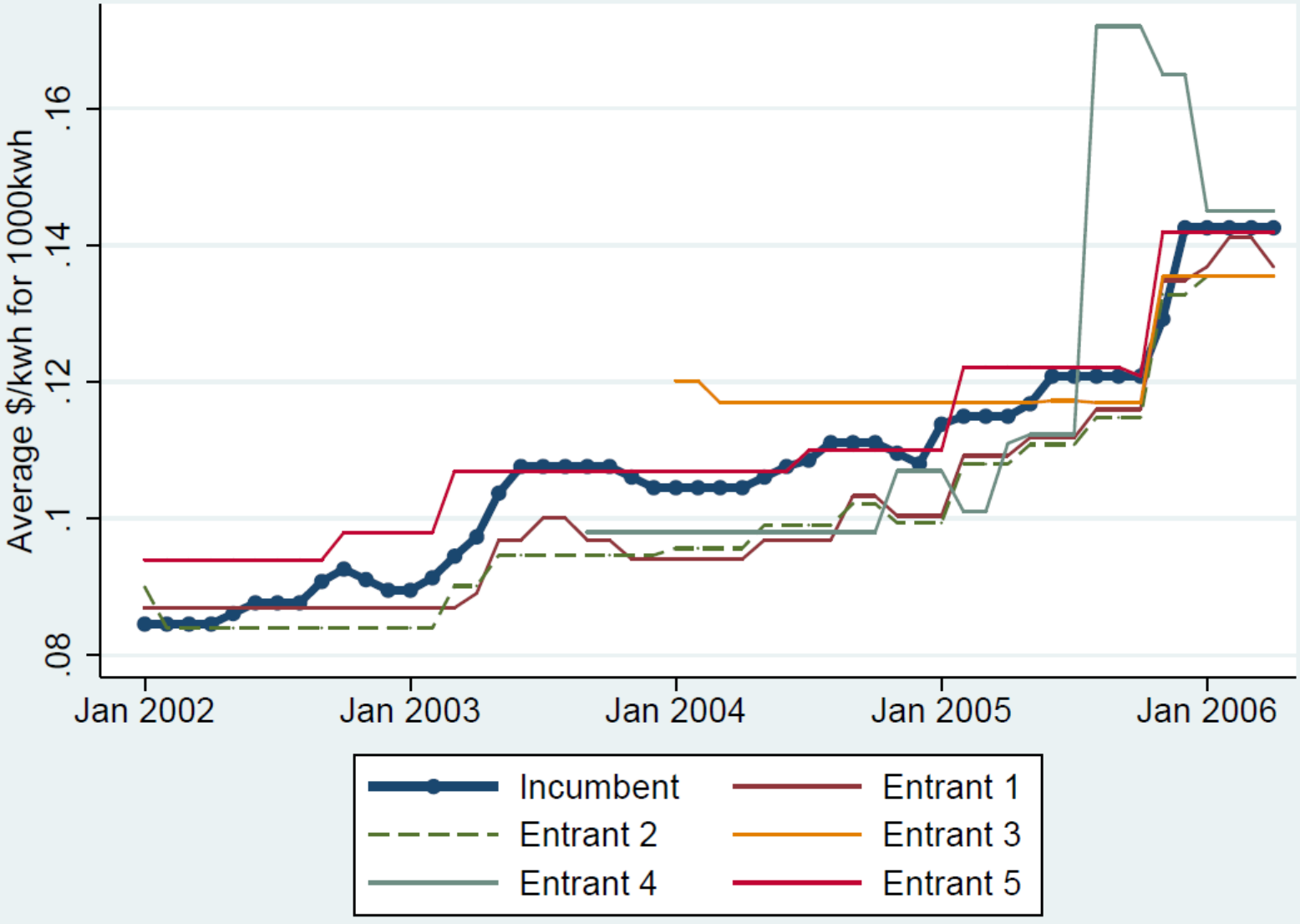
Power to Choose? An Analysis of Choice Frictions in the Residential Electricity Market

Ali Hortacsu (University of Chicago and NBER)
Seyed Ali Madanizadeh (University of Chicago)
Steve Puller (Texas A&M and NBER)

Residential Market Shares….



…Contrasted with Prices



Possible Causes of Inertial Behavior

1. Inattention/search costs
    - Lack of awareness that options exist / inattention from status quo bias
2. Incumbent brand advantage / product differentiation
    - Perception that incumbent offers more reliable power
    - Differences in customer service

Policy reasons to understand cause

Preview of Findings

- Consumers only search in only about 2% of months
- Brand value of incumbent = $62/month, though it diminishes over time
  - $15 by 4 years after market started

Texas Retail Market

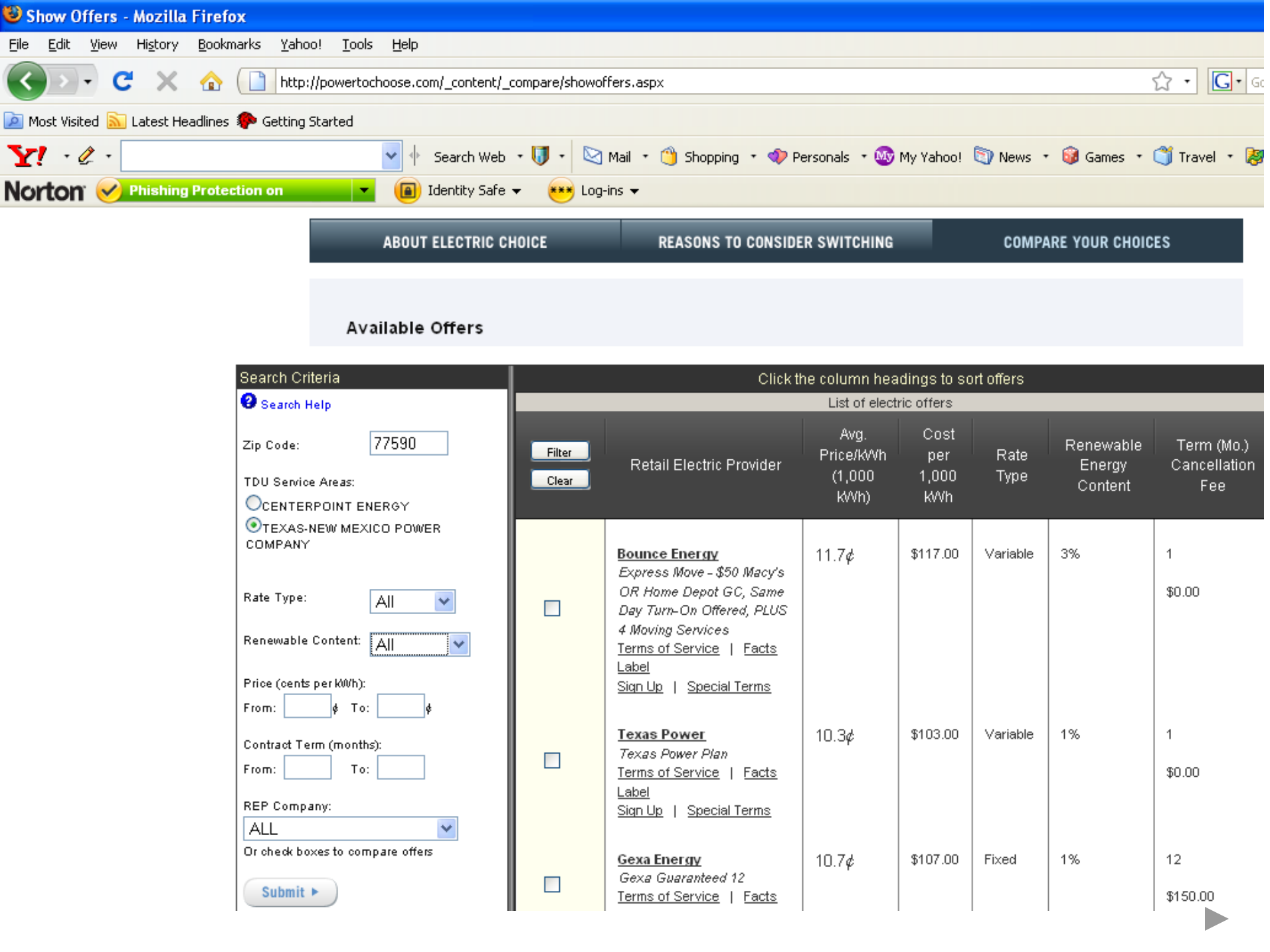
- Prior to 2002, residential customers served by “regulated utility”
- Starting Jan 1, 2002, customers could choose provider
  - By default, assigned to firm affiliated with the old utility (“incumbent”)
  - Incumbent required to charge “price-to-beat”
    - Ended up being above competitive rates (“headroom”)
  - Price-to-beat adjustments indexed to natural gas price

Texas Retail Market (contd)

- Competitive retailers (CREPs)
  - Procure wholesale power and market to residential (and other types) of customers
  - In 2002: 3-5 CREPs in each service territory
  - By 2006: 10+ CREPs
- 1 bill
- No charge to switch from incumbent

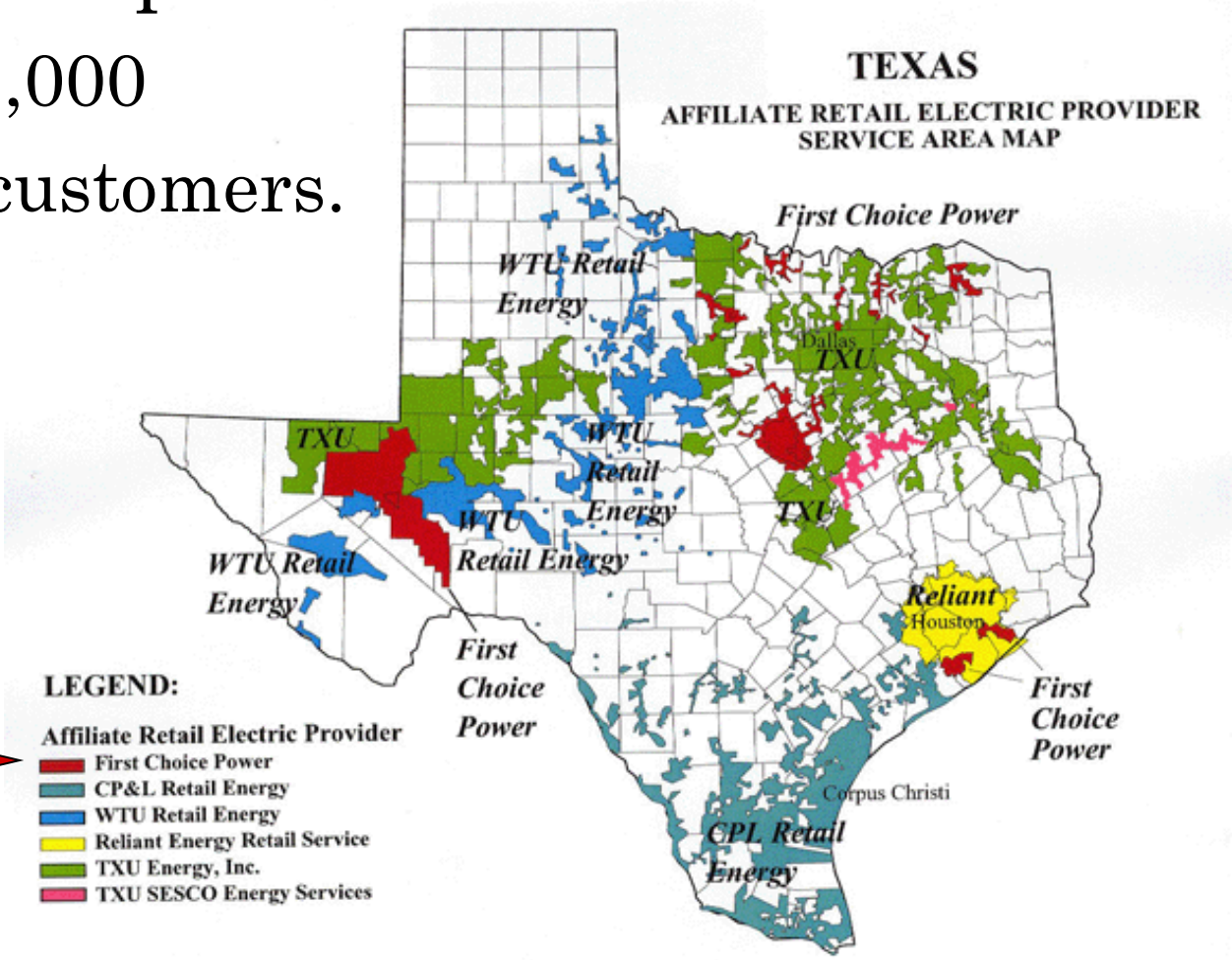
Information for Consumers

- www.powertochoose.com
  - (and www.poderdeescoger.org)
  - 2005-2006: ≈ 100K unique visitors/month
  - Can search for rates
- Various media
  - Radio, TV, billboards
  - PUC public information campaign


Show Offers - Mozilla Firefox
File Edit View History Bookmarks Yahoo! Tools Help
http://powertochoose.com/_content/_compare/showoffers.aspx
Most Visited Latest Headlines Getting Started
Search Web Mail Shopping Personals My Yahoo! News Games Travel
Norton Phishing Protection on Identity Safe Log-ins
ABOUT ELECTRIC CHOICE
REASONS TO CONSIDER SWITCHING
COMPARE YOUR CHOICES
Available Offers
Search Criteria
Search Help
Zip Code: 77590
TDU Service Areas:
CENTERPOINT ENERGY
TEXAS-NEW MEXICO POWER COMPANY
Rate Type: All
Renewable Content: All
Price (cents per kWh):
From: ¢ To: ¢
Contract Term (months):
From: To:
REP Company:
ALL
Or check boxes to compare offers
Submit
Click the column headings to sort offers
List of electric offers
Filter
Clear
Retail Electric Provider
Avg. Price/kWh (1,000 kWh)
Cost per 1,000 kWh
Rate Type
Renewable Energy Content
Term (Mo.) Cancellation Fee
Bounce Energy
Express Move - $50 Macy's OR Home Depot GC, Same Day Turn-On Offered, PLUS 4 Moving Services
Terms of Service | Facts Label
Sign Up | Special Terms
11.7¢ $117.00 Variable 3% 1 $0.00
Texas Power
Texas Power Plan
Terms of Service | Facts Label
Sign Up | Special Terms
10.3¢ $103.00 Variable 1% 1 $0.00
Gexa Energy
Gexa Guaranteed 12
Terms of Service | Facts
10.7¢ $107.00 Fixed 1% 12 $150.00

Our Sample

- TNMP ("First Choice") service territory
- January 2002-April 2006
  - Approx. 192,000 residential customers.

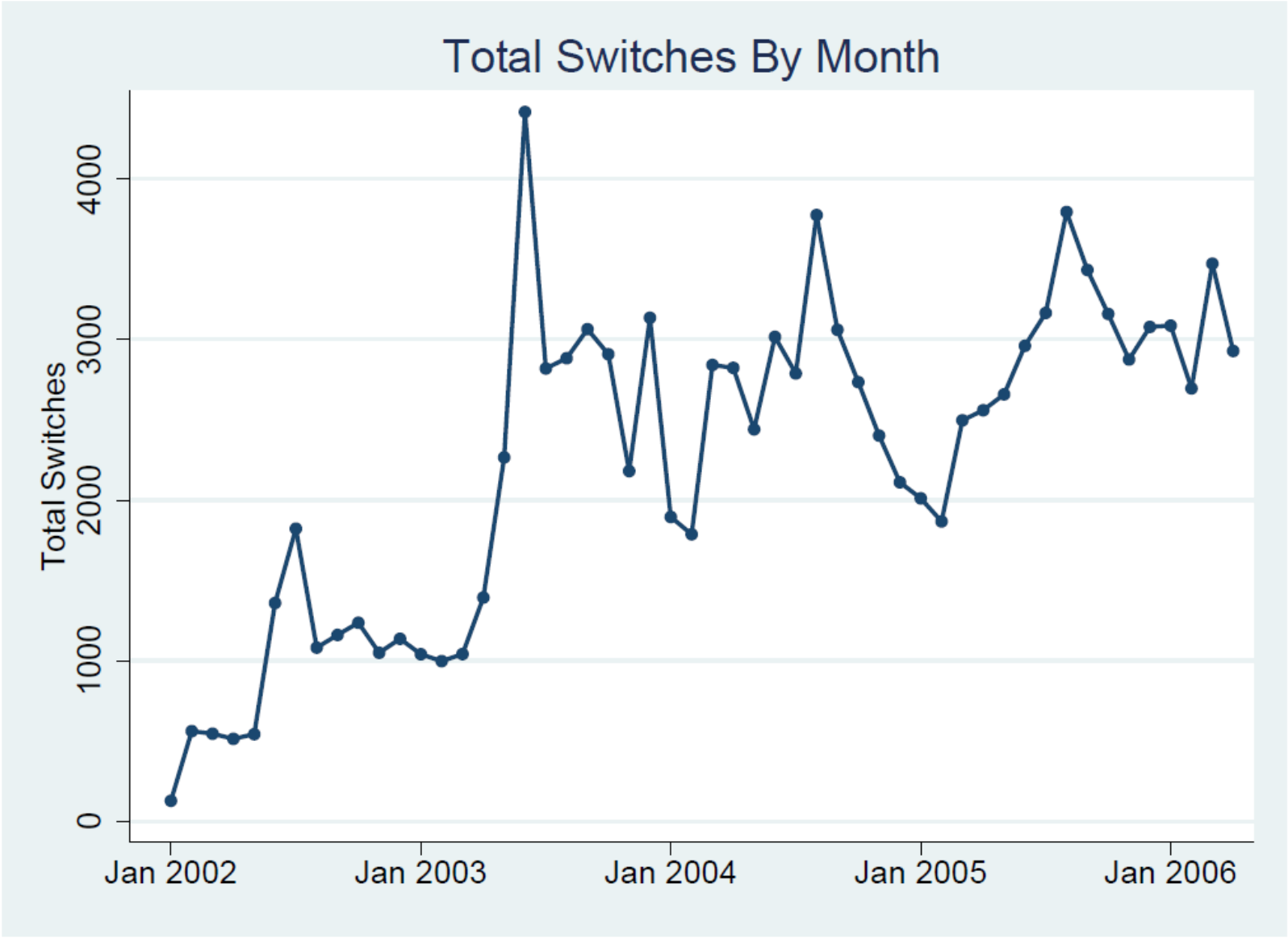


We Study →

Data

- For each residential meter from January 2002-April 2006:
  - History of retail provider
  - Monthly consumption
- For each retailer:
  - PUC monthly data on rate plan(s) offered
- We focus on 6 retailers with > 1% share

Switching: Time Trend and Seasonality



Descriptive Statistics of Potential Savings

- How much would households with incumbent have saved if purchased from lowest-priced retailer?
  - This is expenditure savings, not welfare
- What if households with incumbent had switched only once (in Jan '02) to a large retailer?
  - Large #1: Mean = $7.69/month
  - Large #2: Mean = $9.97/month
- What if households with incumbent switched to cheapest retailer every month?
  - Mean = $12.47/month

Model of Household-Level Choice

- In each month:
  - Stage 1: Decision to Choose
    - Household with provider k chooses whether to consider alternative retailers
  - Stage 2: Choice
    - Households that decide to choose will observe (all) providers' product characteristics, and choose provider that maximizes utility
    - Can choose to stay with current provider k

Simplified Illustration

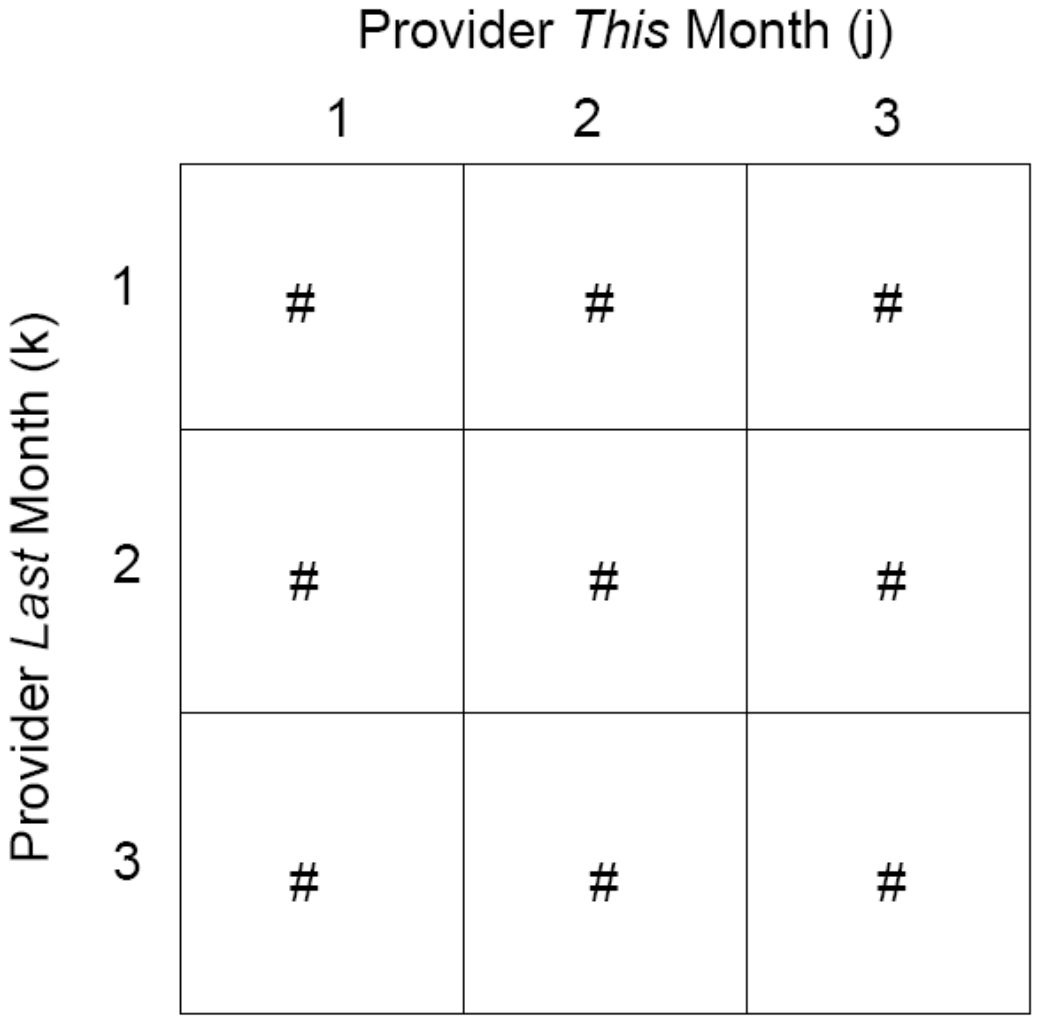
- 3 retailers
- Consumers identical
- Observe only 2 months of data ("last month" and "this month")

- Each household currently with retailer k searches with pr = λ_k
  - Heterogeneity due to k's service

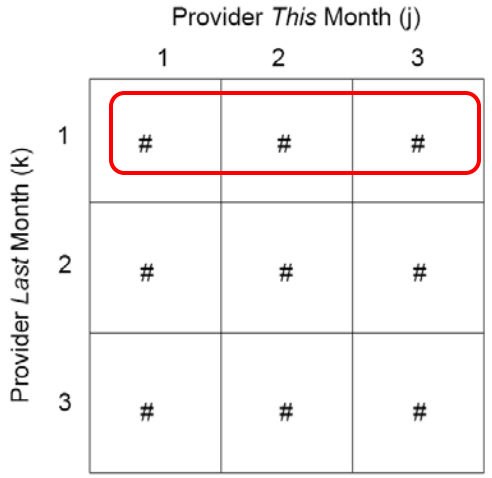
- Conditional upon "deciding", household chooses retailer j with pr = P_j

➔ 5 probabilities ($\lambda_1, \lambda_2, \lambda_3, P_1, P_2$)

Simplified Illustration



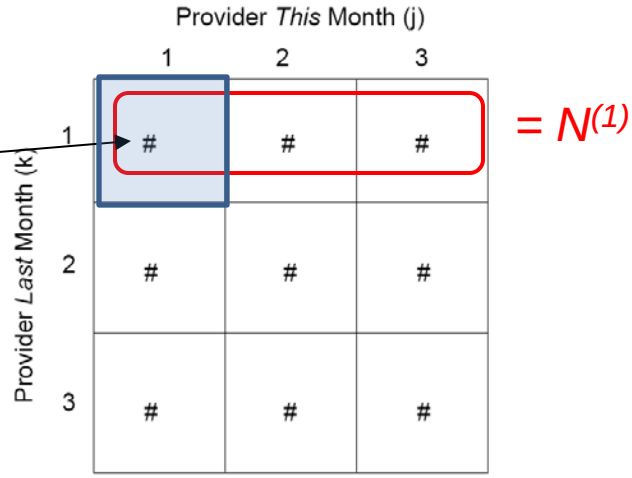
Simplified Illustration



$= N^{(1)}$

Simplified Illustration

$$N^{(1)}\left[\underbrace{(1-\lambda_1)}_{\text{non-deciders}} + \underbrace{\lambda_1 P_1}_{\text{deciders choosing 1}}\right]$$

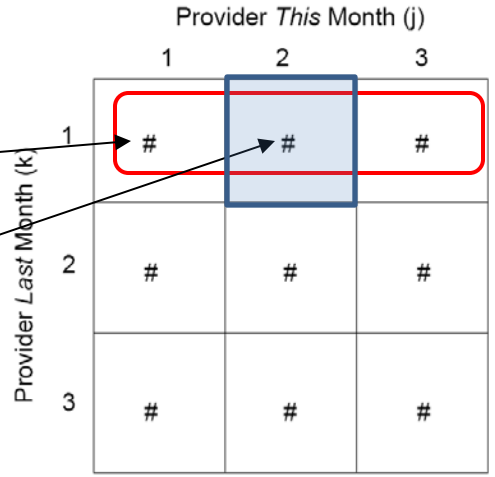


$= N^{(1)}$

Simplified Illustration

$$N^{(1)}\left[\underbrace{(1-\lambda_1)}_{\text{non-deciders}} + \underbrace{\lambda_1 P_1}_{\text{deciders choosing 1}}\right]$$

$$N^{(1)}\left[\underbrace{\lambda_1 P_2}_{\text{deciders choosing 2}}\right]$$



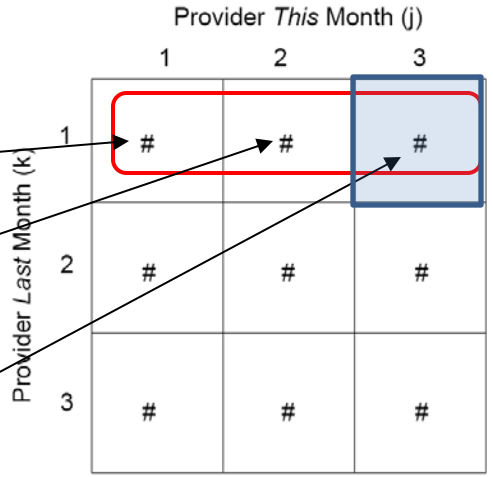
$= N^{(1)}$

Simplified Illustration

$$N^{(1)}\left[\underbrace{(1-\lambda_1)}_{\text{non-deciders}} + \underbrace{\lambda_1 P_1}_{\text{deciders choosing 1}}\right]$$

$$N^{(1)}\left[\underbrace{\lambda_1 P_2}_{\text{deciders choosing 2}}\right]$$

$$N^{(1)}\left[\underbrace{\lambda_1(1-P_1-P_2)}_{\text{deciders choosing 3}}\right]$$



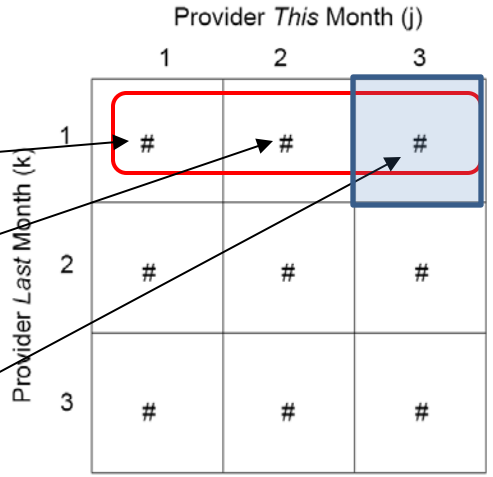
$= N^{(1)}$

Simplified Illustration

$$N^{(1)}\left[\underbrace{(1-\lambda_1)}_{\text{non-deciders}} + \underbrace{\lambda_1 P_1}_{\text{deciders choosing 1}}\right]$$

$$N^{(1)}\left[\underbrace{\lambda_1 P_2}_{\text{deciders choosing 2}}\right]$$

$$N^{(1)}\left[\underbrace{\lambda_1(1-P_1-P_2)}_{\text{deciders choosing 3}}\right]$$



➔ 9 moments e.g. $E[\#(k=1, j=1)] = N^{(1)}[(1-\lambda_1)+\lambda_1 P_1]$

(1 redundant moment in each set – any customer not going to 2 or 3 stays with 1)

➔ 5 probabilities and 6 moments

Specifying "Decision Function" λ^k

For household previously using provider *k* in month *t*:

$$\lambda_t^k(\gamma) = \frac{e^{W_t^k}}{1 + e^{W_t^k}}$$

"Push" Model of Search

where $W_t^k = \sum_r \gamma_r Z_{rt}^k$

$Z =$ retailer dummy variables, month of year dummies,

Customer just received "bill shock"

Specifying "Choice Function" P_j

For each household whose provider was *k* in *t*-1 AND decides to search, it chooses the retailer that maximizes utility:

$$U_{ijt}^{(k)} = \sum_s \theta_s X_{ijt,s}^{(k)} + \varepsilon_{ijt}$$

where ε_{ijt} is Type I Extreme Value i.i.d. across consumer, provider, and time.

$$X_{ijt} = \text{price}_{jt},\ I(\text{Incumbent})_j,\ I(\text{Incumbent})_j \times \text{Month}_t,$$

Distributional assumption implies that:

$$P_{ijt}(\theta) = \frac{\exp(\sum_s \theta_s X_{ijt,s}^{(k)})}{\sum_{k \geq 1} \exp(\sum_s \theta_s X_{ikt,s}^{(k)})}$$

GMM Estimation

Estimate decision parameters (γ) and choice parameters (θ) via GMM:

$$\min_{\gamma,\theta} \ \eta' W \eta$$

where $\eta \equiv \left\langle \eta_{jt}^{(k)} \right\rangle$ and $\eta_{jt}^{(k)} = \dfrac{N_{jt}^{(k)} - \left(\sum_{i \in B_t^{(k)}} \lambda_{it}^{(k)} P_{ijt} \right)}{N_t^{(k)}}$

Estimate for January 2004 – April 2006 when all 6 retailers present (20% sample to ease computation)

Highlights of Findings

- Incumbent customers only consider alternatives in 2% of months
  - Higher in summer and/or month after receiving a "bill shock"
- Incumbent brand effect large but declines over time
  - January 2004: $62/month
  - April 2006: $15/month
  - Interpretation? (Incorrect) perception of power quality? Fear of 'bait & switch"? Customer service?

Implications for Retail Choice Policy

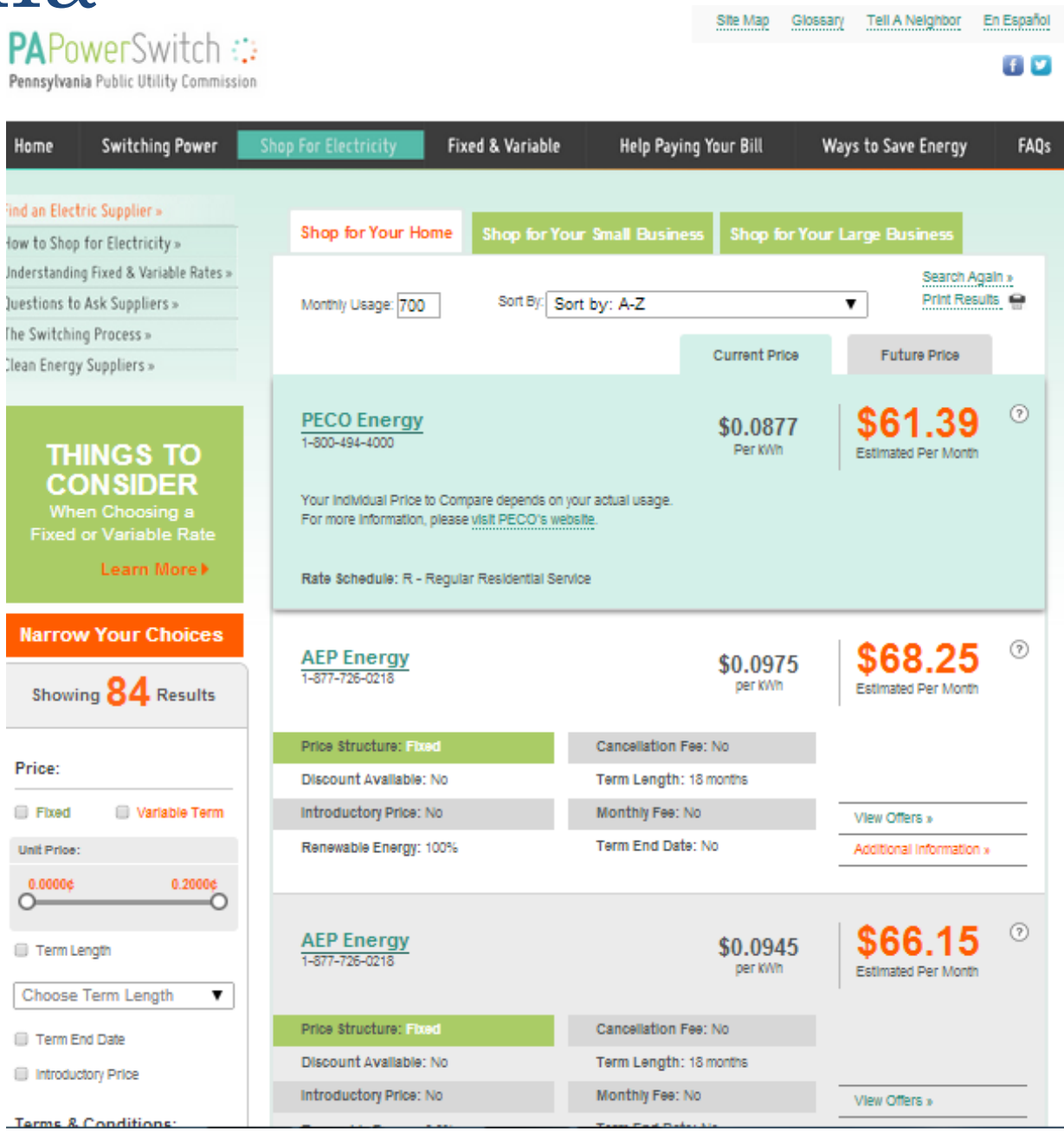
- There will be choice frictions
- Encouraging "search" enhances consumer benefits
  - Bill inserts, user-friendly choice websites
- Making households aware of "homogenous power quality"

Implications for Retail Choice Policy (contd)

- Growing concern today
  - "Choice Overload"
    - Tariff proliferation
    - In UK, the regulator considering limiting the # of plans offered

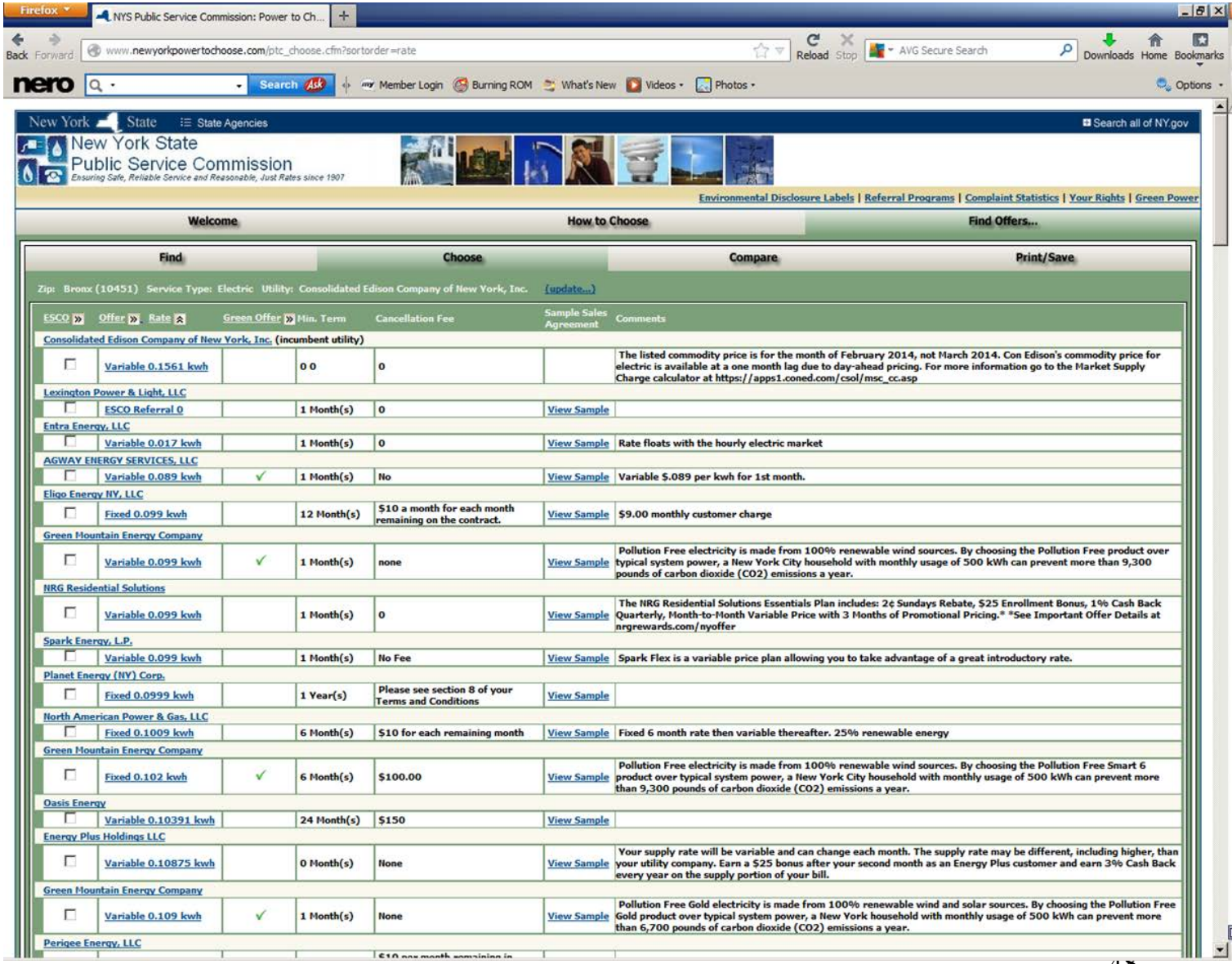
Pennsylvania

84 plans
from
49 retailers
(for a random
zip code)



New York

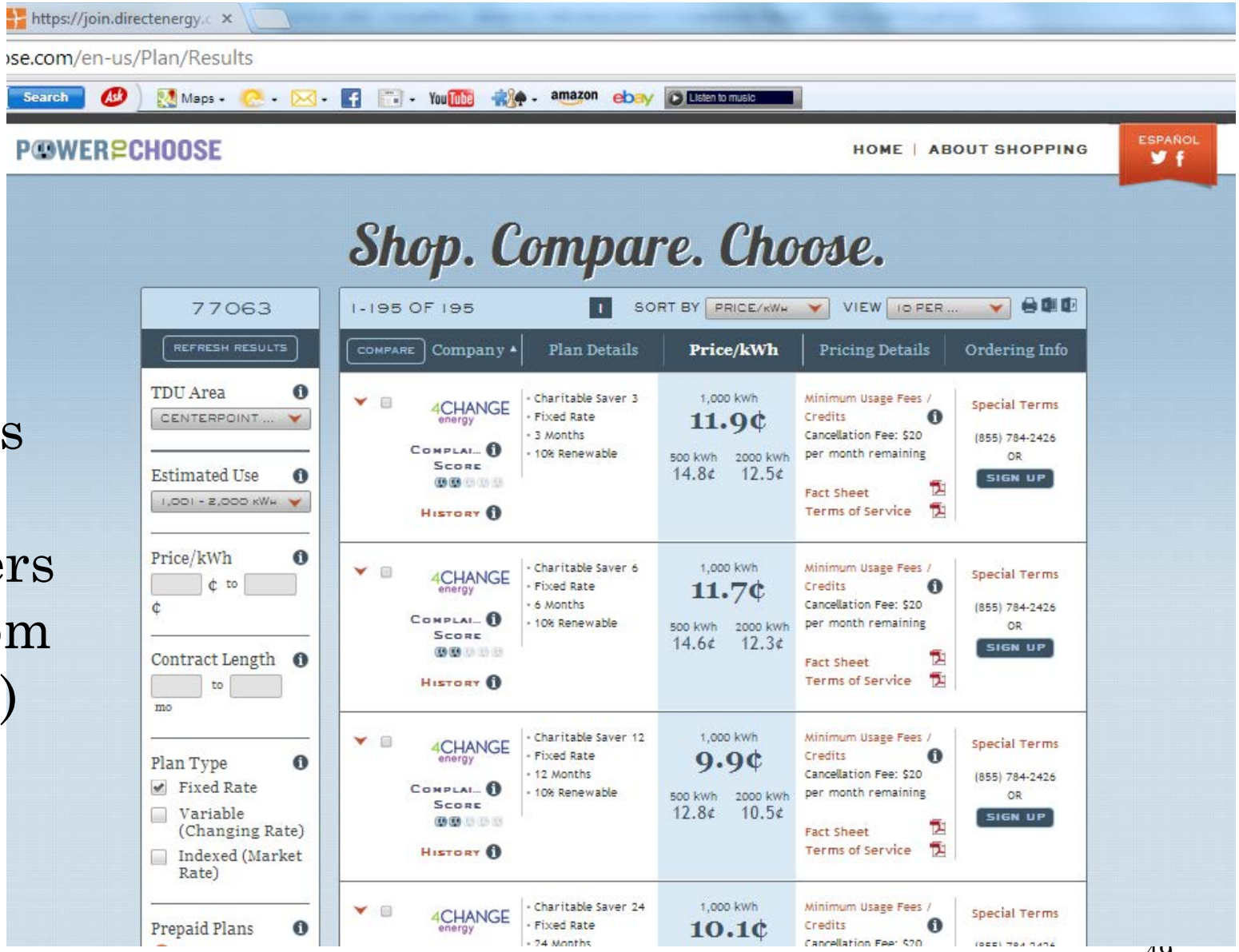
123 plans
from
69 retailers
(for random
zip code)



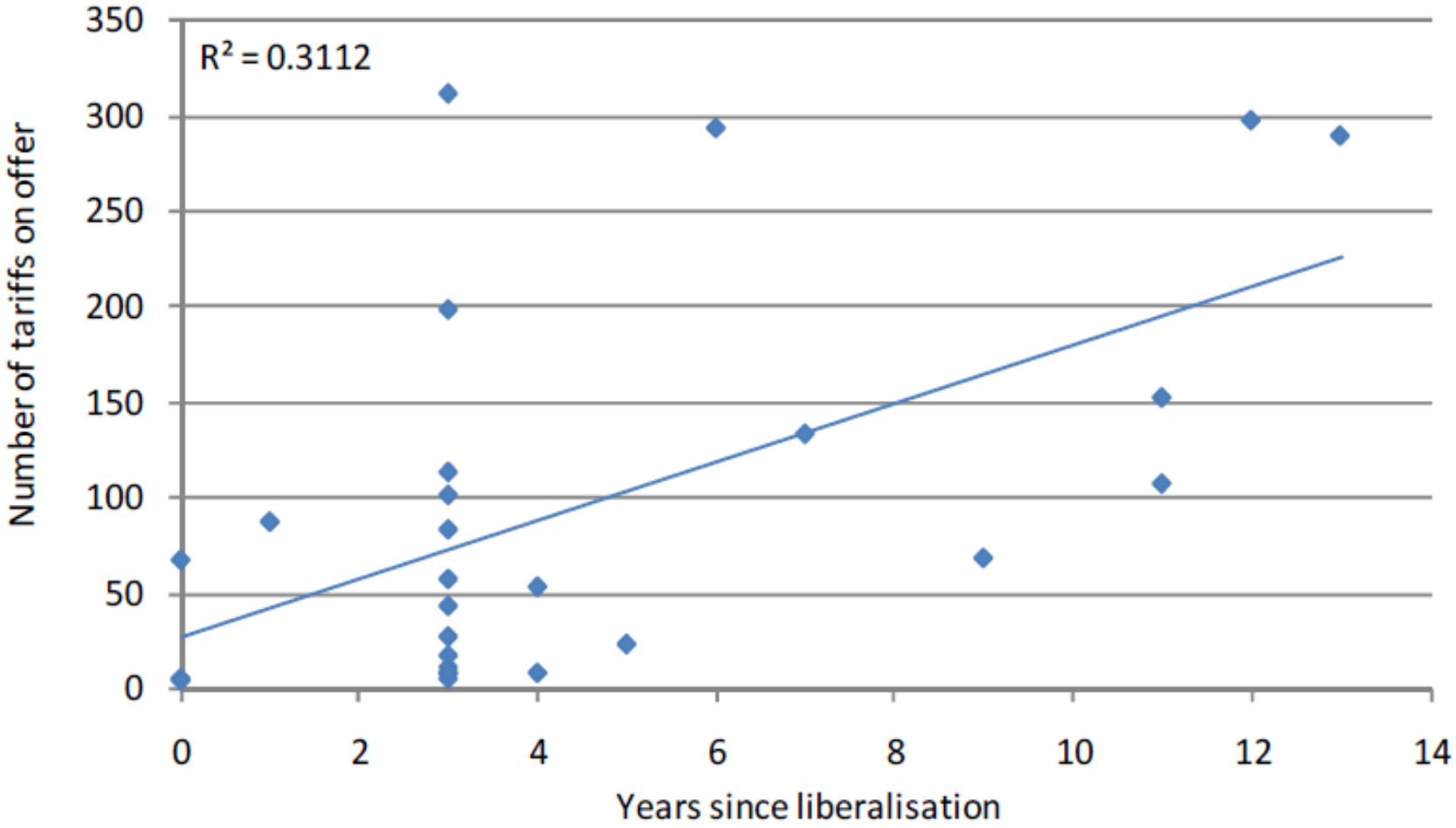
ESCO	Offer	Rate	Green Offer	Min. Term	Cancellation Fee	Sample Sales Agreement	Comments
Consolidated Edison Company of New York, Inc. (incumbent utility)							
	Variable 0.1561 kwh			0 0	0		The listed commodity price is for the month of February 2014, not March 2014. Con Edison's commodity price for electric is available at a one month lag due to day-ahead pricing. For more information go to the Market Supply Charge calculator at https://apps1.coned.com/csol/msc_cc.asp
Lexington Power & Light, LLC							
	ESCO Referral 0			1 Month(s)	0	View Sample	
Entra Energy, LLC							
	Variable 0.017 kwh			1 Month(s)	0	View Sample	Rate floats with the hourly electric market
AGWAY ENERGY SERVICES, LLC							
	Variable 0.089 kwh		✓	1 Month(s)	No	View Sample	Variable $.089 per kwh for 1st month.
Eligo Energy NY, LLC							
	Fixed 0.099 kwh			12 Month(s)	$10 a month for each month remaining on the contract.	View Sample	$9.00 monthly customer charge
Green Mountain Energy Company							
	Variable 0.099 kwh		✓	1 Month(s)	none	View Sample	Pollution Free electricity is made from 100% renewable wind sources. By choosing the Pollution Free product over typical system power, a New York City household with monthly usage of 500 kWh can prevent more than 9,300 pounds of carbon dioxide (CO2) emissions a year.
NRG Residential Solutions							
	Variable 0.099 kwh			1 Month(s)	0	View Sample	The NRG Residential Solutions Essentials Plan includes: 2¢ Sundays Rebate, $25 Enrollment Bonus, 1% Cash Back Quarterly, Month-to-Month Variable Price with 3 Months of Promotional Pricing.* *See Important Offer Details at nrgrewards.com/nyoffer
Spark Energy, L.P.							
	Variable 0.099 kwh			1 Month(s)	No Fee	View Sample	Spark Flex is a variable price plan allowing you to take advantage of a great introductory rate.
Planet Energy (NY) Corp.							
	Fixed 0.0999 kwh			1 Year(s)	Please see section 8 of your Terms and Conditions	View Sample	
North American Power & Gas, LLC							
	Fixed 0.1009 kwh			6 Month(s)	$10 for each remaining month	View Sample	Fixed 6 month rate then variable thereafter. 25% renewable energy
Green Mountain Energy Company							
	Fixed 0.102 kwh		✓	6 Month(s)	$100.00	View Sample	Pollution Free electricity is made from 100% renewable wind sources. By choosing the Pollution Free Smart 6 product over typical system power, a New York City household with monthly usage of 500 kWh can prevent more than 9,300 pounds of carbon dioxide (CO2) emissions a year.
Oasis Energy							
	Variable 0.10391 kwh			24 Month(s)	$150	View Sample	
Energy Plus Holdings LLC							
	Variable 0.10875 kwh			0 Month(s)	None	View Sample	Your supply rate will be variable and can change each month. The supply rate may be different, including higher, than your utility company. Earn a $25 bonus after your second month as an Energy Plus customer and earn 3% Cash Back every year on the supply portion of your bill.
Green Mountain Energy Company							
	Variable 0.109 kwh		✓	1 Month(s)	None	View Sample	Pollution Free Gold electricity is made from 100% renewable wind and solar sources. By choosing the Pollution Free Gold product over typical system power, a New York household with monthly usage of 500 kWh can prevent more than 6,700 pounds of carbon dioxide (CO2) emissions a year.
Perigee Energy, LLC							

Texas

195 plans
from
41 retailers
(for random
zip code)



Tariffs Have Grown Over Time in the EU



Source: EAHC/FWC, 2009

Conclusions

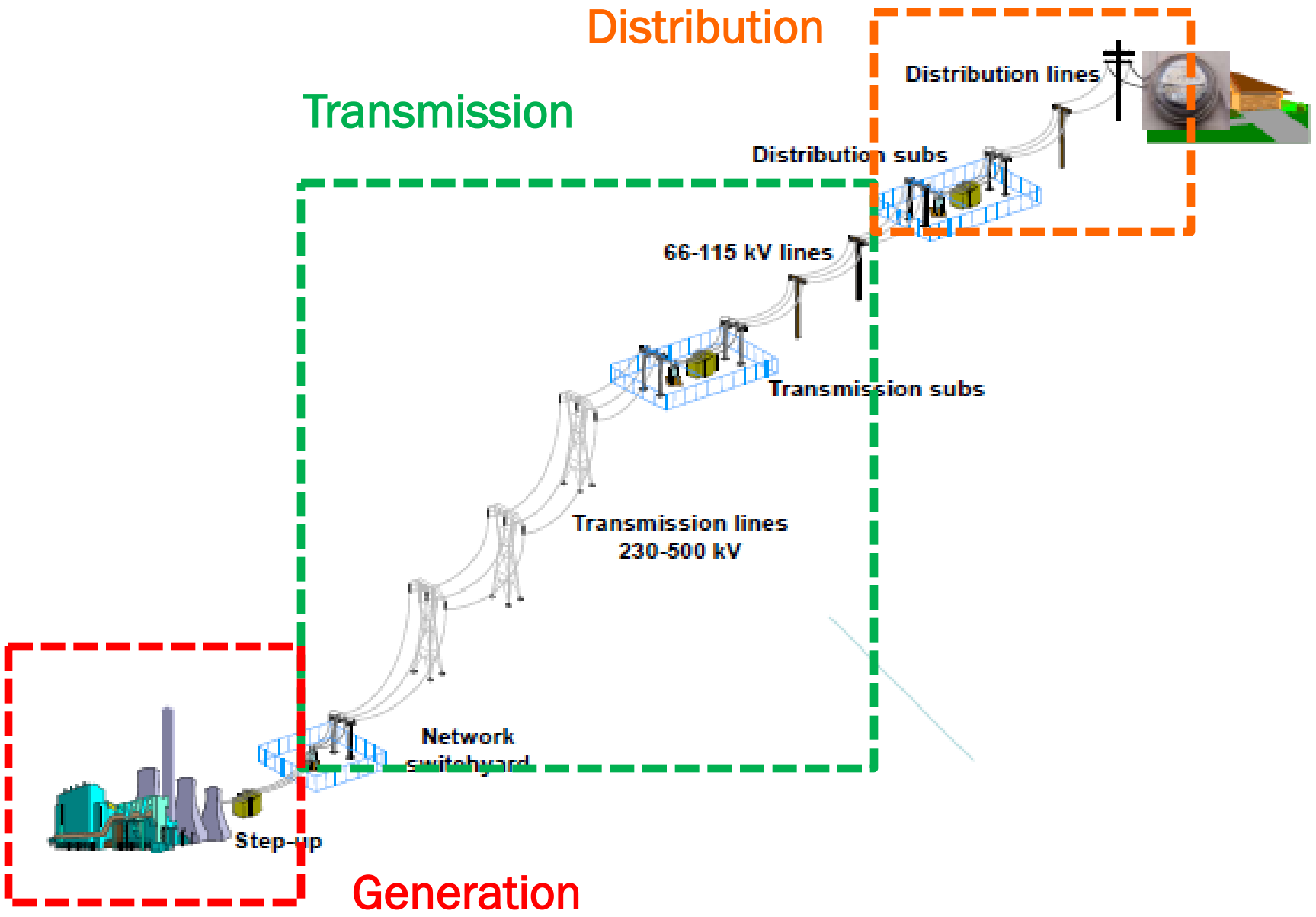
- In all jurisdictions (regulated or retail choice), we need to think about whether tariffs and bills send the right price signals

- In jurisdictions transitioning to retail choice, “choice frictions” and “consumer inertia” are important to address.

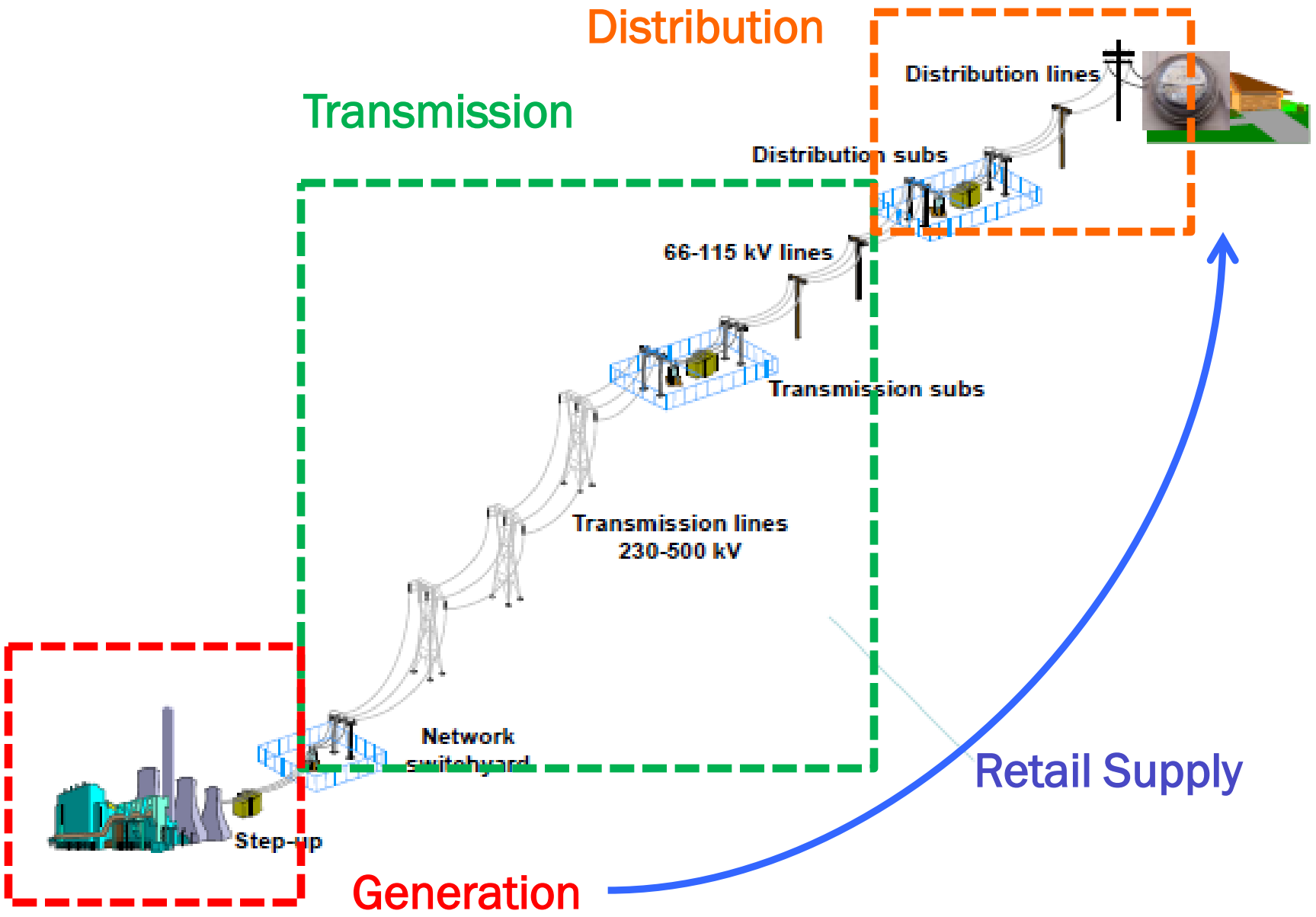
The End

Percent of Retail Electricity Sales by a Competitive Retail Provider (2010)

Source: Form EIA-861. Texas excluded because participation mandated for customers served by IOUs.


Distribution
Transmission
Distribution lines
Distribution subs
66-115 kV lines
Transmission subs
Transmission lines
230-500 kV
Network
switchyard
Step-up
Generation

Household-Retailer Relationship is Purely Financial, Not Technical



Empirical Complication

- We do not observe stage 1 outcome
- Non-switchers are:
  - "non-deciders"

  AND
  - "deciders" who choose current provider