

Colombia's Forward Energy Market

Peter Cramton
University of Maryland
and Market Design Inc.
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Three steps to market design

- Product design ➤ May
 - Auction design ➤ June
 - Transition ➤ July
-
- Total package ➤ Today

Objective

Purpose of market

- Efficient price formation
- Transparency
- Neutrality
- Risk management
- Liquidity
- Simplicity
- Consistency

Efficient price formation

- Reliable price signals based on market fundamentals
- Competitive
- Mitigate market power

Transparency

- Offers are comparable
- Clear why winners won
- Prompt regulatory review and approval
- Regulatory certainty

Neutrality

- All suppliers treated equally
- All demanders treated equally

Risk management

- Reduces risk for both sides of market
- Rate stability, yet responsive to long-term market fundamentals
- Shields from transient events
- Addresses counterparty risk

Liquidity

- Promotes secondary market
- Liquid market for primary product
- Liquid market for derivative products
 - Long-term strips
 - Short-term slices

Simplicity

- For participants
- For system operator
- For regulator

Consistency

- Consistent with other key elements
 - Spot energy market
 - Firm energy market
- Consistent with best practice in world

Setting

Colombia setting

- Hydro-dominated electricity market
 - 80% of energy
 - 67% of capacity
 - 50% of firm energy (exceptional dry period)
- Hourly bid-based spot energy
 - Single zone
- Firm energy market
 - Assures sufficient firm energy
 - Hedges prices above scarcity price (about \$260/kWh)
Note: All \$ amounts in January 2007 Colombia Pesos

Market structure of firm energy (moderate concentration)

Company	ENFICC Declared (GWh)			Market	
	Hydro	Thermal	Total	share	HHI
Emgesa	10,419	2,373	12,792	21%	455
Epm	8,523	3,295	11,818	20%	388
Corelca		9,873	9,873	16%	271
Isagen	5,099	2,327	7,426	12%	153
Epsa	1,487	1,655	3,142	5%	27
AES Chivor	2,925		2,925	5%	24
Gensa	57	2,594	2,651	4%	20
Termoflores		2,189	2,189	4%	13
Termoemcali		1,533	1,533	3%	7
Merielectrica		1,404	1,404	2%	5
Termotasajero		1,349	1,349	2%	5
Termocandelaria		1,062	1,062	2%	3
Proelectrica		708	708	1%	1
Menores	689		689	1%	1
Urra S.A	438		438	1%	1
Total	29,637	30,363	60,000	100%	1,374

Two products, one auction

- Regulated customers (68% of load)
 - *Small* customers *without* hourly meters
 - *Passive* buyers in auction
- Nonregulated customers (32% of load)
 - *Large* customers *with* hourly meters
 - *Active* buyers in auction

Regulated product: Energy share of regulated load

- Supplier bids for % of regulated load
- Supplier that wins 10% share has an obligation to serve 10% of regulated load in each hour
- Deviations between hourly obligation and supply settled at the spot energy price (or scarcity price if spot is higher)
- Pay as demand contract

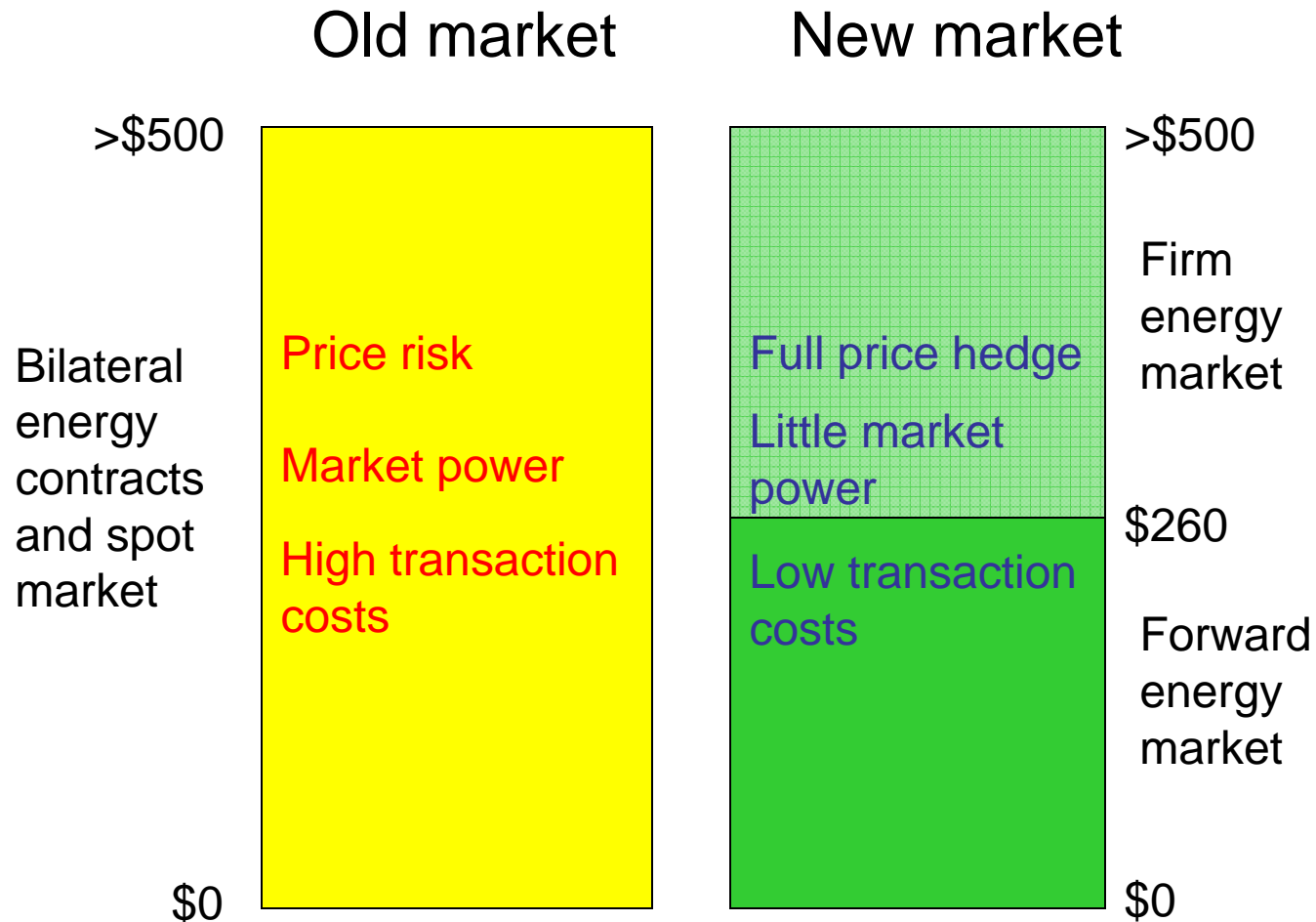
Alternative regulated product: Energy share with *daily* obligation

- Supplier bids for % of regulated load
- Supplier that wins 10% share has an obligation to serve 10% of regulated load in each *day*
- Deviations between daily obligation and supply settled at the spot energy price (or scarcity price if spot is higher) assuming load following for deviation
- Example: Supplier with 10% obligation does 9%
 - Supplier penalized according to 1% hourly load following obligation

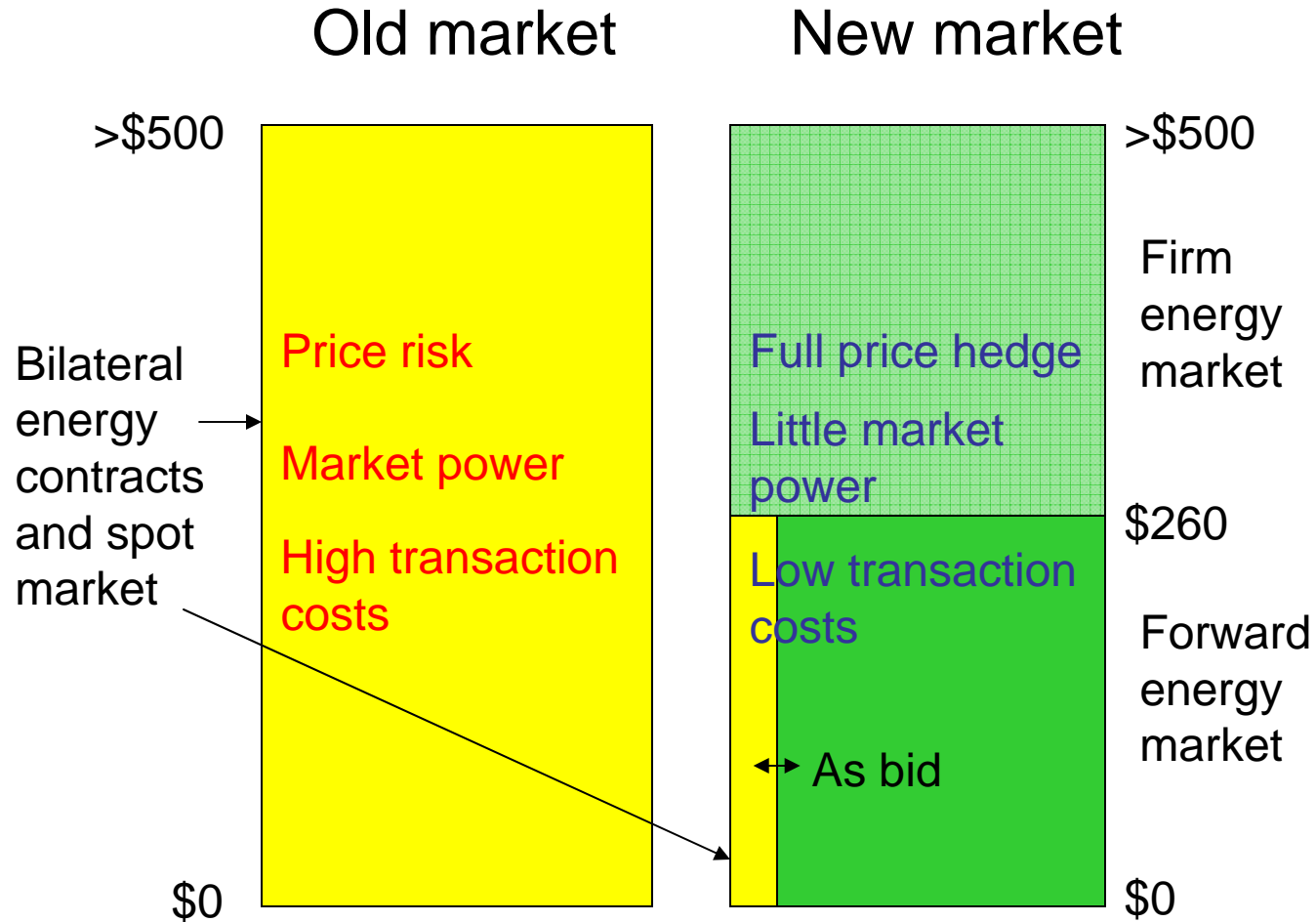
Benefit of daily obligation

- Obligation is consistent with hourly dispatch
 - Lower risk
 - Less market power over day
- But investment incentives are distorted
 - Favors baseload units, since get same forward energy price but supplying more energy in off peak than peaking unit
- *Recommendation: Hourly obligation*

Price coverage of regulated customer



Price coverage of nonregulated customer



Regulated demand participation

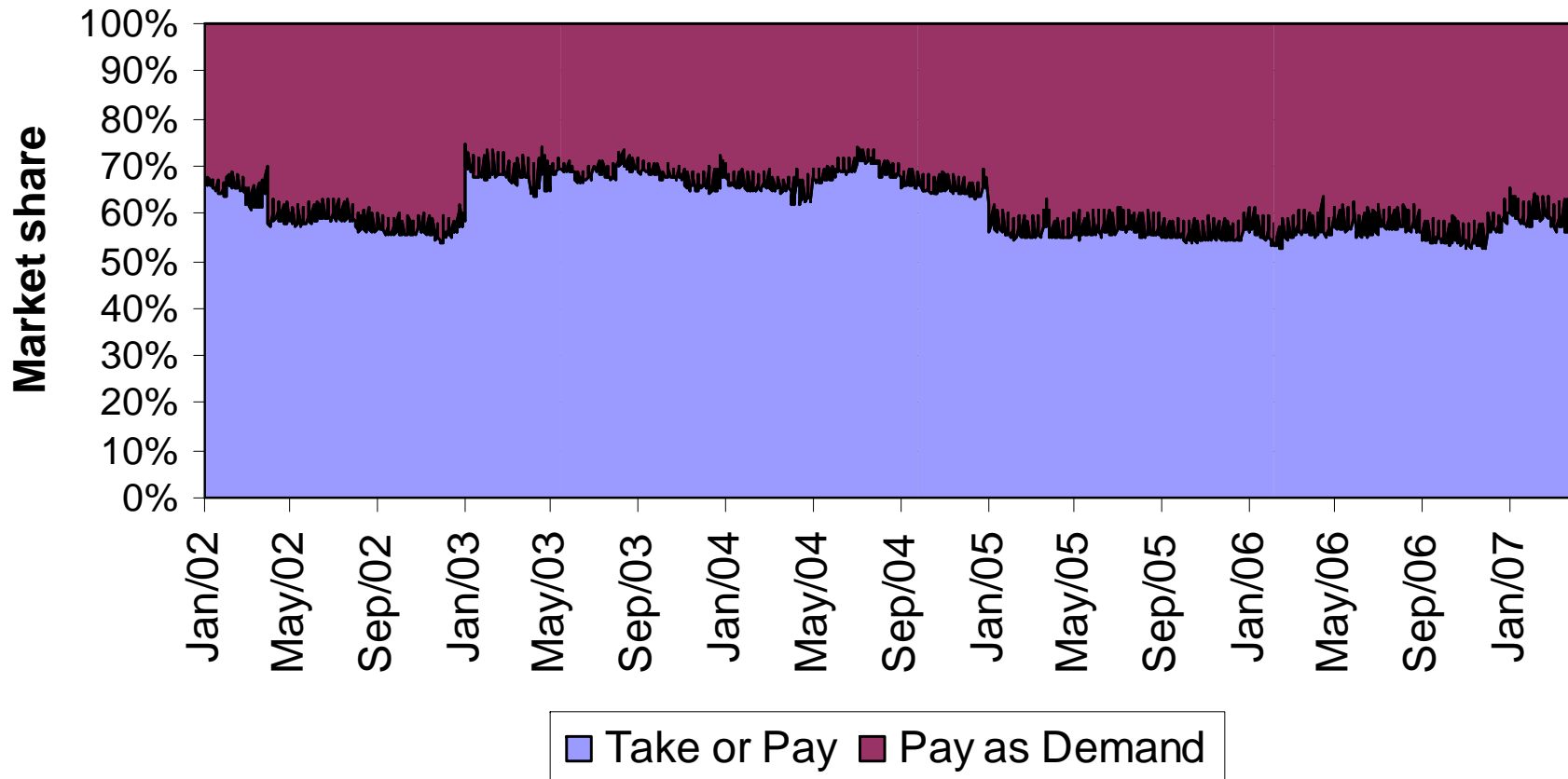
- Participation by LSE is mandatory and passive (no active bidding of demand)
- Regulated customer may decide to become a nonregulated customer
 - Purchase hourly meter
 - Actively participate in auction
- But switch to nonregulated status is permanent (or occurs after sufficient delay)

Nonregulated demand participation

- Nonregulated demand participates in the same auction
 - Single nonregulated product
- Product: *expected* energy, not *actual* energy
 - Hourly, but based on expected energy demand
 - Hedges expected energy demand, but exposes customer to spot price *on the margin*
 - Requires hourly meter (and demand management)
- Participation benefits both regulated and nonregulated customers, as well as suppliers
 - Improved liquidity and price formation

Pay-as-demand is common

Type of contracts



Regulated product

- Regulated load is aggregate of all LSEs
- 100% of regulated load is purchased in auctions
- Mandatory for LSEs
- Voluntary for suppliers
- Accommodates multiple customer classes if required
 - For example, undesirable load shape of LSE

Average cost (\$/kWh) by LSE and Year



Conclusion:
Only *one*
customer
class!

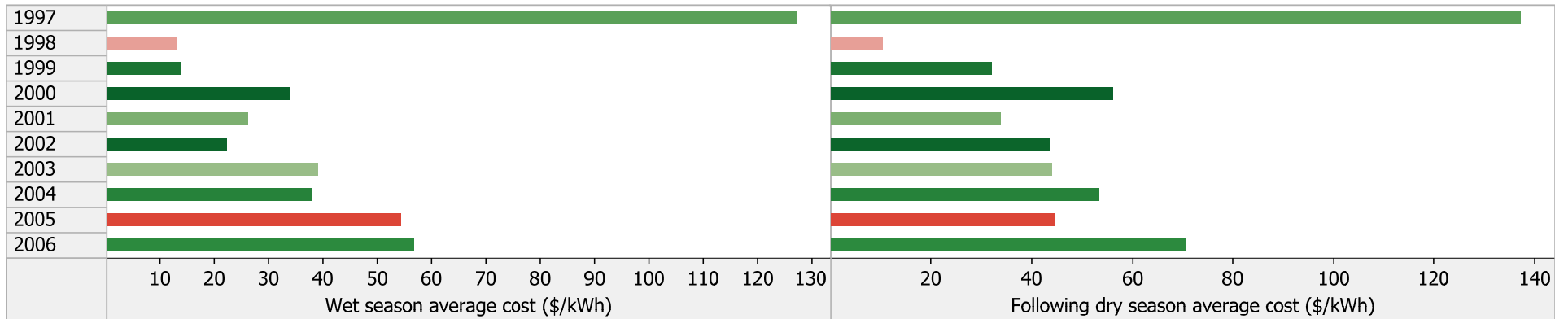
Price for each LSE broken down by Year. Color shows details about Demand. The data is filtered on Days, which ranges from 350 to 366.

Further issues

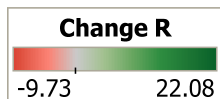
Seasonal factor?

- Costs are about 19% higher in dry season
- Wet season .92; dry season 1.11
- Conclusion: seasonal factor *not* needed

Average cost in wet and dry seasons, regulated market



Wet season is May to November; dry season is December to April. Color shows the change between wet and dry seasons. Spot prices are capped at \$260/kWh.

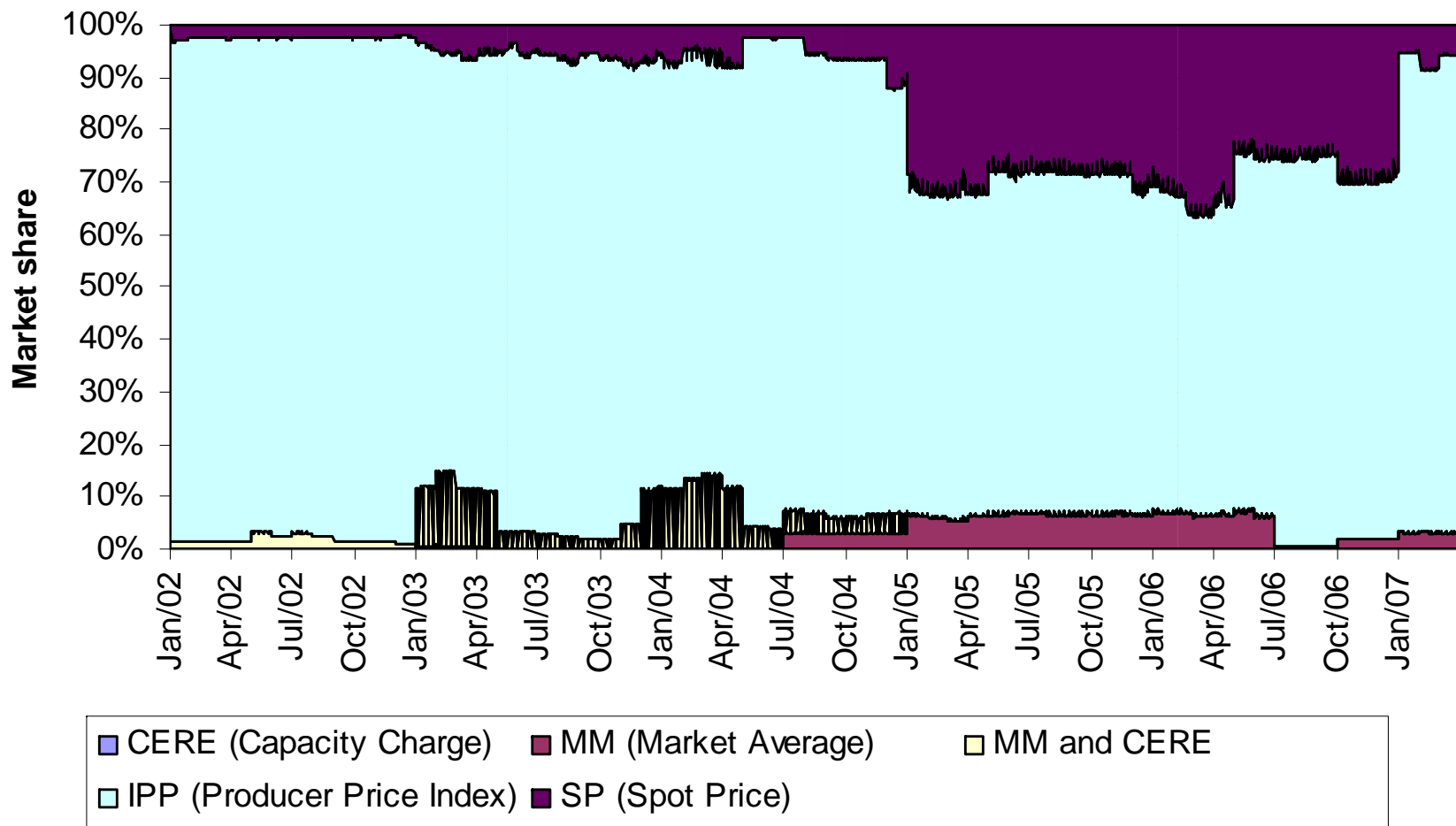


Load-following not ideal for all

- Different resource types have different ideal dispatch
 - Baseload, peaker, limited-water hydro, etc.
- Difference in dispatch and obligation introduces risk and market power issues
- Problem mitigated by
 - Balanced portfolio of resources
 - Balanced portfolio of contracts (Reg. and NR)
- Conclusion: benefits of pay-as-demand greatly exceed costs

Index multi-year contracts with IPP

Market share (energy basis) of active contracts by price index



Small lot size

- 0.1% of load category (reg. and nonreg.)
 - About 6 MW average load for regulated
 - About 3 MW average load for nonregulated
 - Varies with each hour, since load following
- Great flexibility in expressing quantity
- Accommodates small bidders
- Improves secondary market

Planning,
commitment,
and frequency

Planning period

- Time between auction and start of commitment
- Opportunity to make adjustments
- Impacts how much uncertainty has been resolved
- Longer implies price stability
- Longer implies more costly guarantees

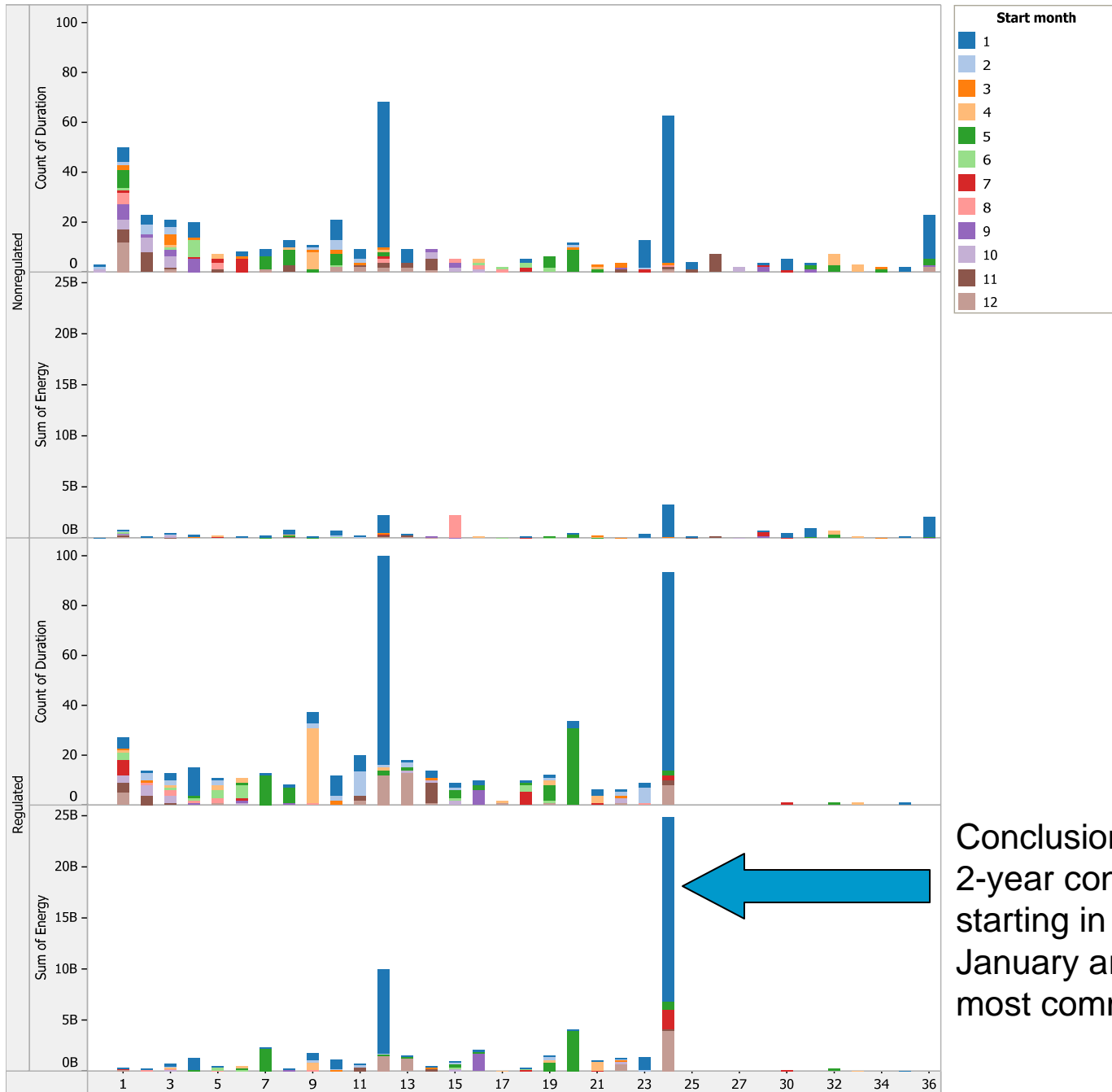
Commitment period

- Time between start and end of commitment; contract duration
- Longer implies price stability
- Longer implies better financing
- Longer implies greater guarantees

Frequency

- Number of auctions per year

Frequency of contract durations by months and market



Conclusion:
2-year contracts,
starting in
January are
most common.

Count of Duration and sum of Energy for each Duration broken down by Market. Color shows details about Start month. The view is filtered on Duration of 3 years or less.

Recommendation:

Quarterly 2-year contracts, annual rolling

Auction date	Energy commitment												Planning Months ahead	
	Yr	2010				2011				2012				
Year	Qtr	1	2	3	4	1	2	3	4	1	2	3	4	
2008	4	1/8				1/8				2 products, 8 prices at any one time.				14
2009	1	1/8				1/8								11
	2	1/8				1/8								8
	3	1/8				1/8								5
2010	4					1/8				1/8				14
	1					1/8				1/8				11
	2					1/8				1/8				8
	3					1/8				1/8				5

Alternative to improve liquidity of 1-year product: Quarterly 1- and 2-year contracts, semi-rolling

Auction date	Energy commitment													Planning Months ahead			
	Yr	2010				2011				2012							
	Year	Qtr	1	2	3	4	1	2	3	4	1	2	3		4		
2008	4	1/32												3 products, 12 prices at any one time.	14		
		3/32															
2009	1	1/32													11		
		3/32															
	2	1/32															
		3/32															
2009	3	1/32													5		
		3/32															
2009	4					1/32									14		
						3/32											
2010	1	1/4 one-year 3/4 two-year		1/32													11
				3/32													
	2			1/32													
2010	3					3/32									8		
						1/32											
2010	3					1/32									5		
						3/32											

Industry questions on product design

If the obligation of the product will be verified on a daily basis, there will be not enough remuneration for the peak plants. It is important to remember that in the Reliability Charge discussions it was said that the peak plants would have a high price during peak hours in the contract market.

- I agree and recommend hourly obligation.

How can market participants be certain of projected demand in light of the fact that large consumers can opt to participate in either the regulated or nonregulated sectors of the market?

- Large customers with hourly meters participate only in nonregulated market
- Regulated customers can switch to nonregulated, *but the switch is one way*
- Over time nonregulated share increases and regulated share decreases

Please provide a more detailed explanation about the size and other characteristics of the nonregulated product.

- 32% of Colombia load
- Demand curve known before clock auction
- Load-following like regulated product, but obligation based on expected demand (forecast)
- Same term as regulated product (2-year)

Is it possible for an LSE to aggregate the demand of many nonregulated customers?

- Yes

To limit quantity risk for a supplier of regulated product, can there be a cap on its obligation relative to forecast?

- Yes. I recommend a cap of about 3% above forecast

Auction

Descending clock auction

- Same as in firm energy auction, but two substitutable products
- Bidders can be rationed at the clearing price
 - Typical case
 - A bidder drops from 2.0% to 1.5% at \$70/kWh
 - Clearing occurs ($S = D$) at 1.7%.
 - Supplier wins 1.7%.

Descending clock auction

- Auctioneer announces high starting price
- Suppliers name quantities
- Excess supply is determined
- Auctioneer announces a lower price
- Process continues until supply equals demand

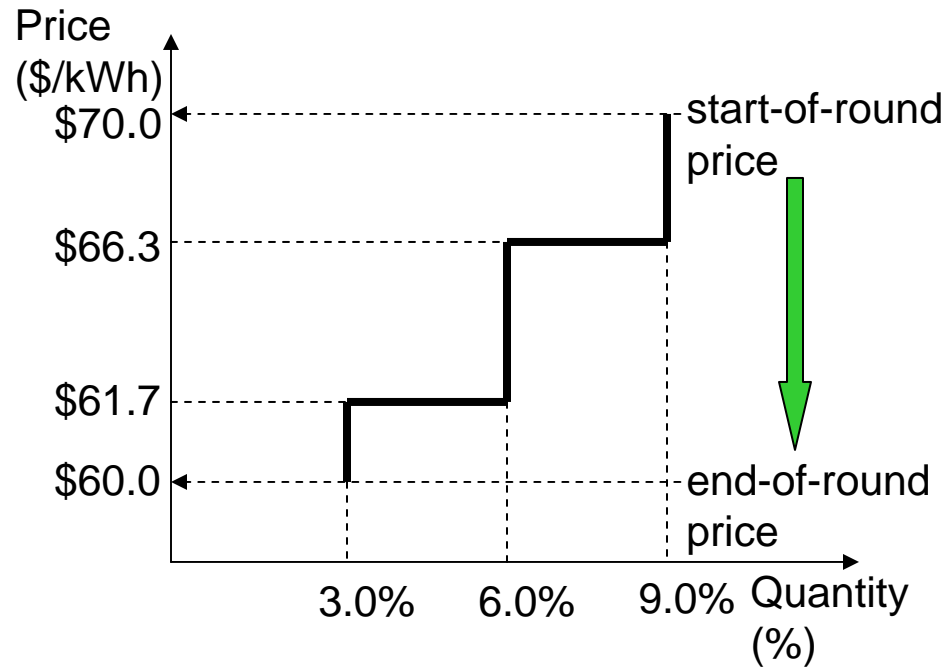
Starting price

- Starting price must be set sufficiently high to create significant excess supply
- Setting too high a starting price causes little harm
 - Competition among bidders determines clearing price; high start quickly bid down
- Setting too low a starting price destroys auction
 - Inadequate supply or insufficient competition
- Set starting price based on market fundamentals and indicative offers from suppliers at min and max starting prices
 - Min starting price roughly 20% above market
 - Max starting price roughly 50% above market

Mechanics

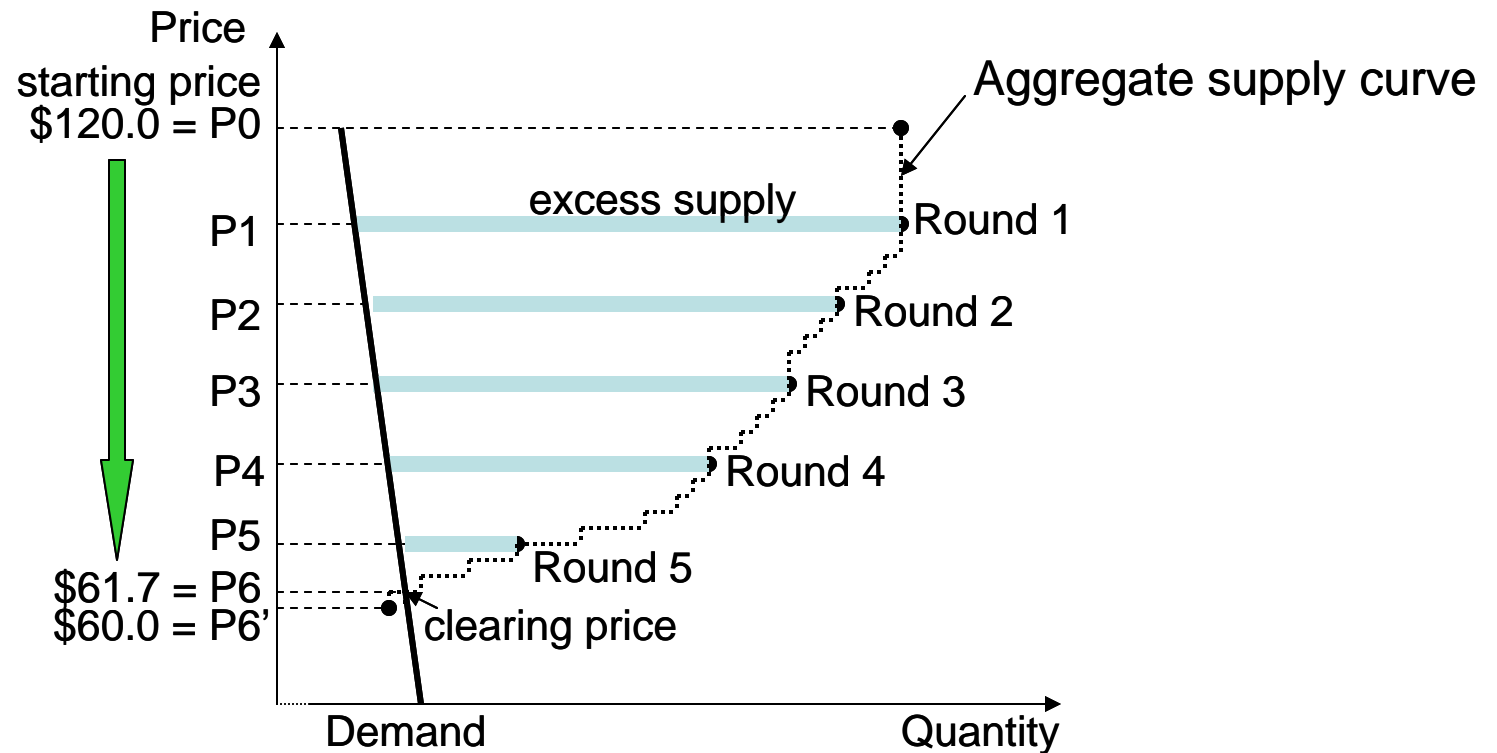
- Clock auction done in discrete rounds
- One price “clock” for regulated product
- Nonregulated price determined from substitution preferences
- In each round,
 - Auctioneer announces
 - Excess supply at end of prior round
 - Price spread between regulated and nonregulated products
 - Start of round price (higher price)
 - End of round price (lower price)
 - Each bidder submits a supply curve for its total supply at all prices between start of round price and end of round price
 - Auctioneer determines excess supply at end of round price
 - Price decreases so long as there is excess supply
 - Price decrement determined from best-practice, essentially in relation to the extent of excess supply
 - If no excess supply, clearing prices are determined

Individual Supply Offer, Round 6



- Activity rule
 - Bidders can only maintain or reduce quantity as price falls (weakly upward sloping supply curve)
- “Intraround bids”
 - More accuracy without too many rounds
 - Better control of pace of auction
 - Ties are reduced

Descending clock auction



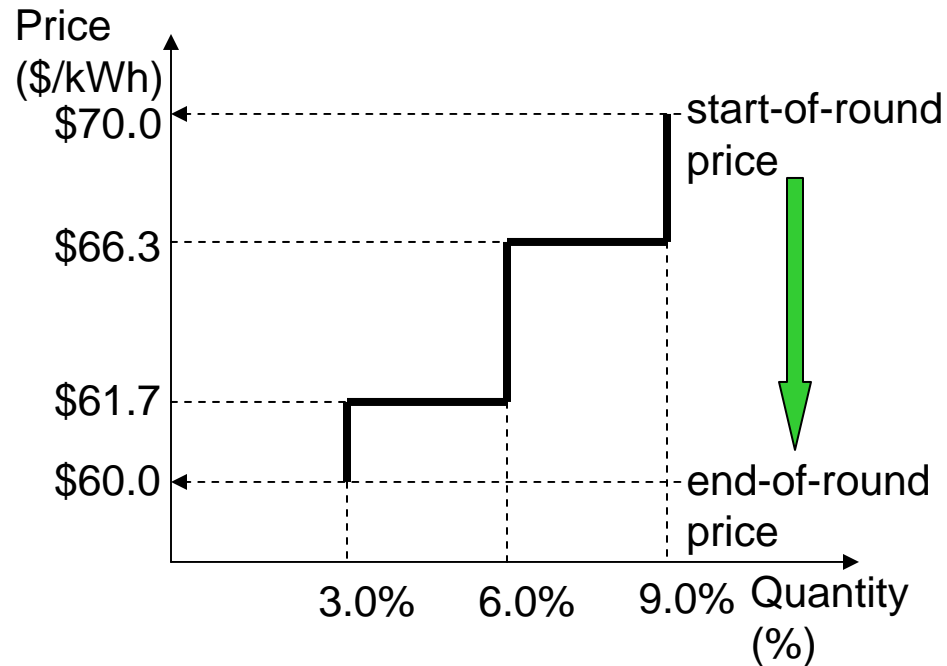
Average cost (\$/kWh) at spot price

Average Cost	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Regulated	105.81	65.39	12.22	33.12	38.60	26.94	40.92	40.51	53.97	51.79	70.77
Nonregulated	107.81	61.33	11.50	31.45	36.78	26.15	40.37	39.33	52.78	50.07	70.11
Difference	-2.00	4.06	0.72	1.67	1.82	0.78	0.55	1.18	1.19	1.72	0.66

Activity rule

- A bidder can only maintain or reduce its *aggregate* quantity as price falls (its aggregate supply curve must be weakly upward sloping)
- Allows full substitution between Regulated and Nonregulated products
- Bidders can express any linear substitution between products

Individual Supply Offer, Round 6



- Supply offer (both regulated and nonregulated)
 - 9.0% from \$70.00 to \$66.30
 - 9.0% to 6.0% at \$66.30
 - 6.0% from \$66.30 to \$61.70
 - 6.0% to 3.0% at \$61.70
 - 3.0% from \$61.70 to \$60.00
- Substitution between regulated and nonregulated
 - All regulated if price spread more than \$1.20
 - All nonregulated if price spread less than \$0.95
 - Linear mix otherwise: regulated = total \times (spread - 0.95) / (1.20 - 0.95)

Sample offer

Carried forward from end of prior round

Set by auctioneer at end of prior round

Bidder's bid in round

Bidder activity	Regulated price (\$/kWh)	Aggregate supply
Start of round prices and quantities	\$70.00	9.0%
Reduces total supply to 6%	\$66.30	6.0%
Reduces total supply to 3%	\$61.70	3.0%
End of round prices and quantities	\$60.00	3.0%

Substitution between regulated and nonregulated products

	All regulated	All nonregulated
Price spread (\$/kWh)	\$1.20	\$0.95

Calculation of price spread

	\$/kWh	S/D ratio	Price	Reg	Nonreg
Spread	1.51	120.0%	\$60.00	\$58.49	
	Share of total market			68%	32%
	Demand in own market			12.5%	10.0%
Demand	11.7%			8.5%	3.2%
	Supplier offer			120.0%	120.0%
Supplier	Supply	All	All	Supply	
		Reg	Nonreg	Reg	Nonreg
A	1.1%	2.20	1.71	0.0%	1.1%
B	1.1%	2.00	1.50	0.0%	1.1%
C	0.8%	1.80	1.42	0.2%	0.6%
D	2.8%	1.60	1.36	1.8%	1.0%
E	1.7%	1.50	1.23	1.7%	0.0%
F	2.2%	1.40	1.20	2.2%	0.0%
G	0.6%	1.11	1.11	0.6%	0.0%
H	1.4%	1.20	0.95	1.4%	0.0%
I	1.7%	1.10	0.94	1.7%	0.0%
J	0.6%	1.00	0.90	0.6%	0.0%
Supply	14.0%			10.2%	3.8%

Auction clearing

- Since both regulated and nonregulated demand is strictly decreasing, aggregate demand is strictly decreasing
- Aggregate supply is weakly increasing
- Thus, there exists a unique point such that aggregate supply = aggregate demand
- Clearing by product achieved by adjusting price spread

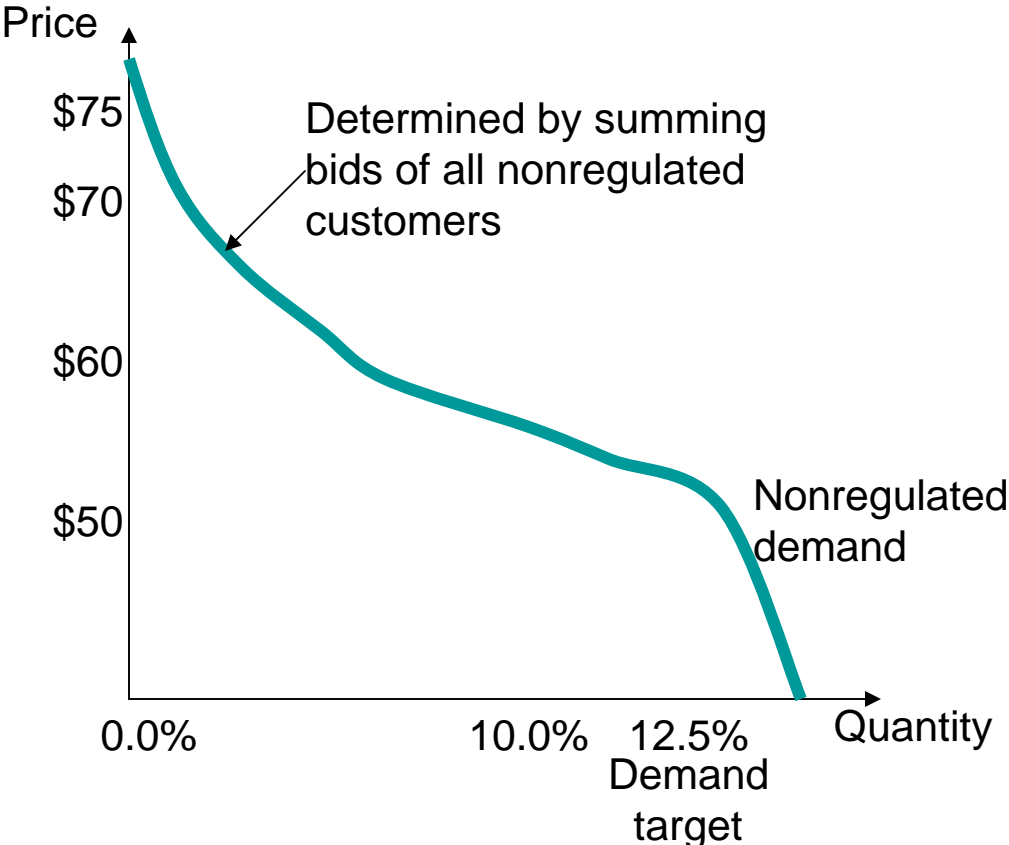
Information policy

- Demand curve and starting price announced before auction
- After every round, auctioneer reports
 - Aggregate supply
 - Excess supply at end of round price
 - Price spread that achieves same supply/demand ratio for each product
 - End of round price for next round (determined from extent of excess supply)

Forward energy auction

- Simultaneous descending clock auction
 - One clock (regulated price)
 - Nonregulated price determined from substitution preferences
- Supplier qualification and credit (nearly) identical for both regulated and nonregulated product
- Regulated demand is mostly vertical (fixed quantity)
- Nonregulated demand is as-bid at qualification
- Both regulated and nonregulated demands are piecewise linear and strictly decreasing
- Suppliers can arbitrage freely across the two products throughout clock auction by expressing substitution preferences
- Auction ends when no excess supply
 - Price spread determined from substitution preferences
- Any price separation reflects difference in serving regulated load and nonregulated load

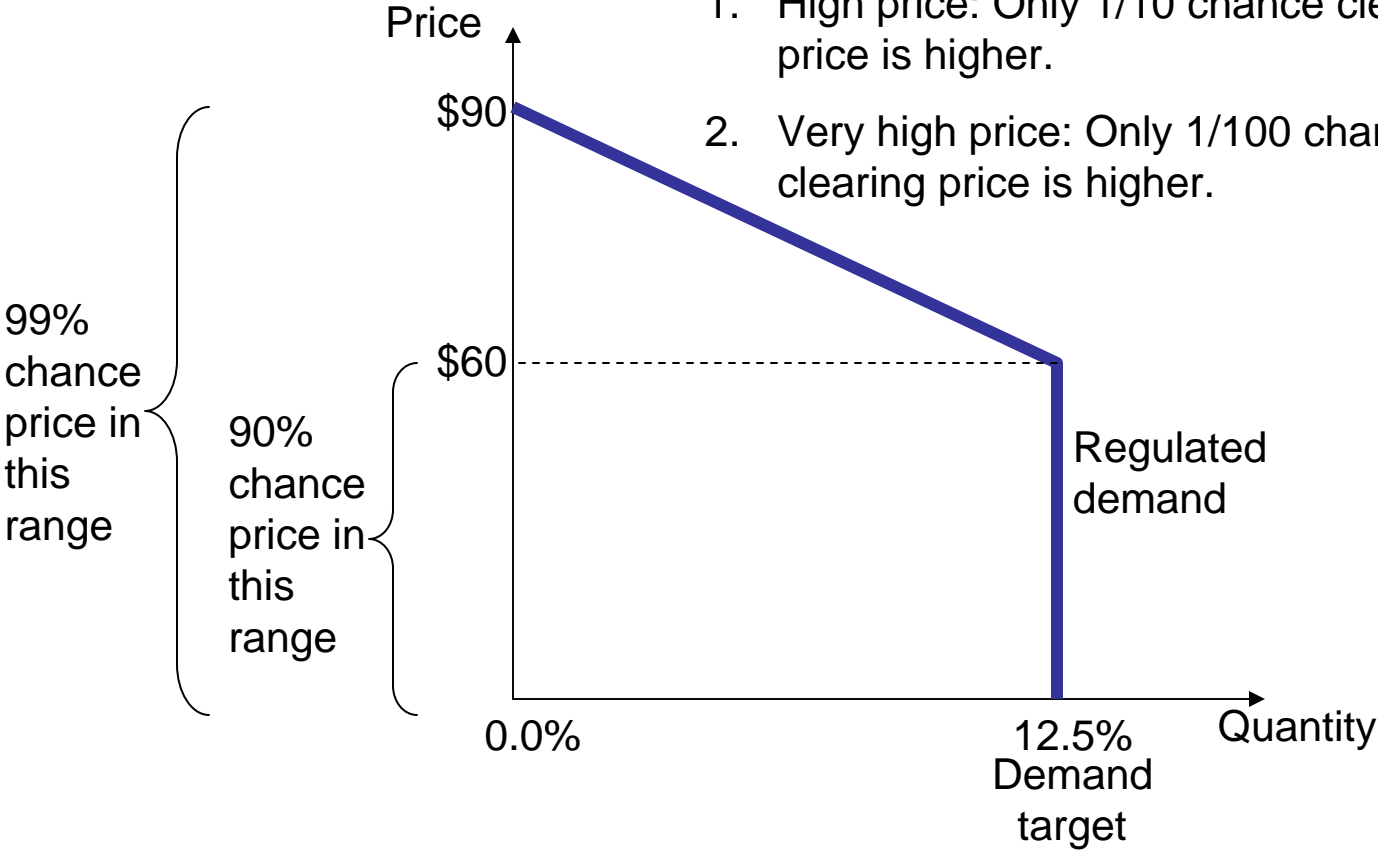
Demand curve for nonregulated product is submitted before auction by each nonregulated customer



Administrative demand curve for regulated product addresses insufficient competition

Demand curve determined by two prices:

- 1. High price: Only 1/10 chance clearing price is higher.
- 2. Very high price: Only 1/100 chance clearing price is higher.



Organized secondary auction

- Held monthly
- Simple uniform-price auction
 - Participants submit demand bids and supply asks for each product
 - Clearing-price determined from intersection of aggregate supply and demand curves
- Regulated and nonregulated products include
 - Monthly slice for next 12 months
 - Yearly slice for each year already auctioned in primary auction

Secondary market has 13 or 14 products each of Regulated and Nonregulated energy

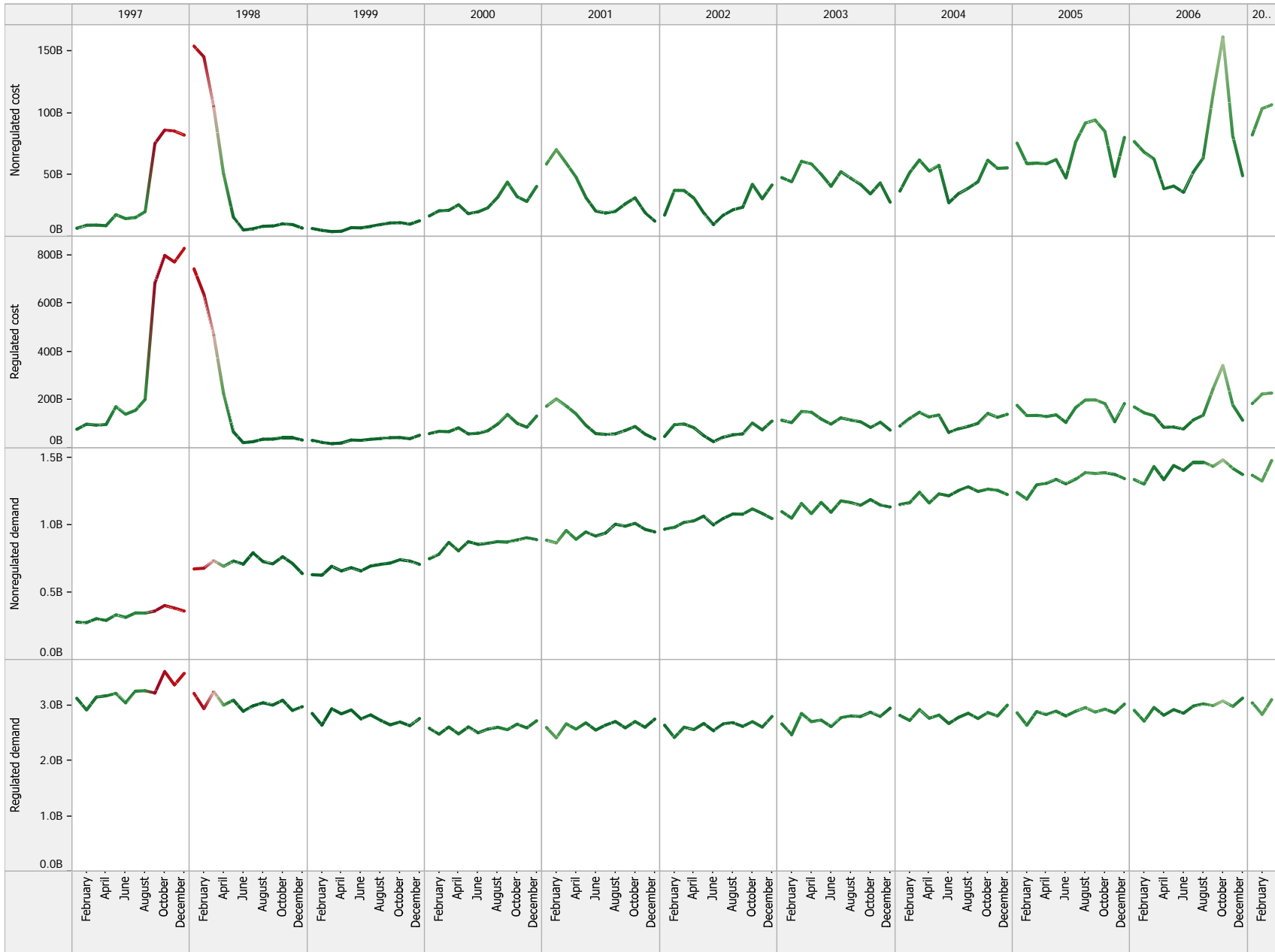
		Primary market products																												
		primary 2008-2009																												
		P2			P3			P4			primary 2009-2010																			
		2009												2010												2011				
Year	Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
		Organized secondary market products																												
	1		2	3	4	5	6	7	8	9	10	11	12	1	+ year 2010															
	2			3	4	5	6	7	8	9	10	11	12	1	2	+ year 2010														
	3				4	5	6	7	8	9	10	11	12	1	2	3	+ year 2010													
	4					5	6	7	8	9	10	11	12	1	2	3	4	+ year 2010												
	5						6	7	8	9	10	11	12	1	2	3	4	5	+ year 2010											
2009	6							7	8	9	10	11	12	1	2	3	4	5	6	+ year 2010										
	7								8	9	10	11	12	1	2	3	4	5	6	7	+ year 2010									
	8									9	10	11	12	1	2	3	4	5	6	7	8	+ year 2010								
	9										10	11	12	1	2	3	4	5	6	7	8	9	+ years 2010 and 2011							
	10											11	12	1	2	3	4	5	6	7	8	9	10	+ years 2010 and 2011						
	11												12	1	2	3	4	5	6	7	8	9	10	11	+ years 2010 and 2011					
	12													1	2	3	4	5	6	7	8	9	10	11	12	+ years 2010 and 2011				

Handling differences among nonregulated customers

- Hourly demand is forecast for each nonregulated customer for every hour
- Single nonregulated product
- Rate is auction clearing price scaled by quality factor of each nonregulated customer
- Quality factor reflects expected cost difference (at spot price) for particular customer
- Each supplier receives its share of payments
- Supplier obligation is its share of aggregate nonregulated *expected* load

Forecasting hourly demand and cost

Monthly demand and cost for regulated and nonregulated load



Cost is based on spot prices. Spot price (\$/kWh) is shown in color.



Simple hourly demand model

- Sample: 1 Jan 2002 to 31 Mar 2007
- Linear growth trend
- Fixed effects for
 - Month of year
 - Day of week
 - Hour of day

Hourly mean and *standard deviation* of demand and cost

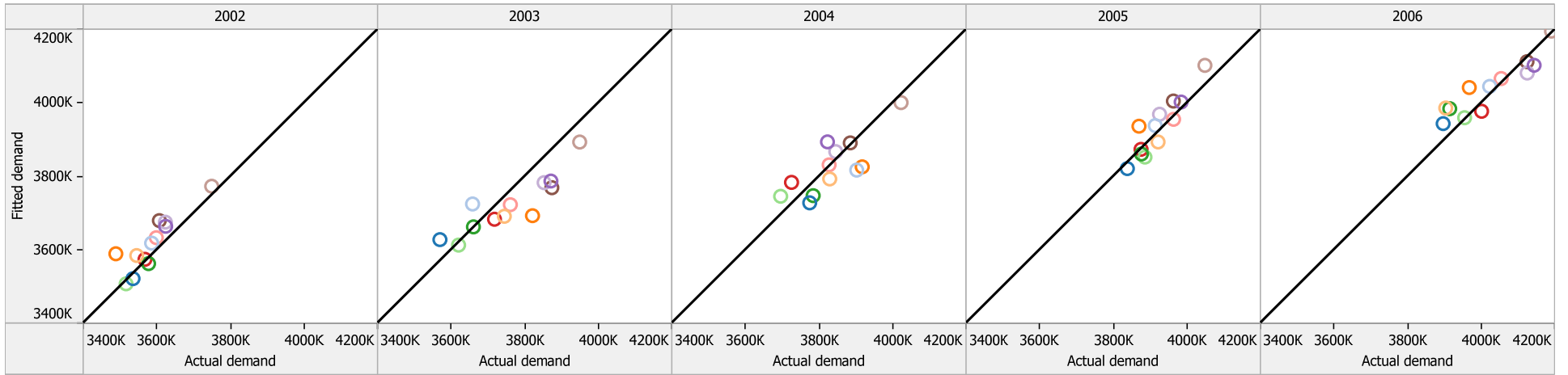
Load	Price (\$/kWh)	Demand (MWh)		Error (%)	Cost (\$M)		Error (\$/kWh)
		Actual	Fitted		Actual	Fitted	
Regulated	42.6	3,841	3,841	0.01	171	171	0.03
	21.5	908	893	4.45	112	110	1.96
Nonregulated	42.6	1,689	1,689	0.02	75	74	-0.09
	21.5	275	251	6.89	46	45	3.42
Total	42.6	5,530	5,530	0.01	246	245	0.03
	21.5	1,062	1,033	4.39	155	153	2.00

Note: Hourly mean and *standard deviation* for the period 1 Jan 2002 to 31 May 2007.

Price and cost are in January 2007 Colombian pesos. Cost is based on spot price.

Hourly demand estimate based on fixed effects model controlling for month, day of week, and hour of day. Linear growth term is also included.

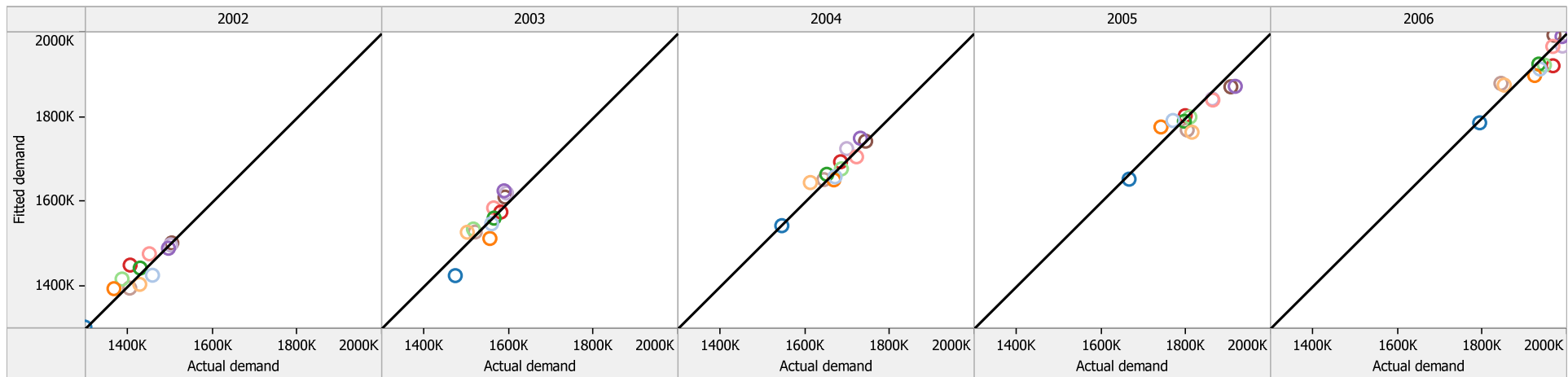
Actual and fitted regulated demand by month and year



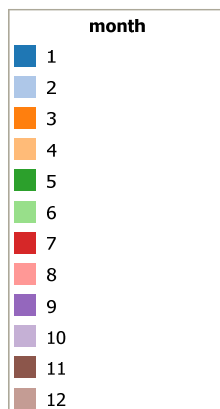
Hourly demand estimate based on fixed effects model controlling for month, day of week, and hour of day. Linear growth term is also included. Sample period is 1 Jan 2002 to 31 Mar 2007.

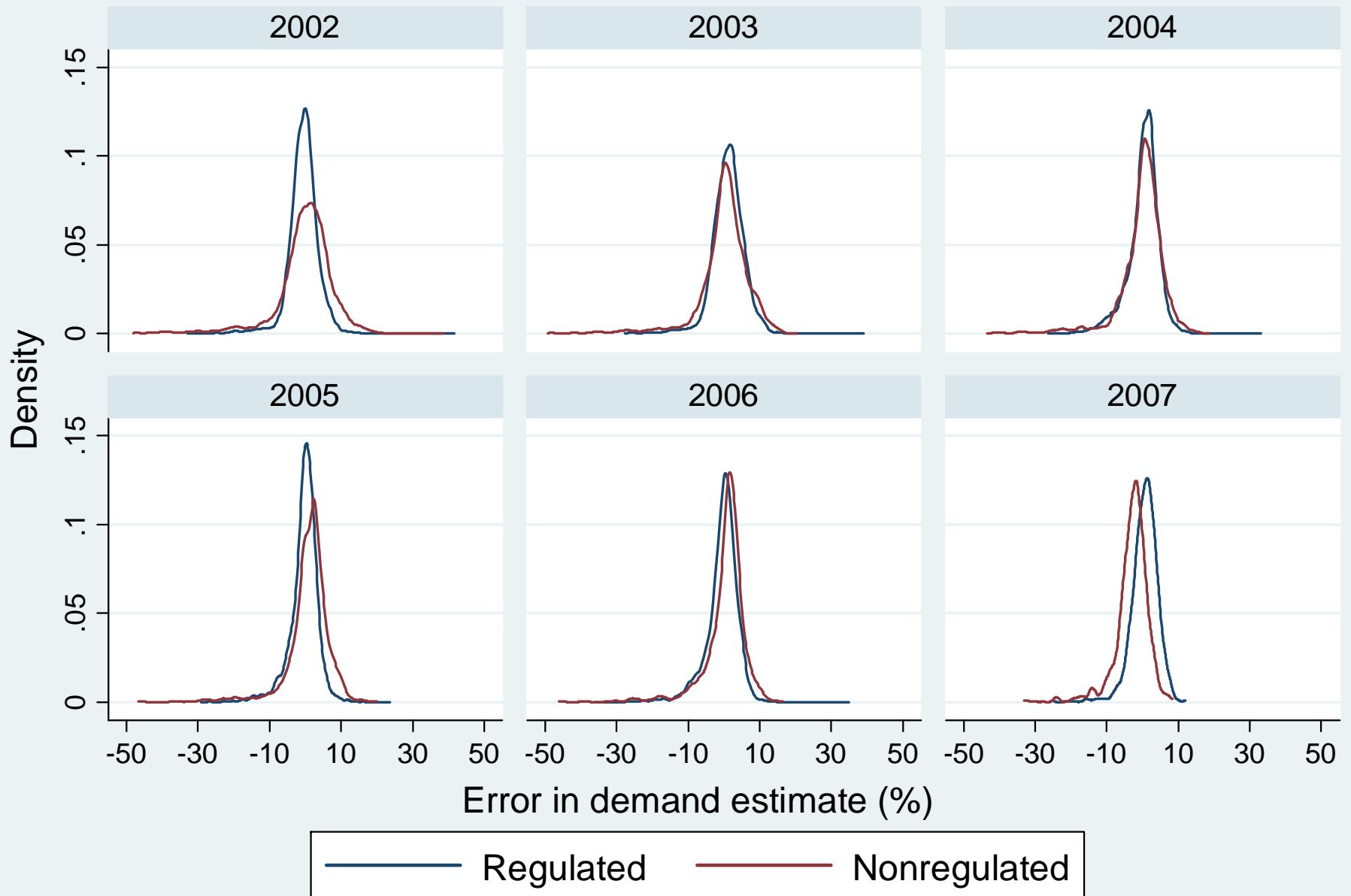


Actual and fitted nonregulated demand by month and year

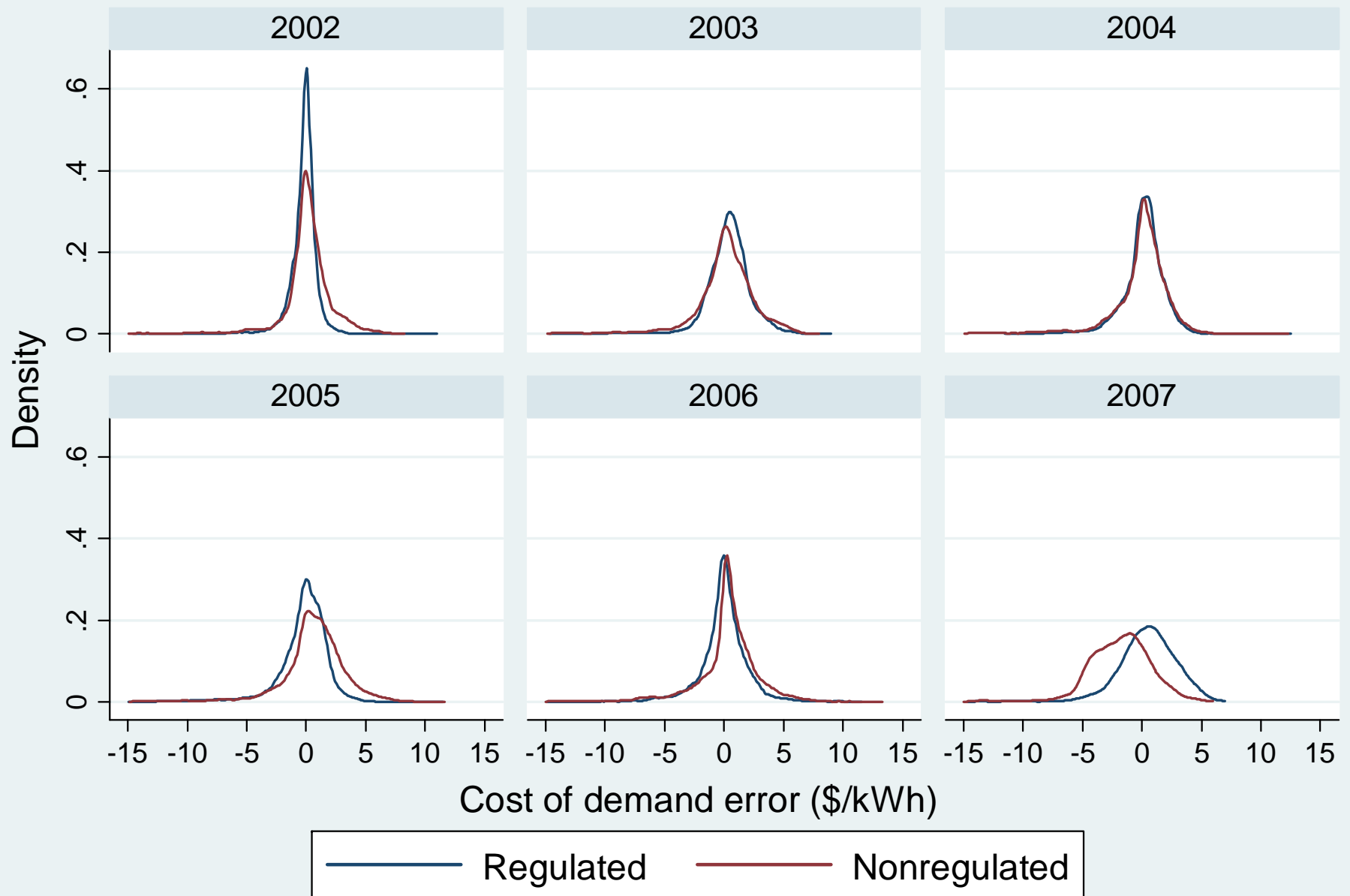


Hourly demand estimate based on fixed effects model controlling for month, day of week, and hour of day. Linear growth term is also included. Sample period is 1 Jan 2002 to 31 Mar 2007.



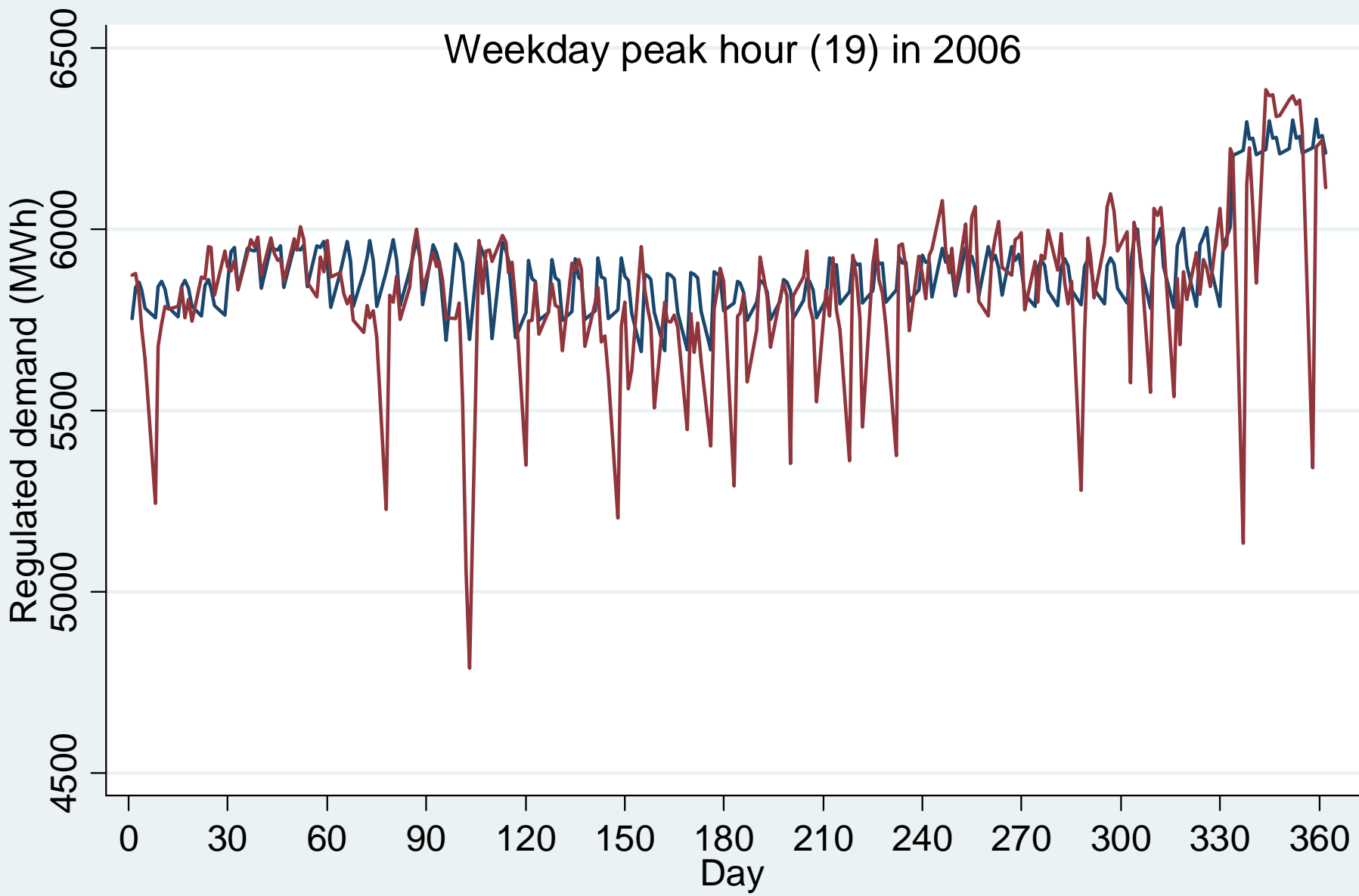


Graphs by year

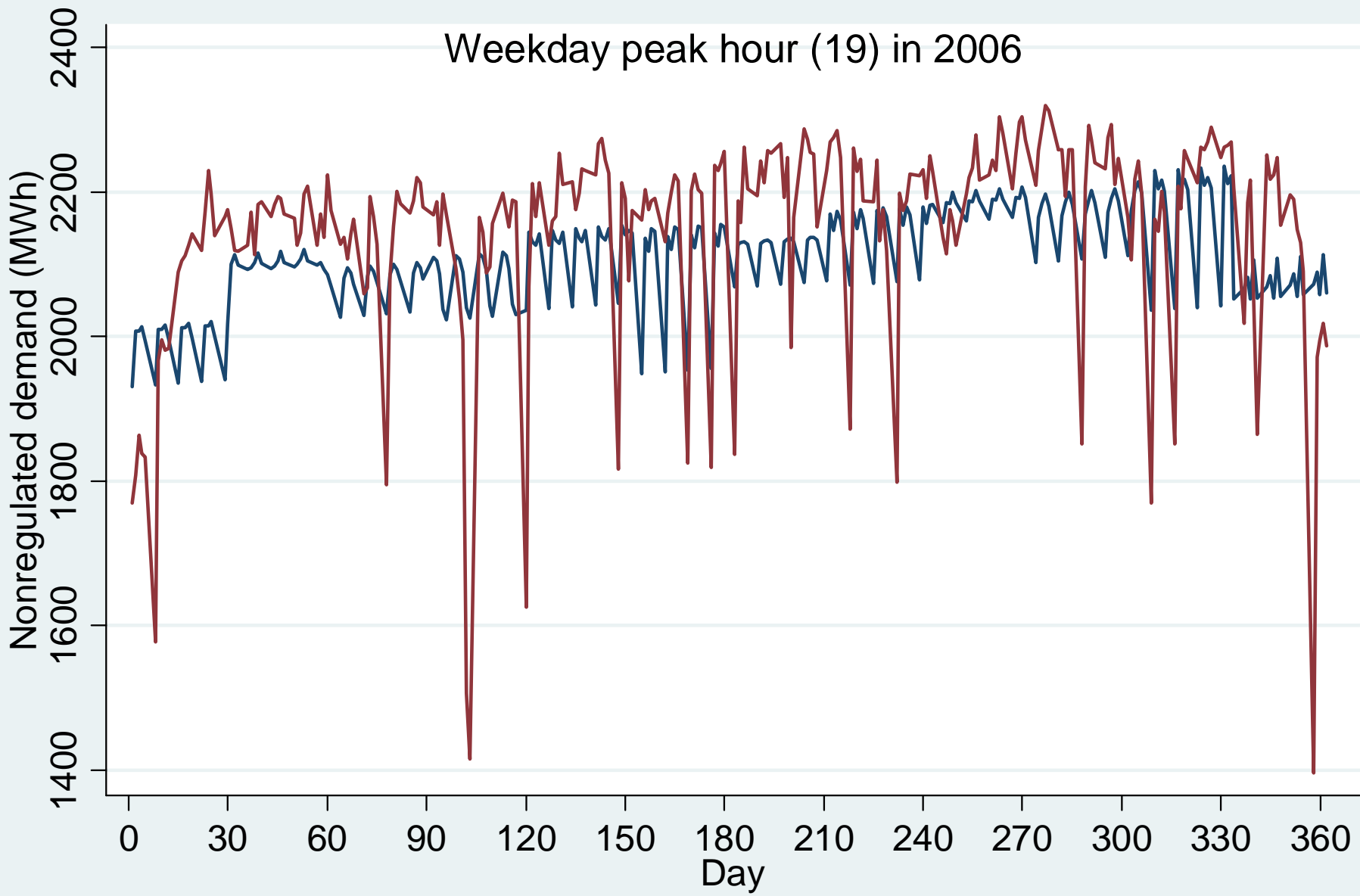


Graphs by year

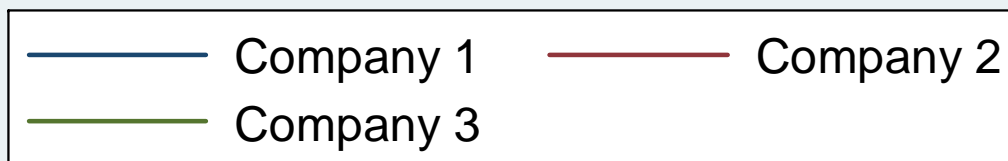
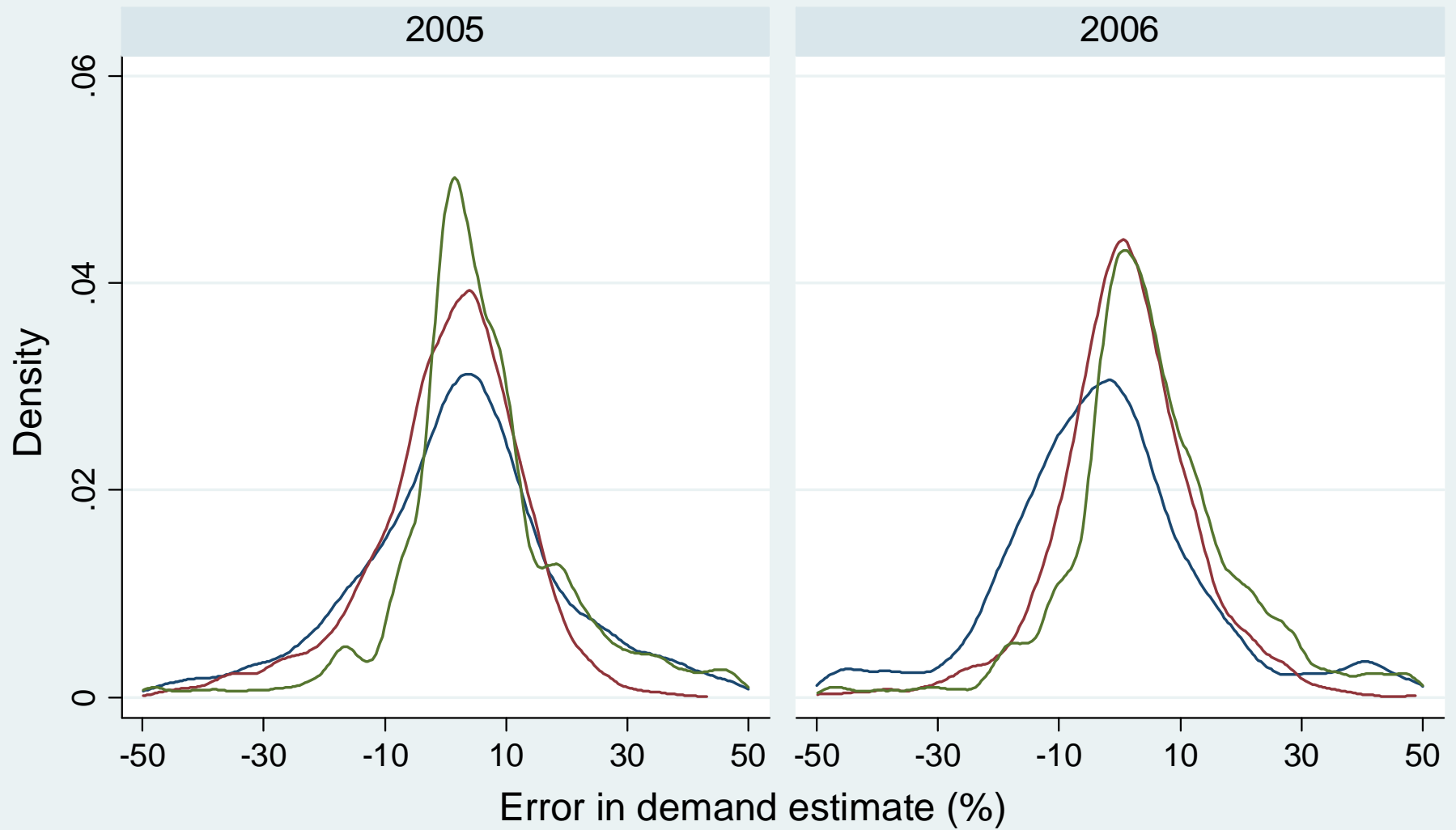
Weekday peak hour (19) in 2006



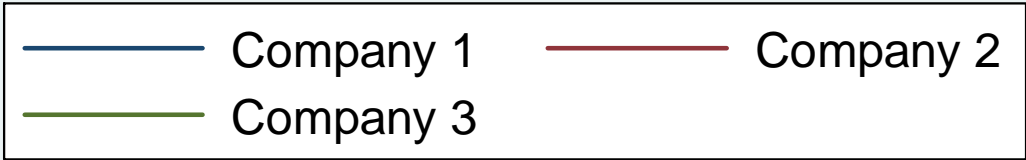
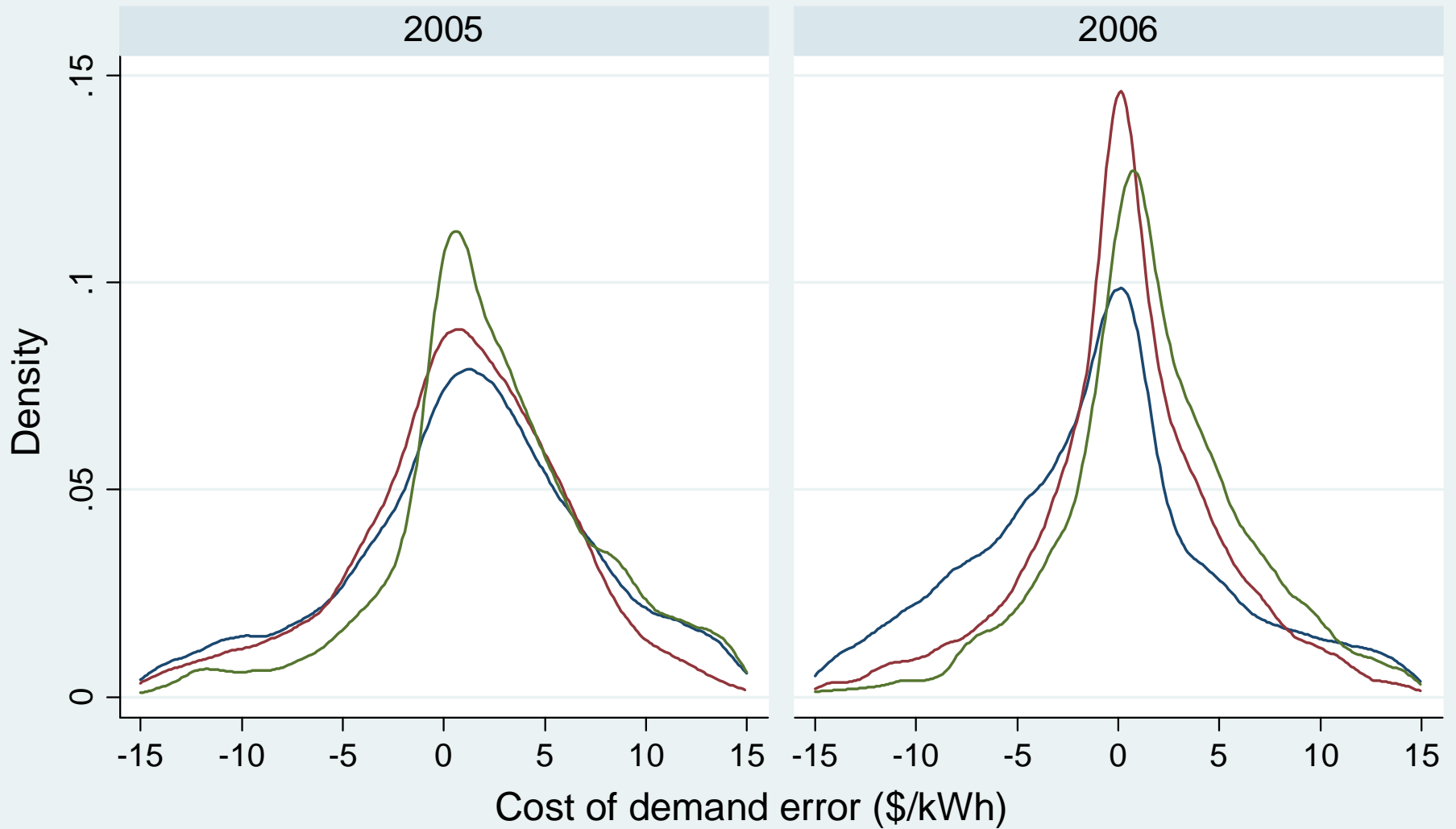
Actual Fitted



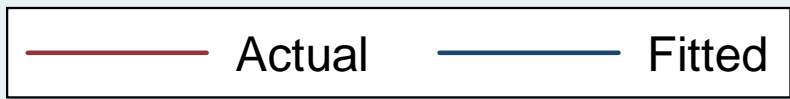
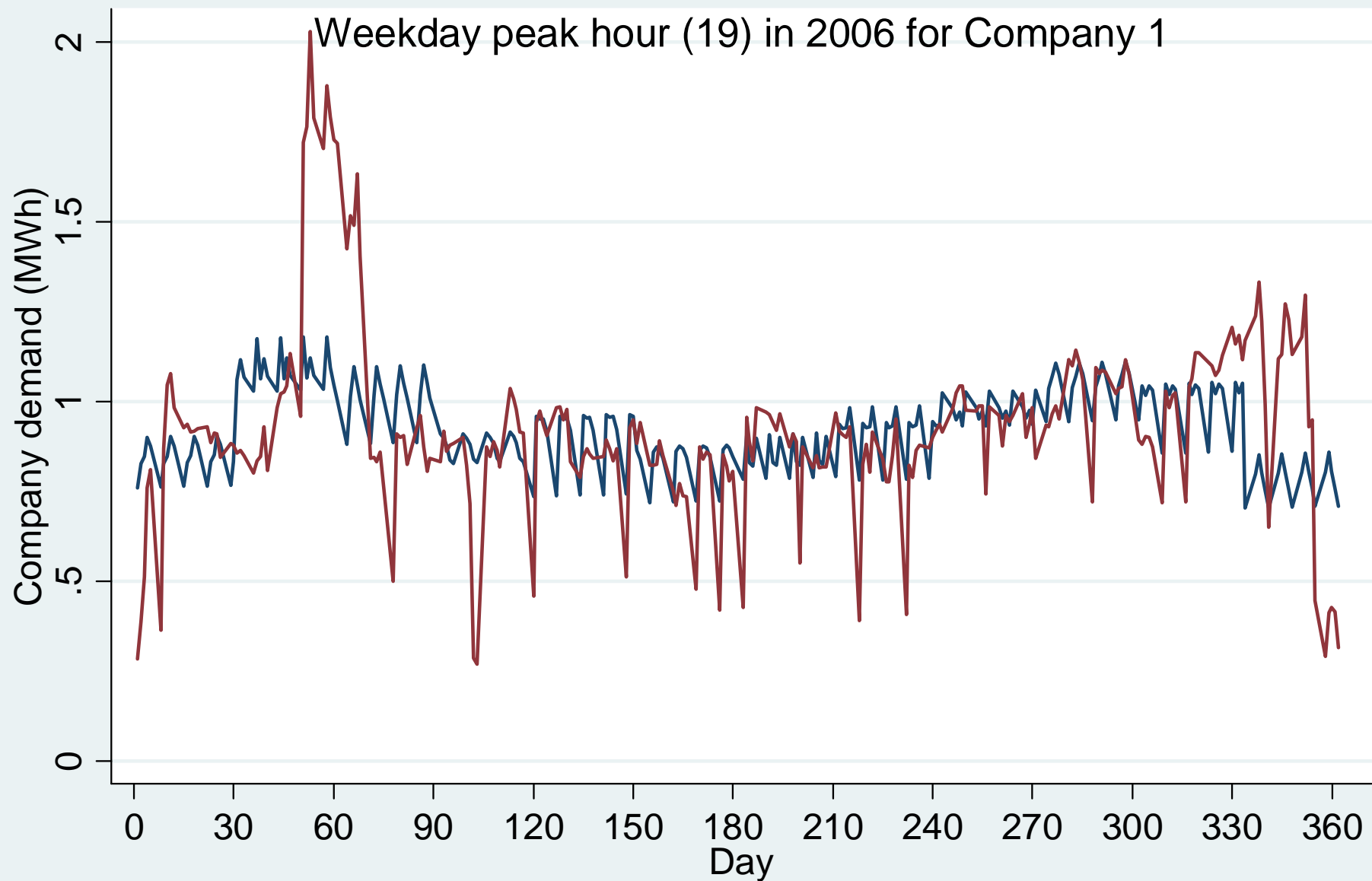
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Graphs by year



Graphs by year



Industry questions on auction design

Please provide a more detailed explanation of exactly how the auction will work.

- Detailed rules provided well in advance
- Bidder training
- Mock auction
- Actual auction

Please describe the various roles in the auction—CREG, Auctioneer, Auction Advisor, Auction Monitor, and the Bidders.

- CREG: general rules and regulations; administrative demand curve
- Auctioneer (XM): detailed rules, auction system, conducts auction with assistance of Auction Advisor (expert in clock auctions)
- Auction Monitor
- Bidders
 - Regulated customers (passive: administrative demand)
 - Nonregulated customers (active: bid demand before clock auc.)
 - LSEs (aggregates bids of regulated and nonregulated)
 - Suppliers (active: offers supply during clock auction)

Why will having two simultaneous auctions, instead of two auctions at different times, be the most efficient method of establishing final prices?

- Allows substitution between products
- Market prices established reflecting cost difference
- No need to guess about clearing price of product auctioned later

Will bilateral contracts among agents will be allowed?

- Yes, except between regulated customers and suppliers

If the energy purchased in an auction for the regulated market is lower than the target demand will the remaining demand be purchased in the next auction?

- Yes, the next auctions
- If target is not met in last primary auction, the remaining is purchased in the spot market

What is the time between rounds?
Is it defined by the auctioneer
during the auction?

- Between 2 hours and 20 minutes
- Pace is determined by auctioneer
- First auction may take 2 days, but 1 day after experience
- Typically about 8 rounds of bidding

In the simultaneous auction, is it possible for one of the products, say the regulated product, to close before the nonregulated product?

- No

For a bidder, must both the regulated and nonregulated supply curves be weakly upward sloping, or is it sufficient for the bidders aggregate supply curve to be weakly upward sloping?

- No. Just the bidder's aggregate supply

Is there a more objective method to determining the demand curve?

- The demand curve approach has been simplified so that only involves the determination of two prices. Each of these prices is subjectively determined based on market data and experience.

What happens if the regulated demand curve does not intersect the supply curve?

- Auction fails
- Auction is redone

The Colombian stock exchange is potentially interested in establishing a secondary market, but they are concerned that the primary product is load following. Those that trade on the exchange may not be comfortable dealing with the risk of a load-following product, and may prefer a fixed energy product. Is it possible to include a cap on the obligation, such as having a take and pay contract including a maximum deviation, in order to have more certainty in the contract?

If the primary auctions do not cover the total regulated demand, where will the remaining demand be procured?

- Spot market

We are unsure whether an organized secondary market can meet the specific needs of all the players in the market. Could we start with a bilateral secondary market and, depending on the results, later establish an organized market?

- Yes

Will the product in the secondary market be the same as the product in the primary market, differing only in the duration of the contract, or will the secondary market product differ in other ways from the primary market product? Please define the characteristics of the product to be traded in the secondary market.

- Same product
- Derivatives: monthly slices
- Other products as desired

What is the information policy for the secondary market?

- Sealed bid clearing price auction

Transition

No new contracts 2009 and on

- For regulated customers, contract cover will come from Forward Energy Market beginning 1 January 2009
- Coverage will be procured in four auctions in 2008
- New long-term contracts would raise concerns of self-dealing between LSE and its affiliated supplier

Simple transition

- First year of auctions (2008 for 2009-2010) is same as later years, except
 - Some compression in the auction schedule to accommodate a late start of the quarterly auctions
 - Roughly 30% of load in 2009 is procured as 1-year contracts
 - Roughly 20% of load in 2009 represents existing contracts that will end after 2009

Both 2-year and 1-year in transition year

Auction date	Yr	Energy commitment												Planning Months ahead	
		2009				2010				2011					
Year	Qtr	1	2	3	4	1	2	3	4	1	2	3	4		
pre-2008	-	20% (existing)													-
2008	1	7.5%													11
	2	7.5%													9
	2	7.5%													7
	3	7.5%													5
	1	1/8				2 products, 8 prices at any one time.								11	
	2	1/8												9	
	2	1/8												7	
	3	1/8												5	
	4					1/8								14	
2009	1					1/8								11	
	2					1/8								8	
	3					1/8								5	

Steady-state reached after 1 year

Auction date	Yr	Energy commitment												Planning Months ahead
		2010				2011				2012				
Year	Qtr	1	2	3	4	1	2	3	4	1	2	3	4	
2008	4	1/8				1/8				2 products, 8 prices at any one time.				14
2009	1	1/8				1/8								11
	2	1/8				1/8								8
	3	1/8				1/8								5
2010	4					1/8				1/8				14
	1					1/8				1/8				11
	2					1/8				1/8				8
	3					1/8				1/8				5

Sample offer in transition

Carried forward from end of prior round

Set by auctioneer at end of prior round

Bidder's bid in round

Bidder activity	One-year Products		Two-year Products	
	Regulated price (\$/kWh)	Aggregate supply (one-year)	Regulated price (\$/kWh)	Aggregate supply (two-year)
Start of round prices and quantities	\$68.00	4.0%	\$70.00	9.0%
Reduces total supply	\$65.12	2.5%	\$66.30	6.0%
Further reduces total supply			\$61.70	3.0%
End of round prices and quantities	\$58.00	2.5%	\$60.00	3.0%

Substitution between regulated and nonregulated products

	All regulated	All nonregulated	All regulated	All nonregulated
Price spread (\$/kWh)	\$1.10	\$0.90	\$1.20	\$0.95

Industry questions on transition

How are the auction prices passed through to the final customers in this period?

Given the fact that existing contracts cover differing portions of the demand from month to month, how can fixed one- or two-year contracts cover the remaining demand for each and every month of the transition period?

- 1-year contracts serve 50% of regulated load less demand satisfied by existing contracts on month-by-month basis

What determines the order of settlement of existing and MOR contracts?

- Existing first, then MOR

In order to reduce demand risk, is it necessary to restrict the movement of customers between regulated and nonregulated markets?

- Yes
- One way switching:
Regulated to Nonregulated

Is it necessary to ban new bilateral contracts before the auction or can the ban wait until after the first auction?

- Yes

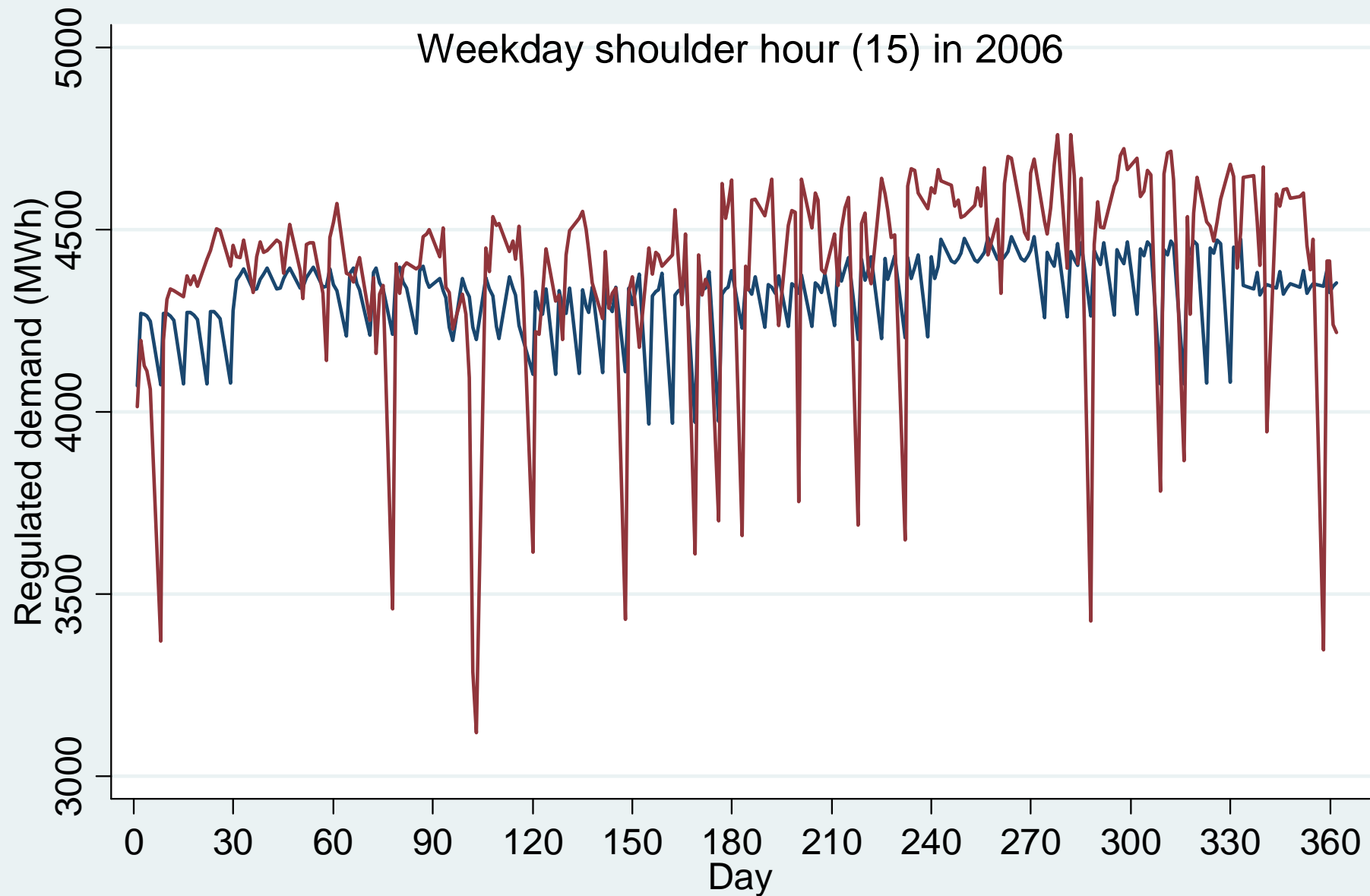
International experience and grades

- Maryland (MOR, since 2005): F
 - Single RFP to procure many years of energy (all eggs in one basket)
 - Poor auction design
- New Jersey (MOR, since 2002): A-
 - Annual auction for one-third of load
 - Very good auction design
- Illinois (MOR, since 2006): A-
 - Nearly identical to New Jersey
- France (Virtual Power Plant, since 2001): A
 - Quarterly auctions with flexibility on duration
 - Excellent auction design
- Belgium (Virtual Power Plant, 2003-2005): A
 - Quarterly auctions with flexibility on duration
 - Excellent auction design
- Spain (MOR, since 2007): A-
 - Process appeared too rushed at end (first auction 19 June 2007)
 - 21 companies supply 6.5 GW at 46.27 euro/MWh
- Spain (Virtual Power Plant, since 2007): A
 - Quarterly auctions with flexibility on duration
 - Excellent auction design
- Gas auctions (Germany, France, UK, Denmark, Hungary; since 2004): A

Conclusion

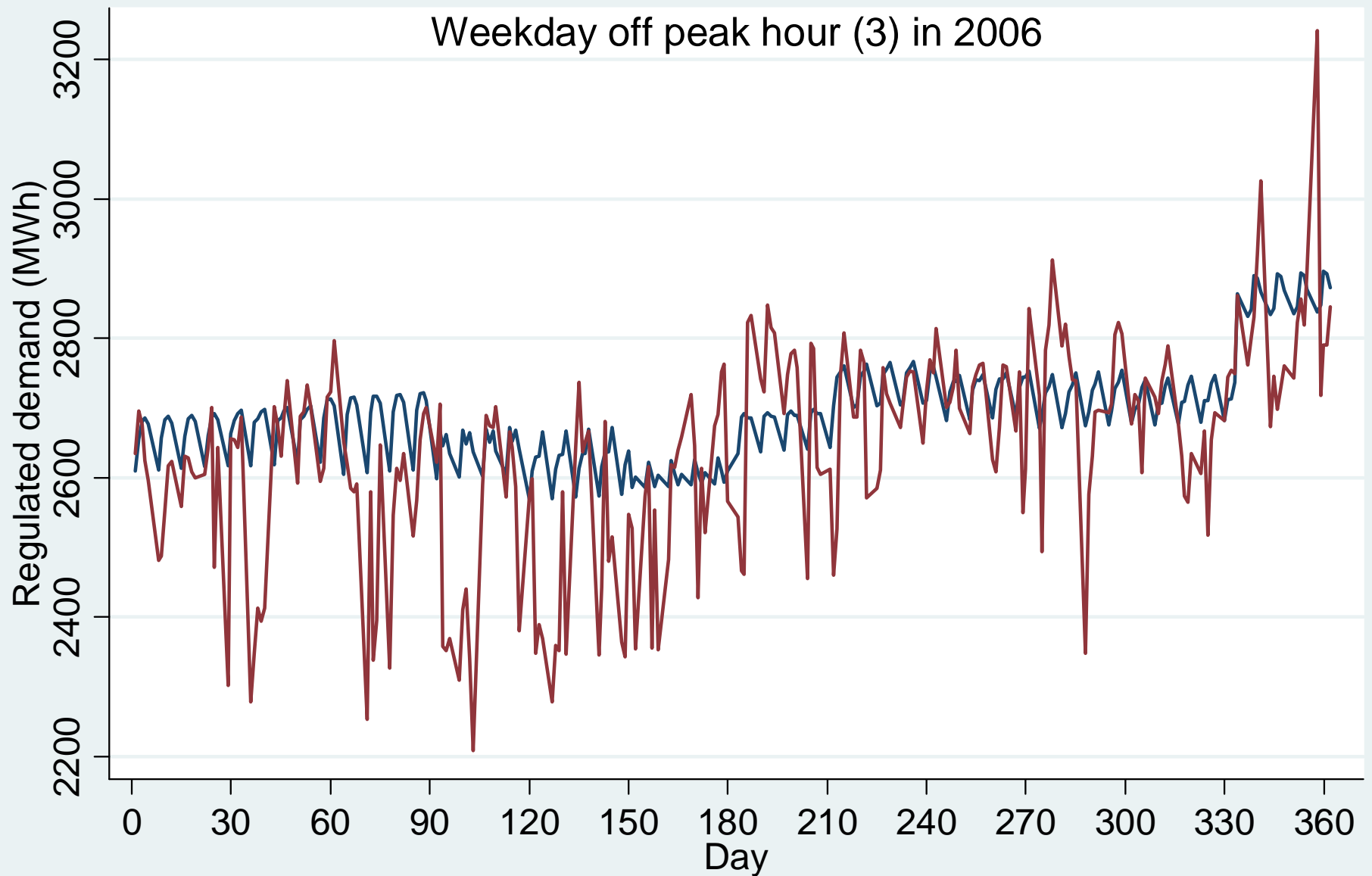
Appendix

Weekday shoulder hour (15) in 2006



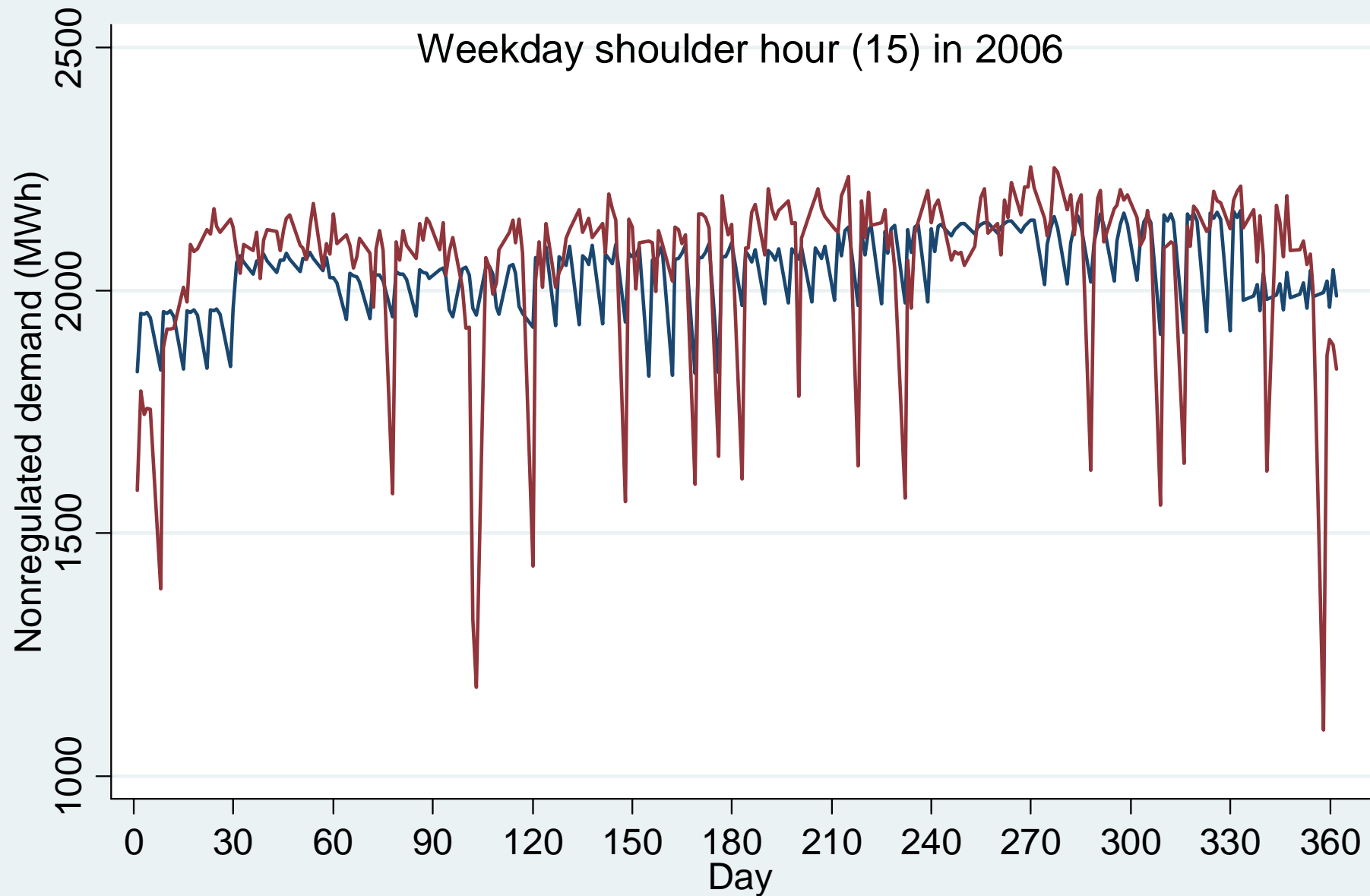
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Weekday off peak hour (3) in 2006



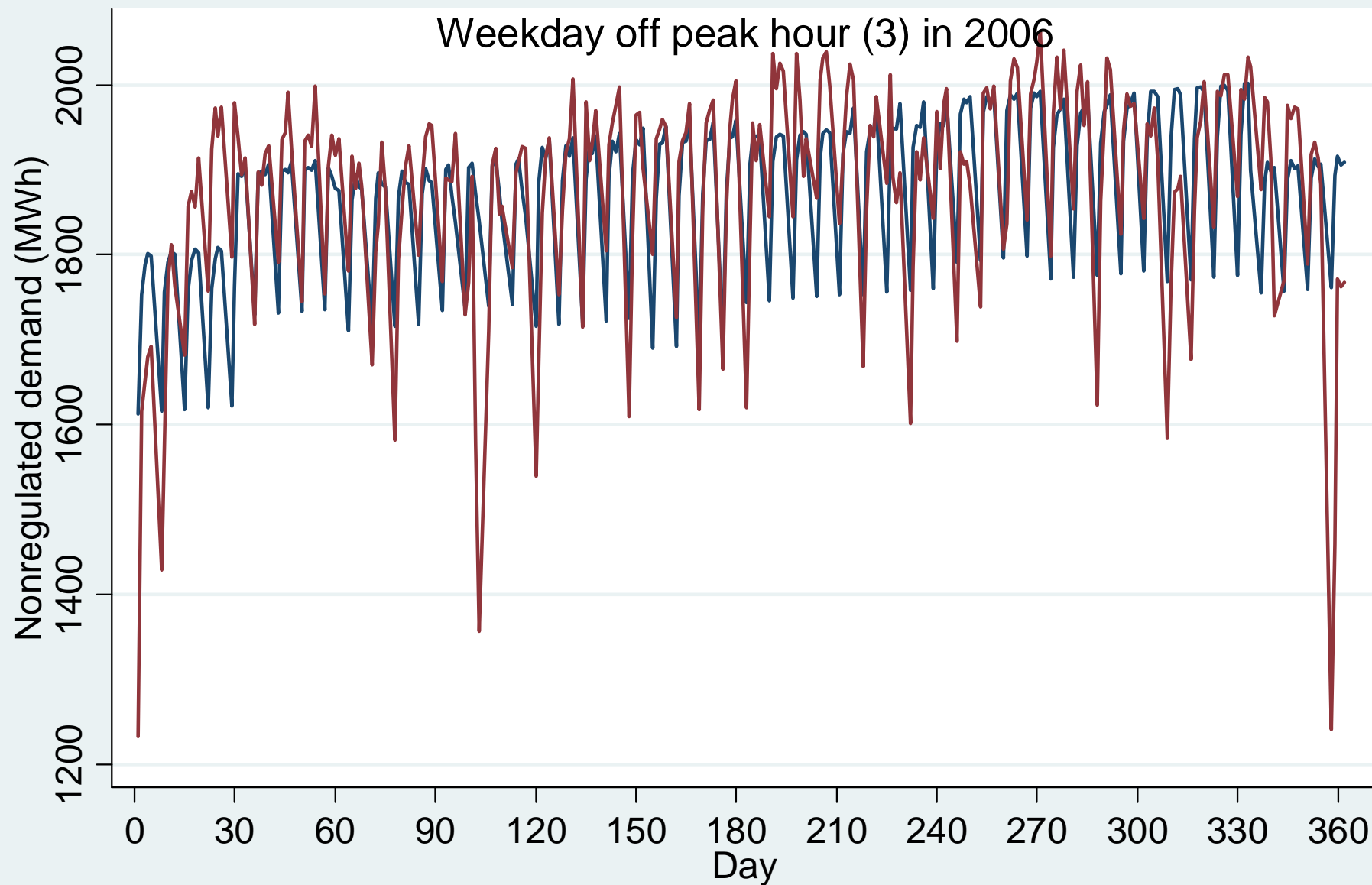
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Weekday shoulder hour (15) in 2006



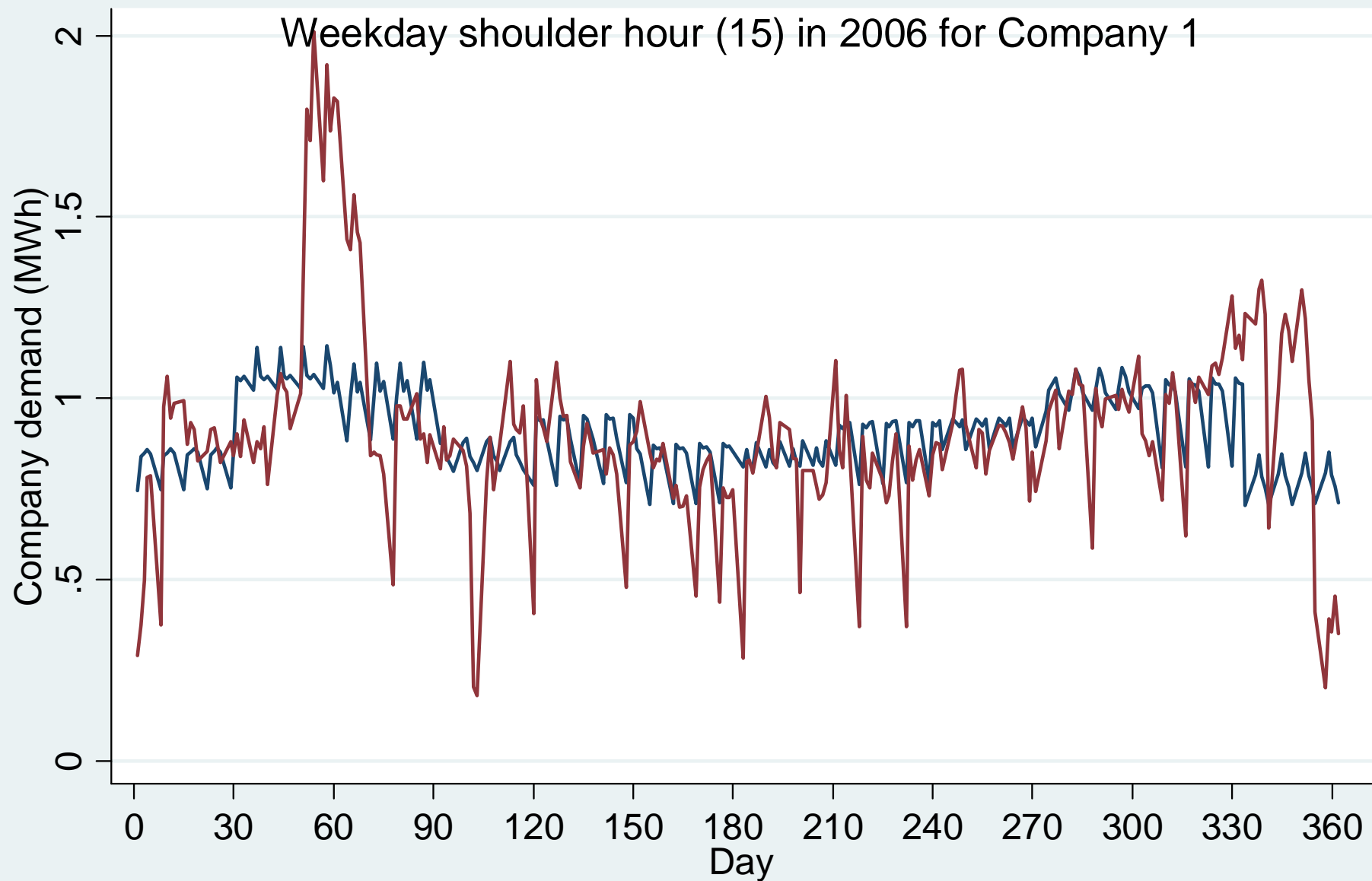
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Weekday off peak hour (3) in 2006



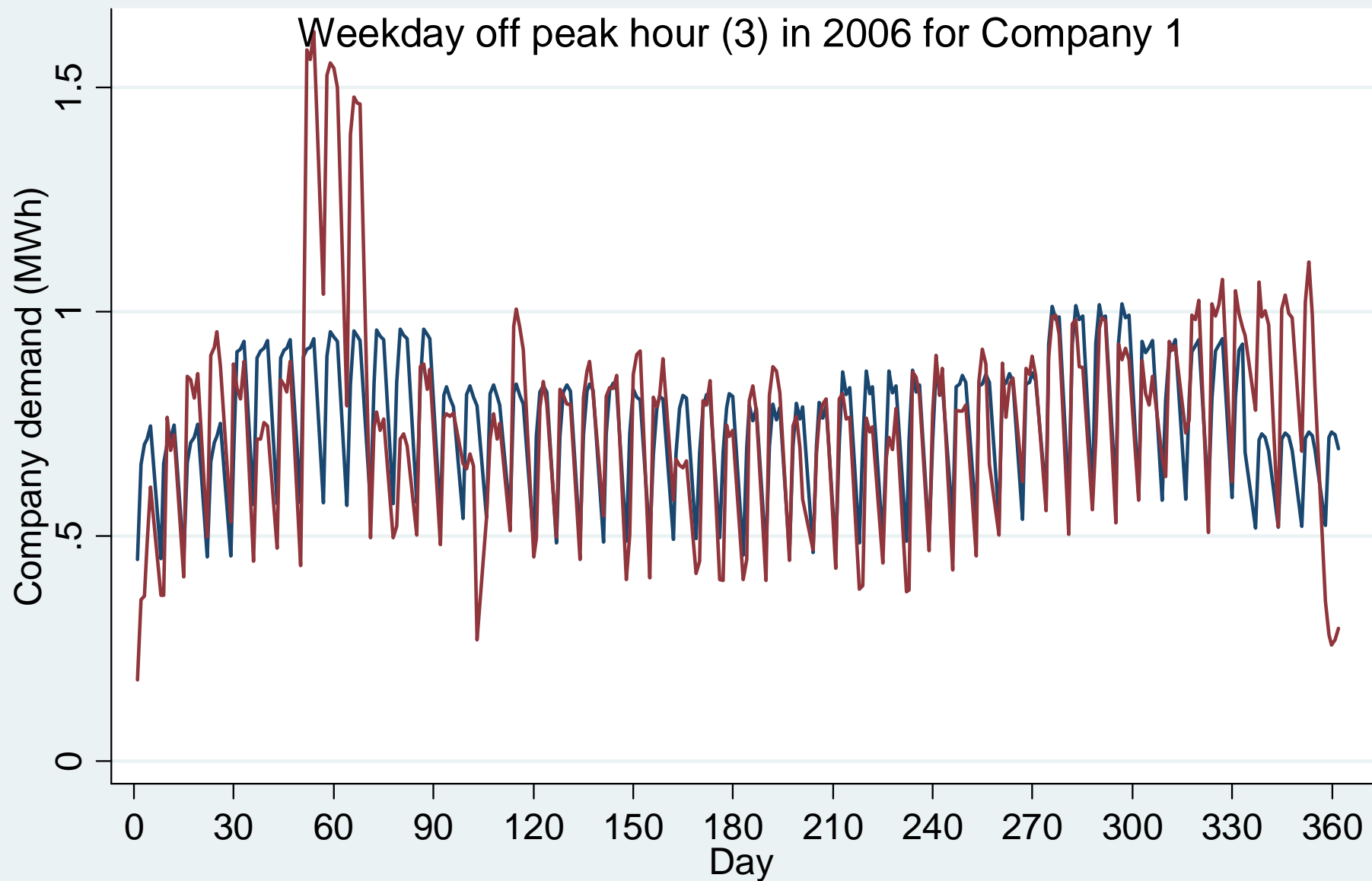
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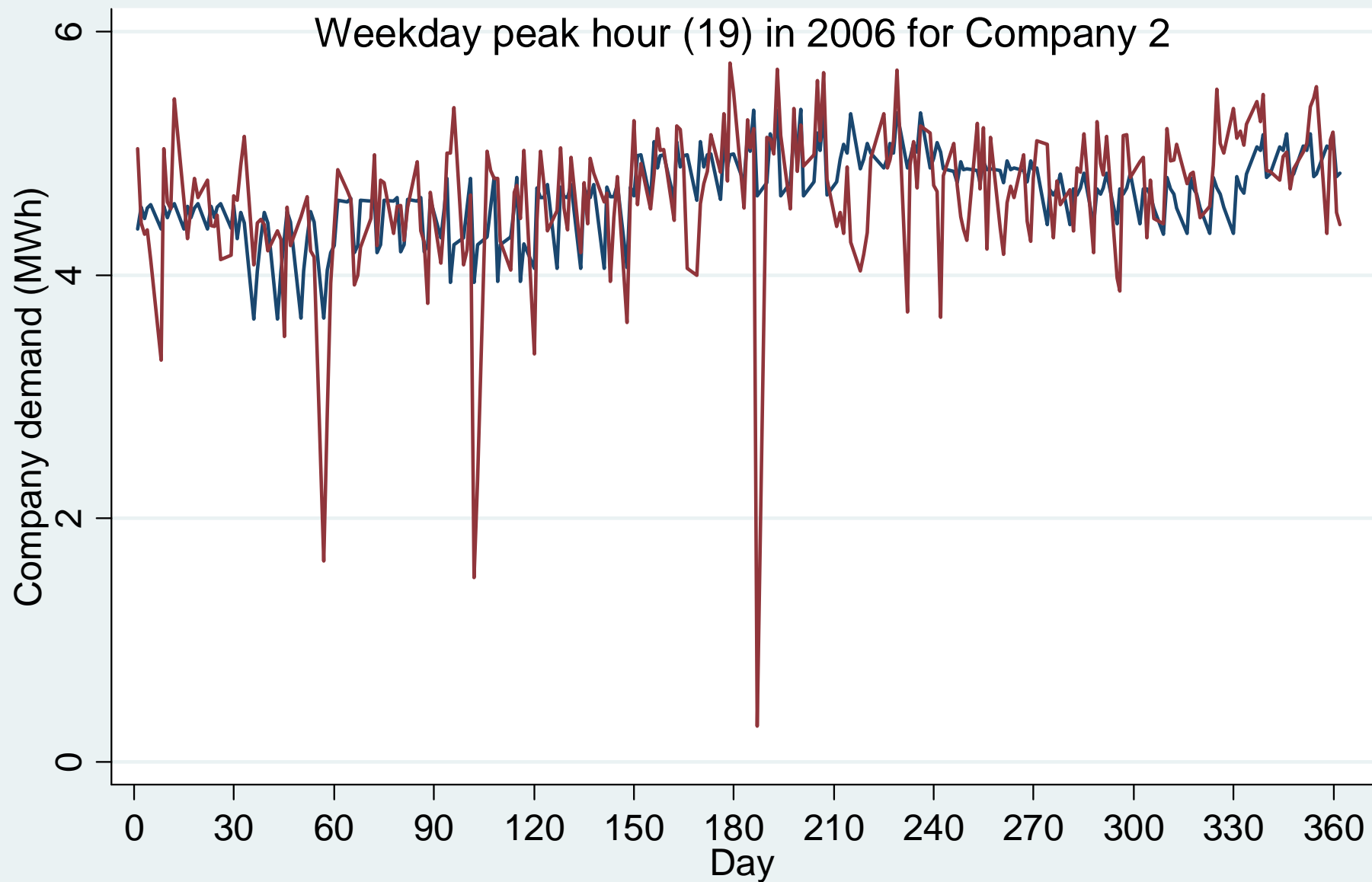
Weekday shoulder hour (15) in 2006 for Company 1



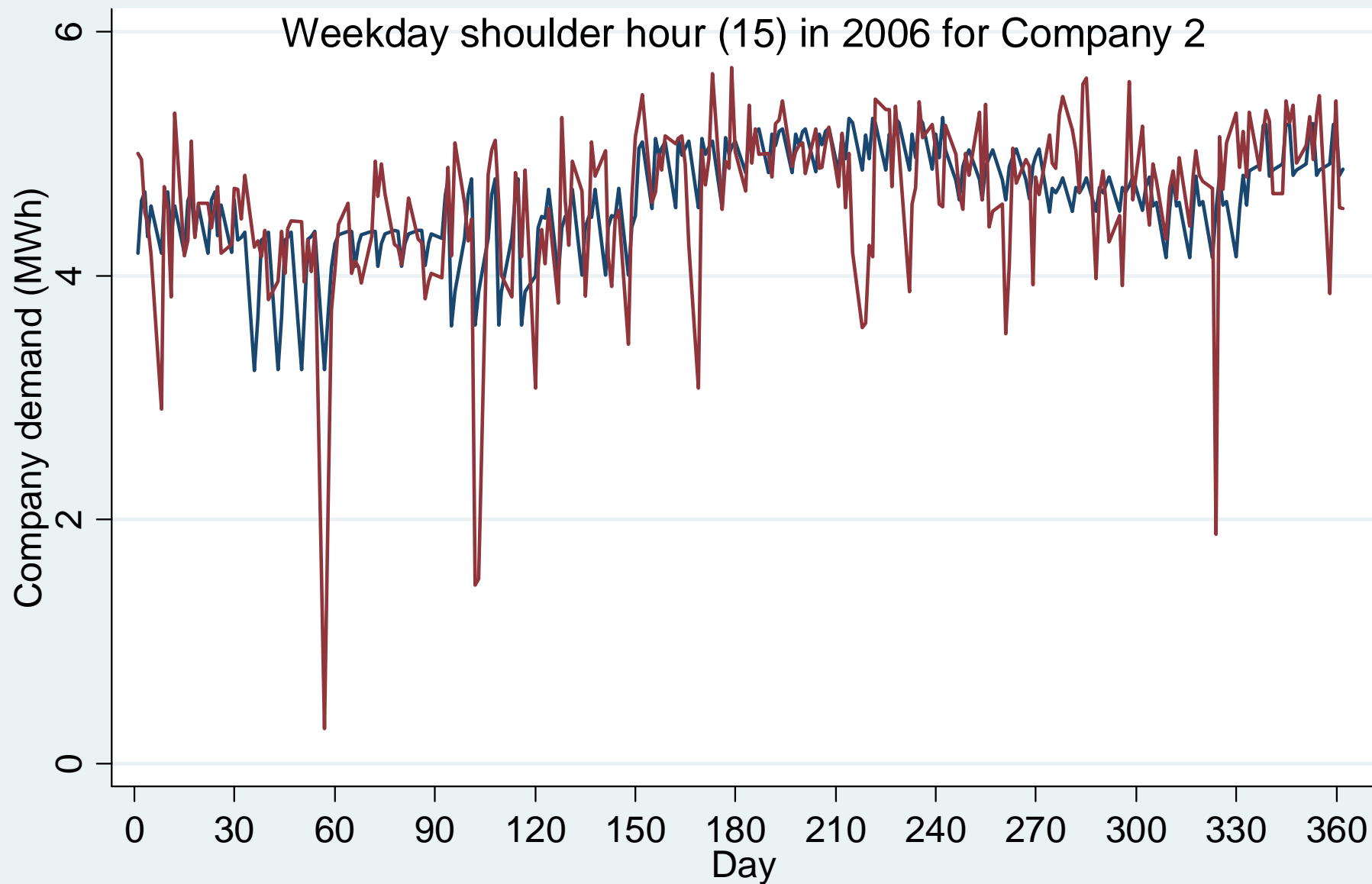
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Weekday off peak hour (3) in 2006 for Company 1



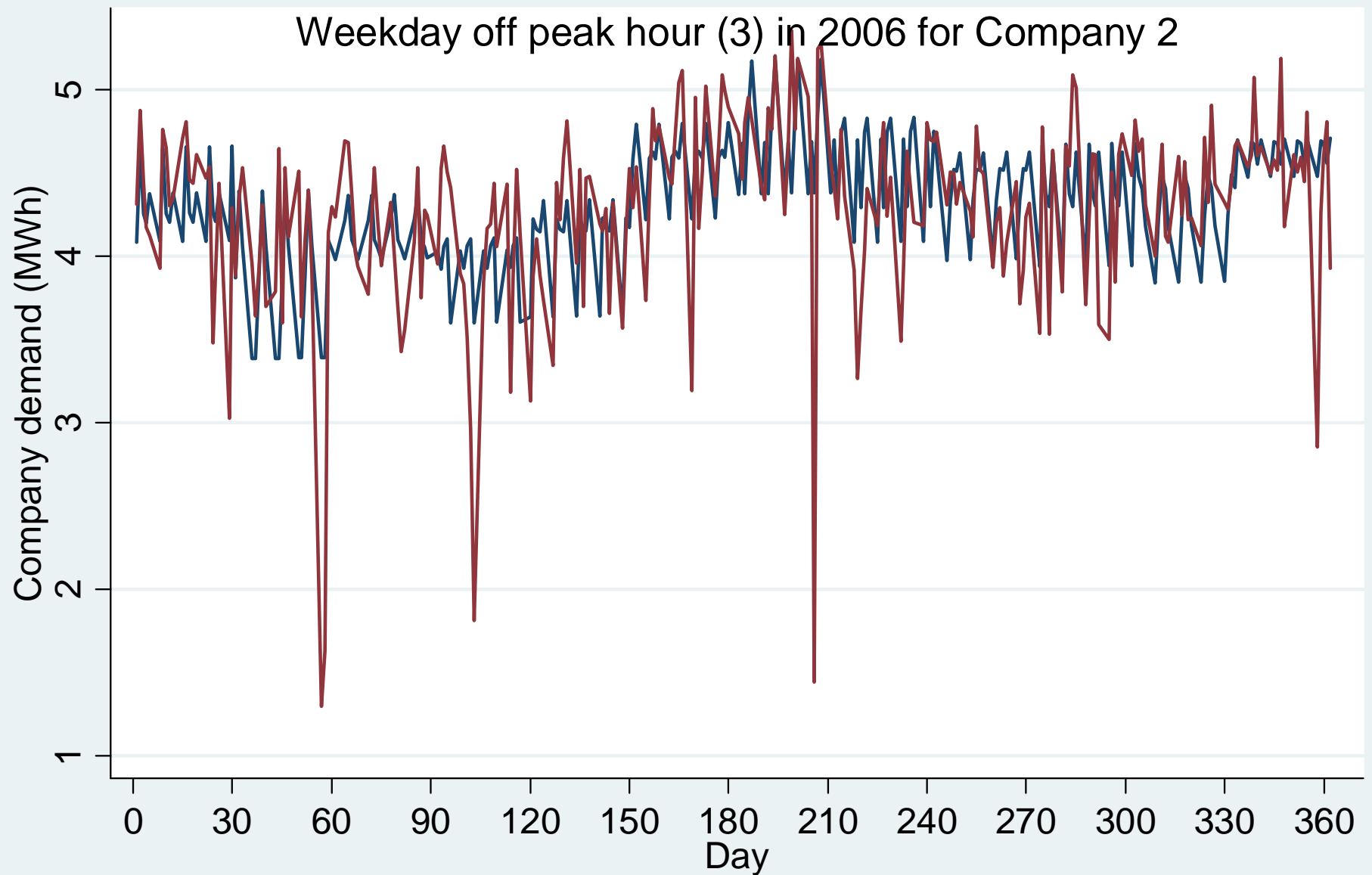


Weekday shoulder hour (15) in 2006 for Company 2



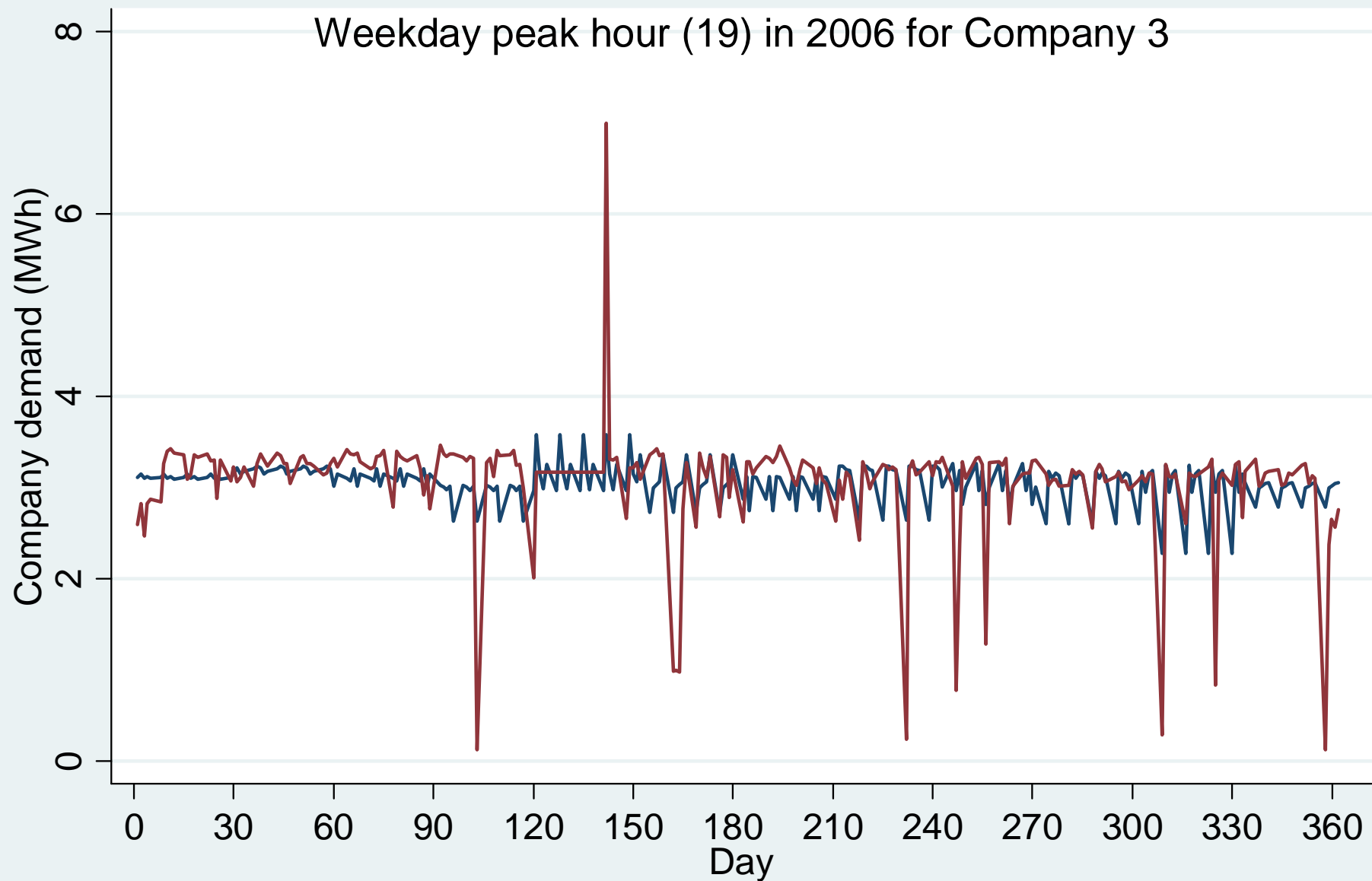
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Weekday off peak hour (3) in 2006 for Company 2



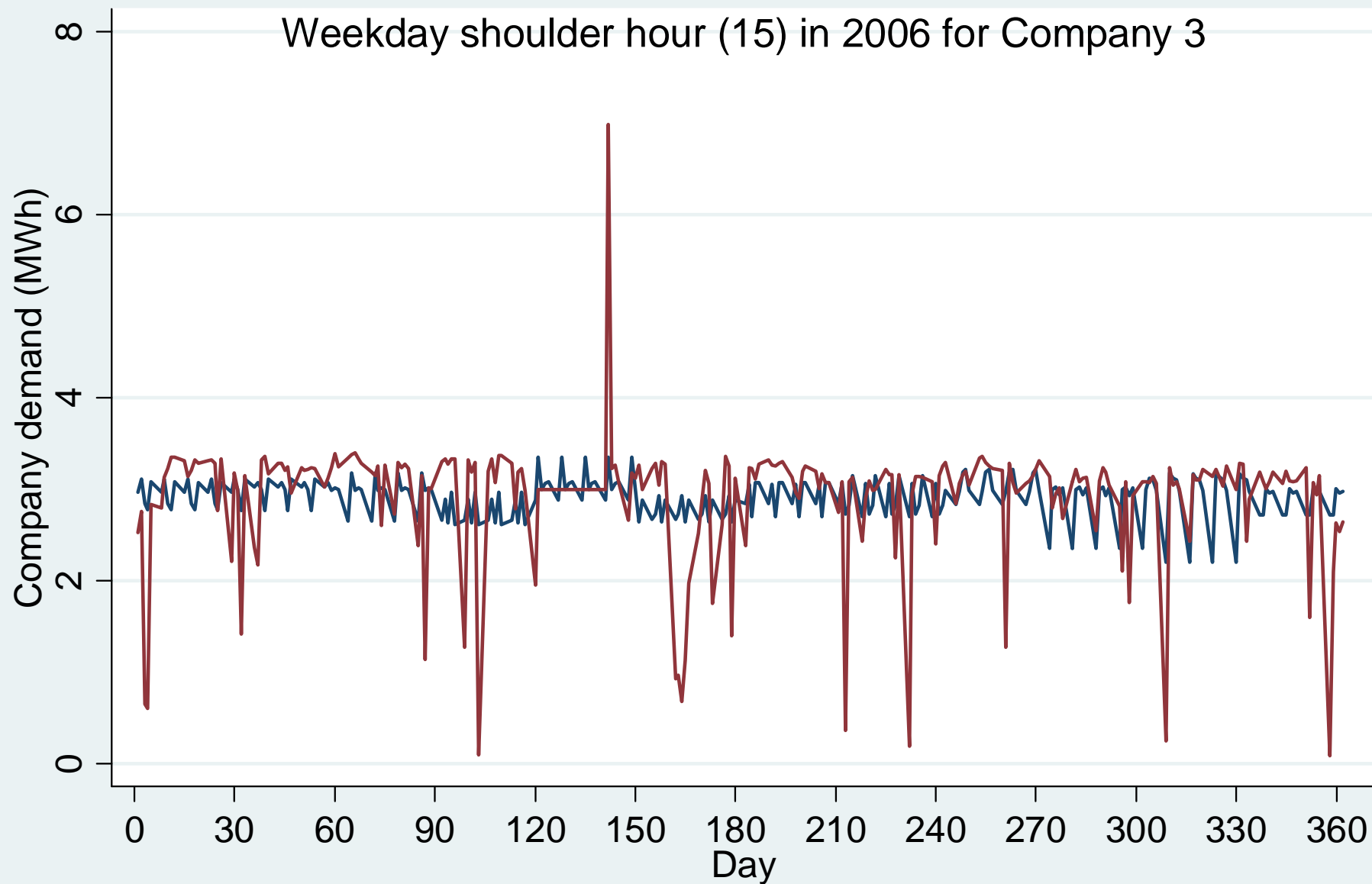
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Weekday peak hour (19) in 2006 for Company 3



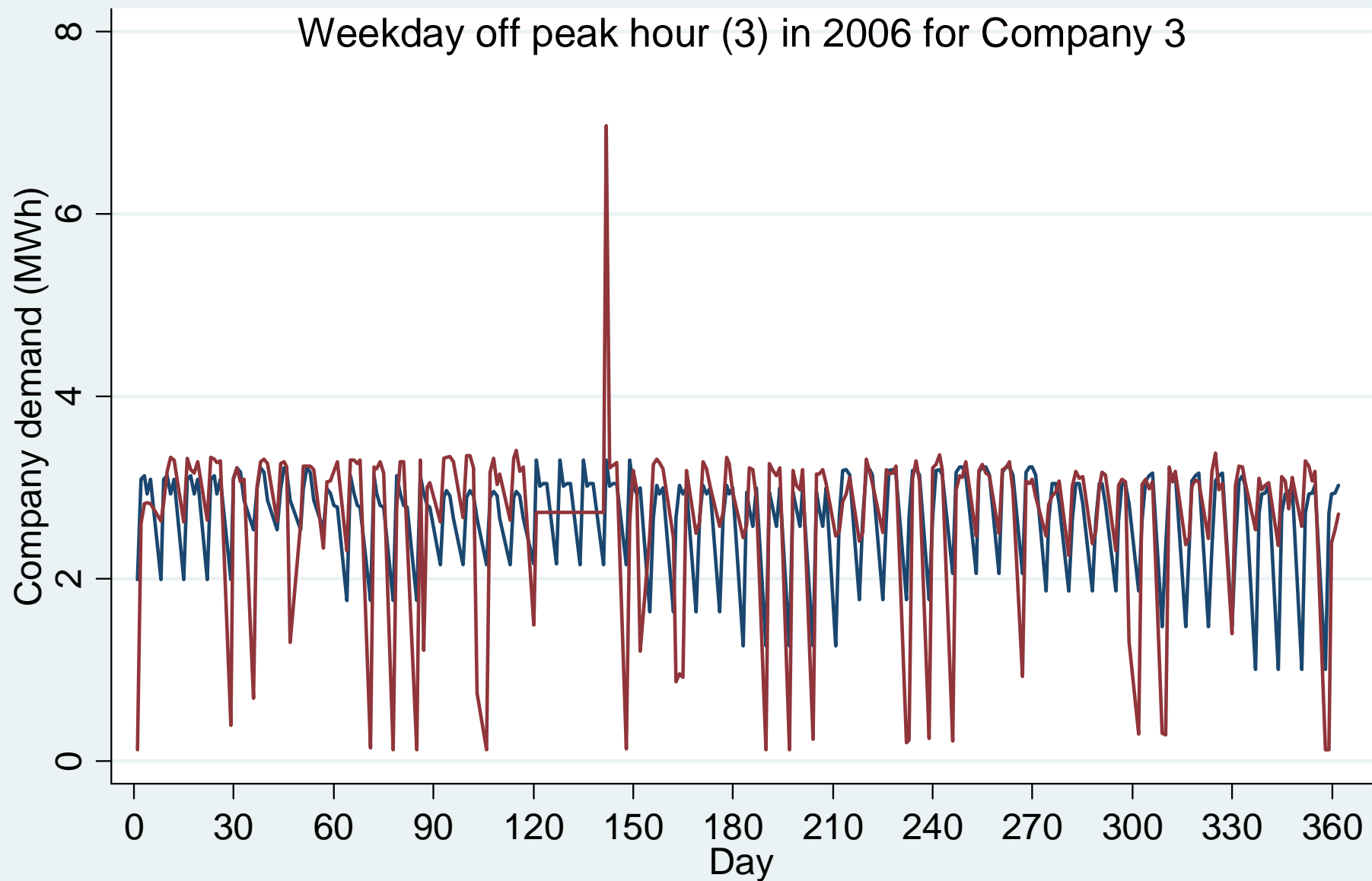
Actual Fitted

Weekday shoulder hour (15) in 2006 for Company 3



Actual Fitted

Weekday off peak hour (3) in 2006 for Company 3



Actual Fitted