



THE PJM INTERCONNECTION STATE OF THE MARKET REPORT 2001

Energy Market Committee
June 19, 2002

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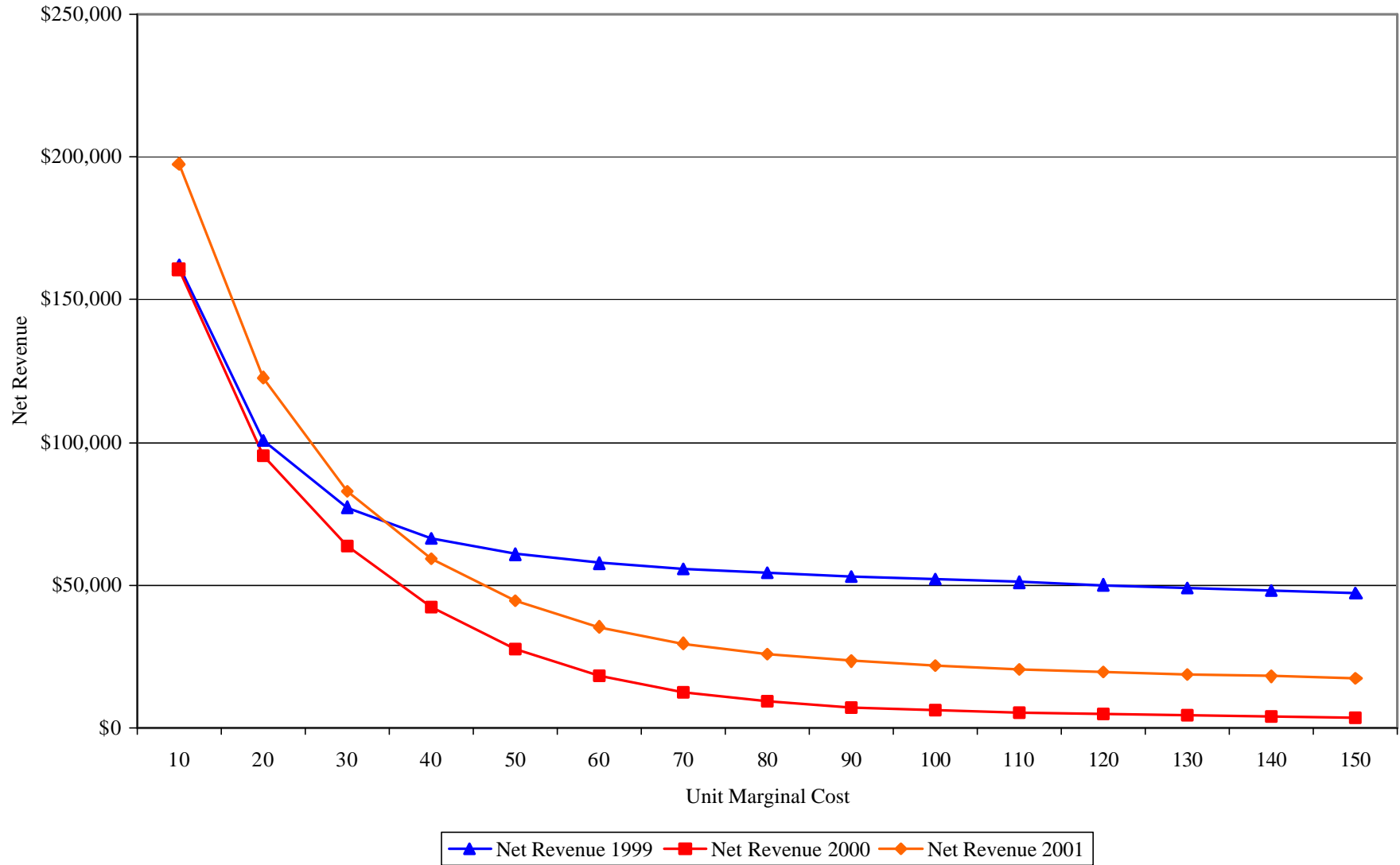


Energy Markets

- Basic tests of competition:
 - Net revenue
 - Price-cost mark up
 - Market structure
 - Prices

Net Revenue

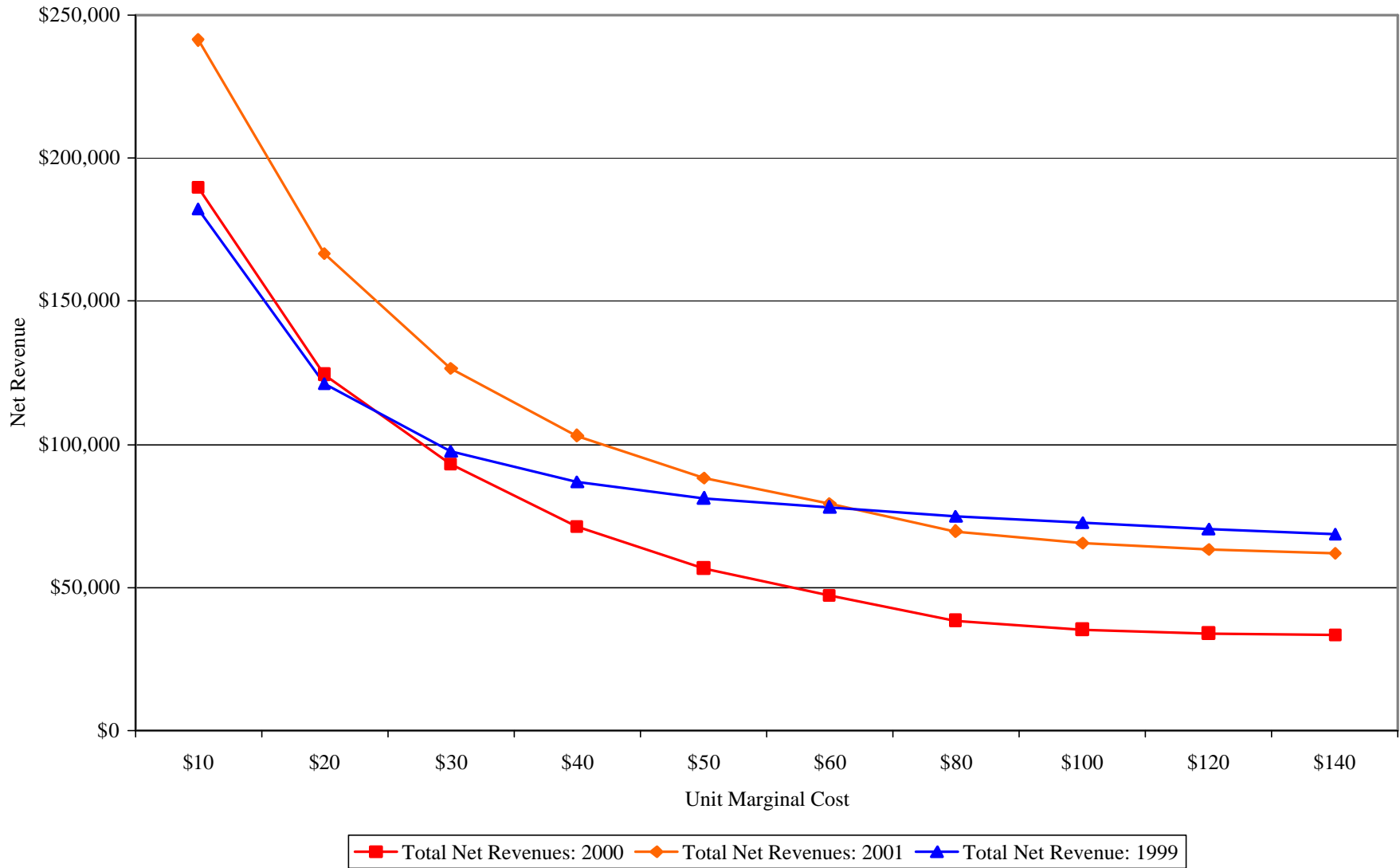
Figure 1: PJM Energy Market Net Revenue - 1999, 2000, and 2001





Net Revenue

Figure 1A: PJM Markets Total Net Revenue - 1999, 2000, and 2001





Annual Net Revenues

- CT at \$40/MWh
 - 2001: \$59,238/MW-year from energy market
 - 2001: \$36,700/MW-year from capacity market
 - 2001: \$7,126/MW-year from ancillary services and operating reserves
 - 2001 Total: \$103,064/MW-year
- CT at \$50/MWh
 - 2001: \$44,386/MW-year from energy market
 - 2001: \$36,700/MW-year from capacity market
 - 2001: \$7,126/MW-year from ancillary services and operating reserves
 - 2001 Total: \$88,212/MW-year

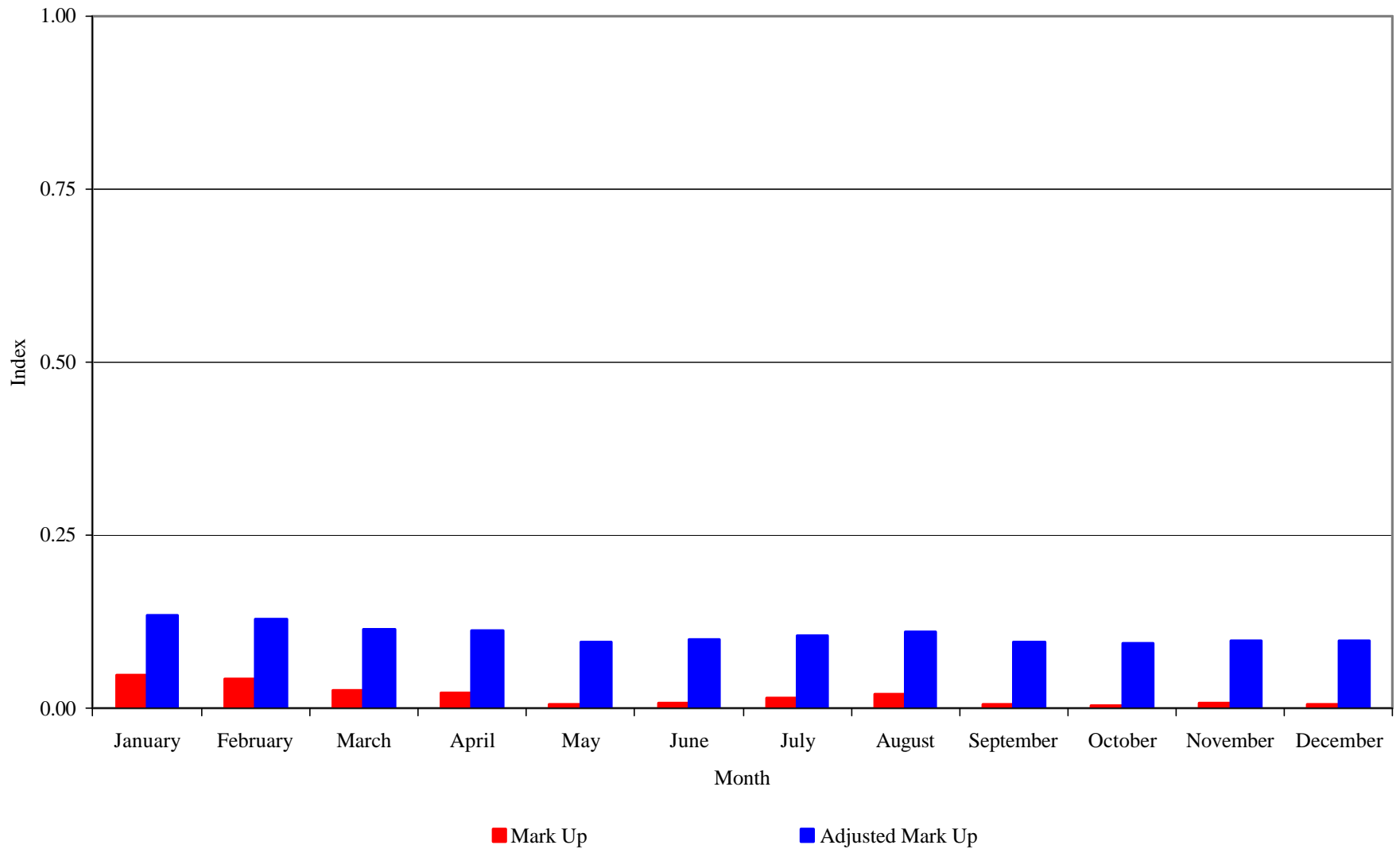


Net Revenues

- Conclusion
 - 1999 net revenues from all sources greater than adequate to cover annual fixed costs of new peaker
 - 2000 net revenues from all sources almost equal to cover annual costs of new peaker
 - 2001 net revenues from all sources greater than adequate to cover annual costs of new peaker
 - Overall: net revenue results consistent with finding that there was no systematic exercise of market power in the energy market in 2001, while there was a finding of market power in the capacity market in 2001

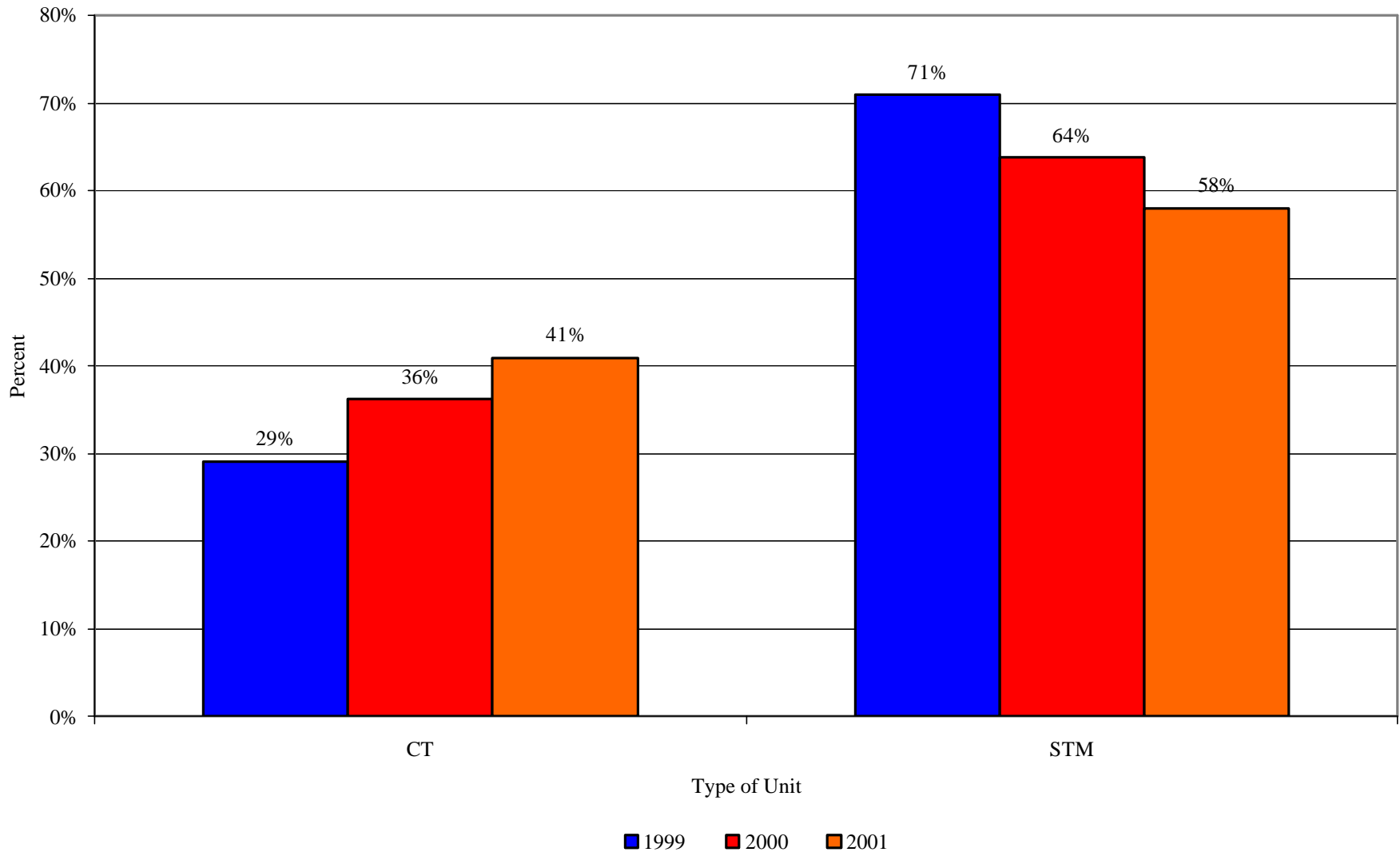
Mark up

Figure 3: 2001 Average Monthly Load Weighted Mark Up Indices



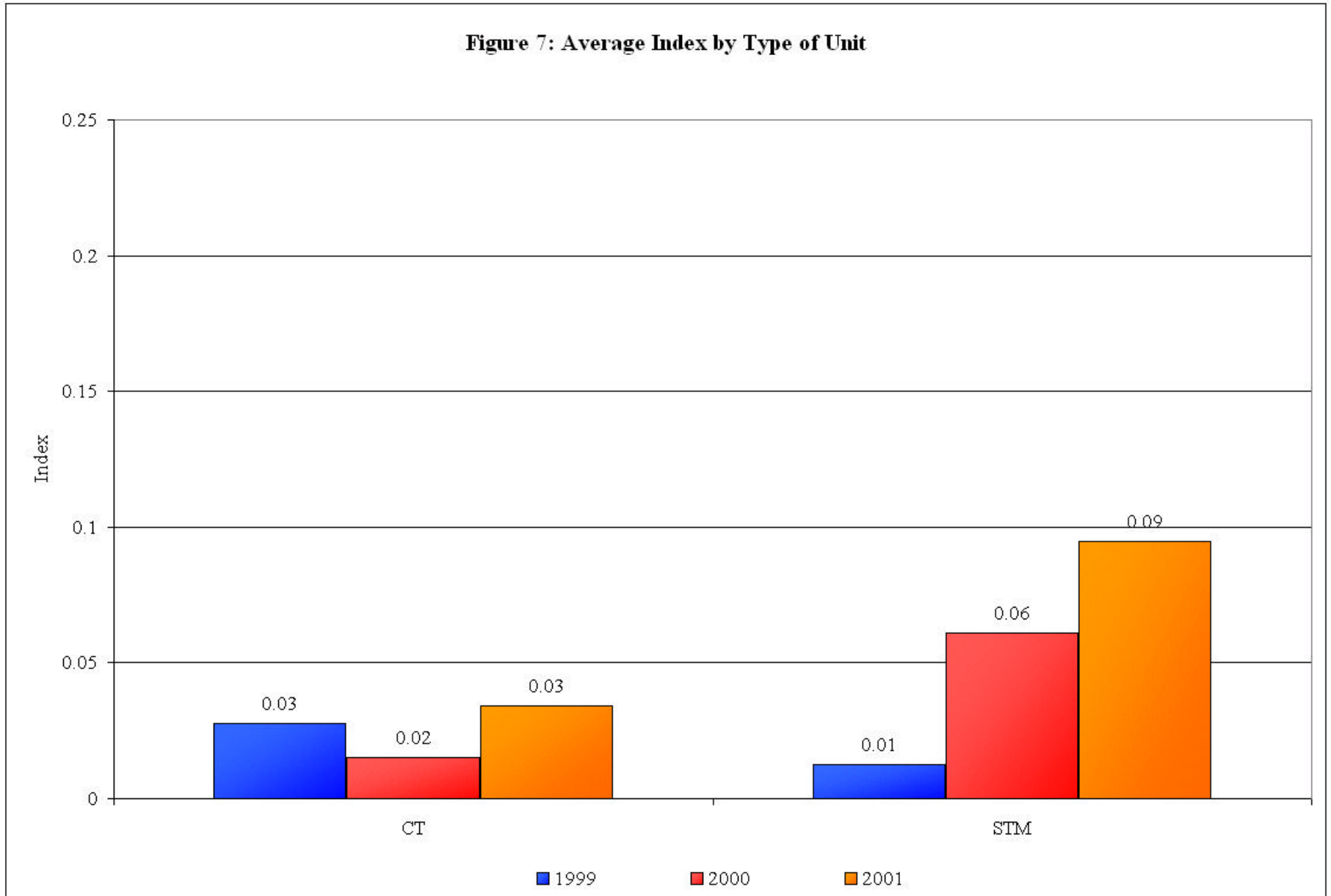
Mark up

Figure 6: Type of Marginal Unit



Mark up by unit type

Figure 7: Average Index by Type of Unit





Mark-Up Index

- Conclusion
 - Mark up index calculations consistent with conclusion that energy market was reasonably competitive in 2001
 - Complexities: opportunity cost not included in cost
 - Complexities: scarcity rent not reflected



Energy Market Structure

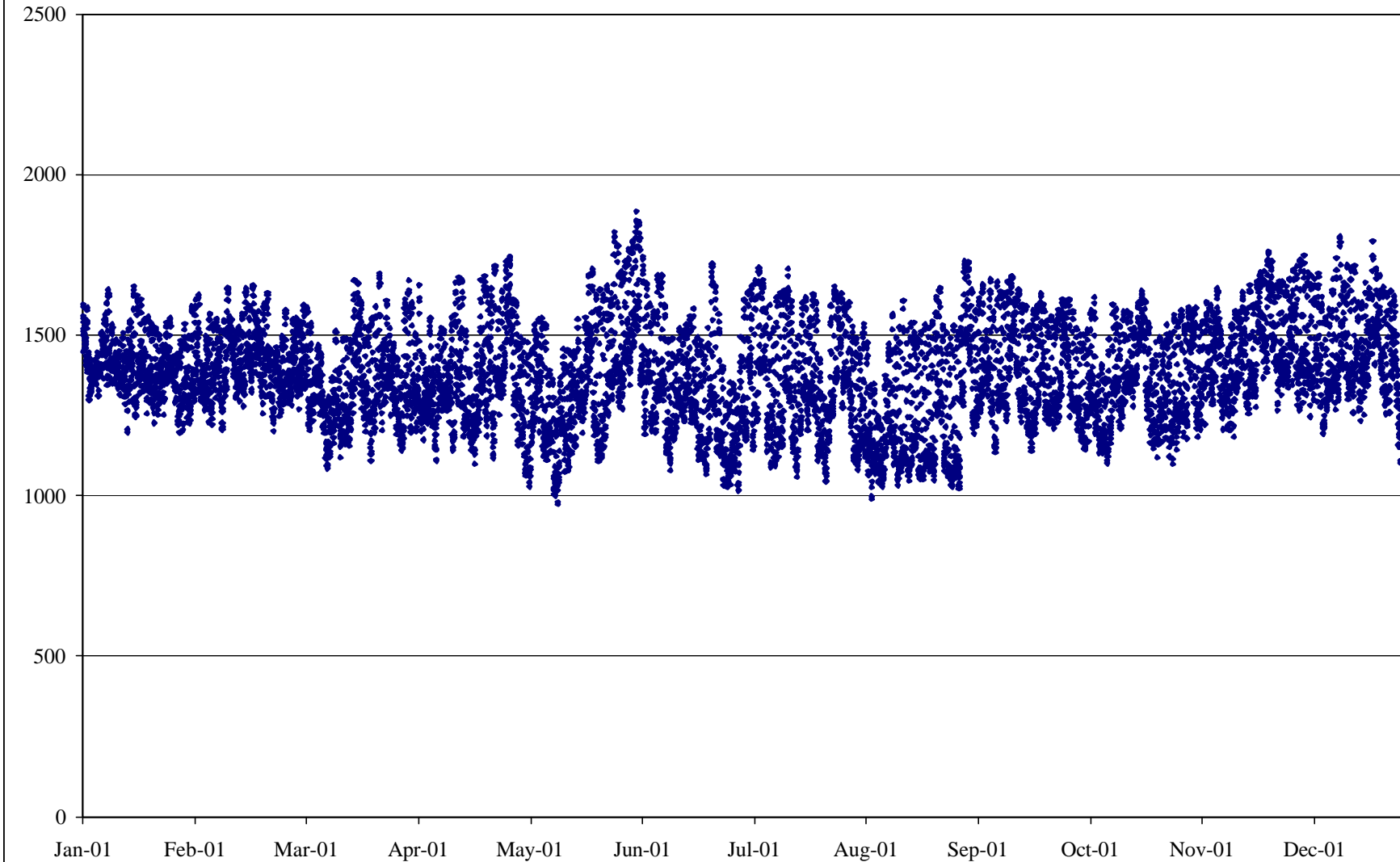
- FERC/DOJ HHI test:
 - $HHI < 1000$: Unconcentrated
 - $1000 < HHI < 1800$: Moderately concentrated
 - $HHI > 1800$: Highly concentrated

Table 2. 2001 PJM Hourly HHIs		
	Overall Minimum	Overall Maximum
Maximum	1885	2140
Average	1375	1565
Minimum	975	1275



Energy Market Structure

Figure 9: 2001 PJM Hourly Energy Market Minimum HHI





Energy Market Structure

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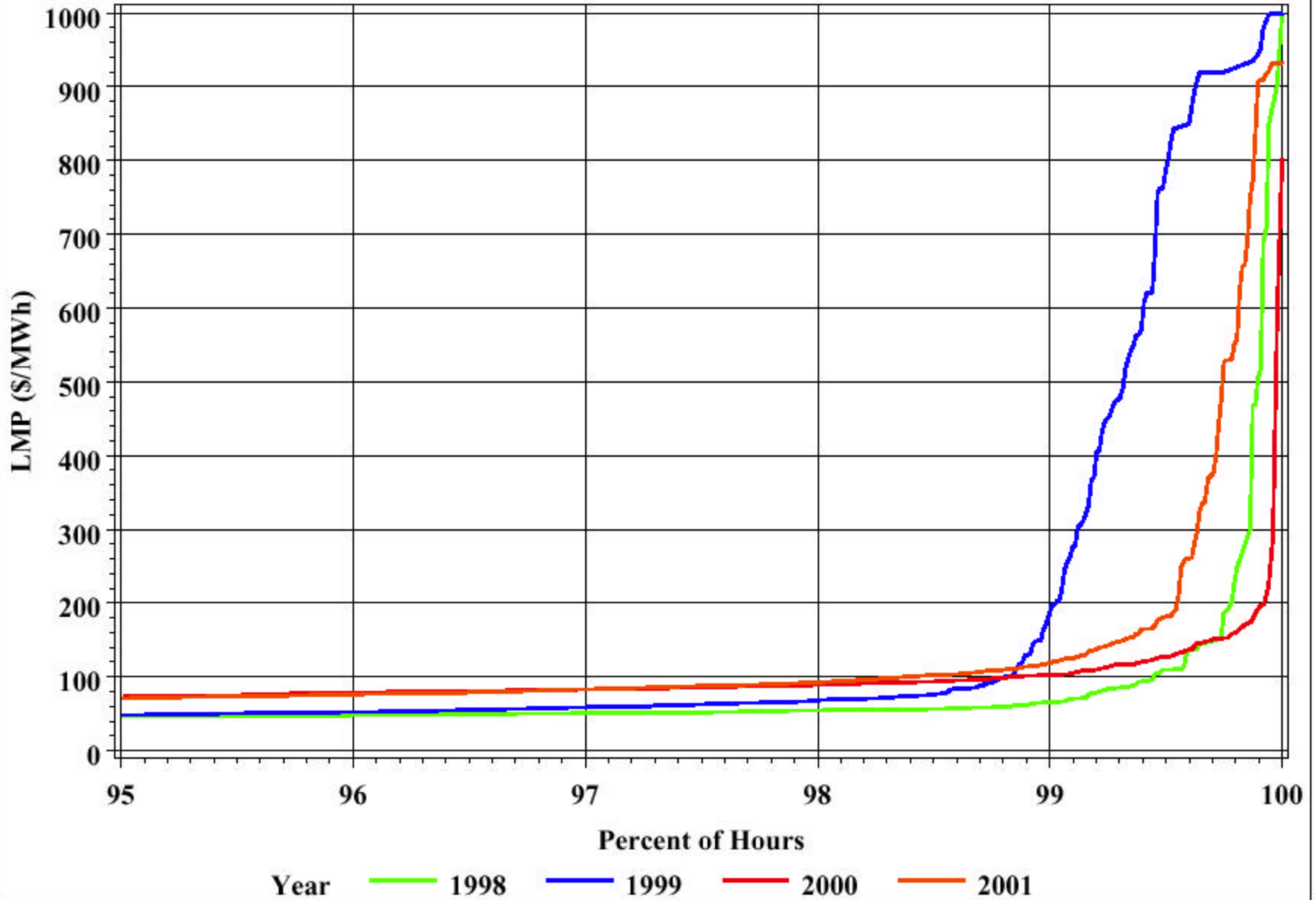
	Base	Intermediate	Peak
Maximum	1725	4575	9080
Average	1525	2925	5140
Minimum	1325	1270	1200



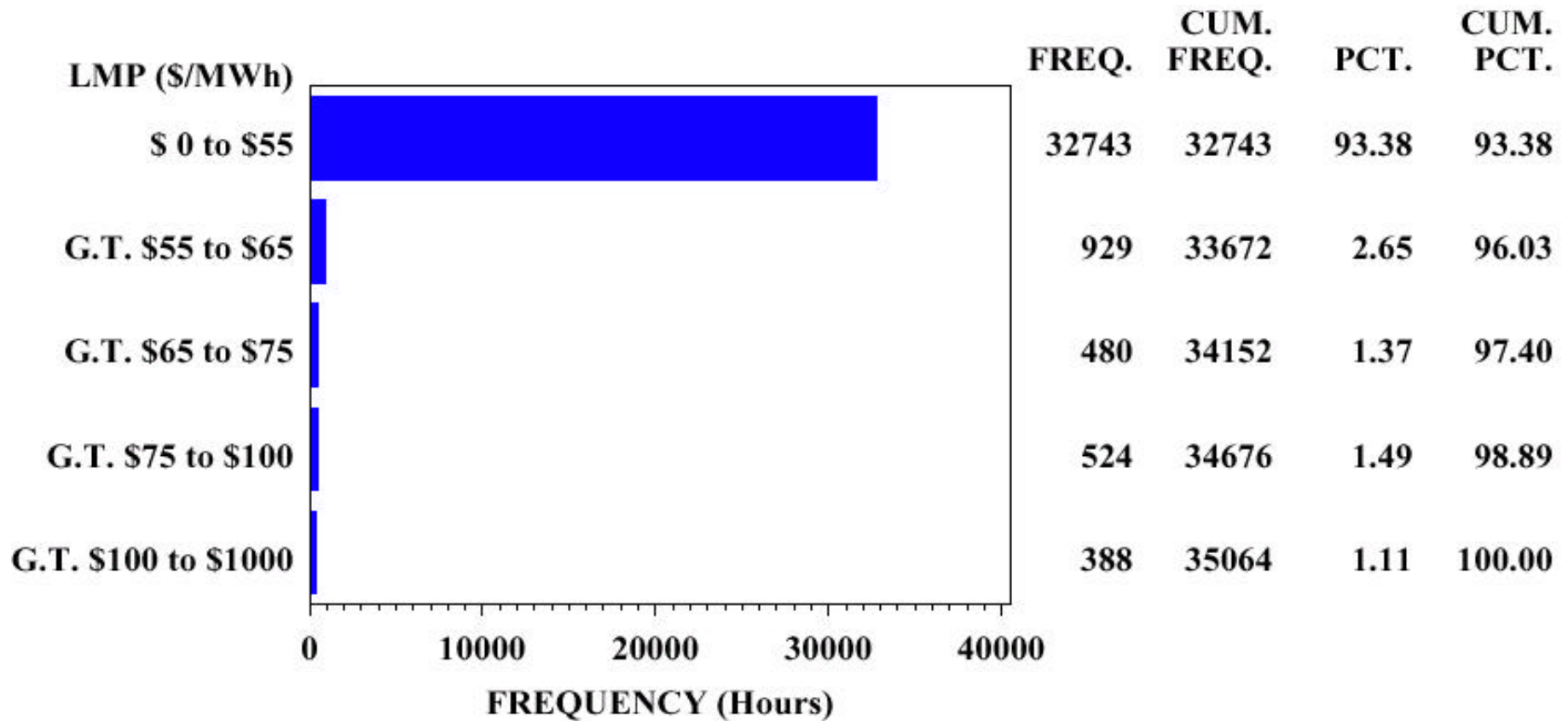
Market Structure

- Conclusion
 - Aggregate HHI results show that PJM energy markets are moderately concentrated
 - Aggregate HHI results do not give reason for confidence during times of high demand
 - HHI levels indicate highly concentrated segments of the supply curve at times
 - HHI levels indicate highly concentrated markets in areas defined by specific transmission constraints

**PJM Price Duration Curves
Hours Above the 95th Percentile**



**Frequency Distribution by Hours of PJM LMPs
1998, 1999, 2000, and 2001**





Simple average prices

PJM Average Hourly LMP (\$/MWh)				
			Year Over Year Percent Change	
	Average LMP	Standard Deviation	Average LMP	Standard Deviation
1998	21.72	31.45		
1999	28.32	72.41	30.4%	130.2%
2000	28.14	25.69	-0.6%	-64.5%
2001	32.38	45.03	15.1%	75.3%



Load Weighted Average Prices

Table 5: PJM Load-Weighted Average LMP (\$/MWh)

	Average LMP	Median LMP	Standard Deviation	Year Over Year Percent Change		
				Average LMP	Median LMP	Standard Deviation
1998	24.16	17.60	39.29			
1999	34.06	19.02	91.49	41.0%	8.1%	132.9%
2000	30.72	20.51	28.38	-9.8%	7.8%	-69.0%
2001	36.65	25.08	57.26	19.3%	22.3%	101.8%



Fuel Cost Adjusted Average Prices

Table 6: Load-Weighted, Fuel Cost Adjusted LMPs (\$/MWh)			
	2000	2001	% Increase
Average LMP	30.72	33.05	7.6%
Median LMP	20.51	23.49	14.5%
Standard Deviation	28.38	55.34	95.0%

Net of impact of high price week of August 6:

Load-adjusted, fuel cost adjusted LMP = \$29.98/MWh

Change in prices = (5.7%)



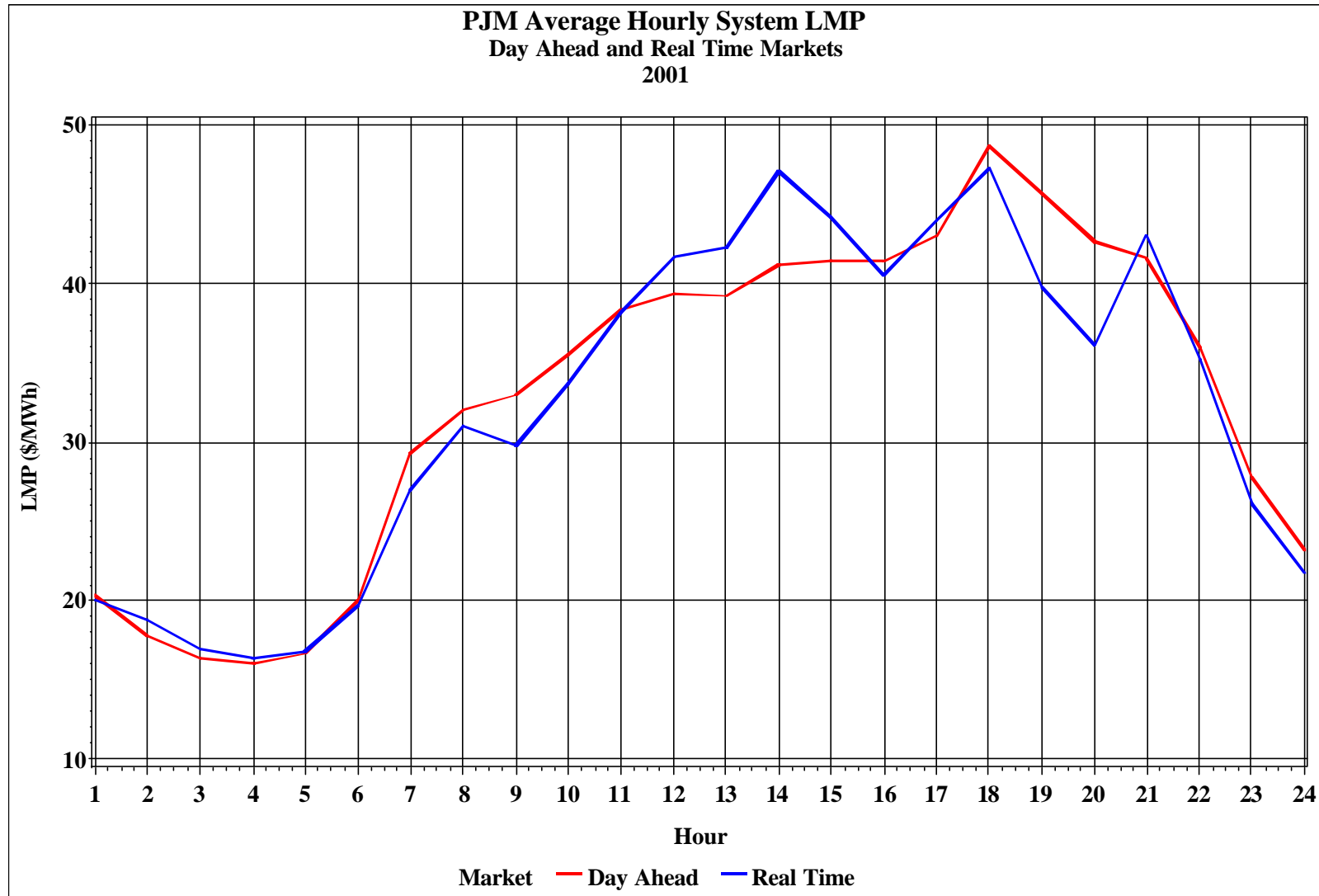
Day Ahead/Real Time Average Prices

Table 7: Comparison of Real-Time and Day-Ahead Market LMPs (\$/MWh)

	Day-Ahead	Real-Time	Average Difference	Percent Over Real-Time
Average LMP	32.75	32.38	-0.37	1.1%
Median LMP	27.05	22.98	-4.1	17.7%
Standard Deviation	30.42	45.03	14.6	-32.5%



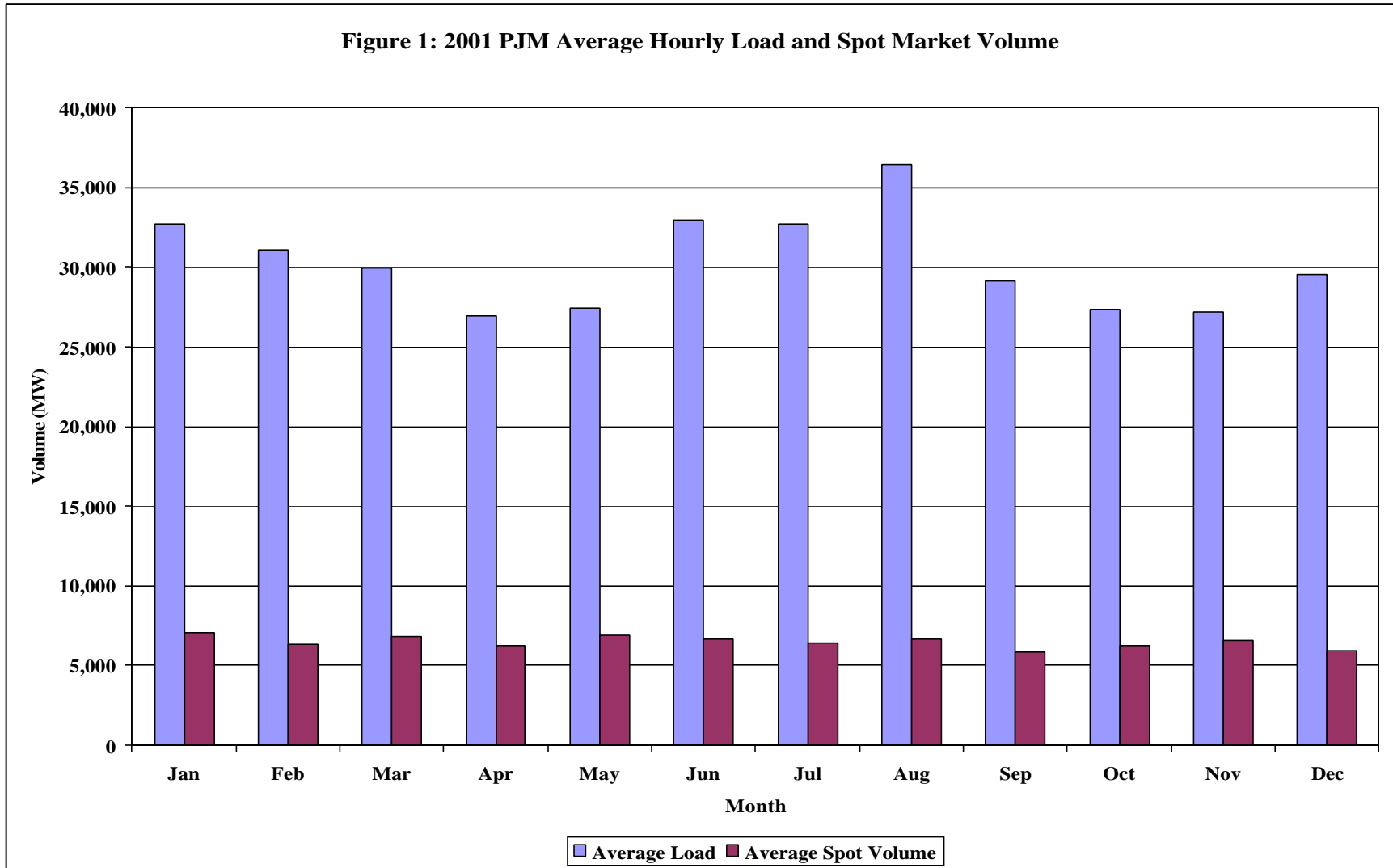
Day Ahead and Real Time LMP





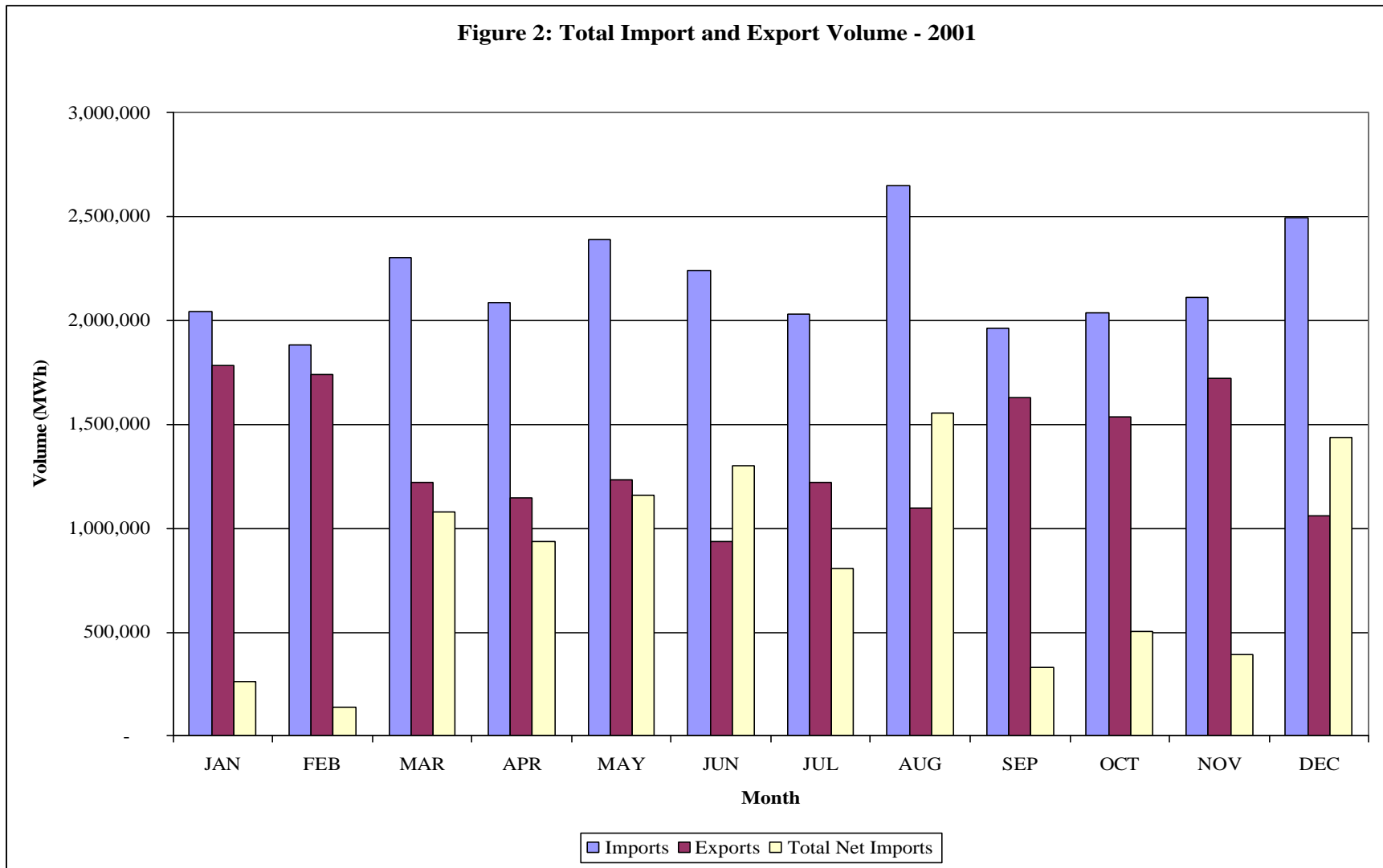
Spot Market

Figure 1: 2001 PJM Average Hourly Load and Spot Market Volume



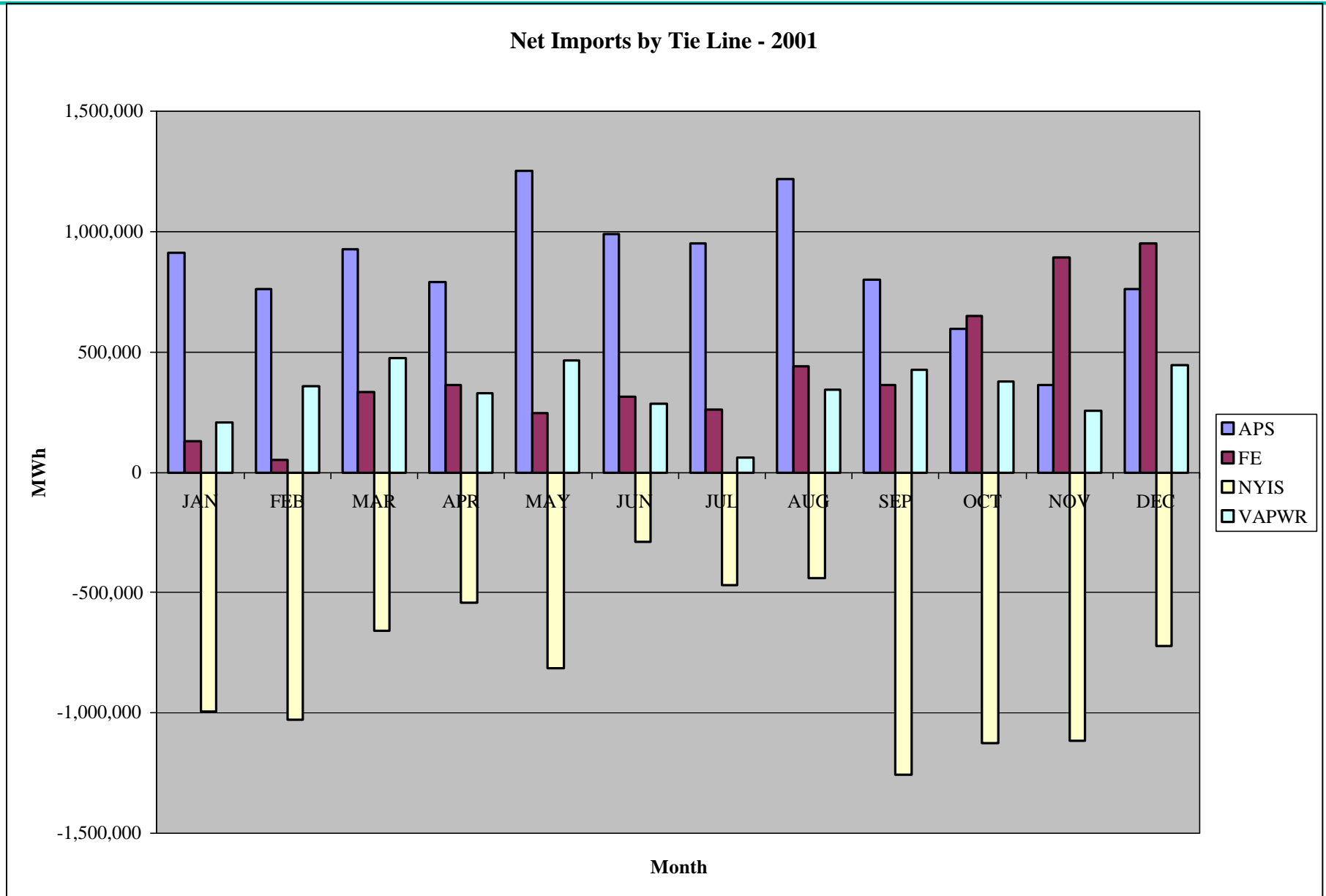
Imports/Exports: 2001

Figure 2: Total Import and Export Volume - 2001





Net Imports by Tie Line





Energy Prices

- Conclusion
 - Prices are a good general indicator of competitive conditions
 - Energy prices in 2001 consistent with a competitive energy market
 - Net imports provide source of competition
 - Pattern of prices across hours illustrates potential for demand side price sensitivity



Energy Market

- Conclusion
 - Net revenue: energy market reasonably competitive in 2001
 - Price-cost markup: energy market reasonably competitive in 2001
 - Market structure:
 - Moderate overall concentration
 - High supply curve segment concentration
 - High regional concentration
 - Prices: energy market reasonably competitive in 2001
- Recommendations
 - Additional actions to increase demand side responsiveness
 - Retention of \$1,000 offer cap
 - Investigate incentives to reduce incentives to exercise market power



Capacity Markets

- Basic tests of competition:
 - Market structure
 - Outage rate performance
 - Prices
- Market power issue

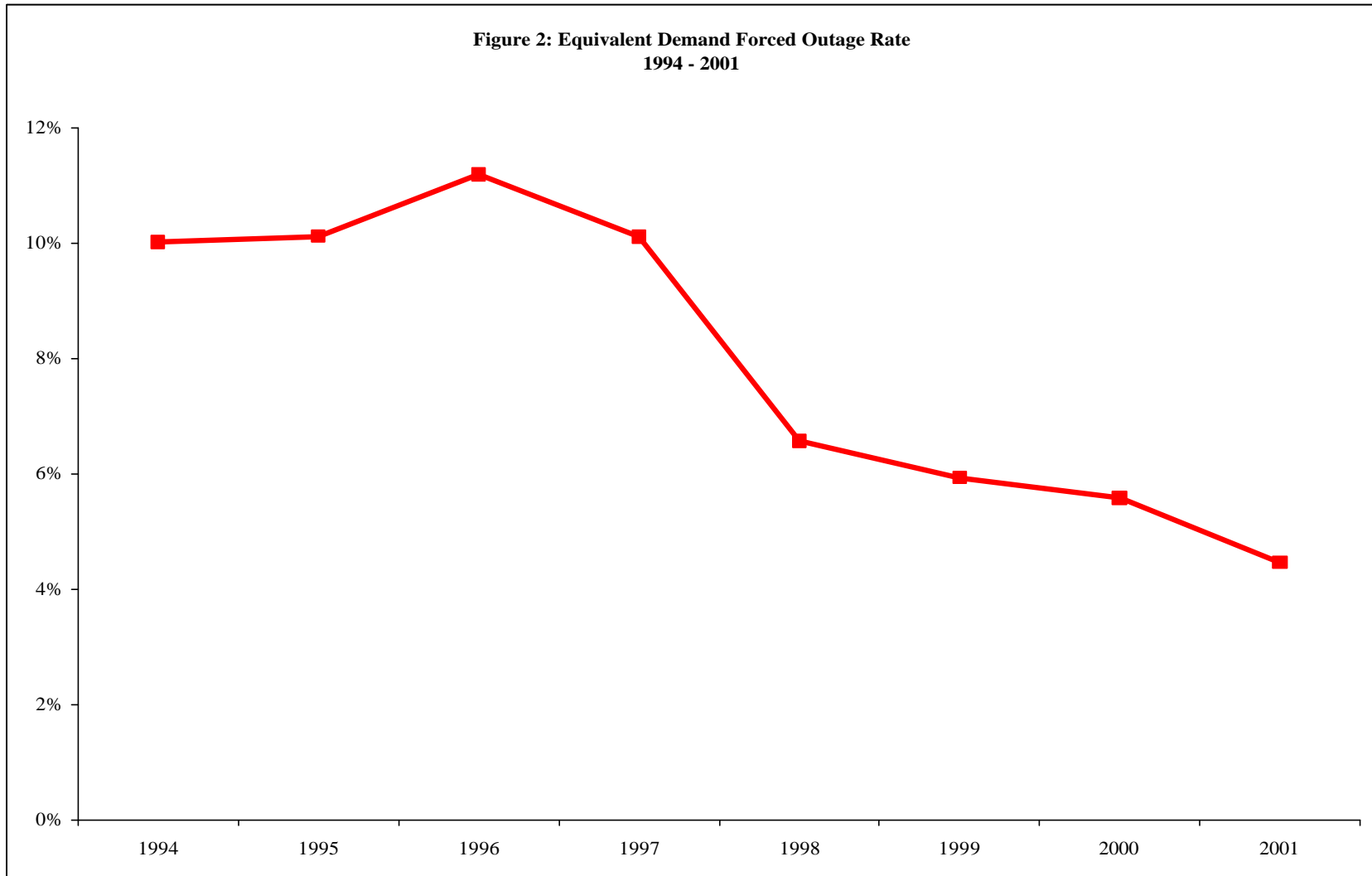


Capacity Market Structure

- FERC/DOJ HHI test:
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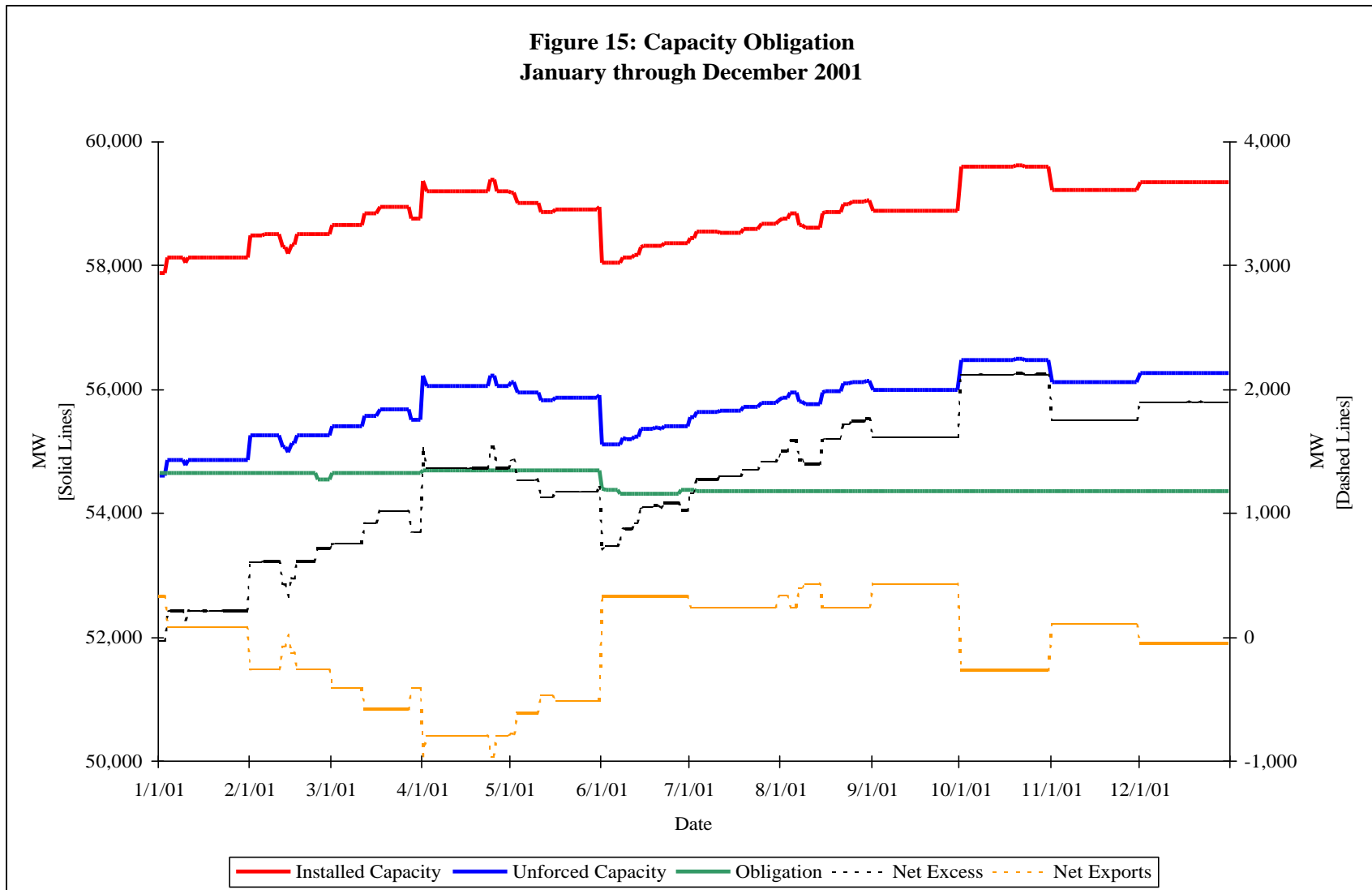
2001 PJM Capacity Credit Market HHIs		
	Daily	Monthly
Maximum	5500	10000
Average	2700	3800
Minimum	1100	1700

Forced Outage Rates

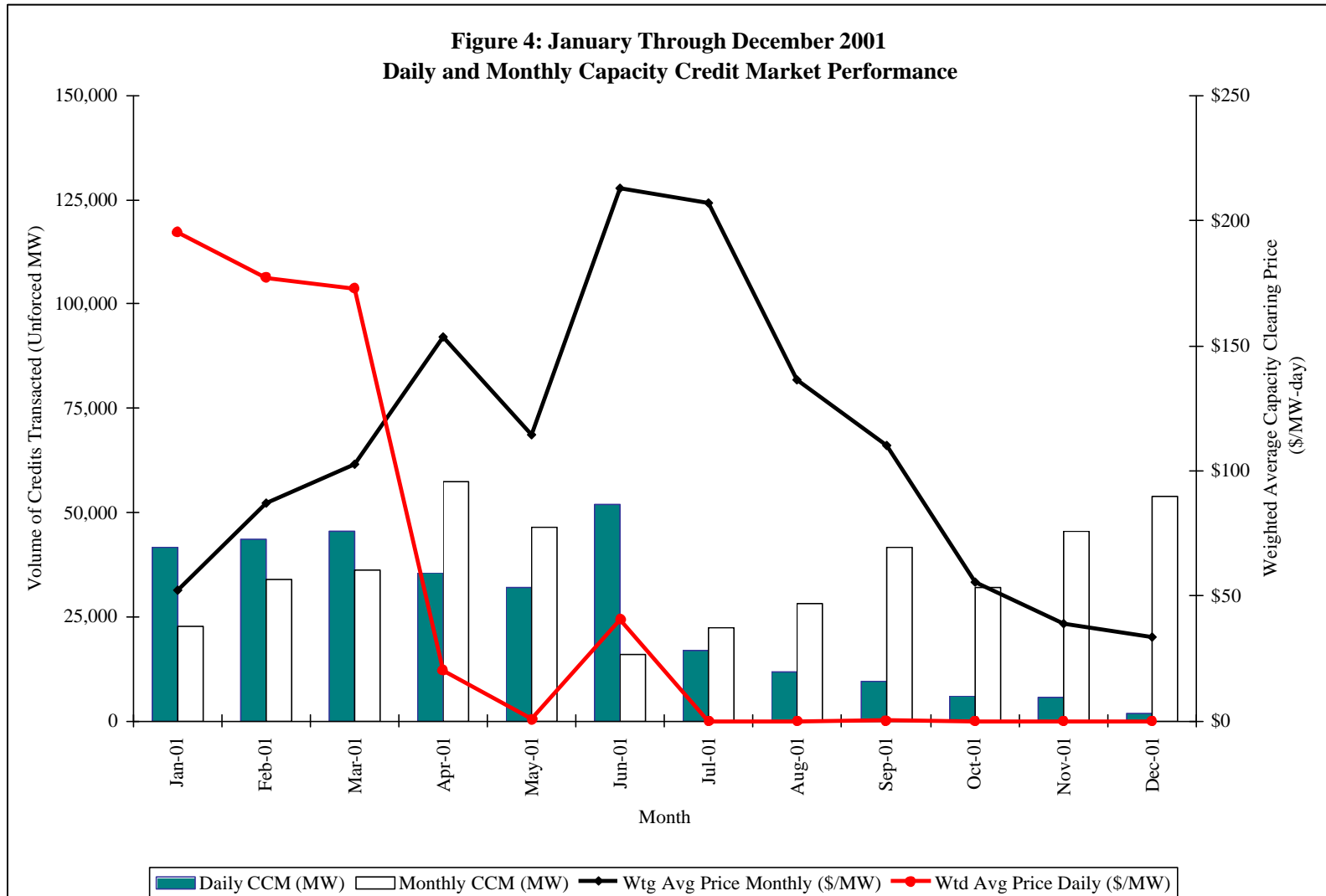


Supply and Demand

**Figure 15: Capacity Obligation
January through December 2001**

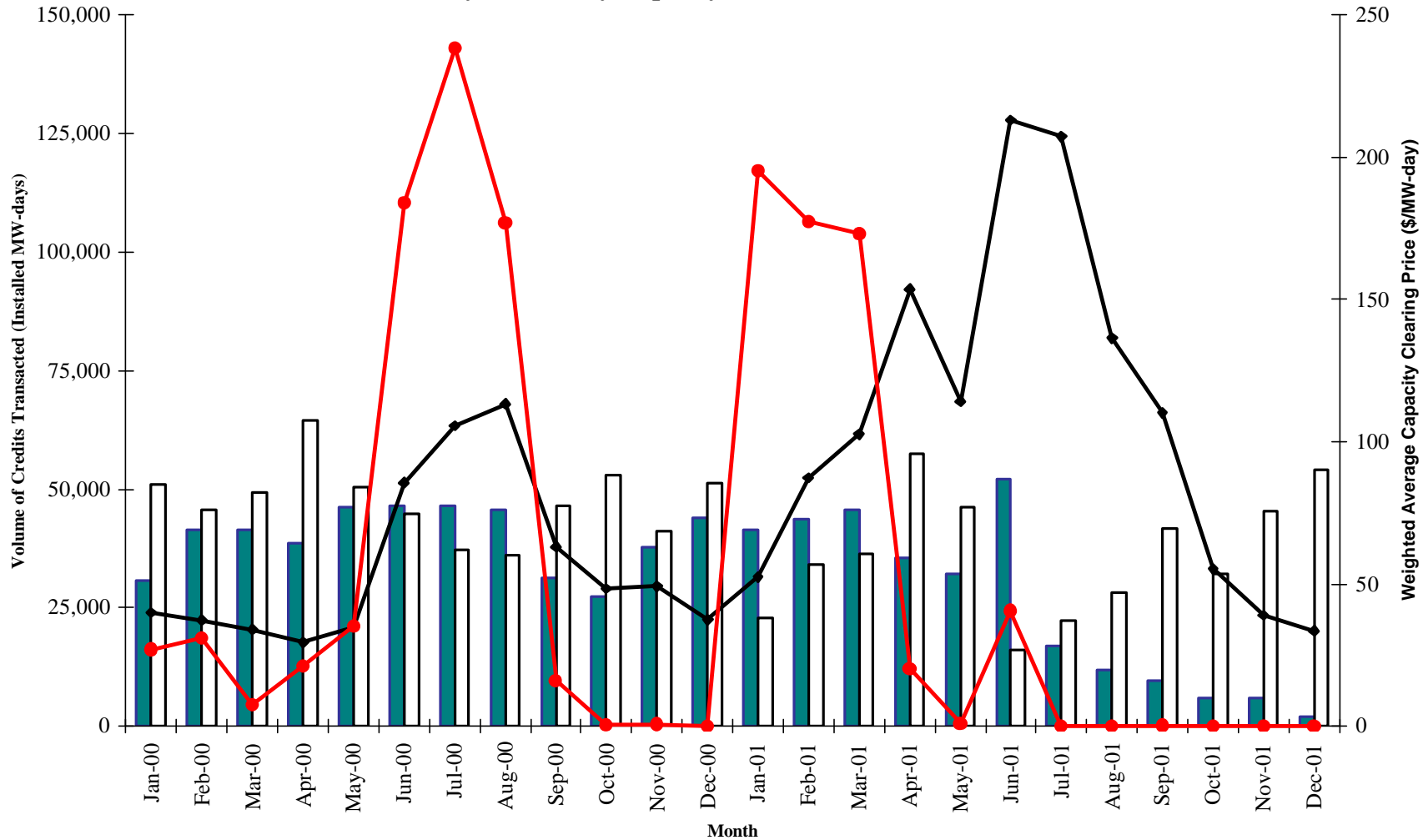


Capacity Markets



Capacity Markets

January 2000 Through December 31, 2001
Daily vs Monthly Capacity Credit Market Performance

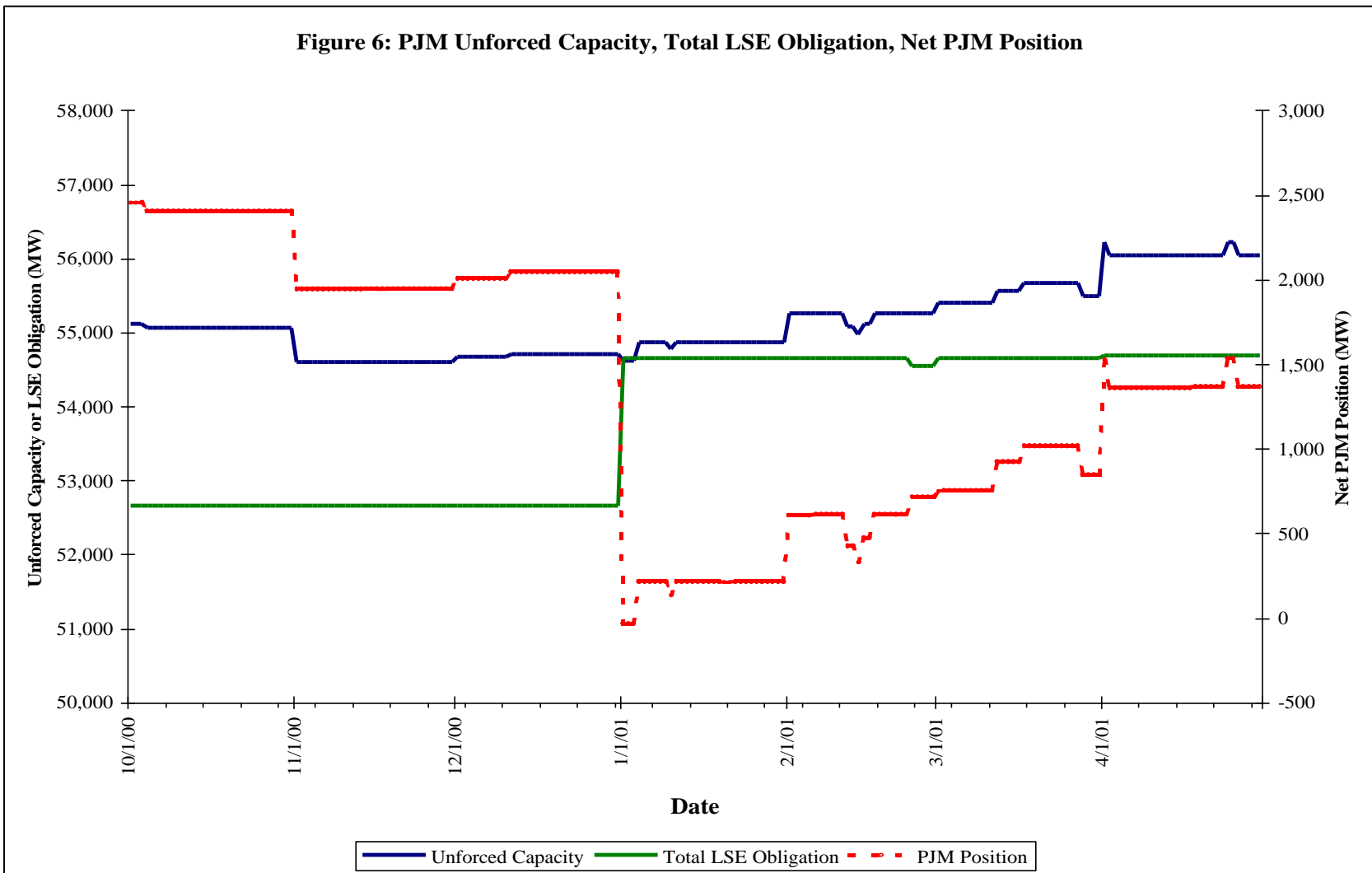


■ Daily CCM (MW)
 Monthly CCM (MW)
 ◆ Wtg Avg Price Monthly (\$/MW)
 ● Wtd Avg Price Daily (\$/MW)

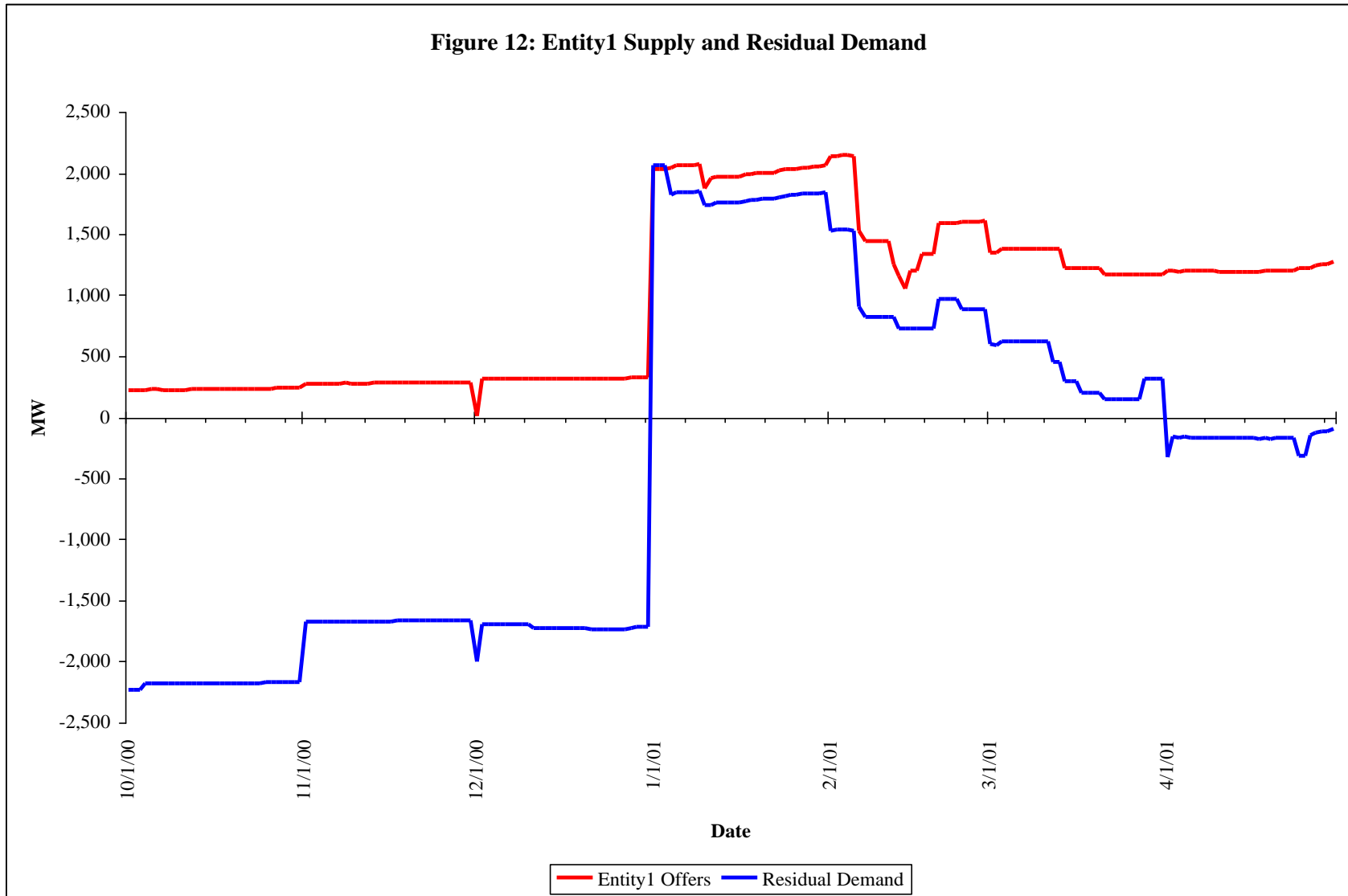


Supply and Demand

Figure 6: PJM Unforced Capacity, Total LSE Obligation, Net PJM Position

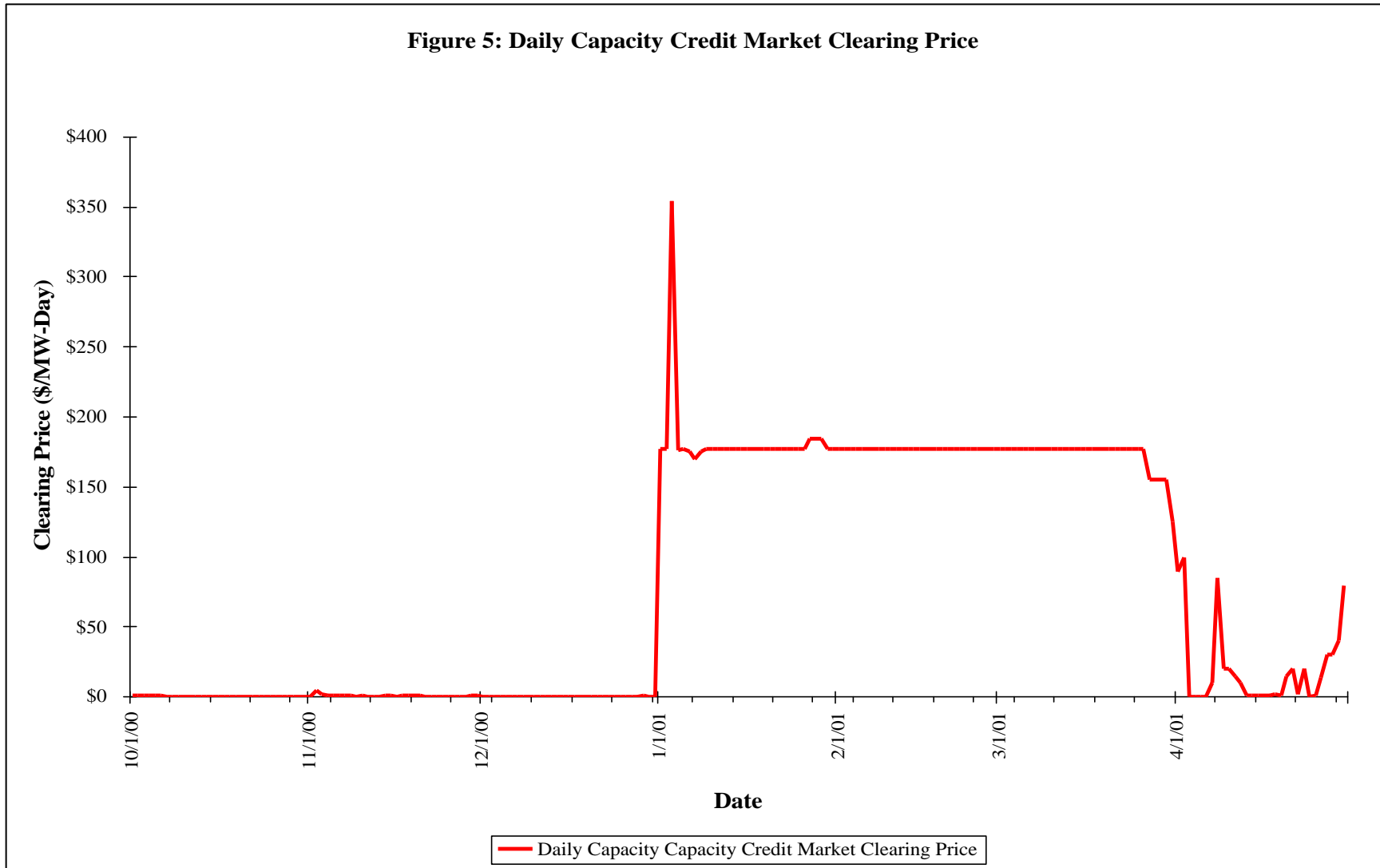


One Supplier and Residual Demand



Daily Capacity Prices

Figure 5: Daily Capacity Credit Market Clearing Price





Capacity Markets

- Conclusion
 - Capacity markets were subject to the exercise of market power in 2001
 - MMU identified issues and PJM modified rules to reduce incentive to exercise market power
 - Concentration levels high
 - Positive outage rate results
 - Contribution to reliability
 - Potential exercise of market power remains a concern
 - Market design issues remain a concern
- Recommendations
 - Continue competitive enhancements to capacity market design
 - Adopt a single market design
 - Incorporate explicit market power mitigation rules

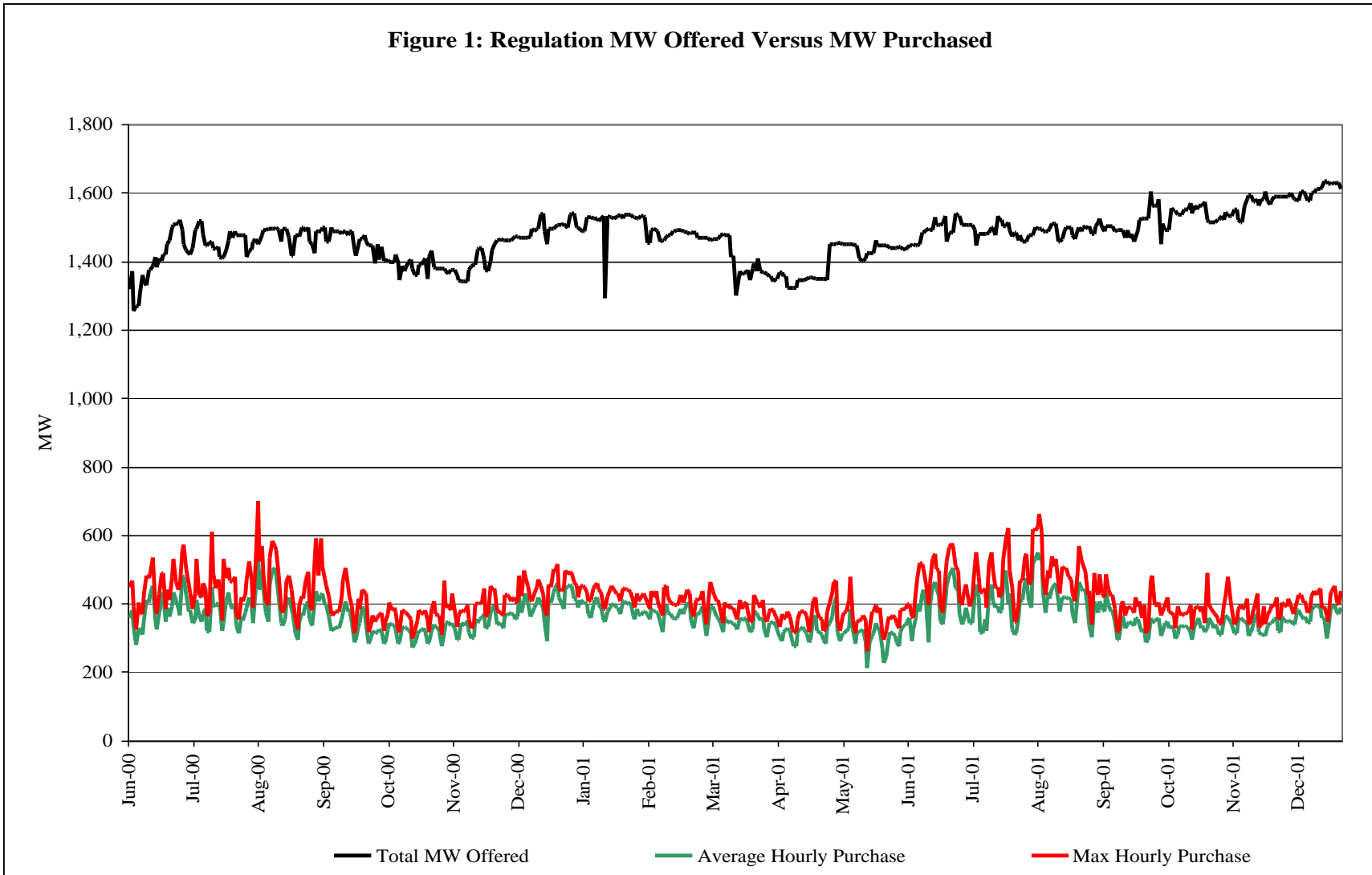


Regulation Market

- Basic tests of competition:
 - Market structure
 - Availability
 - Performance
 - Price

Regulation Market

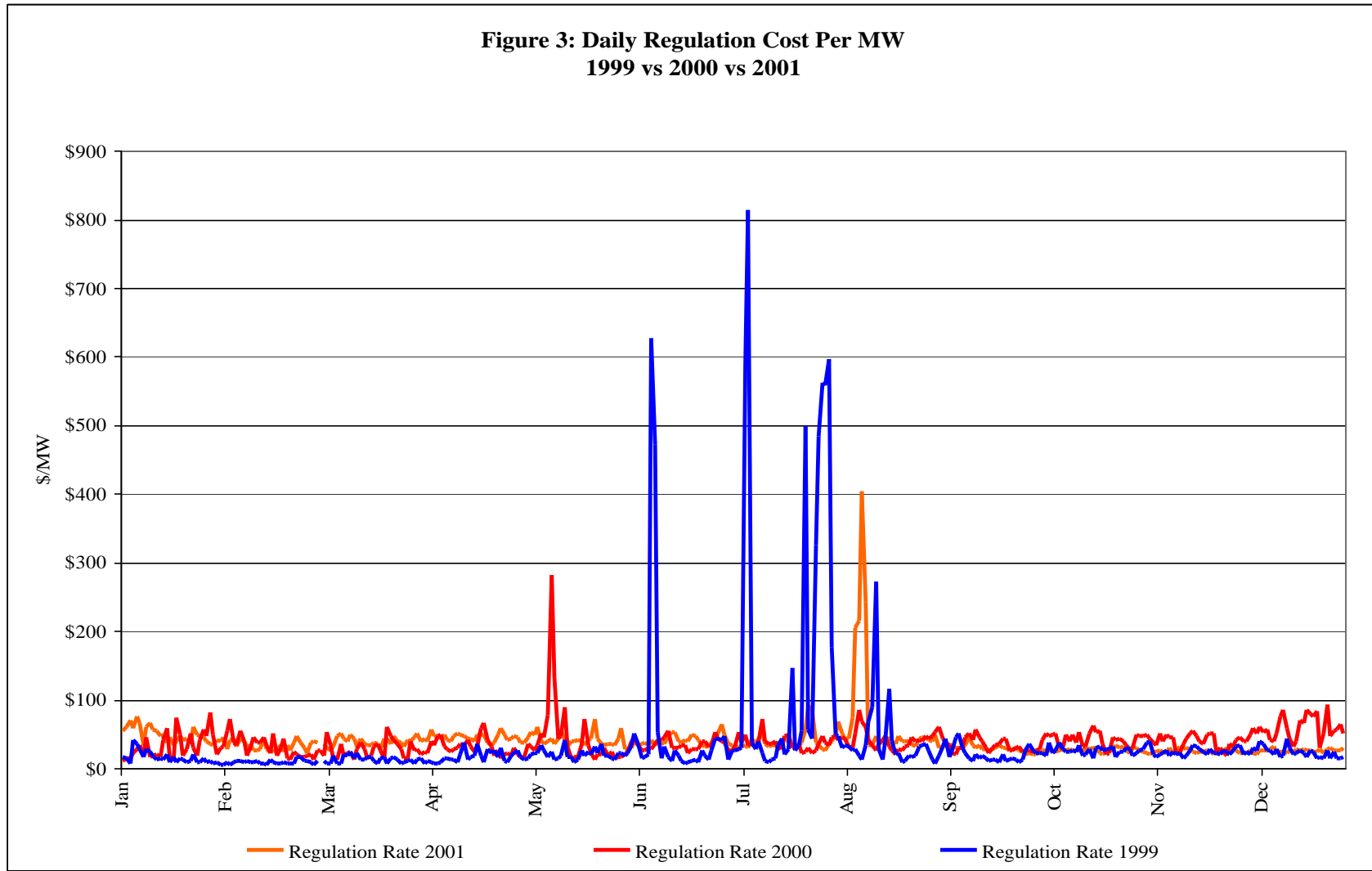
Figure 1: Regulation MW Offered Versus MW Purchased





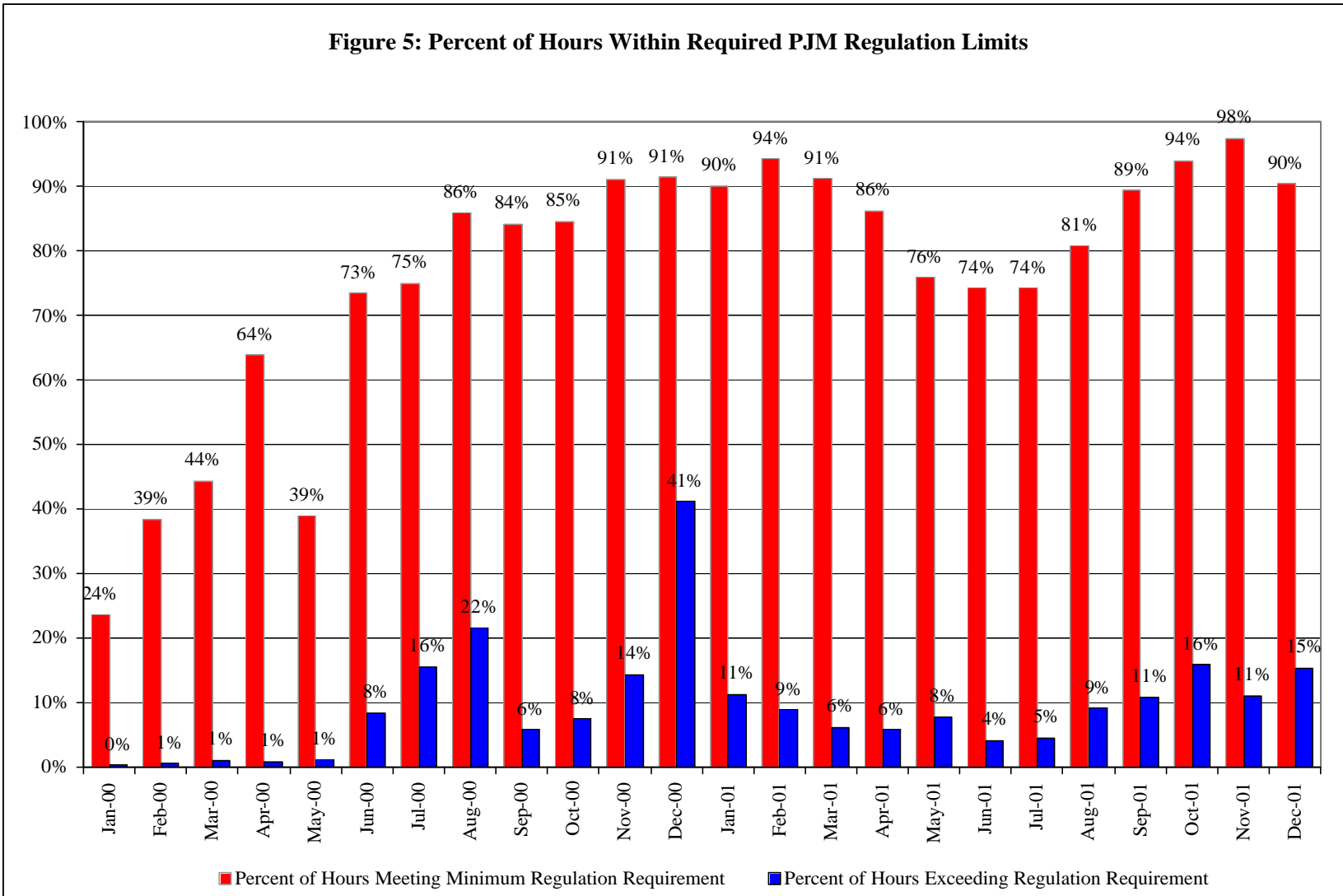
Regulation Market

**Figure 3: Daily Regulation Cost Per MW
1999 vs 2000 vs 2001**



Regulation Market

Figure 5: Percent of Hours Within Required PJM Regulation Limits





Regulation Market

- Conclusion
 - Concentration levels between 1700 and 1800
 - Supply substantially greater than demand
 - Prices were moderate
 - Performance improved after introduction of market and maintained level of performance in 2001
 - Regulation market was competitive in 2001
- Recommendation
 - Retain \$100 offer cap in regulation market

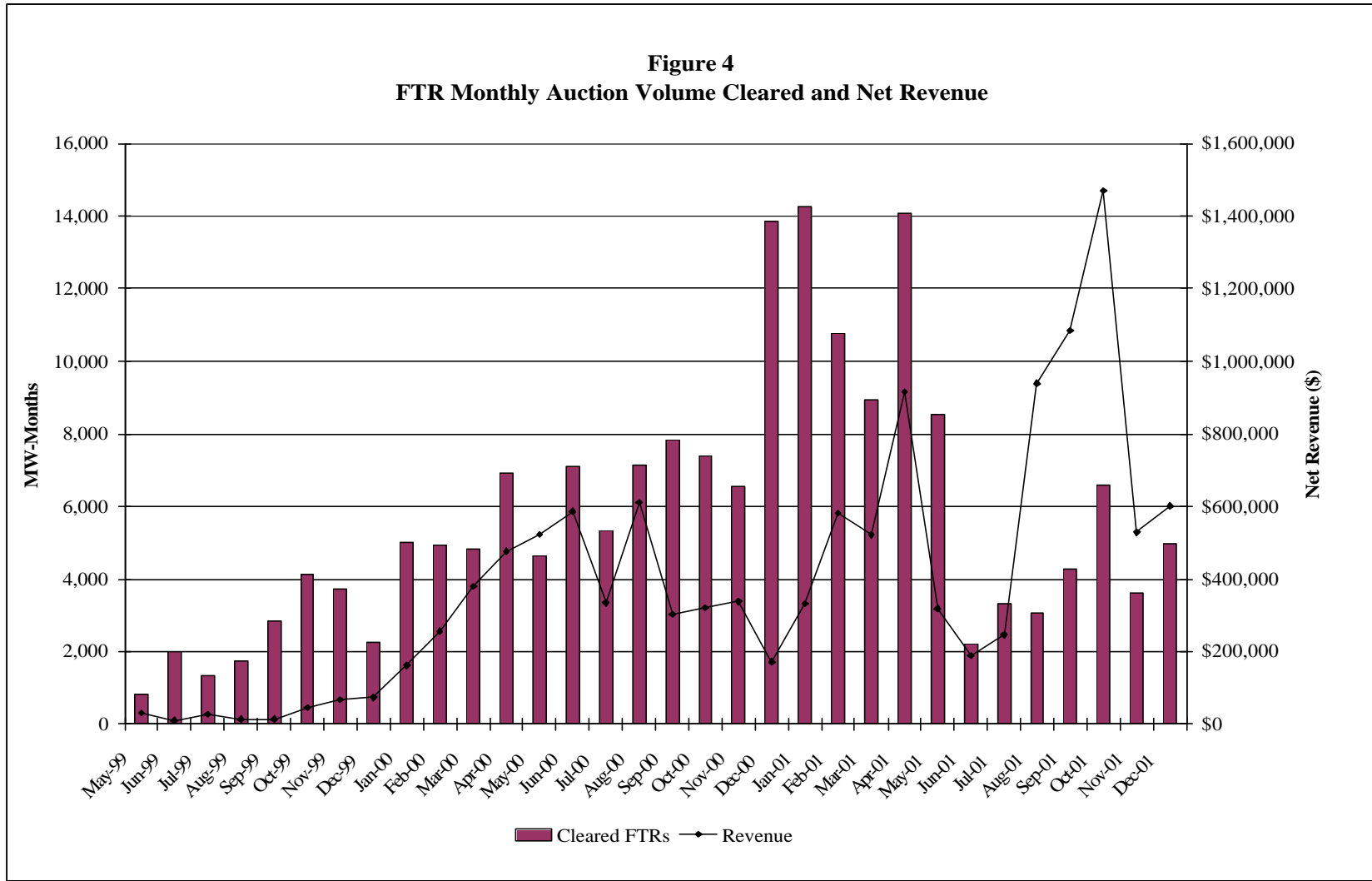


FTR Auction Market

- Basic tests of competition:
 - Activity levels
 - Prices

FTR Auction Market

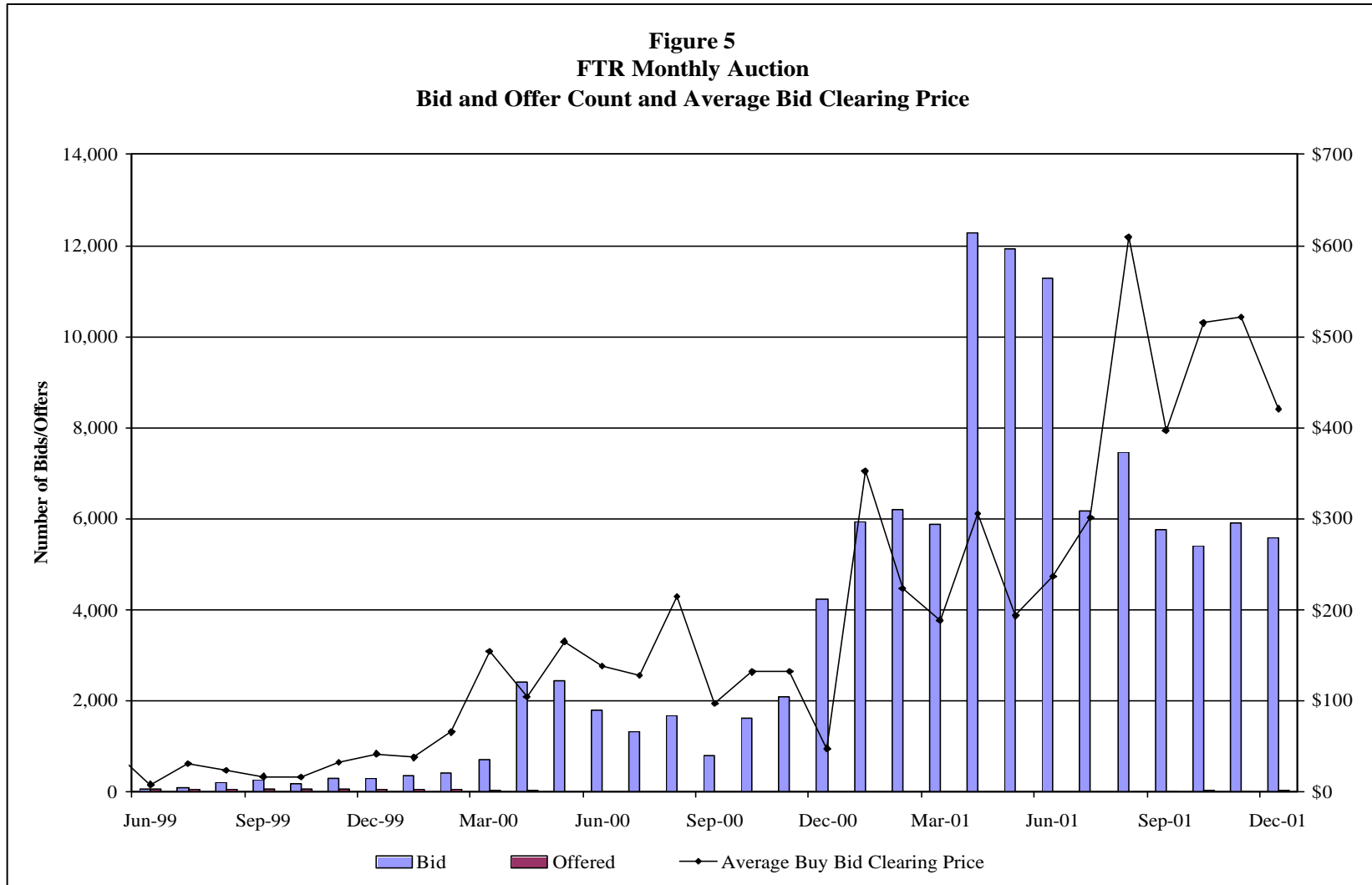
Figure 4
FTR Monthly Auction Volume Cleared and Net Revenue





FTR Auction Market

Figure 5
FTR Monthly Auction
Bid and Offer Count and Average Bid Clearing Price





FTR Auction Market

- Conclusion
 - FTR auction market was competitive in 2001
 - FTR reassignment process constitutes a barrier to retail competition
- Recommendations
 - FTR reassignment process should be modified to eliminate barrier to retail competition
 - Develop an approach to identify areas where transmission expansion investments would relieve congestion where congestion may enhance market power and investments are needed to support competition



IF YOU HAVE QUESTIONS

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