



PJM INTERCONNECTION STATE OF THE MARKET REPORT 2000

Energy Market Committee
June 6, 2001
Revised

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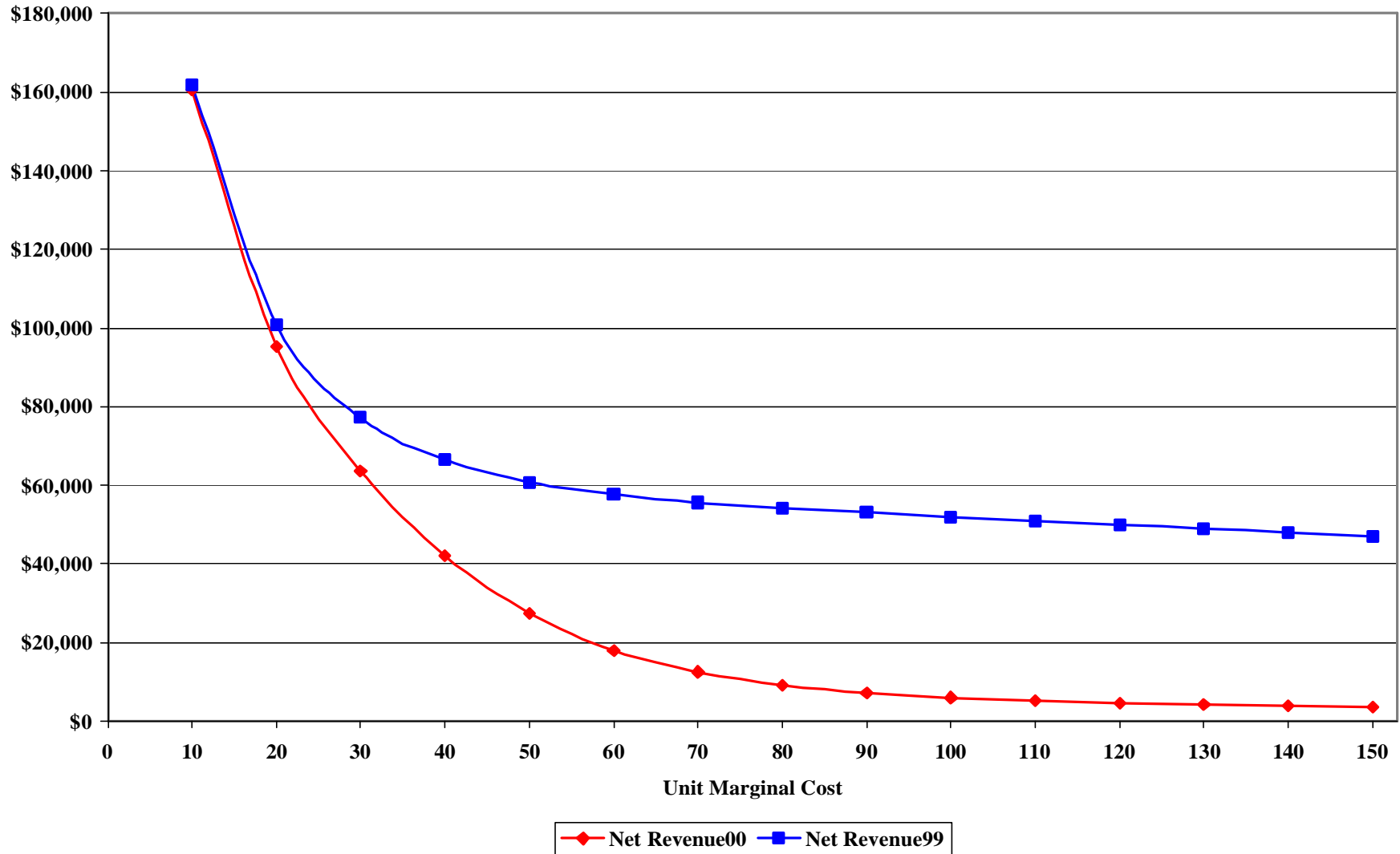
Energy Markets

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



Net Revenue

PJM Energy Market Net Revenue - 1999 and 2000





Annual Net Revenues

- CC at \$30/MWh
 - 2000: \$64,000/MW-year from energy market
 - 2000: \$23,000/MW-year from capacity market
 - 2000: \$6,000/MW-year from ancillary services and operating reserves
 - **2000 Total: \$93,000/MW-year**
- CT at \$50/MWh
 - 2000: \$27,000/MW-year from energy market
 - 2000: \$23,000/MW-year from capacity market
 - 2000: \$6,000/MW-year from ancillary services and operating reserves
 - **2000 Total: \$57,000/MW-year**

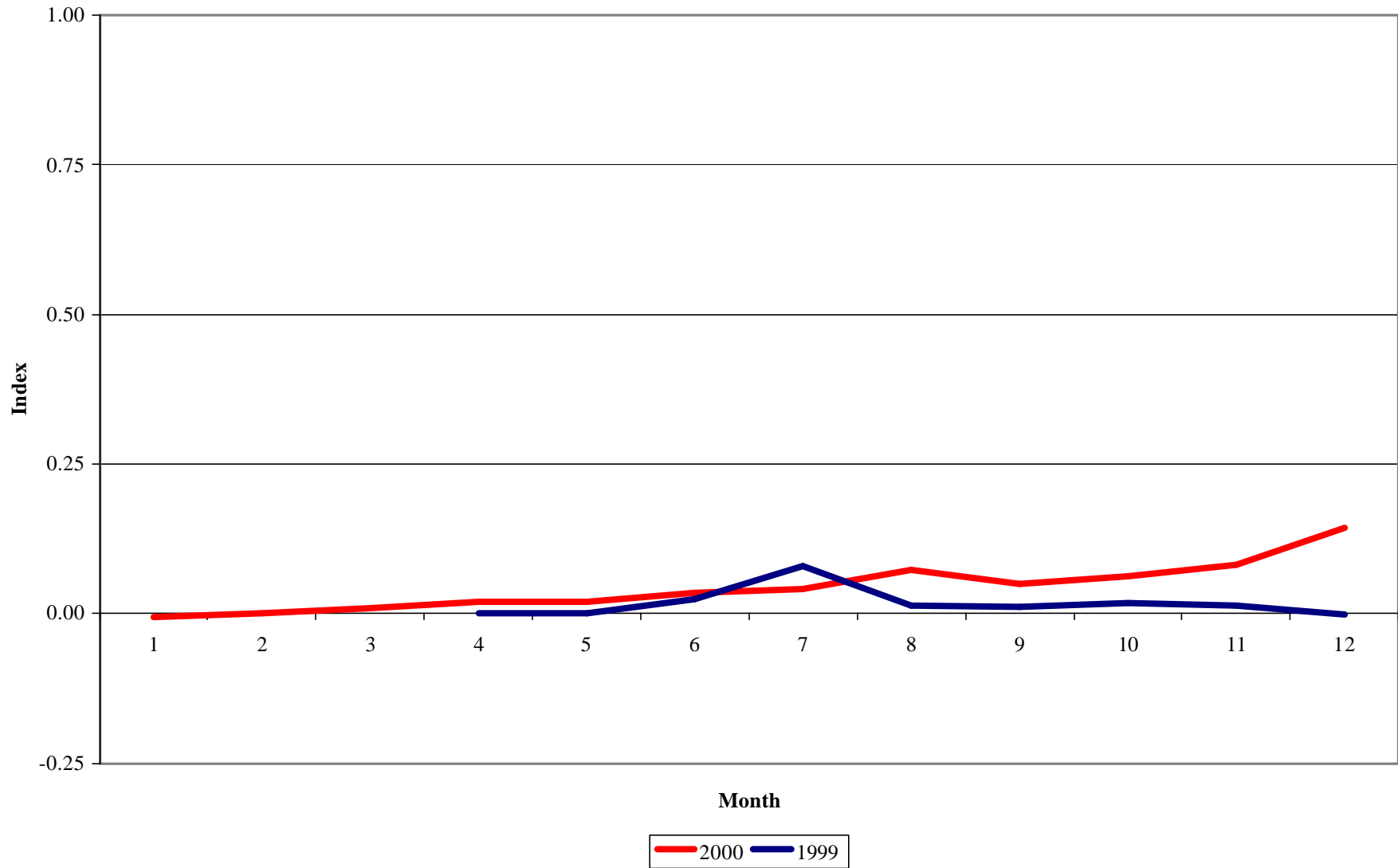


Net Revenues

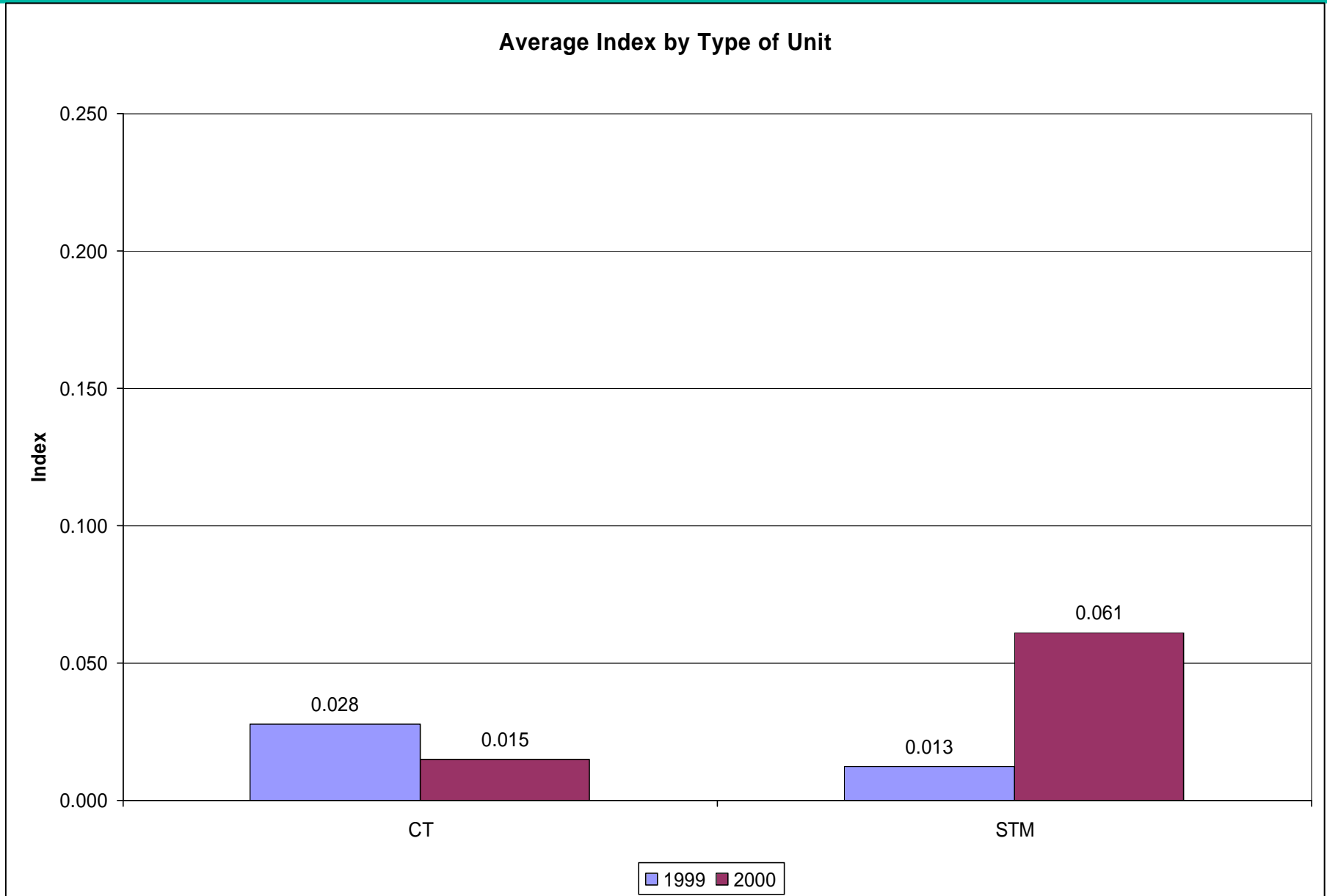
- Conclusion
 - 1999 net revenues from energy market alone adequate to cover annual fixed costs of peaker
 - 1999 net revenues from all sources greater than adequate to cover annual fixed costs of peaker
 - 2000 net revenues from energy market alone not adequate to cover annual fixed costs of peaker
 - 2000 net revenues from all sources almost adequate to cover annual costs of peaker
 - Overall: net revenue results consistent with finding that there was no systematic exercise of market power in 2000

Mark up

Figure 2: Average Monthly Load Weighted Mark Up Index



Mark up by unit type





Mark-Up Index

- Conclusion
 - Mark up index calculations consistent with conclusion that energy market was reasonably competitive in 2000
 - Concern regarding increased mark ups by mid merit units
 - Complexities: opportunity cost
 - Complexities: scarcity rent



Energy Market Structure

- FERC/DOJ HHI merger guidelines:
 - $0 < \text{HHI} < 1000$: Unconcentrated
 - $1000 < \text{HHI} < 1800$: Moderately concentrated
 - $1800 < \text{HHI}$: Highly concentrated

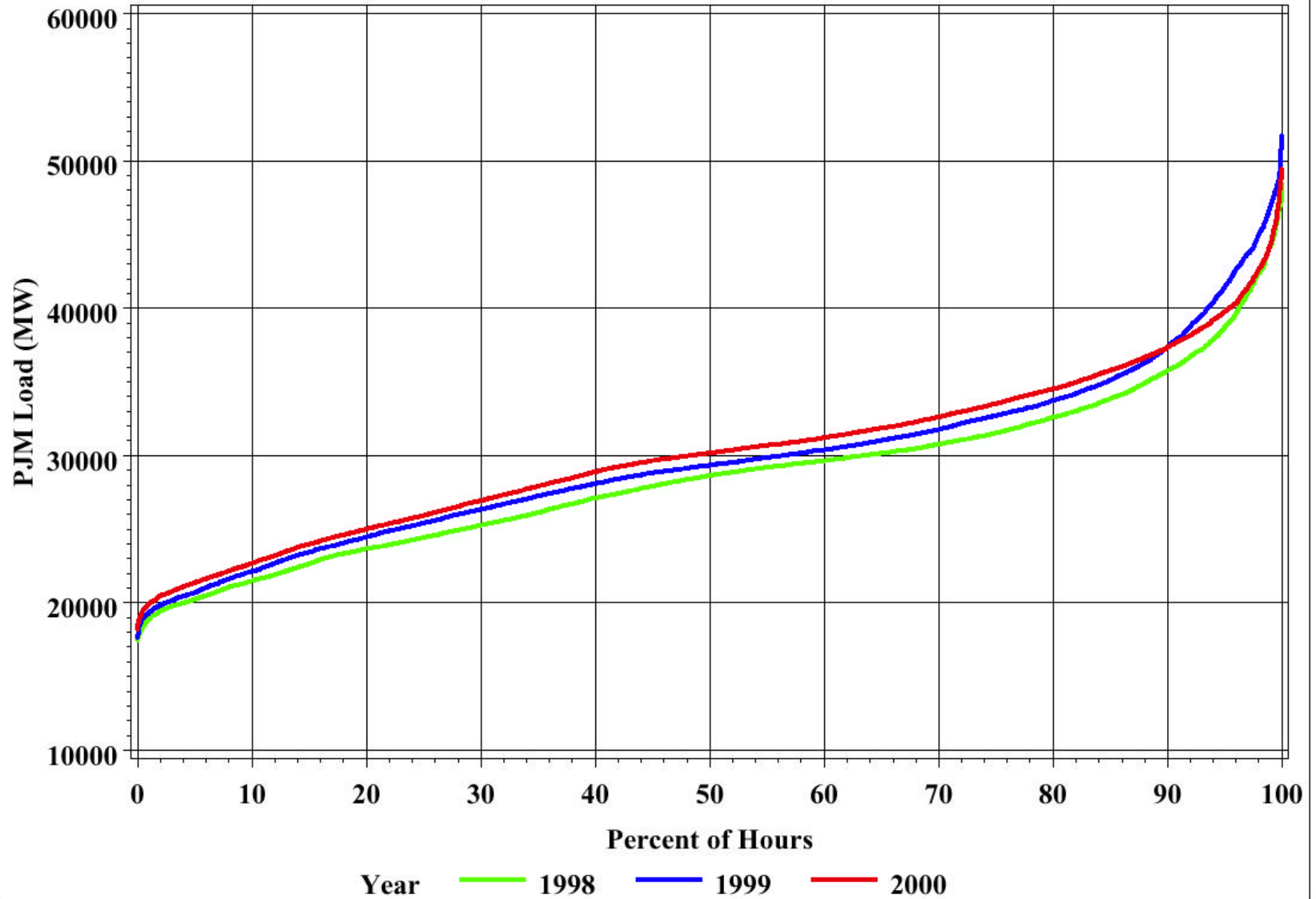
	Hourly	Annual
Maximum	2067	1390
Average	1544	1270
Minimum	1022	1150



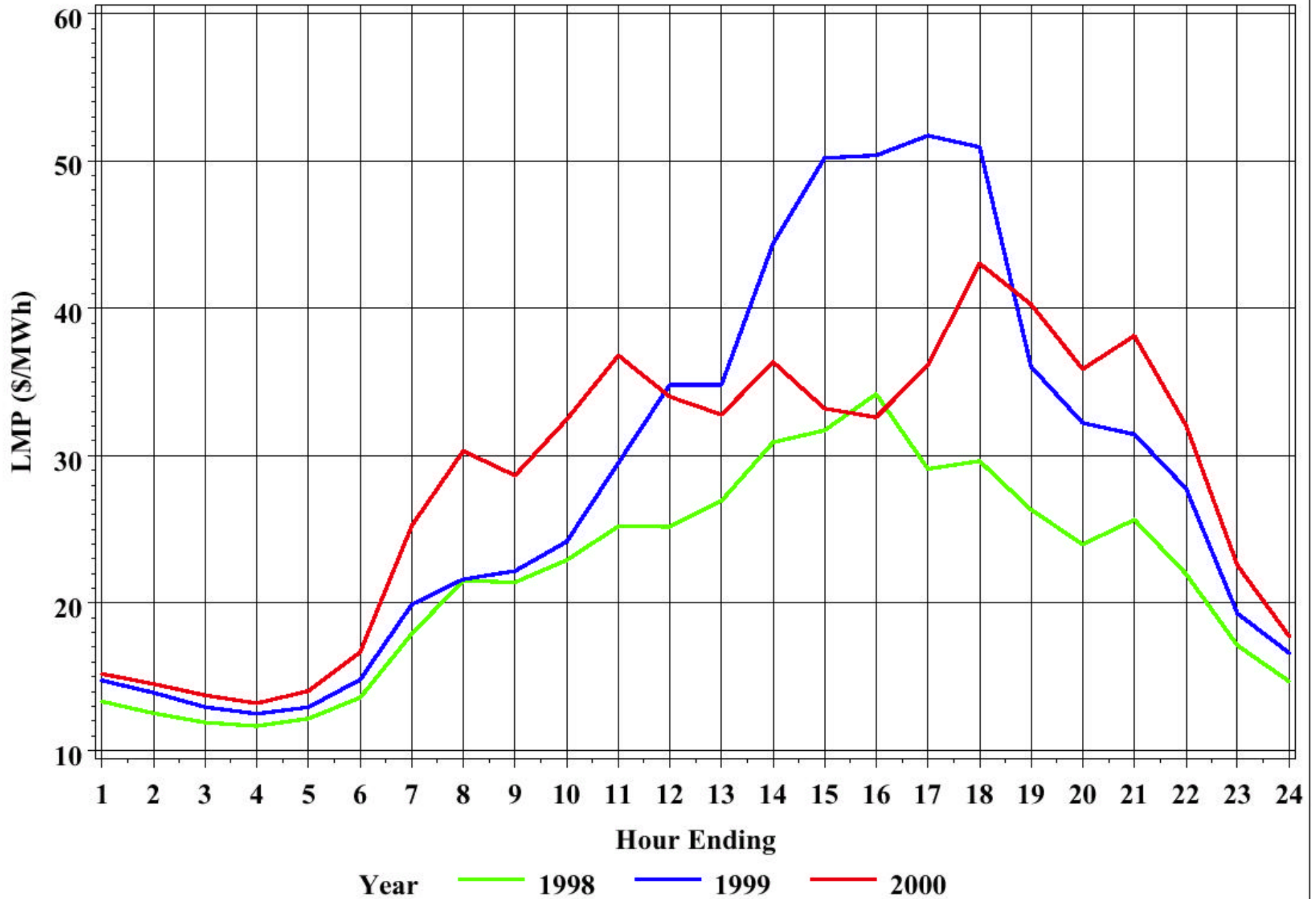
Market Structure

- Conclusion
 - HHI results are that PJM energy markets are moderately concentrated
 - As shown in 1999, these HHI results do not give reason for confidence during times of high demand
 - HHI levels indicate highly concentrated markets in areas defined by specific transmission constraints
 - No explicit evidence of market power during 2000

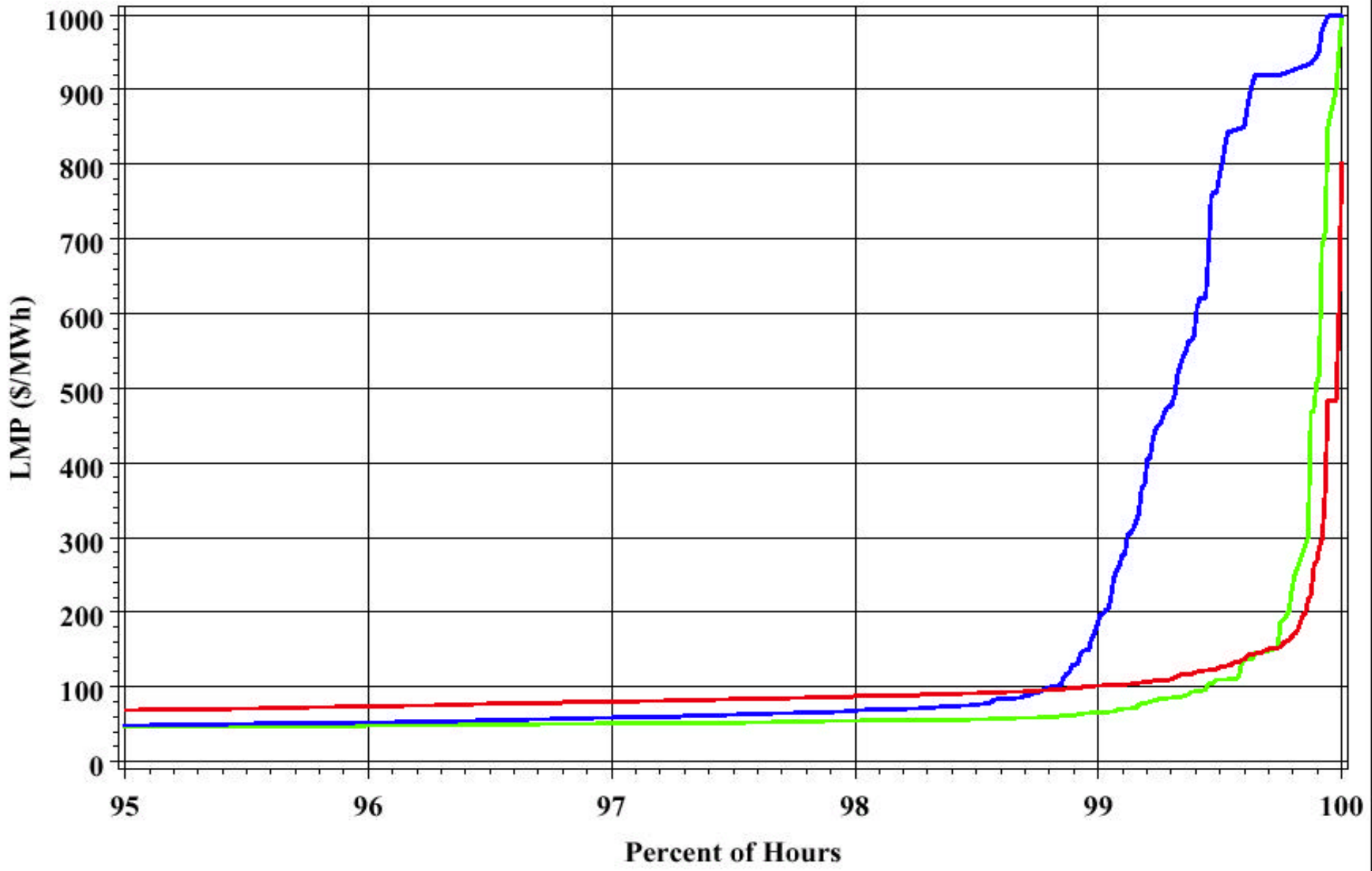
PJM Hourly Load Duration Curve
1998, 1999, and 2000



PJM Average Hourly System LMP 1998, 1999, and 2000



PJM Price Duration Curve Hours Above the 95th Percentile



Year_Market — 1998 — 1999 — 2000



Average prices

	1998	1999	2000
Average LMP	21.72	28.32	28.14
Median LMP	16.60	17.88	19.11
Standard Deviation	31.45	72.41	25.69
	% Increase 98 to 99	% Increase 99 to 00	% Increase 98 to 00
Average LMP	30.4	-0.6	29.6
Median LMP	7.7	6.98	15.1
Standard Deviation	130.2	-64.5	-18.3



Load Weighted Average Prices

	1998	1999	2000
Average LMP	24.16	34.06	30.72
Median LMP	17.60	19.02	20.51
Standard Deviation	39.29	91.49	28.38
	% Increase 98 to 99	% Increase 99 to 00	% Increase 98 to 00
Average LMP	41.0	-9.8	27.2
Median LMP	8.1	7.8	16.5
Standard Deviation	132.9	-69.0	-27.8



Fuel Cost Adjusted Average Prices

	1999	2000	% Increase
Average LMP	34.06	25.10	-26.1
Median LMP	19.02	17.16	-9.8
Standard Deviation	91.49	22.33	-75.6



Day Ahead/Real Time Average Prices

	Day Ahead	Real Time	Average Difference	% over Real Time
Average LMP	31.97	30.36	-1.61	5.3
Median LMP	24.44	20.15	-4.29	21.3
Standard Deviation	21.33	26.16	4.83	-18.5



Energy Prices

- Conclusion
 - Prices are a good general indicator of competitive conditions
 - Energy prices in 2000 consistent with a competitive energy market
 - Pattern of prices across hours illustrates potential for demand side price response

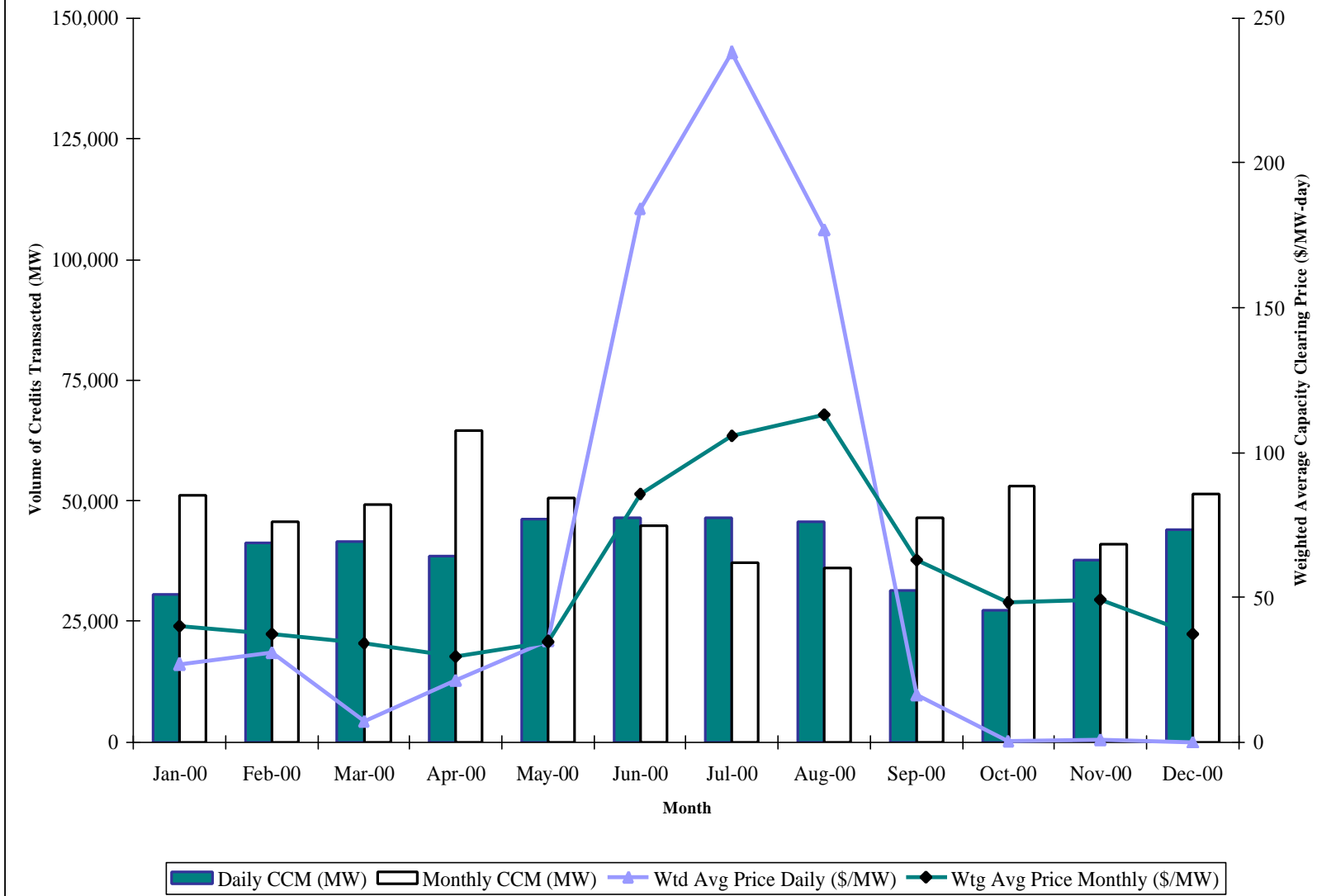


Capacity Markets

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

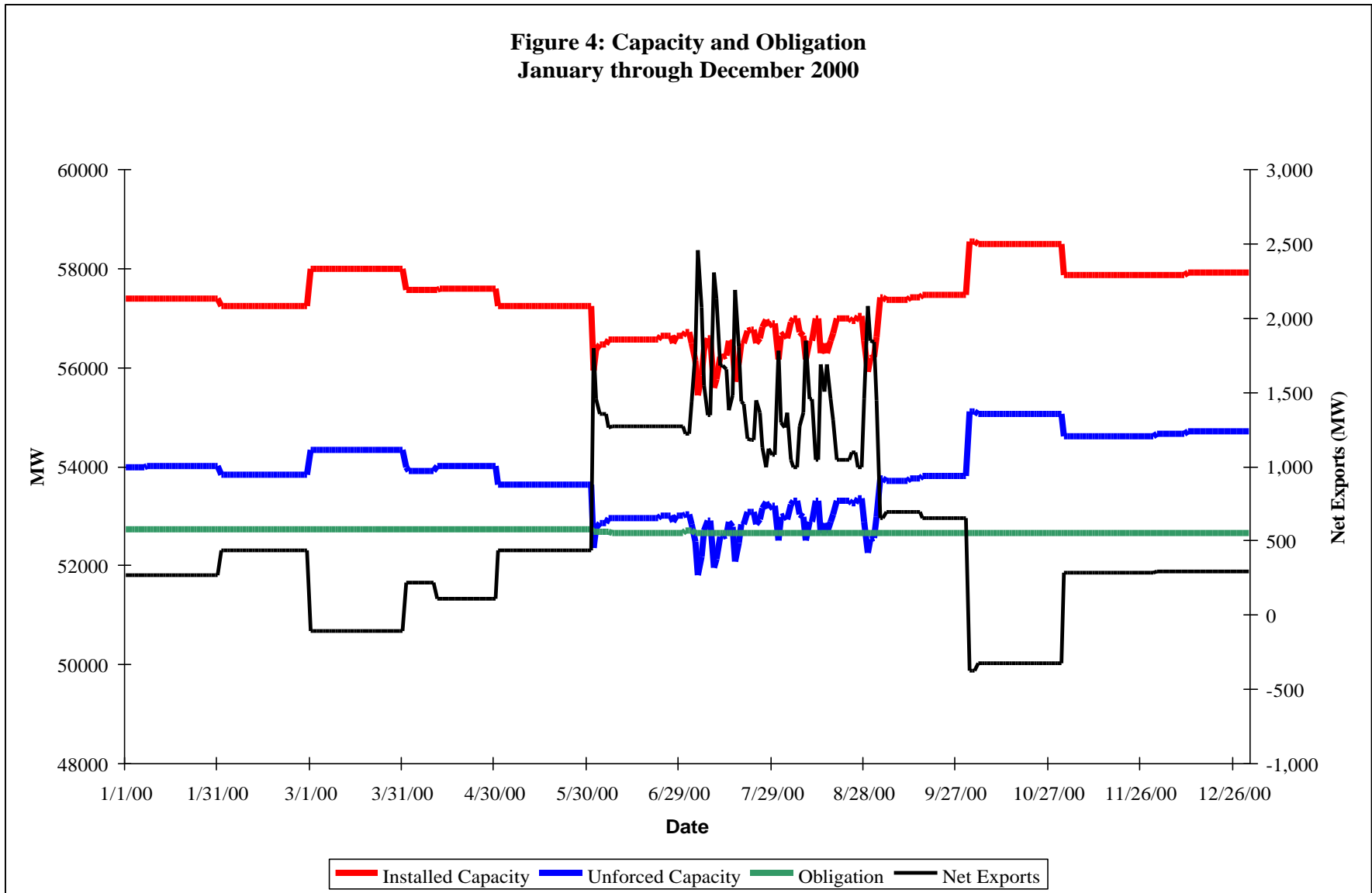
Capacity Markets

Figure 3: 2000 Daily vs Monthly Capacity Credit Market Performance



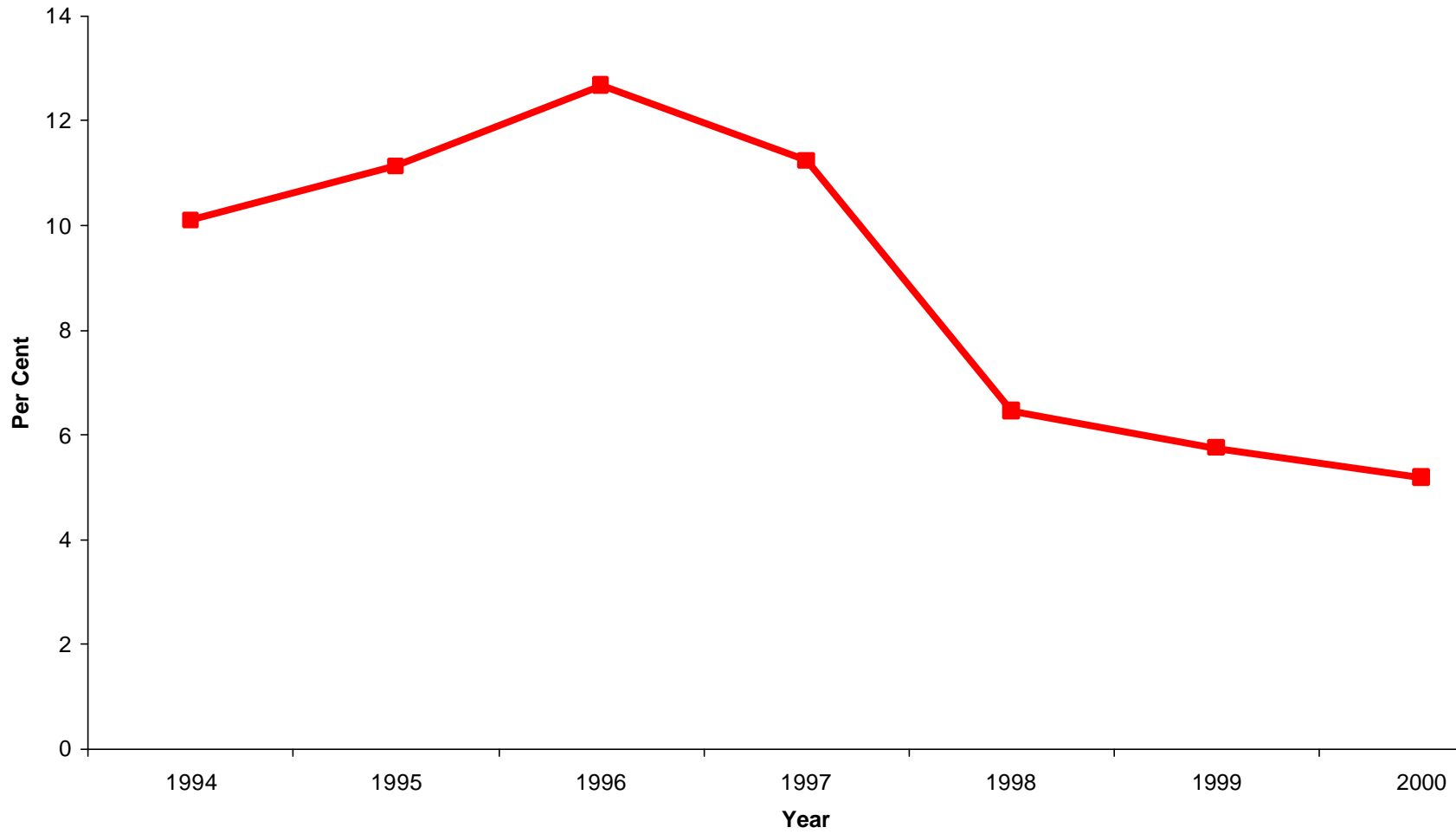
Capacity Markets

**Figure 4: Capacity and Obligation
January through December 2000**



Forced Outage Rates

Equivalent Demand Forced Outage Rate
1994 - 2000



Equivalent Demand Forced Outage Rate



Capacity Markets

- Conclusion
 - Capacity markets were reasonably competitive in 2000
 - Potential exercise of market power is a concern
 - Market design issues a concern



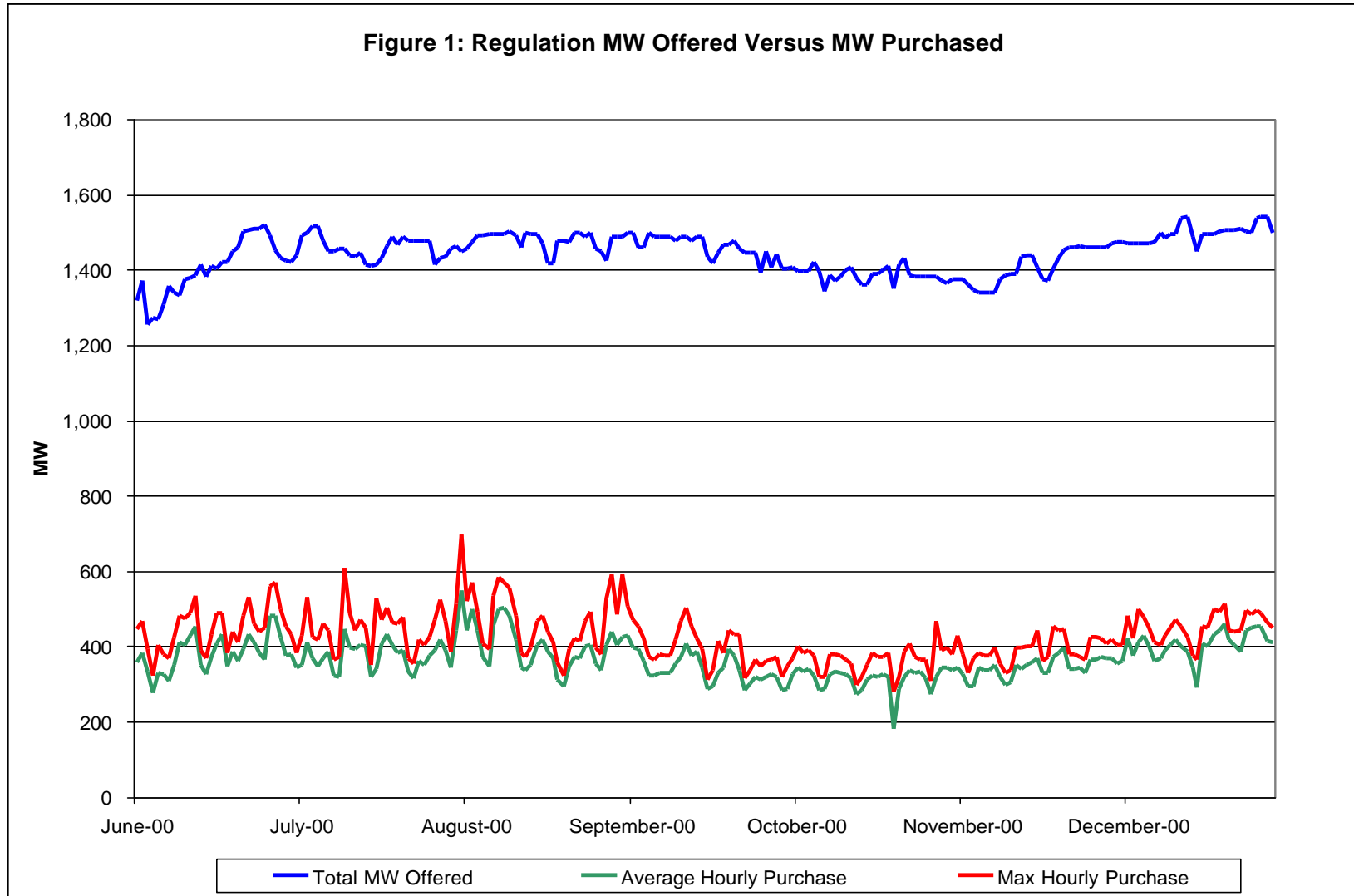
Regulation Market

- Basic tests of competition:
 - Price
 - Market structure
 - Availability
 - CPS1 and CPS2 performance



Regulation Market

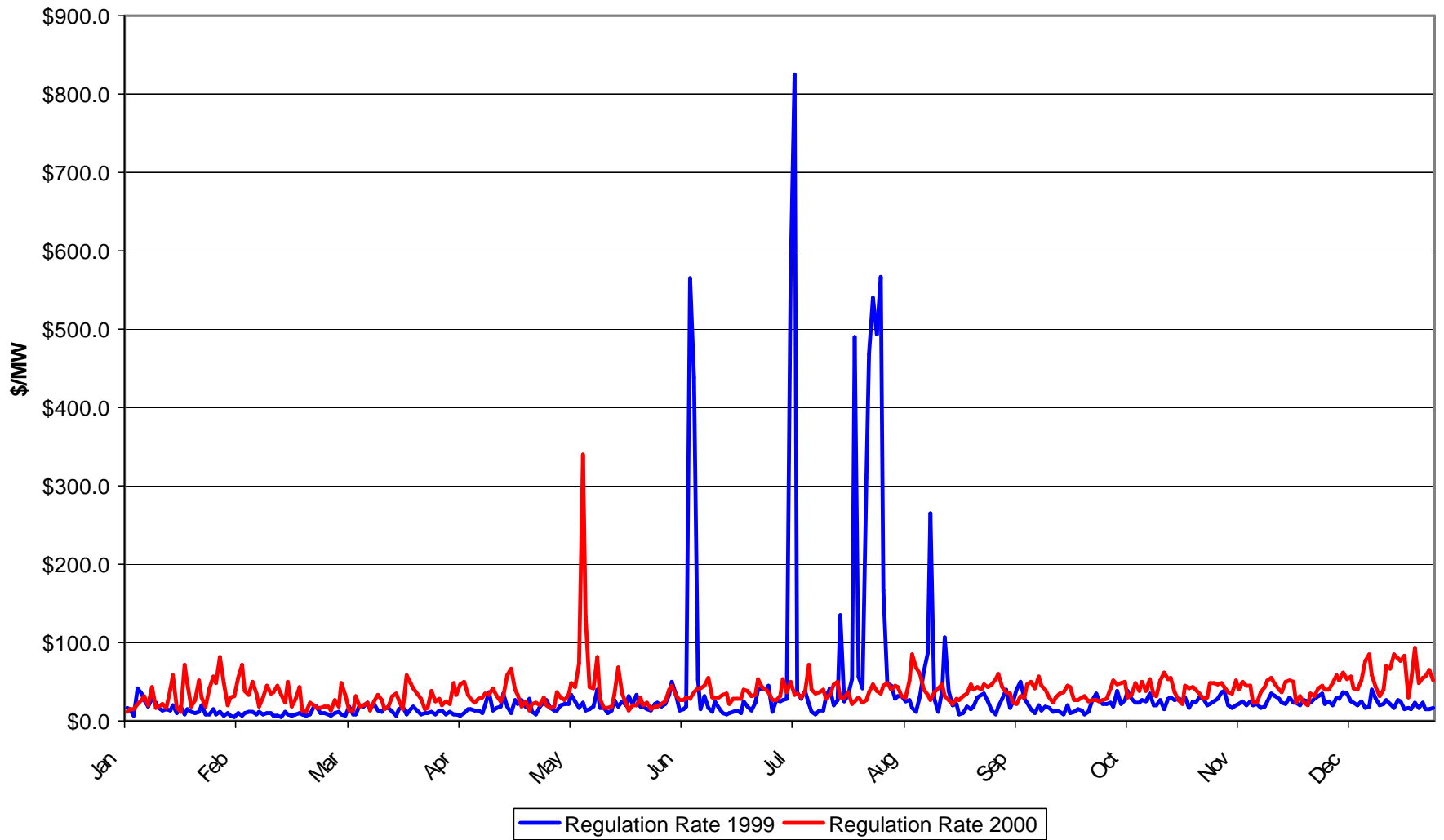
Figure 1: Regulation MW Offered Versus MW Purchased





Regulation Market

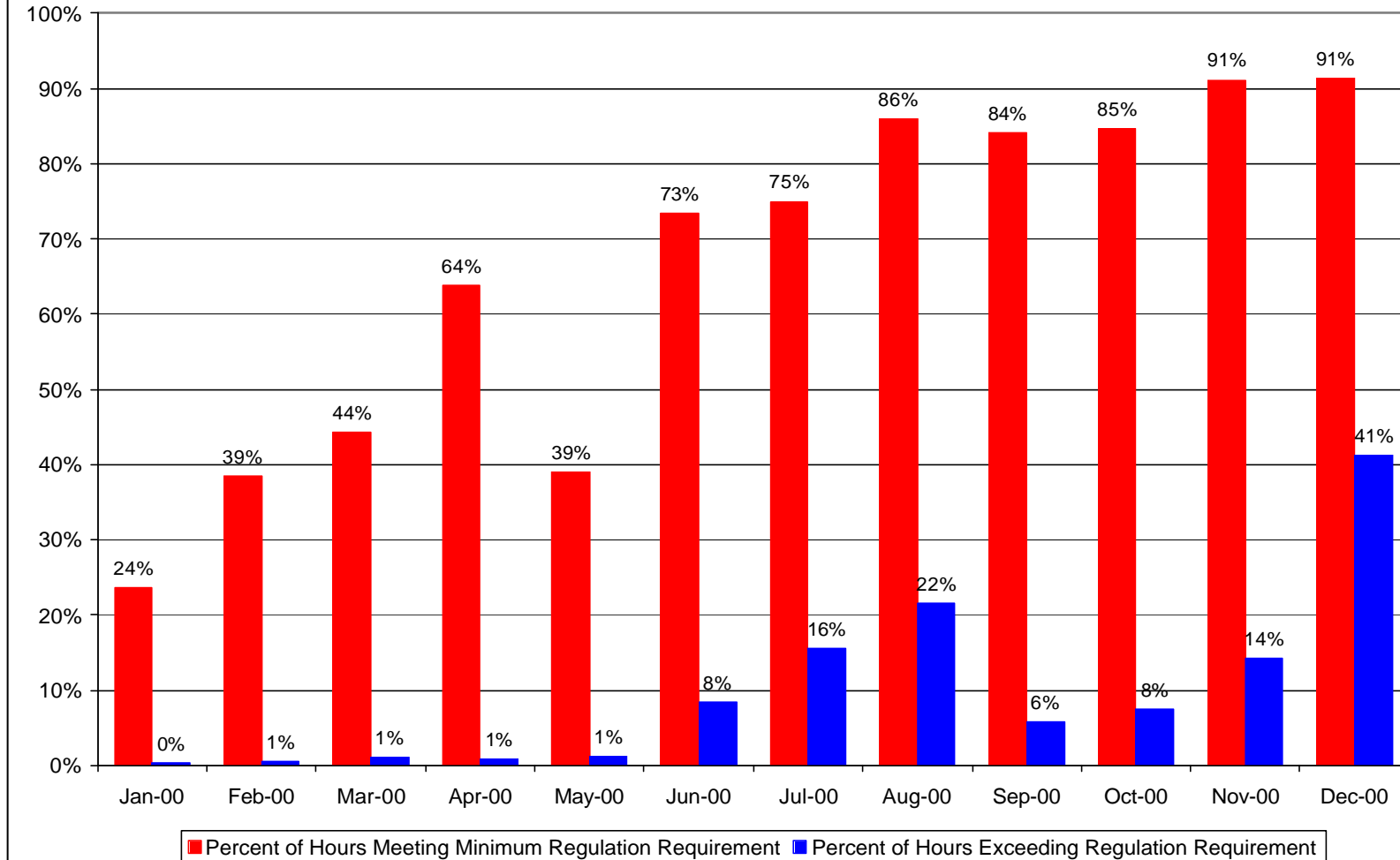
Figure 3: Daily Regulation Cost Per MW
1999 vs 2000





Regulation Market

Figure 5: Percent of Hours Within Required PJM Regulation Limits





Regulation Market

- Conclusion
 - Regulation market was competitive in 2000
 - Concentration levels between 1700 and 1800
 - Supply substantially greater than demand
 - Prices were moderate
 - Performance improved

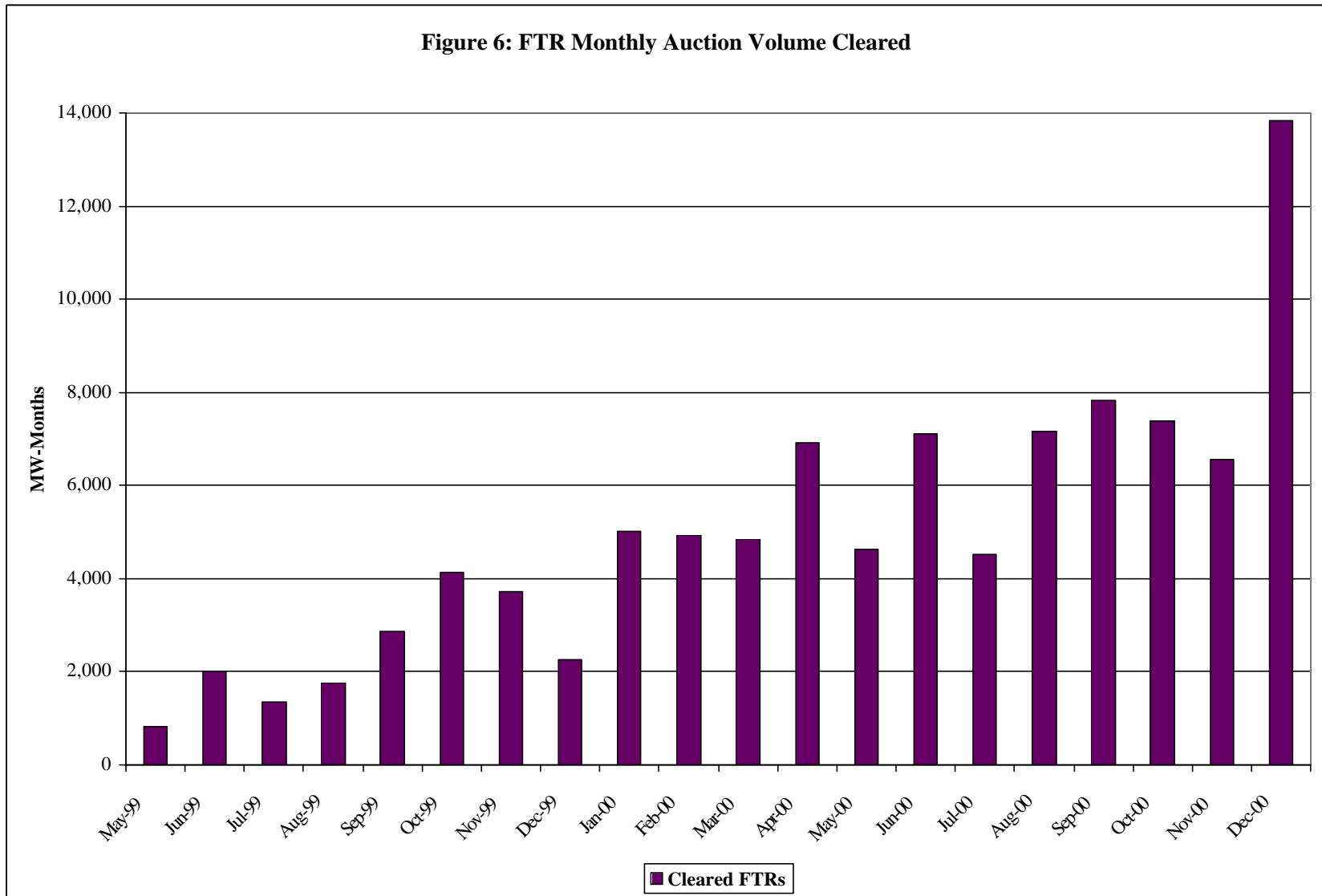


FTR Auction Market

- Basic tests of competition:
 - Activity levels
 - Prices

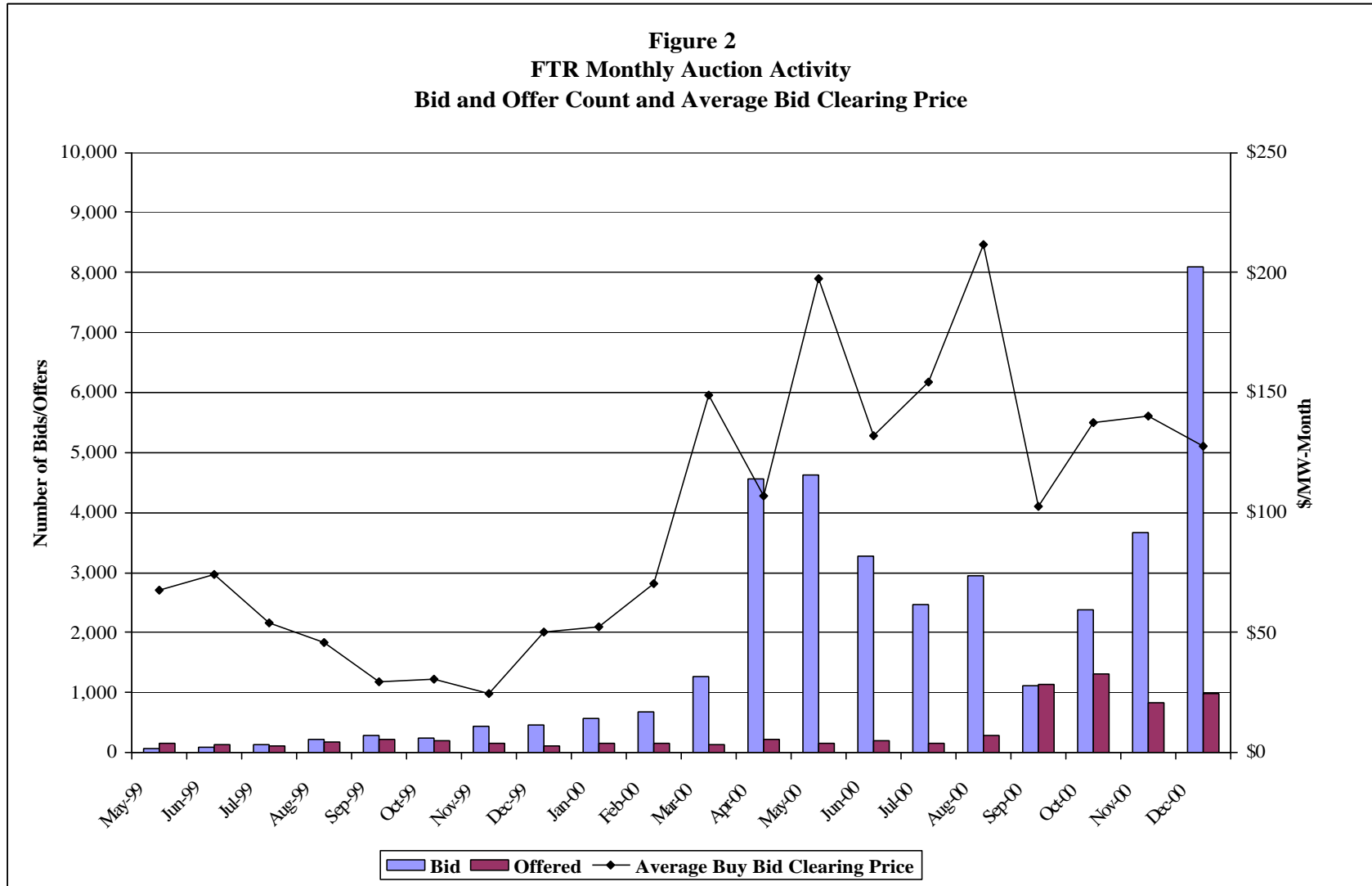
FTR Auction Market

Figure 6: FTR Monthly Auction Volume Cleared



FTR Auction Market

Figure 2
FTR Monthly Auction Activity
Bid and Offer Count and Average Bid Clearing Price





FTR Auction Market

- Conclusion
 - FTR auction market was competitive in 2000
 - Increased access to FTRs
 - Issues addressed in 2000:
 - FTR allocation
 - Creating congestion
 - Transmission outage notification

Summary

- Markets conclusions:
 - Energy market reasonably competitive in 2000
 - Capacity market reasonably competitive in 2000
 - Regulation market competitive in 2000
 - FTR auction market competitive in 2000
- Recommendations
 - Retain energy offer cap
 - Retain regulation offer cap
 - Develop demand side responsiveness initiatives
 - ICAP design changes



IF YOU HAVE QUESTIONS

Contact the PJM Market Monitoring Unit

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