Chapter 7. Market Power and Competitiveness

7.1 Background

7.1.1 Chapter Overview

This chapter reviews different approaches for measuring overall market competitiveness and the market power of individual market participants. We discuss key issues and challenges, as well as the limitations involved in applying these measures to the ISO's ancillary services markets. We illustrate in detail one approach that is appropriate for the ISO markets, the Residual Supply Index (RSI), using aggregate results from the first year of ISO market operations. Finally, we briefly discuss some of the issues in monitoring for market power in the bilateral contract market.

7.1.2 Measuring Market Competitiveness

Measuring market competitiveness is one of the top mandates for the California ISO Market Surveillance Unit and Market Surveillance Committee. Measuring market power and competitiveness is a difficult enough task for a single market such as the PX day-ahead energy market. In the ISO markets, with multiple ancillary services that are inter-related with each other and with the PX energy market, this difficulty is multiplied.

7.1.2.1 Market Concentration

The standard definition of market power is the capability of a firm to raise the market price above the competitive level for a sustained period of time Among the major conditions that determine the seriousness of market power in a market are: (1) product differentiation, (2) barriers to entry, and (3) market concentration. Product differentiation is not a significant factor in the bulk power market, which is essentially a commodity market. Market entry is a long-term concern in the power industry, due to lengthy regulatory procedures and the construction cycle. In the short run, however, the major determinant and indicator of market power in the bulk power industry is market concentration.

The two most common indices of market concentration are:

(1) *m-firm concentration ratio,* or the market share of top m firms in the market. A 4-firm concentration ratio is commonly used for many industries.

(2) *Herfindahl-Hirshman Index* (HHI), which is a market concentration index calculated as follows:

$$HHI = (100 \times S_1)^2 + (100 \times S_2)^2 + \ldots + (100 \times S_n)^2, \text{ where } S_i \text{ is the market share of firm i.}$$

For example, when there are five equal sized firms in the market, with each firm having 20 percent market share, the 4-firm concentration ratio would be 80 percent, while the HHI would be:

$$HHI = 5 \times (100 \times 0.20)^2 = 2000$$

An HHI of 2000 is often viewed as a moderately risky market power condition.

There are two major limitations in applying market concentration measures to the ISO markets. First, a firm's share of existing capacity may be significantly larger than its share of any given market. The amount of capacity each firm bids into each market reflects the strategic behavior of the market participants. For example, the largest firm in the market may have a 50 percent share of total capacity, but may only bid and supply 40 percent of the market clearing quantity as part of a strategy to withhold capacity and push up market price. Thus the m-firm concentration ratios and HHIs may appear artificially low even though ownership of capacity is highly concentrated.

Second, the electric power market is composed of 8,760 hourly markets in a year, exhibiting vastly different demand and supply conditions even within the same geographic area. Even if market concentration remains the same throughout all periods, overall market competitiveness and the market power of individual participants may be very different from period to period. A high concentration of supply in periods when available supply greatly exceeds demand, may result in lower market power in comparison to periods with lower concentration of supply but much tighter supply and demand conditions.

7.1.2.2 Bid Markup

The most direct measure of market power is the *bid markup* above marginal cost. There are two variations of the direct measure:

1. Markup Index (MI), which uses marginal cost (MC) as the basis for measuring bid markup:

$$MI = (\text{Bid Price} - MC) / MC$$

2. Lerner Index (LI), which uses price as the basis for calculating bid markup:

$$LI = (\text{Bid Price} - MC) / \text{Bid Price}$$

These two measures have the following relationship: $LI = MI / (MI + 1)$.

Many economists use the Lerner Index to study market power. However, the Markup Index is more comparable to the Department of Justice merger guidelines, which use a 5 percent markup as a warning level of market power when evaluating merger applications.

7.1.3 Modeling Price Markup

Given the limitations of simple market share indices, it is desirable to measure the price markup directly based on model analysis, as was done in several recent papers on market power in the California electricity market.[1] Evaluations of market power in the California market have been suggested using a model proposed by Green and Newbery to analyze the U.K. market.[2] Using that approach, it has been shown that firm i with marginal cost MC_i will bid the following supply curve into the market:

$$P_i - MC_i = q_i / (dSr(p)/dp - dD(p)/dp)$$

where P_i is the bid price for q_i units of supply, Sr is the supply offered by all suppliers other than firm i (also called the residual supply), and D(p) is the market demand.

The above relationship implies that the price markup is proportional to the quantity supplied, and inversely proportional to the sum of (1) residual supply elasticity and (2) the absolute value of demand elasticity. Price mark-up will be higher if the residual supply elasticity is low, and/or if the demand elasticity is low.

In the ISO's A/S markets and the real-time imbalance energy market, where demand elasticities are approximately zero under most conditions, the equation is simplified to:[3]

$$P_i - MC_i = q_i / (dSr(p)/dp) = q_i \frac{dSr(q)}{dq}$$

In these markets, the mark-up is then mainly determined by the elasticity of residual supply from the other firms in the market. As discussed in Chapter 6, constructing supply and cost curves for ancillary services is complicated by the inter-relationships between these markets and the energy markets, and the fact that most units supplying A/S are simultaneously supplying energy to the real-time or forward markets. Due to the difficulty of constructing MC_i and Sr for each larger supplier in the market, an alternative for assessing the market power of individual market participants is to directly examine the residual supply of other producers in the market. This approach is described in the following section.

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[1] Borenstein, S., Bushnell, J., and Wolak, F. (1999) "Diagnosing Market Power in California's Deregulated Wholesale Electricity Market," Fourth Annual POWER Research Conference, Berkeley, CA, March 5, 1999; and, California Power Exchange Market Monitoring Committee Report, March 9, 1999.

[2] Green, R. J., and D. M. Newbery (1992) "Competition in the British Electricity Spot Market," *Journal of Political Economy*, Vol. 100, pp. 929-953.

[3] The last step of this equation uses the following notation. The function Sr(q) (price as function of quantity demanded) is the inverse function of Sr(p) (quantity as function of price). Thus Sr(p) and Sr(q) are different functions. Using the property that the derivative of the inverse function is the inverse of the derivative of the original function, we have dSr(p) /dp = 1 / (dSr(q)/dq).

7.2 Pivotal Supplier Analysis

7.2.1 Residual Supply Index

For a particular market at a particular hour, the total capacity bid into the market by each firm i can be represented by q_1, …, q_i, …, q_n, where n is the number of suppliers in the market. Let D represent total market demand, and let $S_i = q_i / D$ be the maximum supply share provided by firm i. Then the total market bid sufficiency can then be calculated as follows:

$$\text{Bid Sufficiency} = \text{sum}(q_1 \ldots q_n) / D$$

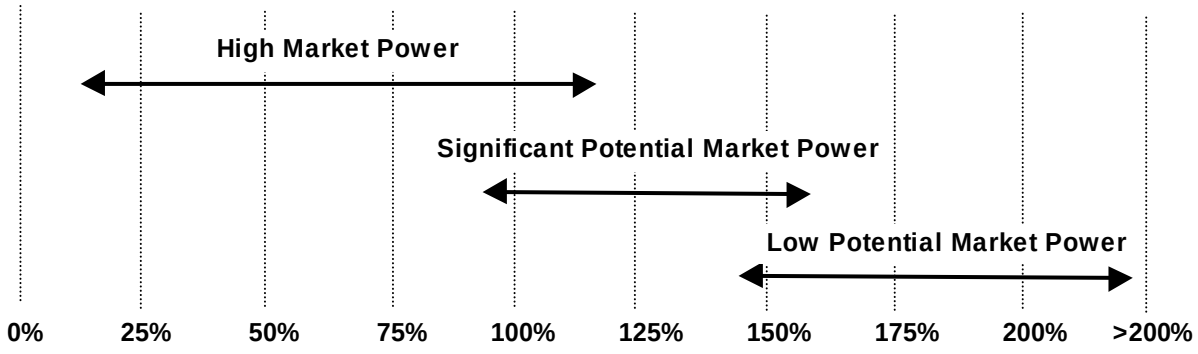
The Residual Supply Index (RSI) for firm i, which measures the percent of residual supply left in the market after taking out firm i's maximum share of supply, is then defined as:

$$RSI_i = \text{Bid Sufficiency} - S_i$$

When residual supply is greater than 100 percent, suppliers other than firm i have enough capacity to meet the demand of the market, and firm i has less influence on market clearing price. On the other hand, if residual supply is less than 100 percent of demand, firm i is needed to meet demand, and is therefore a *pivotal player* in the market. As a pivotal player, firm i has complete control of the market clearing price and can set the price as high as the price cap allows. As discussed in the preceding section, the optimal bid markup for suppliers is determined by the elasticity of residual supply. Therefore, residual supply as a percent of total demand (RSI) is an approximation to the more accurate formula of price markup.

Figure 7-1 illustrates how the RSI is related to a firm's market power in any given hour. In addition to the RSI, however, market power also depends on a number of other factors, so that we cannot define a precise range of RSI values corresponding to different levels of market power under all market conditions. The market power of a given supplier depends on the elasticity of residual supply and demand. Thus the 200 percent RSI "safety line" is approximate, and it is possible, though not very likely, for a firm with an RSI of 200 percent to have significant market power.

Figure 7-1. Residual Supply Index and Market Power



A measure related to the RSI is $(1 - RSI_i)$, a value which, in effect, represents each firm's guaranteed minimum market share.[4] This value represents the portion of the firm's supply curve for which demand is completely inelastic, so that it can be sold at any price set by the supplier. In the ISO markets, for instance, this represents the quantity of capacity that would clear the market if the supplier offered all capacity at the $250 price cap.

In the ISO's ancillary service markets, another relevant measure is the *ratio* of the firm's *minimum* market share (if all its capacity is bid in at the maximum possible price) to the firm's *maximum* market share, if the firm's total available capacity (S_i) were bid into the market as a price taker: $(1 - RSI_i) / S_i$.

In most cases, firms with pivotal market power face a tradeoff between higher market share (or increased sales volume) and higher prices. In determining the optimal profit maximizing bid strategy, the firm must weigh the possible increase in the market clearing price against lower total market share. In practice, actual overall market bid sufficiencies and the bidding patterns of other suppliers are dynamic and not perfectly known or predictable by each supplier prior to each market iteration. It is likely, however, that on a day-to-day basis suppliers can predict residual bid sufficiency with a relatively high degree of certainty. The higher the ratio of minimum market share relative to total available capacity, the less important the potential tradeoff between market prices and market share will be, so that firms will be more likely to benefit from bidding much or all of their capacity at extremely high prices.

The RSI provides an indication of the *magnitude* of market power, as well as a firm's potential gain from exercising this market power. The RSIs of individual firms can be tracked against total system load level or time of day, in order to assess how market power varies as a function of these variables. A more detailed discussion of such analysis, with some actual sample results, is provided in Section 7.3.

7.2.2 Example of Residual Supply Index

The following example illustrates the how the Residual Supply Index may be applied to assess market power in the ISO's ancillary service markets.

Market Demand = 1,000 MW
Total Supply Bids = 1,200 MW
Bid Sufficiency = 1,200/1,000 = 120 percent
Number of Firms = 6

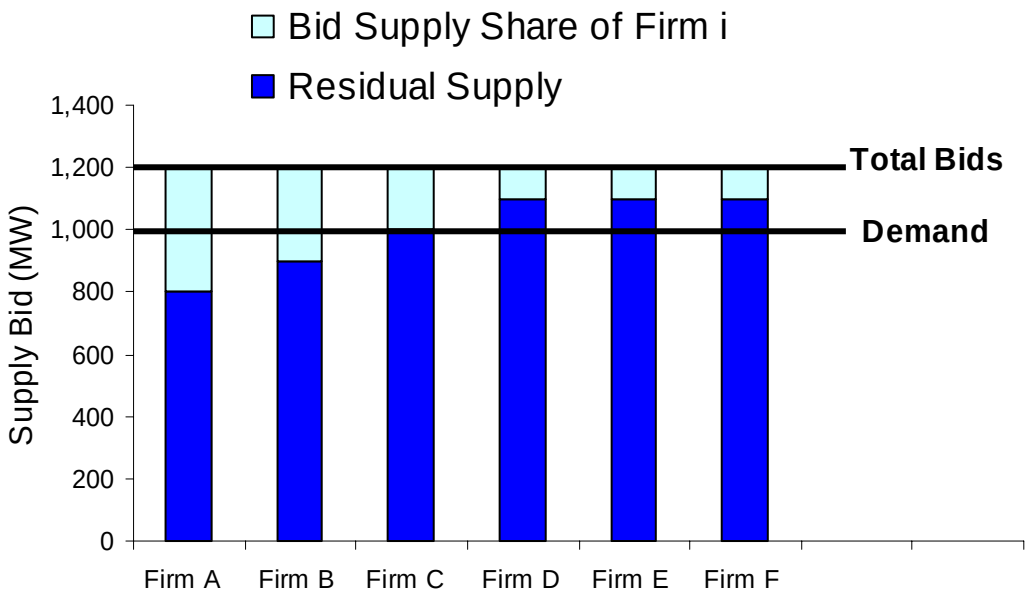
Figures 7-2 and 7-3 present the RSI analysis for this example.

[4] In hours when bid insufficiency occurs, a firm's available capacity bid into the market may be less than (1 – RSI), so that the firm's minimum market share may actually be the *maximum* of either (1 – RSI) or the firm's available capacity.

Figure 7-2. Calculation of Residual Supply Index for Individual Firms

	Supply Bid (MW)	Maximum Supply Share	Bid Sufficiency of Residual Supply
Firm A	400	400/1,000 = 40%	120% - 40% = 80%
Firm B	300	300/1,000 = 30%	120% - 30% = 90%
Firm C	200	200/1,000 = 20%	120% - 20% = 100%
Firm D	100	100/1,000 = 10%	120% - 10% = 110%
Firm E	100	100/1,000 = 10%	120% - 10% = 110%
Firm F	100	100/1,000 = 10%	120% - 10% = 110%
Totals	1,200	120%	

Figure 7-3. Residual Supply Index for Individual Firms



Firms A and B: High Market Power

In this example, the 80 percent RSI for Firm A indicates that Firm A is a pivotal player, and can set the market clearing price by bidding at least half of its available capacity (200 of 400 MW) at any given level. Moreover, if Firm A is a net seller of A/S, it would probably have an incentive to bid an extremely high price, since the firm's minimum market share is also equal to 50 percent of its available capacity bid into the market (200 MW of 400 MW). A comparison of revenues under a price setting and a price taking strategy would suggest which bidding strategy would be optimal for Firm A. Under a *price setting* strategy, Firm A would bid all its capacity at the price cap, and its total revenues would equal $50,000 (200 MW x $250/MW). Under a *price taking* strategy, where the market clearing price was set by other suppliers at $50, total revenues for Firm A would equal $10,000 (200 MW x $50/MW). In markets such as the A/S markets, where prices jump from competitive prices of under $50 to prices at or near the $250 bid cap, this form of analysis may be almost as accurate as a more detailed analysis of the ability to "move" prices with more subtle modifications in biding.

The 90 percent RSI for Firm B indicates that Firm B is also a pivotal player and can also set the market clearing price. Firm B faces a somewhat higher tradeoff between market share and price than Firm A, since Firm B's minimum market share equals 33 percent of its available capacity bid into the market (100 MW out of 300 MW).

If Firm A or Firm B are *net buyers* of AS, these firms could be expected to exercise their market power *defensively*, to keep prices as low as possible. Given the sequential nature of the A/S markets, however, the optimal defensive bidding strategy may not be to bid all available supply into a single A/S market at a very low or zero price. Instead, a pivotal market player bidding defensively could be expected to bid capacity into each market at prices that tend to the minimize overall cost of A/S across all markets.

Firm C: Marginal Market Power

Firm C is on the margin and can easily influence the market clearing price. Such a firm may find that it does have power to set prices during many hours, since other owners may also bid some capacity in at high prices. In a dynamic market, where it is hard to predict bid sufficiencies and bidding patterns of other firms as market conditions change, the bidding behavior of a firm with marginal market power would likely reflect the firm's expectation of having significant power to effect prices. The firm could reasonably expect that its own bids in conjunction with those of other suppliers would cause the price cap to be hit with some frequency. This latter effect may be captured to a greater degree in a variation of the RSI, which would define bid sufficiency only in terms of market bids less than the $250 price cap.

Firms D, E and F: Low Market Power

Firms D, E and F are not pivotal and have less influence on the market clearing price than the other firms do. Participants in this situation should be expected to behave primarily as price takers rather than seeking to affect prices. Profit-maximizing bidding strategies for these suppliers should reflect actual marginal costs of providing A/S, or the true opportunity costs of not providing this capacity in other markets.

7.3 Analysis of Market Power Using RSI

This section presents aggregated results of an assessment of market power in the ISO's ancillary service markets using the Residual Supply Index (RSI) described in the previous section. In the following discussion, RSI values for the investor owned utilities (IOUs) and the new generation owners (NGOs) are calculated for the IOU and the NGO with the highest levels of market power in each market during each hour. The summary results presented in this report have been further aggregated by categories such as month, operating hour and the level of total ISO system load, in order to illustrate trends and variations in market power under different market conditions.

The analysis is presented both in graphs and in tables of summary statistics showing the hourly RSIs for the two supplier groups. The key summary statistics presented here are:

- The percent of hours when the RSI of the most pivotal supplier (by IOU and NGO) is less than 100 percent. This provides an indicator of the *frequency* of market power.

- The average minimum market share (1- RSI) for hours when the RSI of the largest supplier (by IOU and NGO) is less than 100 percent. This provides an indicator of the *magnitude* of market power of the most pivotal supplier, when market power exists.

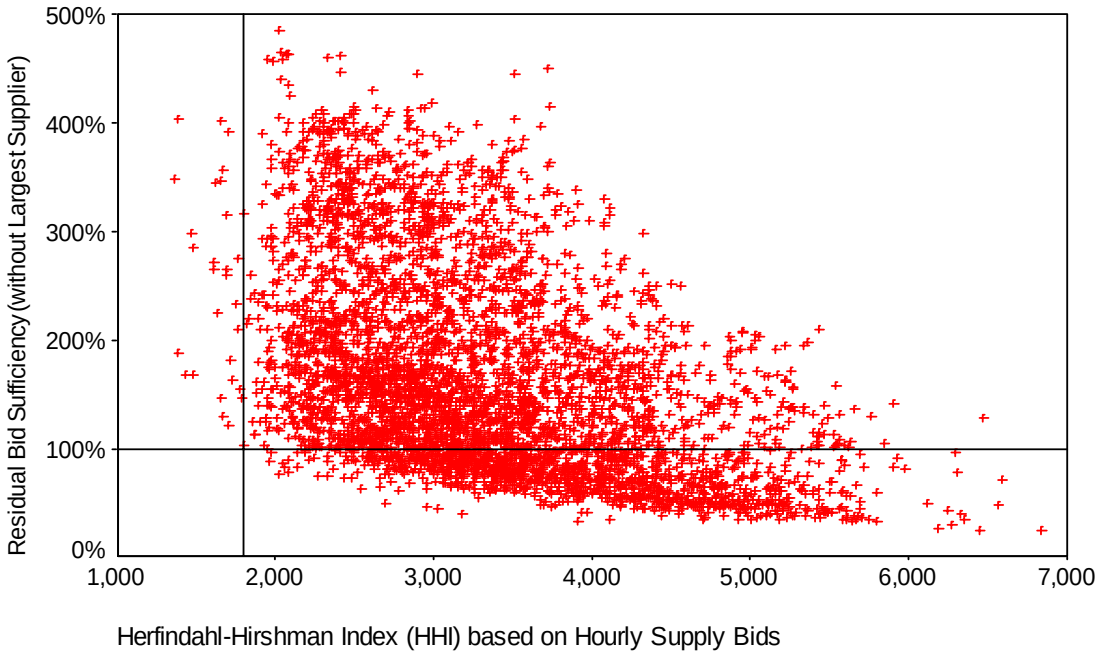
- The average minimum market share (1- RSI) as percentage of the most pivotal supplier's total capacity bid into the market. As described above, this provides an indicator of the relative tradeoff between lower market share and higher market prices when market power is exercised.

7.3.1 Comparison of Residual Supply Index and the HHI

This section compares two indices of market power, the RSI and HHI, in order to illustrate the relationship of these indices and how they apply in the A/S markets. Figure 7-4 compares hourly values for the two indices, calculated using actual supply bids in the Upward Regulation market over the period from October 1998 through March 1999. The RSI is calculated for the largest supplier in each hour. References lines in Figure 7-4 indicate levels of these two indices that are typically used to distinguish between competitive and non-competitive market conditions. Below 100 percent is the non-competitive range for the RSI, while above 1,800 is non-competitive for the HHI.

As shown in Figure 7-4, hourly HHI values are rarely within competitive levels. Although the HHI does tend to increase when the RSI falls below 100 percent, the HHI is also relatively high, indicating non-competitiveness, during many hours when the RSI is very high and indicates competitive market conditions. For the market examined in this example, the RSI yields a more accurate indicator of market competitiveness than the HHI.

Figure 7-4. Comparison of Hourly RSI and HHI – Upward Regulation Market, October 1998 through March 1999



7.3.2 Market Power in Regulation Market

Table 7-5 presents summary statistics by month for the Residual Supply Index (RSI) applied to the Regulation market. After September 1998, separate results are provided for Upward and Downward Regulation, reflecting the fact that the ISO began in October to procure these two services separately. Starting in October, there is an increase in the number of hours when the RSI of the most pivotal IOU and NGO was less than 100 percent. This reflects, at least in part, the fact that true levels of market power prior to October were concealed by the aggregation of the Upward and Downward Regulation markets. Aggregation of data for these two markets results in artificially high RSIs since their bid sufficiencies tend to be negatively correlated.

As described in Chapter 3, the regulation market has been the thinnest of all the ISO's markets, and continues to have very low bid sufficiency during the morning and evening ramping hours. These market conditions are reflected in low RSI values during these hours.

As shown in Figures 7-6 and 7-7, the IOUs have had significant market power that they could exercise to raise Regulation prices during most hours. Figure 7-7 shows that, during the period from October 1998 to March 1999, the IOUs could set high prices for Downward Regulation virtually 100 percent of the time in operating hours 6 through 9. During the evening ramping hours, the IOUs could set high market prices for Upward Regulation about 80 percent of the time. As noted earlier in this report, IOUs have exercised this market power defensively to keep prices low during the first year of operation, in order to minimize their costs as net A/S buyers, and to maximize the rate of collection of stranded costs during the rate freeze.

Due to the thinness of the Regulation market, NGOs continue to play pivotal role in setting prices in this market during many hours. As shown in Figures 7-10 and 7-11, the market power of NGOs in Downward Regulation tends to be concentrated primarily in the morning ramping hours of 6 to 8. In those hours, residual bid sufficiency (excluding bids from the NGO bidding the most capacity) are less than 100 percent nearly 30 percent of the time. In Upward Regulation the NGOs are pivotal up to about 5 percent of the time during some evening ramping hours, as depicted in Figure 7-11.

Figure 7-5. Pivotal Player Analysis Regulation Market

Investor Owned Utilities

	Percent of Hours Residual Bid Sufficiency < 100%	Average Minimum Market Share	Average Percent of Total MW Bid	Minimum Market Share	Average Percent of Total Capacity Bid
July '98	70%	37%	68%	-	-
Aug	22%	17%	40%	-	-
Sept	32%	21%	37%	-	-
		Upward Regulation		Downward Regulation	
Oct	69%	28%	48%	34%	57%
Nov	78%	28%	46%	48%	70%
Dec	77%	30%	47%	36%	60%
Jan'99	76%	26%	40%	31%	52%
Feb	63%	22%	40%	27%	48%
Mar	68%	19%	35%	34%	61%

New Generation Owners

	Percent of Hours Residual Bid Sufficiency < 100%	Average Minimum Market Share	Average Percent of Total Capacity Bid	Average Minimum Market Share	Average Percent of Total Capacity Bid
July '98	19%	8%	88%	-	-
Aug	2%	9%	62%	-	-
Sept	0%	0%	0%	-	-
		Upward Regulation		Downward Regulation	
Oct	8%	9%	70%	9%	80%
Nov	12%	7%	48%	4%	71%
Dec	12%	16%	58%	8%	73%
Jan'99	4%	-	-	6%	67%
Feb	3%	3%	16%	5%	61%
Mar	9%	2%	12%	4%	69%

Figure 7-6. Minimum Hourly RSI Values (IOUs), October 1998 – March 1999

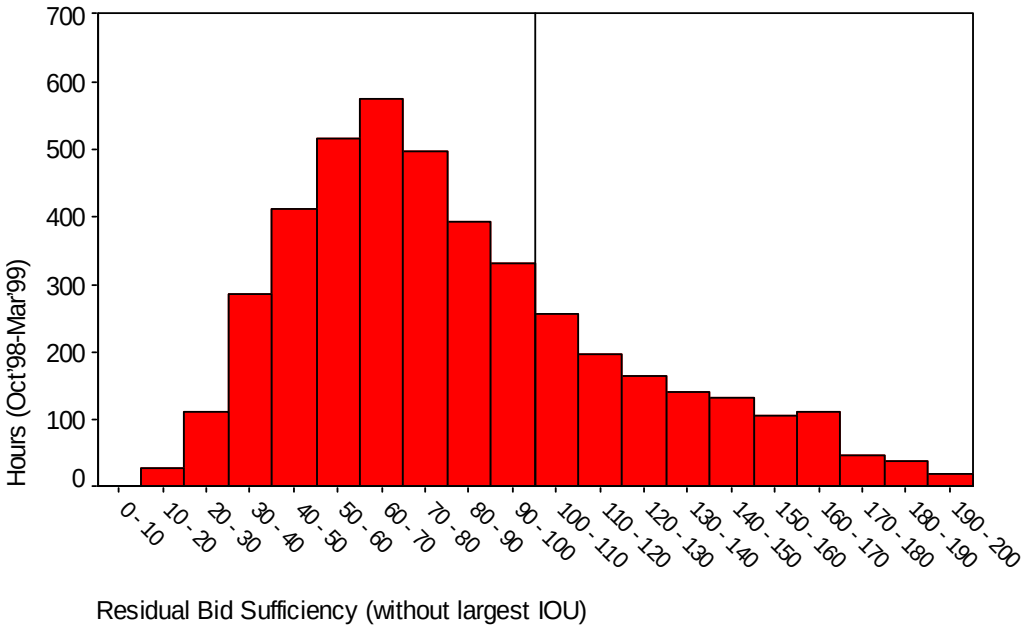


Figure 7-7. Minimum Hourly RSI Values (IOUs) by Operating Hour

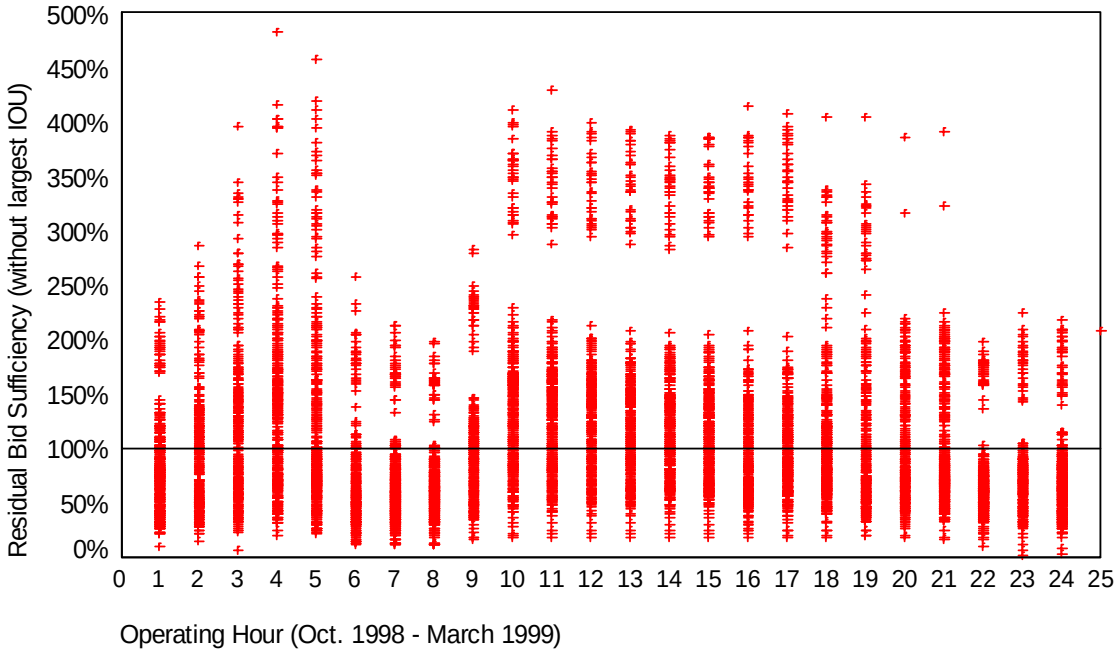


Figure 7-8. Minimum Hourly RSI Values (NGOs), October 1998 – March 1999

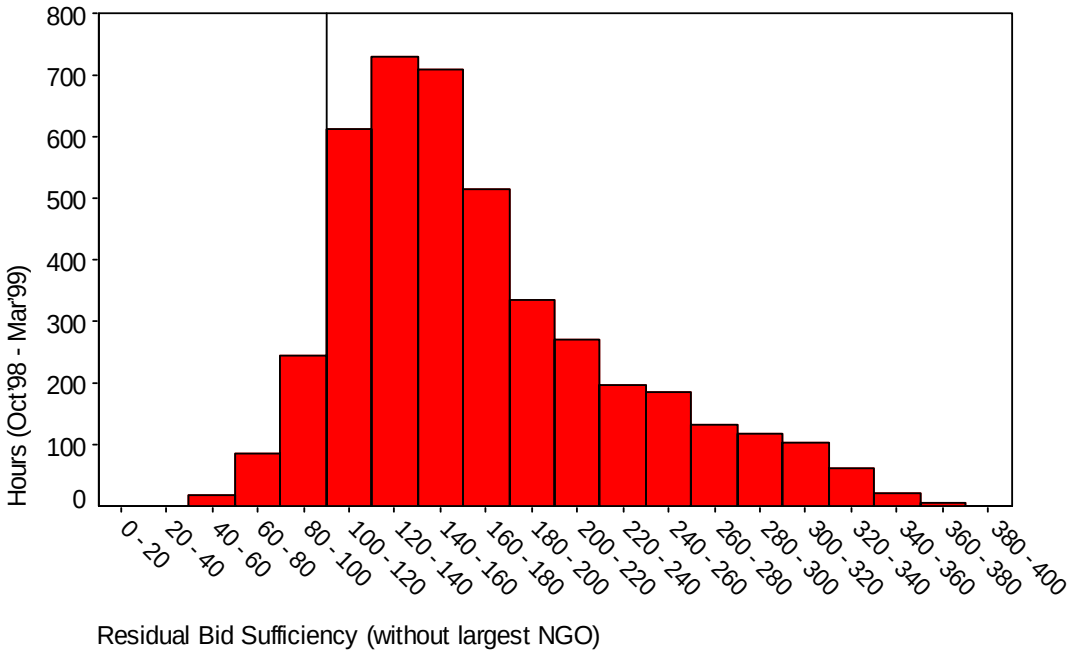


Figure 7-9. Minimum Hourly RSI Values (NGOs) by Operating Hour

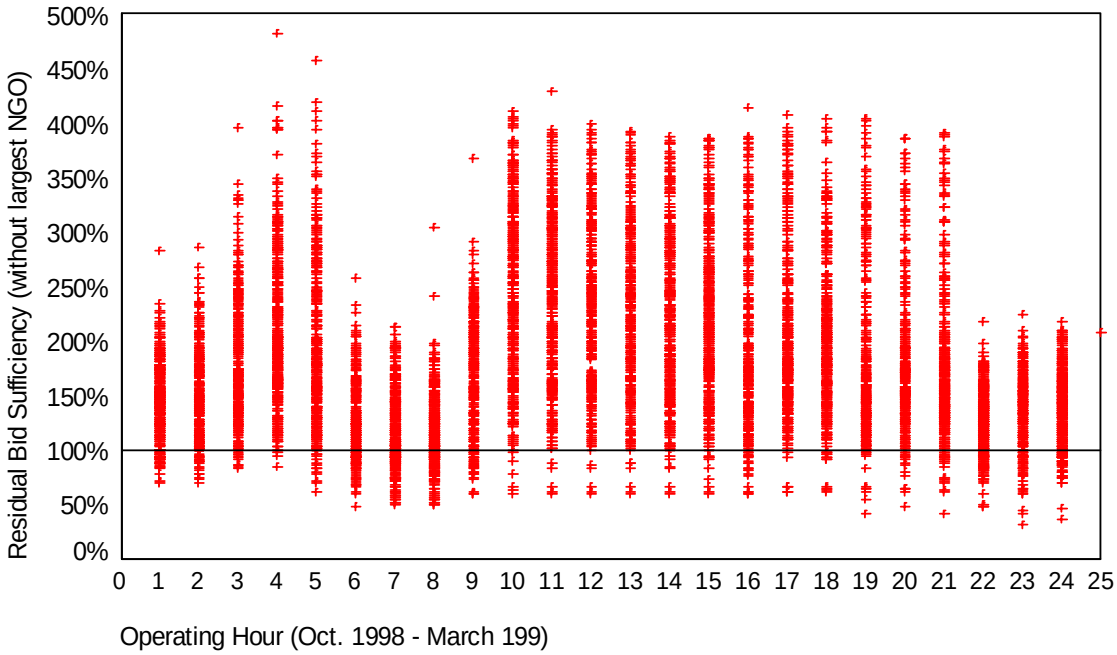


Figure 7-10. Pivotal Hours in Downward Regulation Market, by Operating Hour

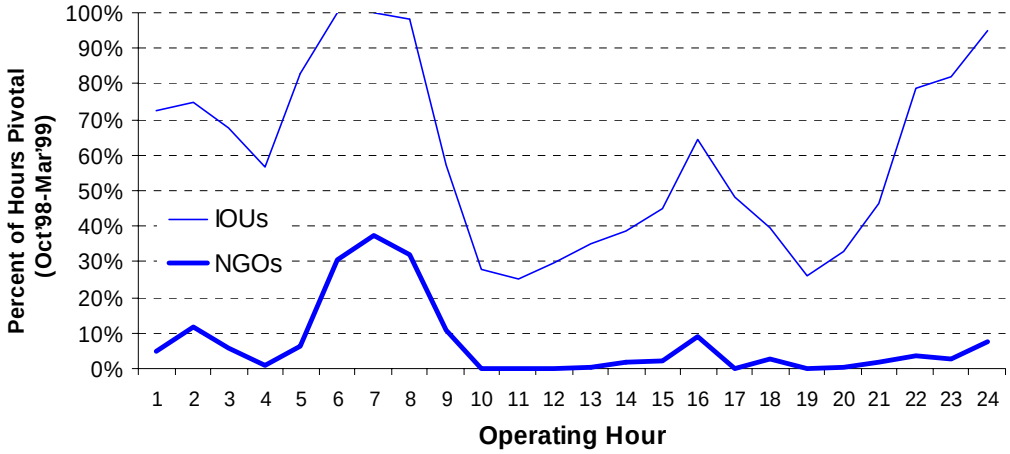
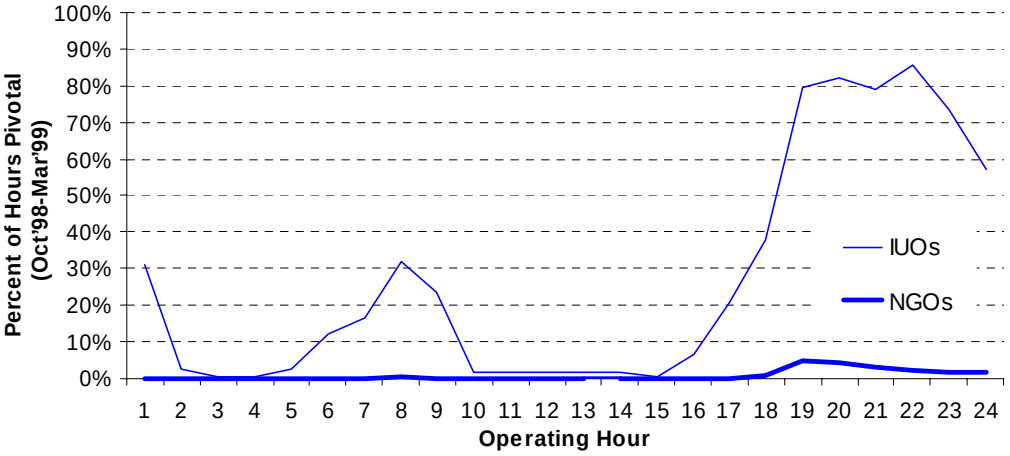


Figure 7-11. Pivotal Hours in Upward Regulation Market, by Operating Hour



7.3.3 Market Power in the Spin, Non-spin and Replacement Reserve Markets

Figure 7-12 presents summary statistics by month for the Residual Supply Index (RSI) applied to the other A/S markets: Spinning, Non-spinning and Replacement Reserves. Figures 7-13 through 7-18 show how the hourly RSIs for the most pivotal IOUs and NGOs in these markets correlates with the level of total ISO system load.

While bid sufficiency and market power in Regulation varies primarily by operating hour, bid sufficiency and market power in the other A/S markets is most strongly correlated with total system loads. As shown in Figure 7-12, bid sufficiency in these other A/S markets has increased significantly since August 1998, with the result that neither IOUs nor NGOs have had pivotal market power in these markets since that time. It should be noted, however, that the increased bid sufficiency since August 1998 was due in large part to the additional capacity that became available to supply A/S as system loads dropped below peak summer levels.

As loads increase again toward the next peak summer season, tight supply and demand conditions will again create market power. As IOU divestiture continues, overall market concentration may decrease, but the incentives will increase for the NGOs, as net suppliers, to exercise market power to raise prices. Besides being a tool for ongoing market power monitoring in the A/S markets, the RSI provides a way of examining in advance the potential competitive effects due to divestiture.

Figure 7-12. Pivotal Player Analysis for the Spin, Non-spin and Replacement Reserve Markets

Spinning Reserve

	Largest IOU			Largest NGO		
	Pct. of Hours Residual Bid Sufficiency < 100%	Average Minimum Market Share	Average Percent of Total MW Bid	Pct. of Hours Residual Bid Sufficiency < 100%	Average Minimum Market Share	Average Percent of Total MW Bid
July '98	60%	34%	75%	36%	16%	82%
Aug	22%	14%	59%	27%	24%	59%
Sept	16%	10%	39%	12%	21%	52%
Oct	43%	20%	41%	6%	10%	77%
Nov	34%	21%	47%	5%	6%	79%
Dec	26%	17%	35%	2%	12%	68%
Jan'99	2%	8%	15%	0%		
Feb	1%	25%	48%	0%	9%	56%
Mar	3%	21%	39%	0%	7%	55%

Non-Spinning Reserve

	Largest IOU			Largest NGO		
	Pct. of Hours Residual Bid Sufficiency < 100%	Average Minimum Market Share	Average Percent of Total MW Bid	Pct. of Hours Residual Bid Sufficiency < 100%	Average Minimum Market Share	Average Percent of Total MW Bid
July '98	50%	34%	78%	17%	17%	95%
Aug	11%	36%	97%	11%	21%	96%
Sept	3%	33%	99%	5%	19%	99%
Oct	0%			0%		
Nov	0%			0%		
Dec	1%	46%	83%	2%	10%	99%
Jan'99	0%			0%		
Feb	0%			0%		
Mar	0%			0%		

Replacement Reserve

	Largest IOU			Largest NGO		
	Pct. of Hours Residual Bid Sufficiency < 100%	Average Minimum Market Share	Average Percent of Total MW Bid	Pct. of Hours Residual Bid Sufficiency < 100%	Average Minimum Market Share	Average Percent of Total MW Bid
July '98	35%	25%	57%	17%	32%	67%
Aug	21%	21%	79%	13%	28%	73%
Sept	2%	8%	66%	3%	20%	56%
Oct	0%	0%	1%	0%		
Nov	0%			0%		
Dec	1%	46%	83%	1%	14%	100%
Jan'99	0%			0%		
Feb	0%			0%		
Mar	0%			0%	5%	11%

Figure 7-13. RSI for Pivotal IOU in Spinning Reserves v. Total ISO Load

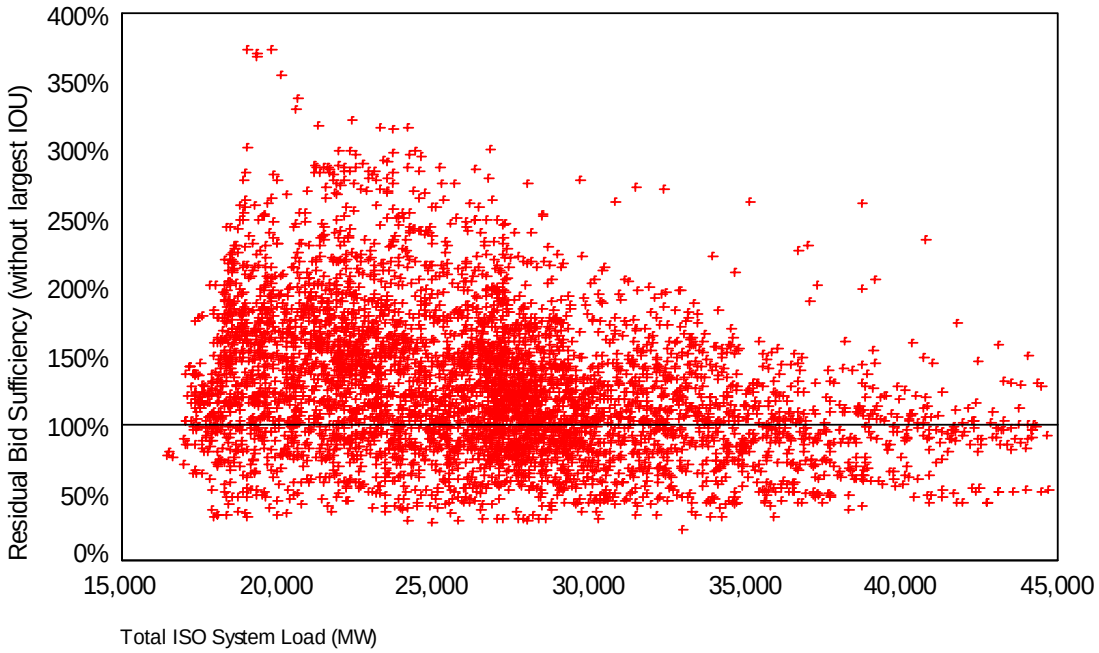


Figure 7-14. RSI for Pivotal NGO in Spinning Reserves v. Total ISO Load

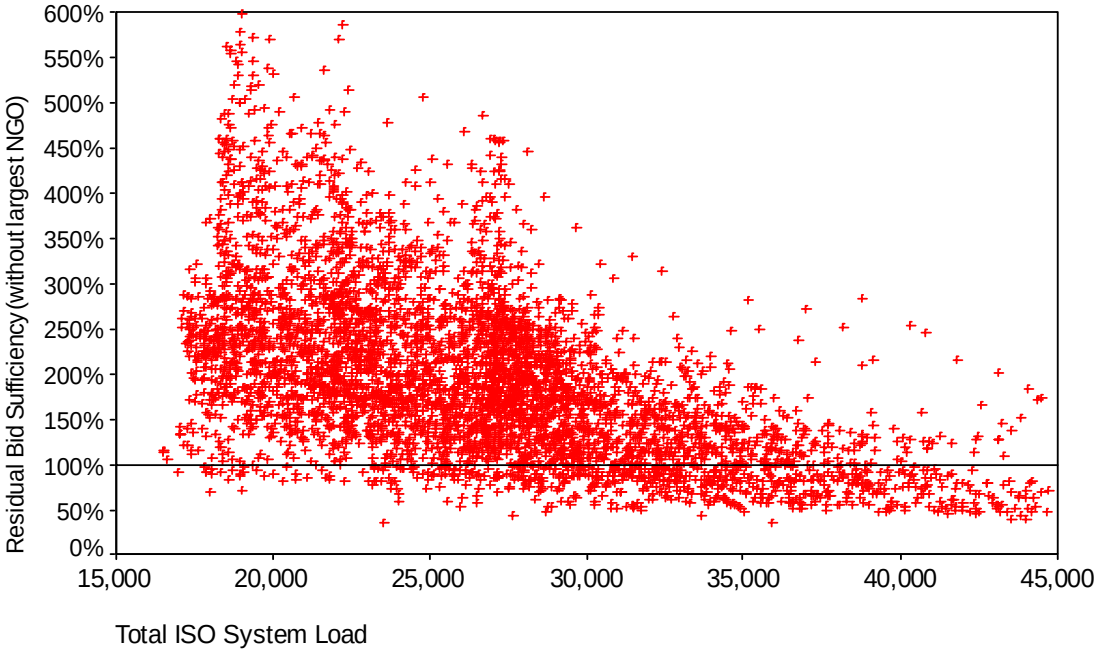


Figure 7-15. RSI for Pivotal IOU in Non-Spinning Reserves v. Total ISO Load

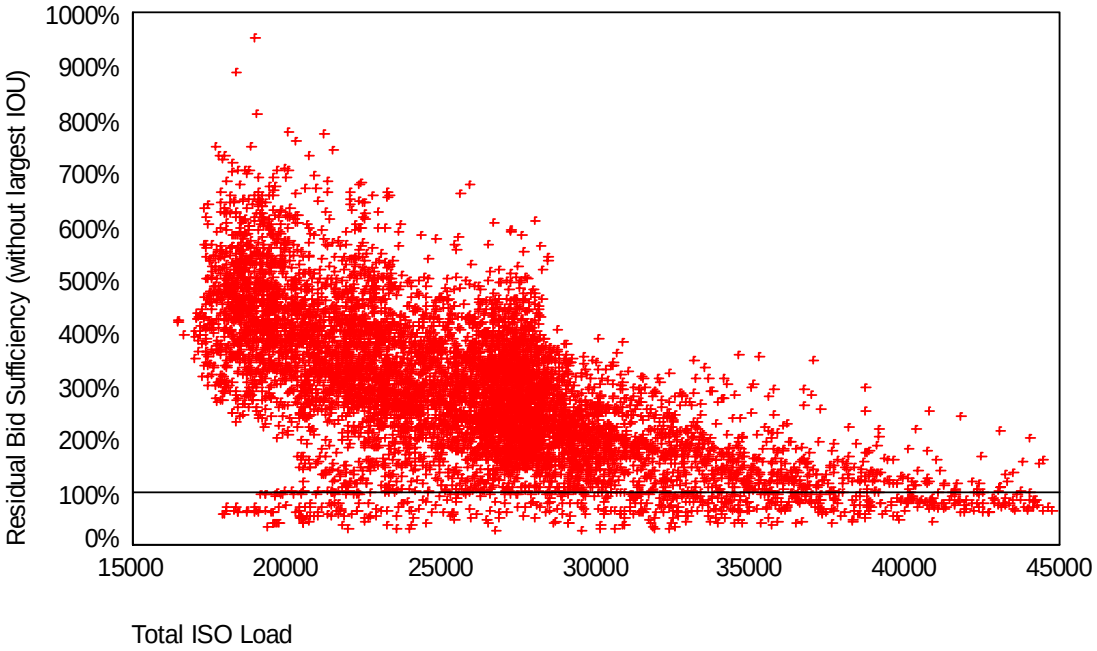


Figure 7-16. RSI for Pivotal NGO in Non-Spinning Reserves v. Total ISO Load

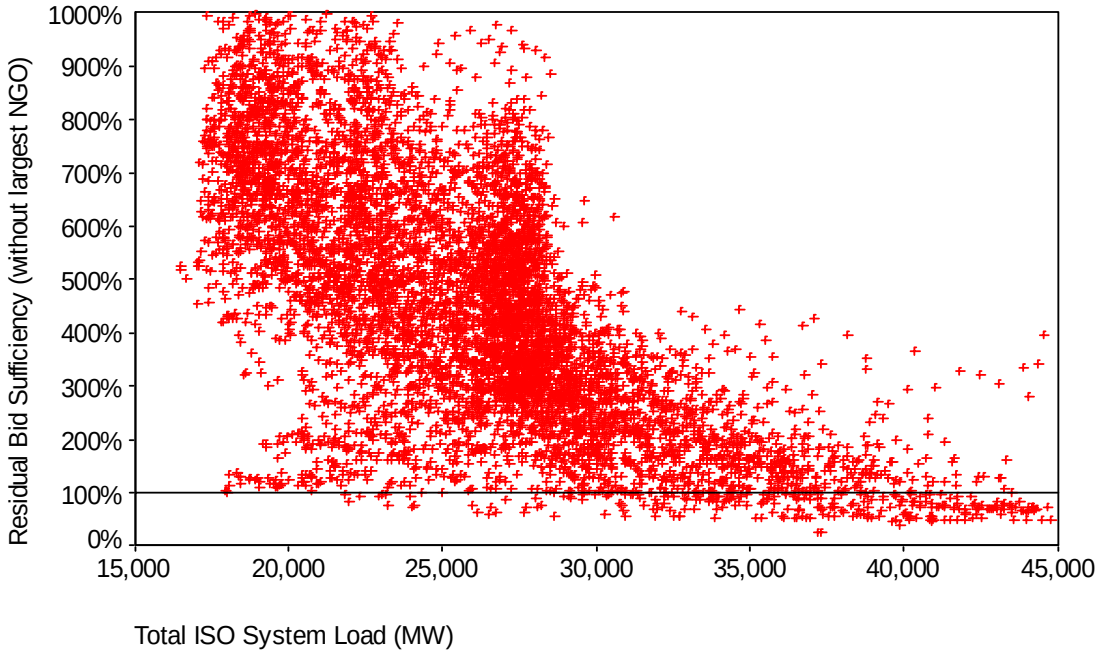


Figure 7-17. RSI for Pivotal IOU in Replacement Reserves v. Total ISO Load

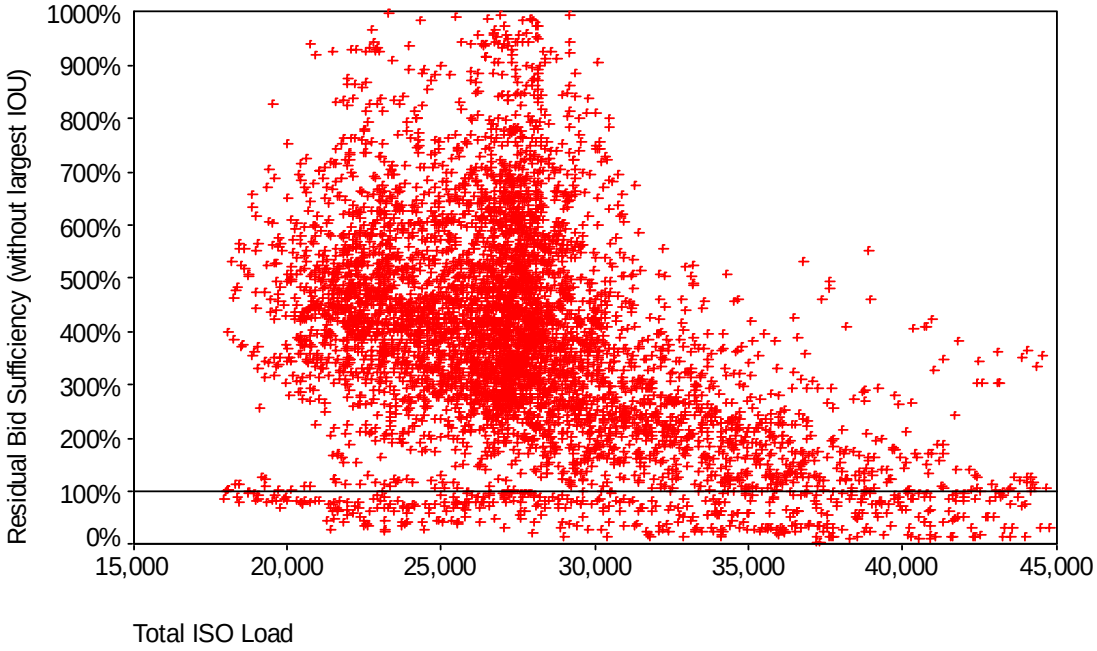
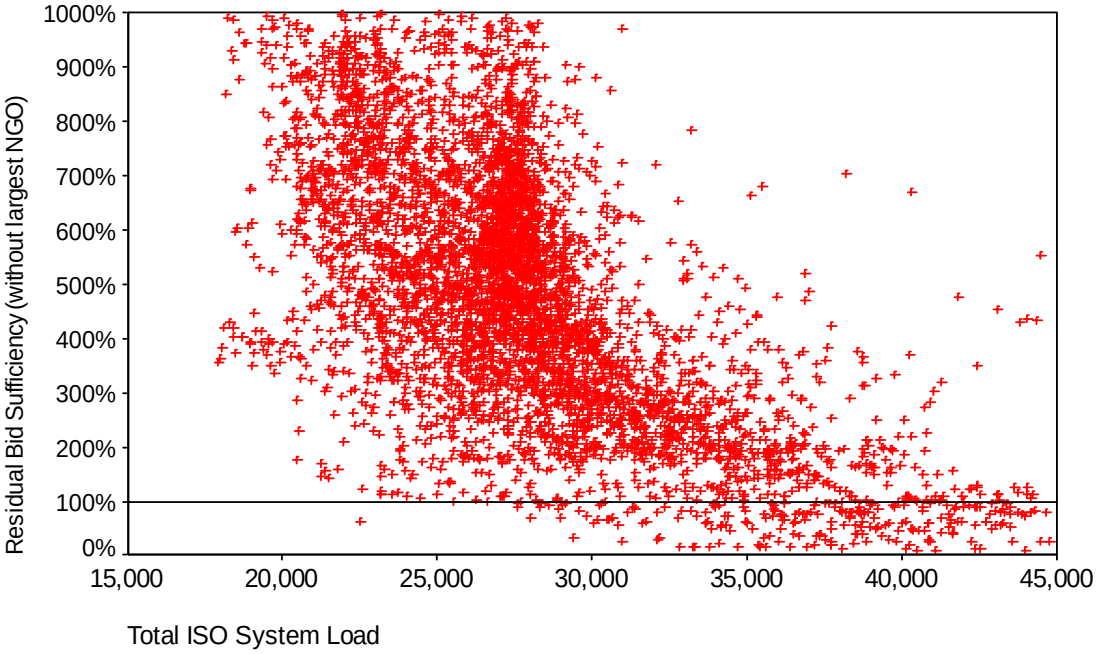


Figure 7-18. RSI for Pivotal NGO in Replacement Reserves v. Total ISO Load



7.4 Monitoring of Bilateral Contracts

In its October 30, 1997 Order, FERC directed the ISO to "include in its annual report a proposal regarding the extent to which bilateral contracts should be monitored. This proposal should specify which information should be collected by the ISO and which information must be kept confidential in order to prevent competitive disadvantage to any party." [81 FERC @ 61,552-53].

The remainder of this section outlines key issues involved in the monitoring of bilateral contracts, and outlines a general framework for developing a more detailed approach for this monitoring.

The issue of whether the ISO should monitor bilateral contracts has been raised in response to concerns that when the requirement that IOUs sell into the PX expires, a company with market power may prefer to sell into the bilateral market if by doing so it can avoid surveillance. This concern pertains primarily to the forward energy markets, but could apply as well to the ISO's ancillary services, congestion, and real-time imbalance energy markets. Because of the high degree of interaction among these markets, monitoring and data confidentiality requirements for them must be coordinated. Market power in any one of these markets resulting from a lack of adequate surveillance can impact the other markets.

Ideally, monitoring requirements on bilateral contracts for ancillary services and transmission should provide the ISO the same level of detailed information that the entities bidding into the ISO markets must provide in order to participate in these markets. This would include unit ownership, quantities, prices, and dates. Similarly, the bilateral forward energy market data requirements should provide the ISO the same level of detail as it can receive from the PX under the terms of its confidentiality agreement with the PX. Moreover, the designation and treatment of confidential and public data should be similar in the centralized and the bilateral markets.

In practice, however, participants might not provide correct or unambiguous data concerning bilateral contracts to the ISO voluntarily, unless they have specific incentives to do so. For example, with respect to the bilateral congestion market (the FTR market), participants would have to reveal their levels of ownership to get paid congestion rents for their financial rights and to enjoy scheduling priority. They would have no motivation, however, to report correct bilateral market transaction prices. Additionally, bilateral market prices may be hard to determine since they could be set in contracts involving multiple markets and products, including even non-energy products.

Ownership and control concentrations are essential to monitor in all bilateral markets. In most cases disclosure of these must be mandated, as the market participants would have little or no incentive to disclose them voluntarily. In fact, parties may consider such disclosure contrary to their profit-maximizing business practices. For example, a generator and FTR owner can use its scheduling ability to create "paper congestion" and protect its own generation from competition or increase its congestion revenues. The intra-zonal congestion market is particularly prone to the exercise of market power by those having scheduling ability regardless of any FTR ownership. This could be particularly important in the future when the ISO starts its forward intra-zonal congestion markets.

To allow effective monitoring of market power, bilateral contracts will need additional information beyond that pertaining to scheduling in the day-ahead, hour-ahead and real-time markets. Bilateral contracts that extend several months into the future can influence the bidding behavior in the current markets. By strategic bidding, a dominant party can influence current market prices and create expectations for advantageous longer-term sales or purchases.

At the same time, bilateral contracts in the forward markets, including Contracts for Differences, can effectively mitigate suppliers' market power, since consumers may have greater demand elasticity and ability to negotiate with suppliers in longer-term forward markets. The MSU is currently evaluating the impact that bilateral transactions may have on the ISO markets.