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The New York Transmission Congestion Contract Market: Is It Truly Working Efficiently?

An analysis indicates that the financial point-to-point transmission rights auction implemented by the New York Independent System Operator may not work efficiently, and that rights sold in auctions may sometimes be greatly over- or under-priced.

Emily S. Bartholomew, Afzal S. Siddiqui, Chris Marnay, and Shmuel S. Oren

I. Introduction

Congestion management is an important component of electricity supply that is, in the U.S., typically achieved by operation of a transmission rights market, often purely financial. In principle, financial transmission rights serve market participants attempting to hedge against uncertain, and often sizable, congestion charges. In addition, effective congestion management can make primary energy markets more efficient and can identify areas where transmission investment is needed (Barmack et al., 2003). The *Wholesale Power Market Platform* white paper circulated by the Federal Energy Regulatory Commission (FERC) in April 2003 proposes the establishment of receipt-point-to-delivery-point (PTP) obligations called firm transmission rights (FTRs), if locational pricing is employed in the energy markets. These rights would allow the holder either to collect or pay the congestion rent between the specified point of injection (POI) and point of withdrawal (POW) for each right. This proposed system is similar to the transmission congestion contract system in operation since the

 doi:/10.1016/j.tej.2003.09.006

spring of 2000 in the New York Independent System Operator (NYISO) area.[1] NYISO TCCs are financial derivatives that can be freely traded both by market participants and by speculators.

There has been a vibrant, ongoing, but primarily abstract, debate between proponents of a more centralized electricity market design and those who favor a more decentralized approach (Joskow, 1997; Wilson, 2002). The former envision a central scheduling entity (typically an ISO) that usually operates multiple energy markets. By contrast, the latter group's paradigm relies more heavily on bilateral transactions between market participants or on independent markets to ensure efficient operation. Included in the visions are various strategies for collecting and hedging congestion rents, based on tradable transmission rights, which could be rooted in the nodal pricing schema of a centralized market, as with PTP rights, or could be independently based on transmission flows across key bottlenecks, as with flowgate rights (Hogan, 1992; Chao and Peck, 1998; Oren, 1997(a),(b); Bushnell, 1997).

Both sides in the debate agree that PTP financial rights offer market participants the promise of a perfect hedge between the point of receipt and point of delivery of a specific contract. TCCs offer a classic hedge by allowing risk exposure to precisely balance over both sides of the market, i.e., revenues received by market participants from their transmission rights exactly offset their congestion rent obligations on transactions. These PTP rights also provide a convenient transition from incumbent firm transmission rights to the new paradigm of tradable rights. The benefits of financial transmission rights are concisely discussed by Lyons, *et al.*, who indicate that in order to capture the benefits of FTRs, the re-sale price of each right ''would reflect the expected net present value of congestion costs for the contract duration'' (Lyons et al., 2000). However, it is not clear whether in practice these rights are efficiently priced by the market, as some theoretical studies assume and/or predict. In other words, are customers paying a reasonable price for the opportunity to hedge against congestion rent and are owners of historic transmission rights being fairly compensated? Many aspects of the market design, including the initial allocation of these rights, rely on the assumption that these rights will be traded efficiently and priced correctly. If market efficiency for financial transmission rights cannot be demonstrated, then their claimed benefits cannot be captured.

There has been a vibrant, ongoing, but primarily abstract, debate between proponents of more centralized and decentralized approaches.

Most functioning electricity markets in the U.S. include auctions in which the holder can sell transmission rights. Nascent electricity markets may choose an auction format for conducting their transmission rights market because this structure appears to be functioning well in other areas of the country. Examination of existing auctions, in particular, the NYISO TCC market, can suggest how efficiently auctions are currently pricing transmission rights, and whether point-to-point transmission rights are appropriate for hedging congestion rent risk and compensating holders of historic rights.

This article summarizes Siddiqui et al. (2003) which reports on the first significant empirical analysis to determine whether the three-year-old NYISO TCC market has been functioning efficiently by analyzing publicly available market price and congestion rent data from the first two years of the market's operation. This research indicates that the financial PTP transmission rights auction implemented by the NYISO may not work efficiently, and that rights sold in auctions may sometimes be greatly over- or under-priced.

II. Comparison of NYISO TCCs and FERC FTRs

The transmission rights offered by transmission owners through

  doi:/10.1016/j.tej.2003.09.006

Table 1: Summary of Similarities and Differences Between TCCs and FTRs

Similarities	Differences
• Tradable point-to-point financial rights meant as hedges against congestion rents	• Auctions not required
• Rights entitle (or obligate) holder to collect (or pay) day-ahead congestion rent	• Rights sales by holders not required
• Existing transmission contracts converted to these rights	
• Effective for every hour of a fixed time period of one month or longer	

the NYISO and those proposed by FERC have some similar characteristics, but the two are not identical. The similarities and differences are outlined in Table 1. Both are tradable PTP financial rights, rather than firm or physical rights, intended as hedges against congestion rents. Holders of both TCCs and the proposed FTRs are entitled to receive, or required to pay, the congestion rent between the POI and POW as determined in the day-ahead market.

As with TCCs in New York, FERC recommends that FTRs be allocated to holders of existing contracts in the amount of their current contract. However, FERC is not requiring ISOs to conduct auctions in which new or existing rights are sold, which is current practice in New York. All new transmission capacity will have associated FTRs, but these will be allocated to customers who paid for the transmission expansion, either directly or indirectly through access charges. Also, whereas in New York TCCs are held only for a specific and limited time, holders of FTRs will not be required to sell their rights. FERC requires ISOs to operate a secondary market for rights, but is not recommending a structure for this market. As mentioned above, it is likely this structure will be an auction similar to that run by the NYISO.

NYISO TCCs are priced through an auction, clearing at a uniform price for each POI/POW pair where the bids maximize returns to the sellers. In other words, the buyers are required to place value on the rights. Rights can be valued positively or negatively in the auction, i.e., if the price is positive the buyer pays the clearing price, and if the price is negative the buyer receives the clearing price. A set percentage of available rights, determined by the NYISO, are auctioned in each of several rounds. The TCC remains valid for every hour over a fixed time period of six months or more. TCCs can be disaggregated into monthly blocks in a reconfiguration auction. In the NYISO market, revenues from the auctions go to transmission owners, who are required to use them to offset the transmission access charge paid by the load.

In a recent development, FERC has decided that FTRs will be directly allocated to market participants instead of auctioned. The effectiveness of either of these methods presupposes that ensuing markets will value the rights efficiently. If participants in secondary markets (auction style or other) are not able to price the rights efficiently neither strategy will result in fair compensation or efficient distribution of rights. In the case of auctions, the holders of historic rights will not be accurately compensated for private property, i.e., historic transmission rights. With direct allocation, holders of historic rights may retain their allotted rights if they are inefficiently priced even if that results in inefficient transmission patterns. This could limit entry into the supplier market by limiting the ability of loads, with FTRs representing historic usage patterns, to change suppliers if they are unwilling or unable to obtain new rights with a different receipt point.

III. Results and Analysis

In this section, 2000 and 2001 data from the NYISO TCC market are analyzed to determine if the prices paid were statistically significantly different from the rents received, based on ordinary least-squares (OLS) regression estimators. Publicly available data from the NYISO Web site are used to calculate summary statistics, a basic measure of market efficiency, the degree to which

  doi:/10.1016/j.tej.2003.09.006

market participants predicted congestion patterns correctly, and the overall efficiency of the market. This initial analysis covers only six-month TCCs that were purchased in the four initial auctions in 2000 and 2001. Approximately 70 percent of all TCC capacity is initially purchased in the six-month auctions. This analysis does not take into account Stage 2 of the initial auctions or the monthly reconfiguration auctions, in which these six-month TCCs could have been resold or disaggregated. Moreover, the analysis does not consider trading in the so-called secondary market, where the holder of a TCC could sell part or all of a TCC without notifying the NYISO. Data on Stage 2 and the monthly reconfiguration auction are released by the NYISO, but is difficult to analyze for fear of double counting contracts. No information is readily available on the unofficial secondary market.

Each of the four auctions analyzed had four rounds, except for the autumn 2000 auction which consisted of two rounds. A summary of these four auctions is shown in **Table 2**. These summary data seem to indicate that on the surface this market is functioning well. The total number of MWs traded is trending upwards, and the average clearing price per MW is decreasing. It is interesting to note that while there are thousands of potential POI/POW pairs, and although the number of traded pairs is increasing, the highest number of distinct pair combinations traded in any auction is 264, suggesting an illiquid market.

A. Empirical methodology

In order to determine the efficiency of TCCs for hedging transmission congestion risk, the price of each contract is compared to the resulting congestion rent that accrued between its POI and POW during its effective period. The total amount paid or received is divided by the total number of MW transacted so that each contract's value is normalized to \$/MW. The hypothesis that the price paid for the TCC effective between POI I and POW W during time interval T, ${}^{T-1}c^{T}_{I,W}$, should not be systematically different from the corresponding congestion rent, $R^{T}_{I,W}$, is tested via the following regression specification:

$$R^{T}_{I,W} = \beta_0 + \beta_1 \cdot {}^{T-1}c^{T}_{I,W} + \varepsilon^{T} \qquad (1)$$

In an efficient market, β_0 and β_1 would not be statistically significantly different from 0 and 1, respectively. The ε^{T} term is a zero-mean disturbance that is independent of all other variables in the model. We use a scatterplot and an OLS regression line to relate the price and the rent. In addition, by inserting a 45° line[2] we determine whether market participants pay a positive or negative risk deviation on their transactions, which is calculated to be:

$$\frac{R^{t,j}_{I,W} - c^{t,j}_{I,W}}{|c^{t,j}_{I,W}|} \qquad (2)$$

Here, $R^{t,j}_{I,W}$ is the rent received per MW for hour t by market participant j from a TCC between POI I and POW W, and $c^{t,j}_{I,W}$ is the corresponding price paid for the TCC.

B. Price-rent comparison

Examination of data for the two-year period reveals that there is positive correlation between the prices and rents.[3] Moreover, the direction of congestion is predicted correctly by the TCCs. As an illustration, note that in **Table 3**, the price paid is positively correlated with the rent

Table 2: Summary of Initial Auctions for Six-Month TCCs (Spring 2000 to Autumn 2001)

	Auction Dates	Total # MWs	Distinct POI/POW Pairs	Average Clearing Price	Total Revenue Generated by Auction
Spring 2000	3/20–4/20, 2000	4903	74	\$10663/MW (\$2.43/MWh)	\$52 million
Autumn 2000	9/7–10/30, 2000	5650	141	\$5550/MW (\$1.27/MWh)	\$31 million
Spring 2001	3/8–4/20, 2000	13537	264	\$3735/MW (\$0.85/MWh)	\$51 million
Autumn 2001	8/24–10/19, 2001	8792	226	\$991/MW (\$0.23/MWh)	\$8 million

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Table 3: NYISO TCC Unique Award Auction (Spring 2000 to Autumn 2001)

	Spring 2000	Autumn 2000	Spring 2001	Autumn 2001	All Auctions
Average cost	6586.69	2980.84	1077.35	−190.18	1707.18
Average rent	4559.69	3307.38	625.86	555.45	1547.26
Correlation	0.63	0.82	0.71	0.48	0.60
STDEV of cost	13474.37	9433.94	9280.25	5752.73	9324.63
STDEV of rent	18556.00	6492.03	4083.03	2546.99	8062.91
Ratio of STDEV (rent/cost)	1.38	0.69	0.44	0.44	0.86
Total number of awards	167	174	453	396	1185
Correct predictions	114	94	315	254	895
Percent correct predictions	68	54	70	64	76
Winners	74	141	245	302	762
Percent winners	44	81	54	76	64

received and about two-thirds of the congestion transactions are being predicted correctly using TCCs, i.e., when the price paid is positive, the rent received is also positive, and vice versa. Finally, more than half of the transactions are considered ''winners'' because the rent received by participants is greater than the price paid. This is confirmed via a scatterplot of the data (see **Figure 1**) in which most of the points lie in the first and third quadrants as well as above the 45° line, thereby indicating a high percentage of correct predictions and winners, respectively.

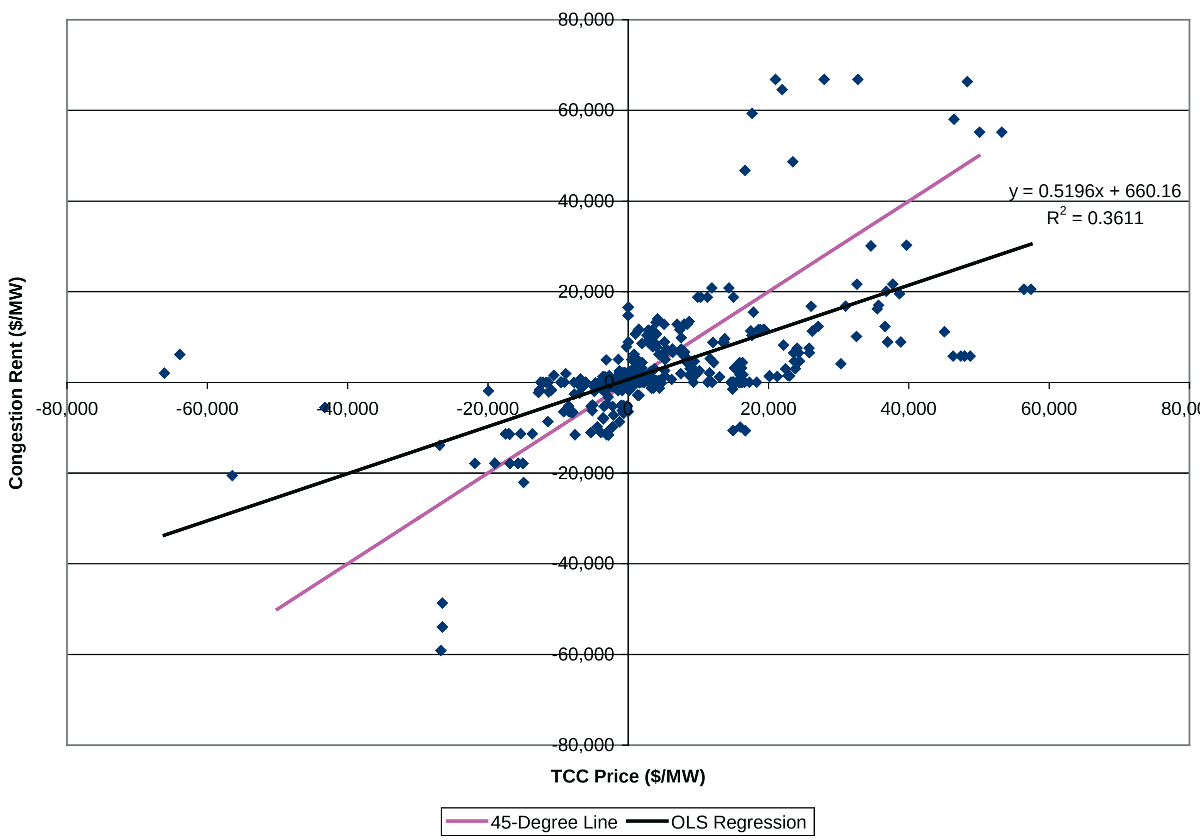

Figure 1: TCC Price Paid and Congestion Rent Collected (All Data for All Rounds of All Auctions)

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If the TCC market were functioning efficiently, then data points should be centered around the 45° line in Figure 1 but with a wide scatter. This would imply that the TCC price is accurately predicting the congestion rents except for the risk premium (the ε^T term in Equation (1)).[4] The broad scatter of points around the 45° line would be expected because any individual TCC will have a large discrepancy between its price and rent, as befits its role as a hedge in a highly uncertain market. The data, however, imply a systematic bias in the scatterplot below the 45° line for positive TCC prices and above it for negative ones. This is illustrated by the fitted OLS regression line, which is systematically different from the 45° line. In particular, the hypothesis that the regression slope coefficient is different from 1 (the slope of the 45° line) is statistically significant at the 99 percent level for all individual auctions and the aggregated data (except in Round 3 of autumn 2001 when there is no clear relationship). While this bias is found across the range of prices, it is more prevalent for extreme prices. This implies that while the market for TCCs functions relatively well for small hedges, it is less efficient for larger ones. In terms of Equation (1), these results imply that $\beta_0 > 0$ and $\beta_1 < 1$. Consequently, market participants systematically lose money when they try to hedge large congestion risk exposures. This can also be gauged intuitively from the summary statistics: Even though almost two-thirds of the transactions are ''winners,'' the average transaction is a ''loser,'' i.e., results in a TCC price paid that is greater than the congestion rent received.[5]

By partitioning the data into ''expensive'' and ''cheap'' contracts (a TCC price paid that is greater or less than \$1/MWh, respectively), the finding that customers systematically lose money overall when trying to hedge large congestion risk exposures can be corroborated.[6] In **Figure 2**, the percentage deviation between price and rent is calculated for each hour for each contract awarded using Equation (2). On the x-axis, this implied risk premium is partitioned into categories with the heights of the bars indicating the volumes traded. While, on average, the absolute deviation is not much different from zero (specifically, negative \$0.21[7]), the distribution of the percentage deviations does not cluster around zero as would be expected if the TCCs were efficient hedging instruments. Indeed, most of the contracts yield implied risk premia of over 100 percent, with the most expensively priced ones returning the most negative percentage deviations, while the less expensively priced ones more often return positive percentage deviations. This corresponds to the OLS regression line's being systematically different from the 45° line in Figure 1 as the TCC price increases or decreases significantly from zero. The direction of this deviation can then be determined from **Figure 3**, in which the implied risk premia are partitioned into positive and negative prices. In the figure, it is obvious that negatively priced TCCs are far more prevalent to the right of the origin, and vice versa. Positive deviations imply large negative risk premia, and vice versa, which corresponds to the

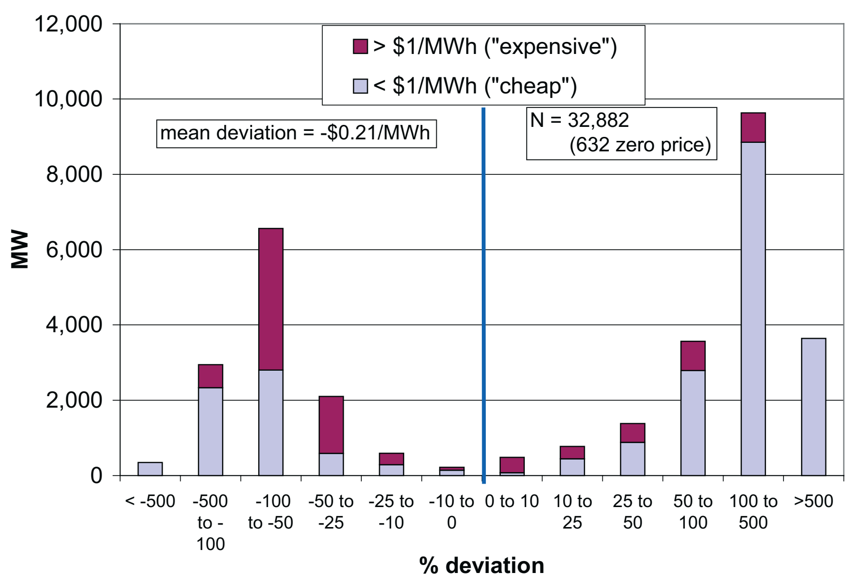

Figure 2: Percent Deviation Between Price and Rent: ''Expensive'' vs. ''Cheap'' TCCs

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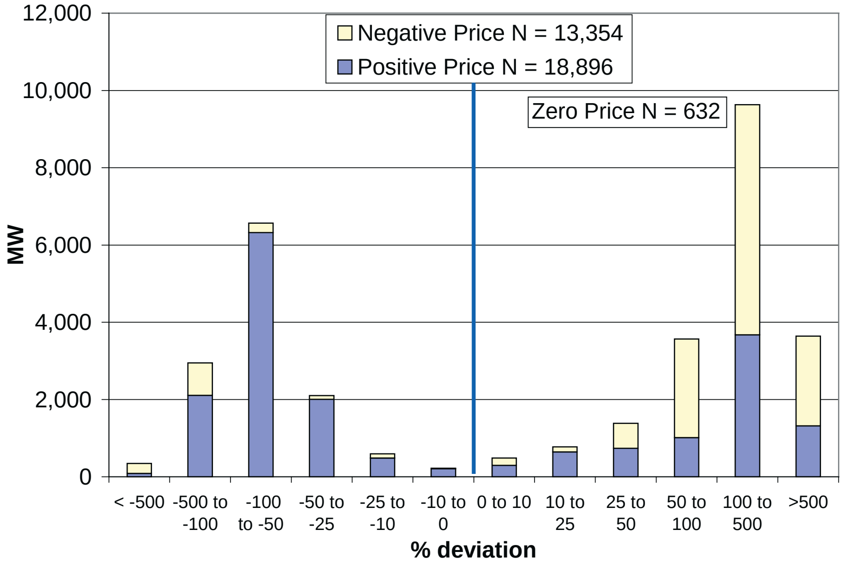

Figure 3: Percent Deviation between Price and Rent: Positive vs. Negative Priced TCCs

OLS regression line's being below the 45° line in Figure 1 for positive prices, and above it for negative prices.[8]

C. Geographical analysis

Since the scatter plot and OLS regression indicate the inefficiency of the TCC market for large congestion risk exposures, TCCs may also be poor hedges for transactions between geographically distant locations. Using the map of NYISO congestion zones, seen in **Figure 4**, a measure of distance between any two POI/POW locations in the control area is constructed. This *geographical indicator* (GI) is obtained by first determining the zones in which the POI and POW are situated and then calculating the number of zonal interfaces between the pair. For example, the GI for the pair of zones ''West,'' zone A, and ''N.Y.C.,'' zone J, is 7. After determining GIs for all pairs of zones (see **Table 4**), they are plotted against the *predictive power index* (PPI), where

$$\mathrm{PPI}_{I,W}^{T} = |R_{I,W}^{T} - c_{I,W}^{T}| \qquad (3)$$

Here, $\mathrm{PPI}_{I,W}^{T}$ is the PPI for a duration of length T between POI I and POW W, in \$/MW. The larger value of $\mathrm{PPI}_{I,W}^{T}$, the less accurate the ability of the buyer of a TCC between POI I and POW W to predict congestion.[9]

With the exception of some rounds in the first and last auctions analyzed, the results of the geographical analysis indicate a noteworthy degree of correlation between the GI and PPI (see **Table 5**). Plotting the two indices against each other shows that the PPI increases, almost superlinearly, with the GI (see **Figure 5**); that is, buyers of TCCs do less well at predicting congestion over longer distances. At the same time the number of MW held in these rights decreases exponentially as the GI increases, which might indicate the difficulty of predicting congestion dissuades market participation. TCC markets seem to function relatively well for hedges of intrazonal or adjacent-zone congestion, providing TCC

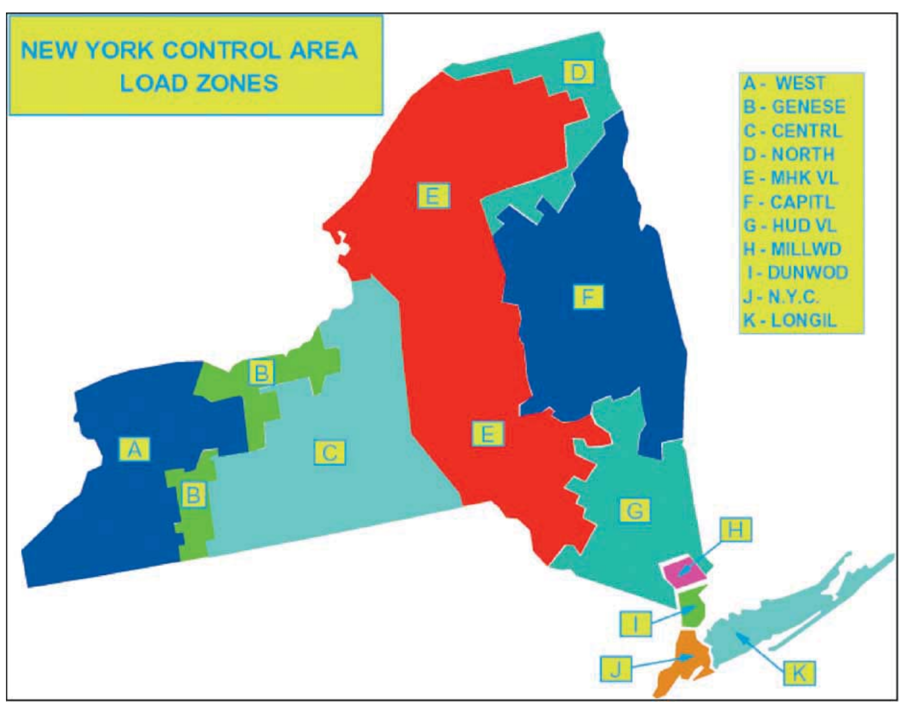

Figure 4: NYISO Congestion Zones

Table 4: NYISO Geographical Indicator

	POW														
POI	West	Genesee	Central	North	Mowhawk Valley	Capital	Hudson Valley	Millwood	Dunwoodie	New York City	Long Island	Hydro-Québec	New England	Ontario	PJM
West	0	1	2	4	3	4	4	5	6	7	8	4	5	1	1
Genesee	1	0	1	3	2	3	3	4	5	6	7	3	4	2	1
Central	2	1	0	2	1	2	2	3	4	5	6	2	3	1	1
North	4	3	2	0	1	1	2	3	4	5	6	2	2	2	3
Mowhawk Valley	3	2	1	1	0	1	1	2	3	4	5	1	2	1	1
Capital	4	3	2	1	1	0	1	2	3	4	5	2	1	2	2
Hudson Valley	4	3	2	2	1	1	0	1	2	3	4	2	1	2	1
Millwood	5	4	3	3	2	2	1	0	1	2	3	3	2	3	2
Dunwoodie	6	5	4	4	3	3	2	1	0	1	2	4	3	4	2
New York City	7	6	5	5	4	4	3	2	1	0	1	5	4	5	1
Long Island	8	7	6	6	5	5	4	3	2	1	0	6	5	6	2
Hydro-Québec	4	3	2	1	1	2	2	3	4	5	6	0	3	2	2
New England	5	4	3	2	2	1	1	2	3	4	5	3	0	3	3
Ontario	1	2	1	2	1	2	2	3	4	5	6	2	3	0	2
PJM	1	1	1	3	1	2	1	2	2	1	2	2	3	2	0

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Table 5: NYISO TCC Geographical Analysis (Spring 2000 through Autumn 2001)

	Spring 2000	Autumn 2000	Spring 2001	Autumn 2001	All Auctions
GI–PPI correlation	0.29	0.42	0.52	0.01	0.28
Average PPI for GI of 0	6721.36	1753.93	1765.27	1410.16	2258.84
Average PPI for GI of 1	14798.33	3351.21	1970.84	800.74	3483.76
Average PPI for GI of 2	16211.82	4862.58	5723.79	780.72	5309.86
Average PPI for GI of 3	13121.64	7083.29	6710.71	1201.17	5724.59
Average PPI for GI of 4+	15607.75	6945.42	25012.55	2043.57	10426.95
Average PPI	11360.69	3337.24	2861.63	1165.93	3558.25

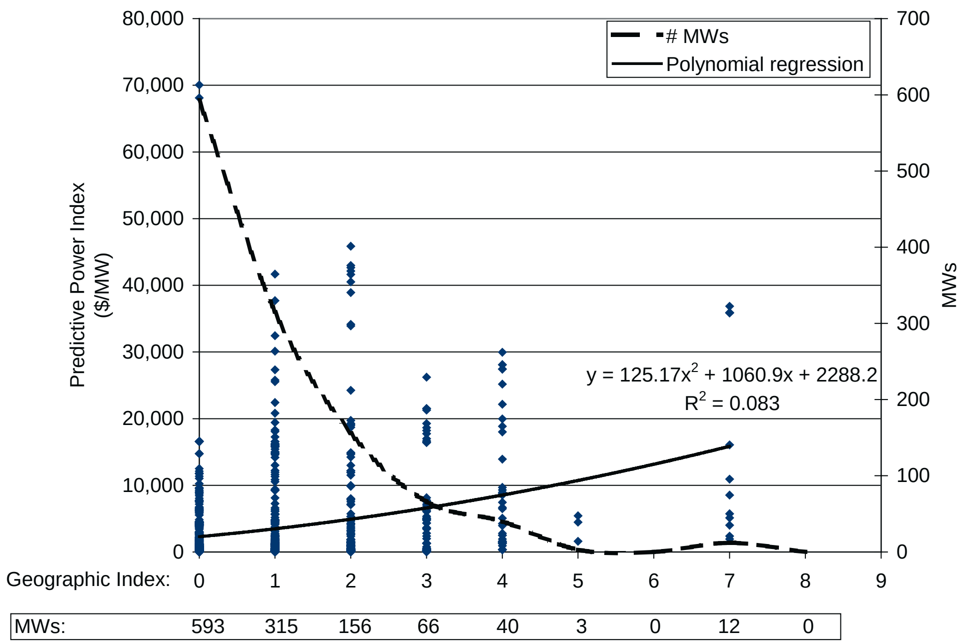

Figure 5: NYISO TCC PPI/GI Comparison (All Data, Unique Awards)

holders with a revenue accurate to within a few thousand dollars per MW (or, less than a dollar per MWh) of the purchase price. It is possible that market participants recognize this and are consciously avoiding long-distance TCCs. As the POI and POW get further apart, however, the discrepancy between the price paid and rent received increases disproportionately to over a few dollars per MWh.[10] This relationship indicates that the market for TCCs is not efficient across multiple congestion interfaces, and this perhaps creates a disadvantage for market participants needing to trade across long distances.

Finally, it should be noted that almost 40 percent of TCCs traded in NYISO six-month primary auctions are intrazonal, that is are defined between nodes within the same zone. Nearly 60 percent of these are within New York City. While some intrazonal transactions are perhaps being hedged with these TCCs, their numbers suggest this trade is largely speculative.

IV. Conclusion

The liberalization of electricity supply requires well-functioning institutions that can efficiently allocate scarce transmission resources among potential transactions. Towards this end,

  doi:/10.1016/j.tej.2003.09.006

markets for transmission congestion rights should ensure that electricity from the cheapest sources is used first and that congestion bottlenecks are identified and ultimately attract the investment needed to alleviate them. Although much faith has been placed in the ability of financial transmission rights auctions to serve this function efficiently, to date little empirical examination of existing U.S. markets has been conducted. With the impending allotment of historical transmission rights according to FERC criteria, such an evaluation of the efficiency of the allocation mechanism is now necessary to ensure the long-term viability of the transmission network.

This article describes an empirical analysis of the NYISO TCC market during the years 2000 and 2001 using publicly available price and rent data for six-month awards in the initial auctions. Specifically, the hypothesis is tested that the price paid for such contracts is not statistically significantly different from the rents received. By fitting an OLS regression line to the data, the hypothesis is shown to be false. Indeed, in most of the auctions (and for the dataset as a whole), market participants systematically lose money when they try to hedge large congestion risks. Furthermore, market participants are also unsuccessful at using TCCs to hedge transmission congestions risks over large distances, e.g., across multiple congestion interfaces, and few such TCCs are traded. Based on the initial six-month auction data from its first two years of operation, it does not appear that the NYISO TCC market permits participants to mitigate transmission congestion risk effectively.

It could be argued that because this study only examines the first four auctions, the disconnect

between TCC prices and congestion rents is merely a symptom of a new market with procedures and rules that are unfamiliar to participants. Given more time, the market participants may figure out how to price the TCCs more efficiently. On the other hand, two years seems like a reasonable time frame for the market participants to equilibrate a market. Perhaps much of the observed overpaying for TCCs could be explained as high risk premiums on large or complex rights. The existence of a risk premium cannot be disputed and should be included in further study in this area, possibly by replacing the 45° line with a concave, non-linear function to represent non-linear risk aversion or perhaps some of the inefficiencies are being corrected in the secondary market. Most interestingly, perhaps the price revenue disconnect is a product of unnecessarily complex or illiquid financial rights. Conducting a study of the flowgate-based approach used by the Electric Reliability Council of Texas (ERCOT) and comparing the results with those from the New York market might reveal whether these problems are a result of the PTP structure.

The subject of hedging against congestion rent is an important, but complex, issue. Without efficient allocation of transmission resources, efficient overall electricity markets are difficult to construct or run. Market participants in deregulated electricity markets need protection from volatile congestion rent, but the question still remains what kind of protection. The observations from this study indicate that the existing NYISO market for financial PTP transmission rights may not be pricing the rights efficiently, thereby rendering them ineffective as hedges for congestion rent. This in turn could lead to an inefficient dispatch of assets. Likewise, incorrect pricing of financial rights will not result in accurate compensation for historic rights.

From a public policy perspective, the current high level of confidence that a highly speculative derivatives market can provide for the efficient delivery of a vital public service

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appears unusual, and performance of these markets merits close scrutiny. Empirical study of existing congestion cost hedging mechanisms should be a critical part of the continuing evolution of deregulated electricity markets.■

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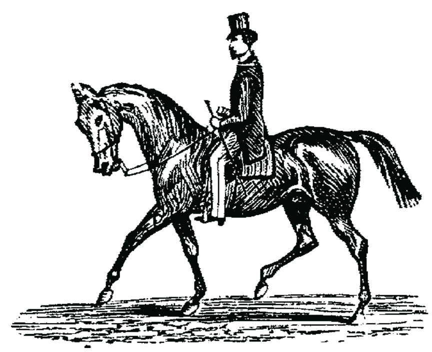
Endnotes:

1. The NYISO market has been operating since Nov. 1999. The first TCC auction was held in spring of 2000, the effective period of the rights bought at that auction beginning April 2000.



2. This is the locus of all zero-profit points, i.e., those for which the TCC price paid is exactly equal to the congestion rent collected.

3. In order to weight each *distinct* TCC equally rather than by the number of awards, here we discard multiple instances of each TCC/congestion rent pair. Our concern is that by counting n instances of a given TCC award as n separate data points, we weight the summary statistics by the more heavily traded transmission paths.

4. If market participants are risk-averse, however, then the efficient relationship between TCC prices and the congestion rents would not be a 45° line but a concave, non-linear function.

5. Note that interpretation of comparisons between prices and revenues on TCCs must be made cautiously. A TCC that generated revenues short of its price can still have benefited its owner substantially if it aided in risk hedging.

6. Note that a TCC price of $1/MWh is equivalent to a net TCC price of $4,380 because it is effective for six months (4,380 hours) at a constant 1 MW.

7. Overall, this suggest players in this market are equilibrating a certain 79 cents collected over the six months the TCC is effective to a highly uncertain $1. While on its face this seems a reasonable tradeoff, given the other apparent limitations of the market, this result should be viewed skeptically. The mean deviation in Figure 2 is negative even though its ''center of gravity'' is positive because the TCCs to the left of the origin tend to be more expensive.

8. Note that the risk premium is always an expense to the market player hedging risk. Implicitly, market participants directly benefiting from holding a hedging instrument paid a negative risk premium.

9. Since we use an absolute measure, it may be that it picks up on the correlation between the quantity of transmission capability and the POI/POW distance. The use of a relative measure, e.g., employing a percentage difference, is precluded, however, because it under- or overstates the severity of large or small deviations, respectively. It is, therefore, not effective at measuring differences between the two quantities.

10. This relationship is not as convincing for the first and last auctions we studied. We conjecture that trading in the first auction (spring 2000) was subject to the usual warm-up period in which market participants learned market rules and procedures. Therefore, the prices offered were not indicative of the market participants' true valuations of congestion rents. In autumn 2001, on the other hand, the NYISO region experienced a drop in electricity consumption as a result of the Sept. 11 terrorist attacks on New York City, thereby disrupting the relationship between prices paid and rents received. The autumn 2001 auctions were actually under way on Sept. 11.

  doi:/10.1016/j.tej.2003.09.006