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Allowance Trading Activity and State Regulatory Rulings: Evidence from the U.S. Acid Rain Program

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ALLOWANCE TRADING ACTIVITY AND STATE REGULATORY RULINGS: EVIDENCE FROM THE U.S. ACID RAIN PROGRAM

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ABSTRACT

The U.S. Acid Rain Program is one of the first, and by far the most extensive, applications of a market based approach to pollution control. From the beginning, there has been concern whether utilities would participate in allowance trading, and whether regulatory activity at the state level would further complicate utilities' decision to trade allowances. This paper finds that public utility commission regulation has encouraged allowance trading activity in states with regulatory rulings, but that allowance trading activity has not been limited to states issuing regulations. Until there is evidence suggesting that significant additional cost savings could have been obtained if additional allowance trading activity had occurred in states without regulations or that utilities in states with regulations are still not taking advantage of all cost saving trading opportunities, this analysis suggests that there is little reason to believe that allowance trading activity is impeded by public utility commission regulations.

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1. Introduction

The U.S. Acid Rain Program was created by Title IV of the 1990 Clean Air Act Amendments (1990 CAAA). It is one of the first, and by far the most extensive, applications of a market based approach to pollution control. The Acid Rain Program applies to fossil fuel fired electric utilities in the 48 contiguous United States requiring the affected generating units to achieve, in sum, a reduction of 10 million tons of sulfur dioxide (SO_2) per year from 1980 emissions levels and a 2 million ton reduction of nitrogen oxide (NO_x) emissions annually by the year 2000. Sulfur dioxide and nitrogen oxide are thought to be the two primary precursors of acid rain. The Acid Rain Program was implemented in two Phases, with the first round of emission limitations taking effect in 1995, and a stricter round of emissions limitations taking effect in the year 2000.

Compared to the historical "command and control" approach to pollution abatement, the market based approach to acid rain control instituted by the 1990 CAAA recognizes that the cost of pollution abatement is not identical across all generating units. Tradable permits, called allowances, are allocated to affected electric utility generating units. Each allowance represents one ton of SO_2. The firms are free to buy and sell the allowances with few restrictions in order to reduce aggregate SO_2 emissions at the least cost. In theory, the higher marginal cost of abatement units reduce emissions by less, purchasing allowances to cover their higher SO_2 emissions, while the lesser cost of abatement units reduce SO_2 emissions by more, selling allowances generated from over-compliance to those units with higher abatement costs. Under Title IV, the only obligation on the part of the generating units is that at the end of every "true-up

period"[1] each affected generating unit must hold an allowance with a vintage year of that year or earlier for each ton of SO_2 emitted in that year.

Earlier tradable permits programs, such as the Environmental Protection Agency's (EPA) emission trading program, which was initiated in 1974 to curb smog in the Los Angeles basin, have tended to have more restrictive trading guidelines than the EPA's Acid Rain Program. While the smog control program restricts the ability to bank permits, devalues banked permits, restricts trading between geographic regions, and requires regulatory approval for permit trades,[2] the Acid Rain Program allows for inter-temporal trading ("banking"), unrestricted geographic trading, and does not require the EPA's approval of allowance trades.[3] The only federal restriction on trading is that allowances may not be borrowed from future vintages for use in the current compliance year.

From the beginning, there has been concern whether utilities would choose to participate in allowance trading, and whether regulatory activity at the state level would further complicate utilities' decision to trade allowances. Several sources suggested early on that electric utilities would be reluctant to engage in inter-utility allowance trading activity for a variety of reasons

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[1]The "true-up" period is the thirty days (1 January to 30 January) following the compliance year during which affected units may do last minute buying or transferring of allowances into their unit accounts in order to match allowance holdings with their emissions tonnage for the year for which compliance is being established without incurring penalties. After these 30 days the affected units must surrender the appropriate number of allowances from their unit accounts to the EPA, on a first in first out basis unless otherwise requested, or be subject to a fine of $2,000 per ton. Gross non-compliance may result in criminal proceedings.

[2]See Foster and Hahn 1995.

[3]The differences in the freedom to trade permits in the two programs are due, in part, to differences in the nature of the pollutants, volatile organic chemicals, which cause smog, and the nature of the pollutant, sulfur dioxide, which causes acid rain.

including regulatory, industry, and market factors.[4] This concern was magnified by a second, and inter-related concern, that misrepresentations by the popular press of the tradable permits program[5] would cause state public utility commissions (PUC) to bow to pressure from local environmentalists and constituents, and balk at allowing utilities to trade allowances.[6] Fullerton, McDermott, and Caulkins (1996) argue that the potential cost-increasing impact of state regulatory behavior could be substantial.

The ease with which utilities can engage in both internal and arms lengths exchanges will be an important determinant of the performance of the market, in particular, it may suggest reasons why the allowance trading program may (or may not) achieve all potential cost savings available in a market based approach as compared to a command and control approach to pollution control. In addition, it is important, as well as interesting, to understand which states have been trading allowances because it provides important evidence on the trading process itself. Finally, it is important to understand trading behavior in a tradable permits market in order to improve future market based approaches to pollution control.

The purpose, then, of this paper is to determine whether, and the extent to which, PUC rulings on allowance trading activity explain observed allowance trading. Because regulatory rulings may be endogenous, a simultaneous equations model is used to analyze the effect of state regulatory rulings on allowance trading activity. A reduced form model is used to assess the direct and indirect effects of regulatory and non-regulatory activity on allowance trading behavior. The

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[4]See Bohi 1994; Bohi and Burtraw 1992; Burtraw 1996; Cason 1993; Cason 1995 Cason and Plott 1996**;** GAO 1994; Solomon 1994.

[5]See, for example, Wald 1995, a *New York Times* article which describes the Acid Rain Program as a Federal law which creates a national market to pollute.

results indicate that regulation has been conducive to allowance trading activity in the early years of the Acid Rain Program. The final Section adds several caveats to drawing hasty policy implications from this conclusion.

The organization of this paper is as follows. Section 2 sets the stage by providing a brief overview of allowance trading activity observed to date, discusses PUC regulations of emission allowances, and considers the endogeneity of regulations and the regulated activity. Section 3 describes the empirical framework and the source and scope of the data used, as well as its limitations. Section 4 presents empirical results. Section 5 assesses whether PUC regulations affect the extent to which allowance trading activity is undertaken. Section 6 offers concluding remarks.

2. Allowance Trading Activity and PUC Regulations

A. Allowance Trading Activity

According to the EPA's Allowance Transaction System (ATS), the official record of allowance holdings for compliance purposes and the primary source for allowance trading data, it appears that over 32 million allowances have been traded since the program's inception, since that is the total number of allowances that have been recorded changing accounts.[7] There are several reasons why this may be an inaccurate way of examining allowance trading activity. First, trades for allowances to be used for compliance in the current compliance year must be recorded in the ATS files, but it need not be earlier than the "true up" deadline. As a result, the ATS may lead to an underestimate of the number of trades occurring and the volume of allowances being traded.

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[6] See Passell 1996.

[7] Approximately 268 million allowances have been issued and are available to trade.

Consequently, the ATS data has been supplemented with data from reports in *Energy Daily* as well as from reports in *Clean Air Compliance Review (CACR)*, a publication specifically targeted to issues of clean air compliance for stationary sources. A comparison of trades listed in the trade press to trades listed in the ATS files indicate that most trades have been registered with the ATS regardless of the allowances' vintage or the year the unit or operating company intends to use the allowances for compliance purposes. The ATS may also underestimate the number of trades occurring and the volume of allowances being traded because the ATS does not record options to buy or sell allowances that have not been exercised.

Second, it is important to distinguish between what trading activity is a *trade* in its proper sense and what activity is merely *transfer* activity. A *trade* is defined to be a considered decision to move emission allowances based in whole or in part on the price of allowances, the compliance strategies of the unit(s), if any, involved, or for strategic reasons. Trades include allowances bought in the EPA's annual auctions, allowances sold in the EPA's annual private auctions, and movements of allowances between plants, units, operating companies, brokers, fuel companies, individuals, and organizations for considered reasons rather than for reallocation, accounting, and/or joint ownership agreements. All other movements of allowances between two accounts, including reallocation, accounting, and/or prior contractual arrangements, are defined to be *transfers*. The distinction between a trade and a transfer is that a trade is an exchange that is considered in nature, such as for cost savings reasons, and is not simply the result of an accounting arrangement or a prior ownership agreement.

This paper will be concerned solely with arms-length allowance trades since it is difficult to disentangle the reason why an allowance may be transferred internally (e.g. economic versus accounting) without additional and usually propriety information. Internal -- intra-utility -- transactions include transactions between units within the same utility as well as between utilities within the same holding company. Arms-length -- inter-utility -- transactions are more clearly classified as motivated by economic reasons than intra-utility transactions. Including only executed, arms-length, trades involving at least one utility, approximately 4 million allowances have been traded since the program's inception.

B. Public Utility Commission Regulation

A utility's decision to trade allowances may be affected by the nature and behavior of its public utility commission. A utility's trading activity may be influenced by PUC behavior primarily because expenditure decisions made by a utility are subject to a prudence test by the utility's PUC. A prudence test determines whether a purchase or sale by a utility was reasonable under the circumstances that were known, or reasonably knowable, at the time of the expenditure or sale. For example, if a purchase is deemed reasonable, then cost recovery (usually through the rate base) of the expenditure is allowed; if a purchase is deemed imprudent, then the utility is not permitted to pass the costs incurred on to the ratepayers. Utilities may also perceive a risk associated with allowance sales. In particular, utilities may perceive a risk that during a ratemaking case, the price that any allowances were sold at will be questioned by the commission as to whether it was the "best" available price, or that they will be chastised by the commission for not seeking out a "better" price. Because emission allowances are a relatively new cost for a PUC to assess the prudency of, utilities may perceive an added risk when trading allowances, in

particular, that the commission will be inexperienced in judging the prudency of allowance purchases, and will, therefore, too frequently determine allowance trades imprudent.

Formal PUC regulations, called generic orders, as well as informal PUC rulings, called guidelines, may mitigate a utility's perceived risk of trading emission allowances. Although a guideline does not carry the same force as an order, guidelines nevertheless convey the commission's attitude and intent.[8] Generic orders as well as guidelines on allowance trading indicate the state PUC's expected treatment of emission allowances in a ratemaking case thereby minimizing the possibility that a utility's allowance trading activity will be ruled imprudent in a prudency review. It is possible that utilities in states with no formal ruling engaged in informal conversations with their state commission regarding the ratemaking treatment of allowances, but this type of guidance is much less certain and certainly less secure.

As of the close of 1995, fifteen state public utility commissions had explicitly addressed the issue of allowance trading through the issuance of a formal generic order or an informal guideline. A complete discussion of the state regulatory rulings from the fifteen state PUCs which have addressed the issue of allowance regulation is reserved for the Appendix; Table 1 and Table 2 summarize information about the states whose PUC has issued a guideline or generic order.

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[8]The issuance of a guideline versus a generic order may in itself be endogenous: Frequent trading activity may be associated with the issuance of a formal order, while infrequent trading activity may be associated with the issuance of an informal order. This point is not dealt with in this paper.

Table 1
States With PUC Guidelines or Generic Orders

Guidelines Issued	Generic Order Issued
Florida	Connecticut*
Illinois	Georgia
Maryland	Indiana
New Hampshire	Iowa
New York	Mississippi
Ohio	Missouri
	North Carolina*
	Pennsylvania
	Wisconsin

*States with no Phase 1 affected units.
Note: To date, the issuance of guidelines or generic orders has been mutually exclusive.

Table 1 summarizes the states whose PUC has issued a guideline or generic order on the regulatory treatment of allowances. There are several general observations about the regulatory treatment of allowances that have been issued, formally or informally, by state public utility commissions. First, the regulations largely require one hundred percent of both expenses and revenues to be returned to the ratepayers. In terms of accounting practices, the net gain (or loss) incurred from allowance transactions are used to offset (or increase) fuel costs. Second, a few states have taken an incentive based approach to allowances, allowing the utility to retain a portion of any gains from allowance sales beyond those sales which are below the line.[9] Finally, the regulations are often drawn to a state's specific circumstance. States with a large bank of allowances, due to a pre-existing state SO_2 cap which makes units in those states largely unconstrained by Title IV (e.g. Wisconsin, Connecticut) or due to Phase 1 Extension Bonuses (e.g. Pennsylvania), have issued regulations creating favorable conditions for utilities to sell

[9]A below the line transaction is one that only involves shareholder monies. All gains or losses from below the line transactions are absorbed by the electric utility shareholders not the ratepayers. Thus far, all rulings permit utilities to retain one hundred percent of the gains and losses from below the line transactions.

allowances, while states anticipating the purchase of allowances have issued regulations encouraging favorable conditions for utilities to buy allowances (e.g. Ohio, North Carolina). Table 2 illustrates the increase in number of states with guidelines or generic orders in effect. The number of states issuing regulatory statements on allowance trading has grown sharply over time: From zero in 1992, to ten in 1993, to fifteen by the close of 1995. As the number of states issuing regulations on the treatment of allowances has increased, so too has the number of states with utilities engaging in allowance trading activity. From zero in 1991, the number of states with utilities engaging in inter-utility allowance trading grew to twelve in 1993, eighteen in 1994 and then to thirty in 1995, the first year that Phase 1 emission limitation requirements were in effect.[10] Looking over all the years, thirty-one states have at least one utility that has engaged in allowance trading activity.

Table 2
Number of States With PUC Guidelines or Generic Orders, 1993-1995

Year	Guidelines: Number of States	Generic Orders: Number of States
1992	0	0
1993	5	5
1994	5	9
1995	6	9

Note: To date, the issuance of guidelines or generic orders has been a mutually exclusive event.

[10]There are 21 states that have at least one generating unit affected by Phase 1 emission limitations.

C. Endogeneity

The effect of the issuance of regulations on allowance trading activity may be endogenous to the utility's decision to trade allowances. A state's PUC regulation on allowance trading activity may increase observed trading activity in that state by minimizing risk born by utilities in that state. In addition, increased allowance trading activity by utilities in a state may increase the likelihood that the state PUC will issue a regulation on allowance trading activity in order to address the issue of allowance trading comprehensively rather than on a case by case basis.

A thorough reading of the guidelines and generic orders issued by state PUCs, other PUC documents pertaining to the ratemaking treatment of allowances, as well as conversations with PUC staff directly involved in the regulatory treatment of allowances, reveal that, in most cases, regulation is prompted by a request from one of the utilities in the commission's jurisdiction for a ruling prior to the appearance of any trading activity in that state. But this is not always the case. For instance, the New York State Department of Public Service took the initiative in 1992, prior to any trading activity or requests from utilities for guidelines on allowance treatment, to issue a notice to utilities under its jurisdiction soliciting comments on basic questions regarding the ratemaking treatment of allowances and the role the New York state commission should have in shaping utility emission compliance actions. The casual observation that regulations occur before trading activity in the calendar sense of time also neglects any feedback that particular regulations may have on future allowance trading activity, particularly with respect to the number, volume, or type of allowance transactions that occur.

3. Empirical Specification

A reduced form model is used to assess the direct and indirect effects of regulatory and non-regulatory activity on allowance trading behavior. In addition, in reduced form the data can shed light on which of the two hypothetical impacts of PUC regulation on allowance trading behavior dominates. On the one hand, regulation may reduce regulatory uncertainty, decreasing the transaction costs associated with allowance trading activity, thereby increasing allowance trading activity. On the other hand, regulation may provide disincentives to trading, increasing transaction costs. Higher transaction costs decrease allowance trading activity. The data can reveal, in reduced form, which regulatory effect dominates allowance trading behavior.

The empirical method is based on annual observations from 45 states and the District of Columbia (which is referred to as a state for the purposes of this paper) between the years 1993 and 1995. Five states are excluded: Nebraska because it does not have any investor owned utilities, Alaska and Hawaii because they are not affected by Title IV, Idaho because it does not have any fossil fuel fired (SO_2 emitting) utilities, and Tennessee because all generating units in Tennessee are both operated and regulated by the Tennessee Valley Authority.

A. Model Specification

Whether a state experiences allowance trading activity by one or more of its electric utilities is modeled as a binary choice.[11] To address the endogeneity concern, allowance trading activity is considered in a simultaneous framework by specifying an allowance trading equation and a

[11]The binary choice model does not differentiate between large volumes of trading activity nor large numbers of trades. As a result, the simultaneous logit model will not capture the possibility that states without allowance regulation have observed only small volumes of trades or small numbers of trades, while those states with regulations observe large volumes of trades or large numbers of trades. This issue is taken up in the next section.

allowance regulation equation. Assuming a logistic distribution[12], the probability that state s experiences allowance trading activity in year t is:

$$P(TRADE_{st}=1) = \exp(\alpha RULING_{st} + \Sigma X_{stk}B_k)/(1+\exp(\alpha RULING_{st} + \Sigma X_{stk}B_k))$$

where $TRADE_{st}$=1 if at least one utility in state s experienced "arms-length" allowance trading activity in year t, $RULING_{st}$=1 if there was a regulation on allowance trading activity present in state s in year t, and X_{stk} are the K (k=1,..K) non-regulatory factors which influence the decision to engage in allowance trading activity. Assuming a logistic distribution, the probability that state s has a regulation on allowance trading activity in year t is:

$$P(RULING_{st}=1) = \exp(\delta\ TRADE_{st} + \Sigma Z_{stm}\gamma_m)/(1+\exp(\delta\ TRADE_{st} + \Sigma Z_{stm}\gamma_m))$$

where $RULING_{st}$ and $TRADE_{st}$ are defined as per above, and Z_{stm} are the M (m=1,..M) non-trading related factors which affect whether a regulation is issued on allowance trading activity.

Following Schmidt and Strauss (1975), a simultaneous logit model is derived. Schmidt and Strauss show that from the above specification it follows that $\delta = \alpha$, and that the appropriate likelihood function to maximize over β, γ, and α is:

$$\prod_{i=0}^{1}\prod_{j=0}^{1}\prod_{t\in\Theta i,j} P(RULING_{st}=i, TRADE_{st}=j) \qquad (i,j=0,1)$$

where $RULING_{st}$ and $TRADE_{st}$ are as defined above, $\Theta_{i,j} = \{st \mid RULING_{st}=i, TRADE_{st}=j\}$, and $P(RULING_{st}= i, TRADE_{st}=j)$ takes on one of the following functions depending on the value of $RULING_{st}$ and $TRADE_{st}$:

[12]Although I have no a priori reason to assume a particular probability distribution function, the simultaneous logit model is substantially more tractable than the simultaneous probit model (See Schmidt and Strauss 1975).

$$P(RULING_{st}=0, TRADE_{st}=0) = 1/\bullet_t$$
$$P(RULING_{st}=0, TRADE_{st}=1) = \exp(\Sigma X_{stk}B_k)/\bullet_t$$
$$P(RULING_{st}=1, TRADE_{st}=0) = \exp(\Sigma Z_{stm}\gamma_m)/\bullet_t$$
$$P(RULING_{st}=1, TRADE_{st}=1) = \exp(\Sigma X_{stk}B_k + \Sigma Z_{stm}\gamma_m + \alpha)/\bullet_t$$

where $\bullet_t = 1 + \exp(\Sigma X_{stk}B_k) + \exp(\Sigma Z_{stm}\gamma_m) + \exp(\Sigma X_{stk}B_k + \Sigma Z_{stm}\gamma_m + \alpha)$.

B. Variable Specification and Data

i. Allowance Trading Equation

As discussed above, $TRADE_{st}=1$ if at least one utility in state s experienced "arms-length" allowance trading activity in year t. The primary source for the trading data is the Allowance Transaction System, supplemented with data from reports in *Energy Daily*, as well as from reports in *Clean Air Compliance Review (CACR)*. Allowance trading activity is expected to depend positively on state PUC regulatory behavior. Two variables assess state PUC behavior. First, a commission more favorable to electric utility shareholder interests (RATING) may be less likely to rule allowance purchases or sales imprudent thereby increasing allowance trading activity. The Merrill Lynch *Opinions of Regulation*, 1992 – 1995 is used to assess how favorable a PUC commission is to electric utility shareholder interests.[13] Second, a generic order or guideline (RULING) explicitly issued by a state PUC on how allowances will be treated for ratemaking purposes is expected to minimize utilities' concerns that allowance purchases will be ruled imprudent in a ratemaking case thereby increasing allowance trading activity observed in that state. On the other hand though, regulation may provide disincentives to trading, increasing

[13]For a discussion of the use of investment bank ratings as a gauge of the regulatory climate faced by electric utilities see Joskow, Rose and Wolfram 1994 and the literature cite therein.

transaction costs thereby decreasing allowance trading activity. In reduced form, the data can reveal which regulatory effect dominates.

Several non-regulatory factors (X_k, k=1,..K) are also hypothesized to affect the probability that a state experiences allowance trading activity. First, the aggregate number of allowances the state was allocated by Title IV above or below its annual cost minimizing allowance allocation (ALLOCATION) is expected to have a positive effect on allowance trading activity.[14] ALLOCATION is equal to the absolute value of the difference between the state's aggregate Title IV allowance allocation and the state's aggregate cost minimizing allowance allocation.[15] Utilities in states with more or less allowances than expected to be needed for compliance purposes may have excess allowances to sell or need to purchase additional allowances to, at the very least, meet their cost minimizing allowance needs. The square of the variable ALLOCATION is included in order to capture the effect that states with allowance allocations further from cost minimizing allowance needs will be even more likely to observe allowance trading activity than those states whose allocation differs only slightly from cost minimizing allowance needs.

Second, a greater percentage of a state's generating capacity subject to Phase 1 emission limitation requirements (UNITS) is expected to have a positive effect on allowance trading behavior in that state. Because the Acid Rain Program was implemented in two Phases, utilities

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[14]ALLOCATION is not defined simply as the allocation given by Title IV because if each state were allocated its cost minimizing allocation by Congress then no trading should be expected to be observed. The idea behind ALLOCATION is that allowances were not perfectly allocated (see Joskow and Schmalensee 1998), and therefore trading should be expected. Those states that were given "too few" allowances will need to buy allowances and those states that were given "too many" allowances will want to sell allowances.

[15]The cost minimizing allowance allocation is the allocation of allowances that minimizes estimated total compliance costs. The cost minimizing allowance allocation is derived from ICF 1990. See also Joskow and Schmalensee 1998.

with more Phase 1 affected generating capacity are expected to have assessed their allowance needs for compliance purposes earlier than Phase 2 affected utilities, and therefore more likely to engage in allowance trading activity.

Allowance trading in previous years by utilities in a particular state (PAST), is expected to have two opposing effects on current trading behavior. First, previous trading behavior is expected to have a positive effect on allowance trading activity through a learning or familiarity effect that acts to minimize perceived risk of allowance trading. On the other hand, previous trading activity is expected to have a negative effect on allowance trading activity to the extent that a utility in a state engaged in trading activity in previous years may have fulfilled its allowance needs and therefore not need to trade allowances in the current year. The variable $PAST_{st}$ equals one if utilities in state s traded allowances in a year prior to year t and zero otherwise.

Finally, the immediacy of mandated emission requirements is expected to have a positive effect on the likelihood utilities in a state engage in allowance trading activity. The probability of trading allowances should be smaller in 1993 (THREE) and 1994 (FOUR) relative to 1995 for two reasons. First, planning for the first year of compliance is less immediate in earlier periods. Second, utilities may perceive the risk and uncertainty associated with allowance trading to be greater in earlier years of the program. It is expected that the likelihood of allowance trading activity in 1994 is greater than the likelihood of allowance trading activity in 1993, all else equal.

The specification of the allowance trading equation is thus:

$$\alpha \text{RULING}_{st} + \Sigma X_{stk} B_k = \alpha \text{RULING}_{st} + ß_1 + ß_2 \text{RATING}_{st} + ß_3 \text{ALLOCATION}_{st} + ß_4 \text{ALLOCATION}^2_{st} +$$

$$ß_5 \text{UNITS}_{st} + ß_6 \text{PAST}_{st} + ß_7 \text{THREE}_{st} + ß_8 \text{FOUR}_{st} + \mu_{st}$$

ii. Regulation Equation

As discussed above, RULING_{st}=1 if state s has a regulation on allowance trading activity in year t. Allowance trading activity in a state (TRADE) is expected to increase the likelihood that the state will have a regulation on allowance trading activity because it may be more efficient and cost effective to address the issue of allowance trading comprehensively rather than on a continuing case by case basis. Non-trading activity in a state is also expected to affect the decision to regulate allowance trading. A larger percent of the state's generating capacity affected by Phase 1 emission limitations (UNITS) is expected to increase the likelihood that the state will have a regulation on allowance trading since more units subject to emissions restrictions suggests that more utilities may take an active, and immediate, interest in allowance trading. States with elected PUC commissioners (ELECTED) are expected to have a lower likelihood that the state will have a regulation on allowance trading activity because a PUC with elected commissioners is expected to be more observant of public opinion, environmental pressure, or constituent pressure.

The specification of the regulation equation is thus:

$$\delta \text{TRADE}_{st} + \Sigma Z_{stm} \gamma_m = \delta \text{TRADE}_{st} + \gamma_1 + \gamma_2 \text{UNITS}_{st} + \gamma_3 \text{ELECTED}_{st} + \varepsilon_{st}$$

4. Empirical Results

Table 3 presents maximum likelihood estimates from the above likelihood function using data from 46 states inclusive of the District of Columbia in the years 1993 - 1995. The top section of

Table 3 presents parameter estimates from the allowance trading specification while the bottom section of Table 3 presents parameter estimates from the regulation specification. A likelihood ratio test was used to test the null hypothesis that $ß_i = \gamma_j = \alpha = \delta = 0$ for i=2,...8 and j=2,3. Denoting L_0 as the restricted logit model and L as the unrestricted logit model where all coefficients are free, $(-2.0)(\ln L_0 - \ln L)$ is distributed as a chi-square with 9 degrees of freedom. The test statistic is 236.26, and the null is rejected at the 1% significance level.

Parameter estimates for the allowance trading specification given in Table 3 are consistent with expectations. With respect to PUC behavior, a PUC favorable to shareholder interests (RATING) has a positive and significant effect on the probability that allowance trading activity is observed in that state. In addition, the presence of a regulation on allowance trading activity (RULING) has a positive and significant effect on the probability that utilities in that state engage in allowance trading activity. A likelihood ratio test was done to assess the null hypothesis that PUC behavior does not affect allowance trading activity. A joint test of the hypothesis that $ß_2 = \alpha = 0$ is rejected at the 1% significance level, indicating that PUC behavior positively affects allowance trading activity.

The number of excess allowances issued to a state (ALLOCATION) has a negative but insignificant effect on the probability that utilities in that state will engage in allowance trading activity. In addition, the coefficient on the square of the number of excess allowances ($ALLOCATION^2$) is positive but insignificant. The percent of generating capacity affected by Phase 1 emissions limitations (UNITS) has a negative but insignificant effect on allowance trading activity. Trading activity observed in a previous period (PAST) has a positive effect on allowance trading activity, but is not statistically significant at the 5% level.

Table 3

Simultaneous Maximum Likelihood Logit Estimates: Parameter Estimates

	Coefficient	Estimate	Asymptotic Standard Error	Asymptotic Normal Test
α	RULING	5.372	0.932	5.764***
$ß_1$		-1.545	0.867	-1.783*
$ß_2$	RATING	0.119	0.062	1.930*
$ß_3$	ALLOCATION	-0.0005	0.0004	-1.009
$ß_4$	ALLOCATION^2	$6.3x10^{-8}$	$4.6x10^{-7}$	0.136
$ß_5$	UNITS	-2.445	2.188	-1.114
$ß_6$	PAST	0.063	0.653	0.096
$ß_7$	THREE	-1.627	0.642	-2.532***
$ß_8$	FOUR	-1.226	0.550	-2.230**
δ	TRADE	5.373	0.932	5.764***
γ_1		-7.222	1.118	-6.456***
γ_2	UNITS	4.848	2.639	1.837*
γ_3	ELECTED	-26.767	8211.4	-0.003

*significant at 10%, **significant at 5%, ***significant at 1%
N=138
LogLikelihood, lnL, = -50.03

The passage of time has a positive and significant effect on allowance trading activity, suggesting that trading activity is more likely to be observed in 1995 relative to 1993 and 1994. This result suggests that the immediacy of mandated emission requirements had a positive effect on the

likelihood utilities in a state engage in allowance trading activity either because planning for the first year of compliance is less immediate in earlier periods or because risk and uncertainty associated with allowance trading is perceived to be greater in earlier years of the program. A likelihood ratio test was done to test the null hypothesis that the passage of time between 1993 and 1995 (THREE) as well as between 1994 and 1995 (FOUR) has no differential effect on trading activity: $ß_7=ß_8$. The null fails to be rejected at the 5% significance level, suggesting that the allowance trading activity is equally less likely in 1993 and 1994 compared to 1995.

Parameter estimates for the regulation specification given in the lower portion of Table 3 are also consistent with expectations. The parameter estimates for UNITS and TRADE are positive and significant suggesting that the percent of generating capacity affected by Phase 1 emissions limitations and observed trading activity increase the probability that the PUC will issue a regulation on allowance trading activity. The variable ELECTED is negative, as expected, but is not statistically significant.

Table 4 presents the parameter estimates from maximum likelihood logit estimation when the allowance trading equation is estimated *separately* (non-simultaneous) from the regulation equation. As in Table 3, the top section of Table 4 presents estimates from the allowance trading specification, while the bottom section of Table 4 presents estimates from the regulation specification. For the allowance trading specification, a likelihood ratio test of the null hypothesis that $\alpha = ß_i = 0$ for i=2,..8 yields a test statistic of 78.8 with 9 degrees of freedom, clearly rejecting the null hypothesis at the 1% level. For the regulation specification, a likelihood ratio test of the null hypothesis that $\delta = \gamma_i = 0$ for i=2, 3 gives a test statistic of 62.30 with 3 degrees of freedom, clearly rejecting the null hypothesis at the 1% level.

Table 4

Maximum Likelihood Logit Estimates: Parameter Estimates

	Coefficient	Estimate	Asymptotic Standard Error	Asymptotic Normal Test
α	RULING	1.372	0.625	2.195**
$ß_1$		-2.264	0.838	-2.707***
$ß_2$	RATING	0.244	0.099	2.444**
$ß_3$	ALLOCATION	0.0005	0.0004	1.515
$ß_4$	ALLOCATION^2	6.7×10^{-7}	3.8×10^{-7}	1.745*
$ß_5$	UNITS	3.346	1.865	1.793*
$ß_6$	PAST	2.106	0.958	2.197**
$ß_7$	THREE	-2.095	0.591	-3.544***
$ß_8$	FOUR	-1.828	0.652	-2.805***
δ	TRADE	4.189	0.578	4.189***
γ_1		-5.853	0.558	-5.853***
γ_2	UNITS	7.129	1.588	4.489***
γ_3	ELECTED	-0.0004	0.0002	-2.064**

*significant at 10%, **significant at 5%, ***significant at 1%
N=138.
LogLikelihood for the decision to trade equation (top) is –55.801
LogLikelihood for the decision to issue regulations equation (bottom) is -51.017

By and large the implications from the simultaneous approach compared to those from the single equation approach are very similar. Looking first at the allowance trading equation, the coefficients on RATING, ALLOCATION, ALLOCATION^2, THREE, and FOUR are very similar in magnitude, direction, and significance between the simultaneous approach and non-simultaneous approach. Although the negative sign on the coefficient UNITS in the simultaneous approach is inconsistent with expectations, the variable does not carry any explanatory power. The coefficient on PAST is smaller and insignificant in the simultaneous logit approach. The coefficient on RULING, the endogenous variable, becomes larger and remains significant at the 1% level when one takes the endogeneity into account. Turning to the regulation equation, the coefficients on UNITS and TRADE are very similar in magnitude, direction, and significance between the two estimation approaches. The variable ELECTED loses all explanatory power when one accounts for the endogeneity of trading activity.

5. Additional Evidence on the Effect of State PUC Regulation

A second way state PUC regulations may influence allowance trading behavior is by affecting the extent to which allowance trading activity occurs. For example, both a state with a regulation and a state without a regulation may have utilities engaging in allowance trading activity, but the state with the regulation may have utilities engaging in "more" allowance trading, measured by volume of allowances traded or number of executed transactions, than the state without a regulation on allowance trading activity. Because the logit model considers only the binary trade-no trade decision and ignores any detailed information available on the number and volume of allowance trading activity, the logit model is unable to capture any effect that states without allowance regulations observe only small volumes of trades or small numbers of trades while those states with regulations observe large volumes of trades or large numbers of trades. This section

explores the possibility that state PUC regulations effect the extent to which allowance trading activity occurs and finds some evidence that state PUC regulations positively effects the number of executed allowance transactions.

Two equations are estimated in order to assess whether state PUC regulations affect the extent to which allowance trading activity occurs. The first assesses the effect of regulatory activity on the volume of allowance trading. The equation estimated takes the form:

$$\begin{aligned} VOLUME_{st} = {} & ß_0 + ß_1 RULING_{st} + ß_2 RATING_{st} + ß_3 ALLOCATION_{st} + ß_4 ALLOCATION^2_{st} + \\ & ß_5 UNITS_{st} + ß_6 PAST_{st} + ß_7 THREE_{st} + ß_8 FOUR_{st} + \mu_{st} \end{aligned} \qquad (1)$$

where the right hand side variables are as defined in the previous section and $VOLUME_{st}$ is equal to the number of allowances traded in state s in year t. As in the previous section, RULING is instrumented for using the variable ELECTED.

The second equation employs a Poisson model to analyze the effect of state PUC regulations on the number of allowance transactions that occur. The estimated equation takes the form:

$$\#TRADE_{st} = e^{\hat{a}_0 + \hat{a}_1 RULING_{st} + \hat{a}_2 RATING_{st} + \hat{a}_3 ALLOCATION_{st} + \hat{a}_4 ALLOCATION^2_{st} + \hat{a}_5 UNITS_{st} + \hat{a}_6 PAST_{st} + \hat{a}_7 THREE_{st} + \hat{a}_8 FOUR_{st} + \hat{\iota}_{st}} \qquad (2)$$

where the right hand side variables are as defined in the previous section and $\#TRADE_{st}$ is equal to the number of transactions occurring in state s in year t.

Table 5

Generalized Least Squares: Parameter Estimates
Dependent variable = volume of trades (VOLUME)

	Coefficient	Estimate	Standard Error
$ß_0$		9030.9	25998.1
$ß_1$	RULING	7033.4	20538.4
$ß_2$	RATING	161.86	2897.9
$ß_3$	ALLOCATION	-3.6387	13.161
$ß_4$	ALLOCATION^2	0.0220*	0.01259
$ß_5$	UNITS	-36702.6	51553.4
$ß_6$	PAST	88498.7***	20733.6
$ß_7$	THREE	-9315.0	18201.1
$ß_8$	FOUR	1459.0	16454.7

*significant at 10%, **significant at 5%, ***significant at 1%
N=138.

Table 5 presents the parameter estimates from generalized least squares estimation of equation (1). Parameter estimates in Table 5 suggest that a state PUC regulation on allowance trading activity has no statistically significant discernable effect on the volume of allowances transacted. Results in Table 5 suggest that the volume of allowances transacted is greater in states that were allocated allowances further from cost minimizing allowance needs; the difference is statistically different from zero at the 10% level. This result is consistent with the hypothesis that states which were allocated many more allowances than needed to meet SO_2 emissions transact a larger

volume of allowances because they have additional allowances to sell off and states which were allocated many fewer allowances than needed to meet SO_2 emission needs transact a larger volume of allowances because they need to purchase many more allowances in order to meet SO_2 allowance needs. Finally, parameter estimates in Table 5 suggest that allowance trading in a past period increases the volume of allowances transacted by 88,498 allowances. This difference is statistically different from zero at the 1% level. The positive effect of previous trading activity on volume of allowances traded is consistent with the expectation that a learning or familiarity effect acts to minimize the perceived risk of allowance trading.

Table 6 presents the parameter estimates from a Poisson maximum likelihood estimation of equation (2). Coefficient estimates measure the change in the rate at which allowance trading activity occurs as a result of a one unit increase in the right hand side variable. Coefficient estimates statistically different from one imply a differential effect in the rate at which allowance trading activity occurs. Parameter estimates in Table 6 suggest that the rate at which allowance trading occurs is 2.09 times greater in states with a PUC regulation on allowance trading activity than in states without a PUC regulation on allowance trading activity. This difference is statistically different from one at the 5% level. A state PUC favorable to utility interests increases the rate at which allowance trading occurs by 1.08 times and is significant at the 1% level. A state with a larger percent of generating capacity designated as Phase I affected increases by 1.67 times the rate at which allowance trades occur. This result is significantly different from one at the 1% level. States which have experienced allowance trading activity in previous years have a 3.9 times greater rate of allowance trades activity in the current year. Finally, being in 1993 or 1994 decreases the rate of executed allowance trades by approximately one half. This difference is statistically different from one at the 1% level.

Table 6

Poisson Maximum Likelihood Estimation: Parameter Estimates
Dependent variable = number of trades (#TRADE)

	Coefficient	Estimate	Standard Error
$ß_1$	RULING	2.099**	0.281
$ß_2$	RATING	1.077***	0.023
$ß_3$	ALLOCATION	0.999	0.001
$ß_4$	$ALLOCATION^2$	1.000	$7.65x10^{-8}$
$ß_5$	UNITS	1.676*	0.481
$ß_6$	PAST	3.909***	0.588
$ß_7$	THREE	0.537***	0.100
$ß_8$	FOUR	0.692***	0.068

*statistically different from 1 at 10%, ** statistically different from 1 at 5%, *** statistically different from 1 at 1%
N=138.

Taken together, Table 5 and 6 suggest that state PUC regulations on allowance trading activity have some effect on the number allowance trades taking place but not on the volume of allowances transacted. All else equal, a state with a regulation may be expected to make more allowance transactions to acquire the same volume of allowances as a state without a regulation on allowance trading activity. One explanation for this phenomenon may be linked to the role that a PUC regulation plays in diminishing the perceived risk associated with allowance trading activity. There are two competing hypotheses. On the one hand, because a PUC regulation may diminish the risk associated with a prudency review, a state with a regulation may be less worried

about seeking out the best available transaction and instead purchases smaller bundles of allowances less tailored to their specific needs than a state without a regulation. As a result, utilities in states with a PUC regulation on allowance trading activity are more comfortable incurring transaction costs than utilities in states without a PUC regulation on allowance trading activity. On the other hand, a utility with a PUC regulation may be more comfortable seeking out the best possible bundle of allowances despite the increased transaction costs incurred by purchasing smaller packages of allowances. A utility without a state PUC regulation may perceive multiple transactions and multiple transaction costs as a more risky strategy than a single purchase. Without additional proprietary details on the price and contract terms that allowance bundles were purchased at, it is impossible to disentangle these two competing explanations.[16]

6. Implications and Conclusions

When considering allowance trading activity, the question naturally arises whether there would be still more allowance trading activity if state public utility commission rulings were more favorable, such as explicit incentive regulation, or if more state commissions had issued rulings specific to the ratemaking treatment of allowances. One tempting, but incorrect, argument to make is along these lines:

> Fifteen states have issued rulings on allowance trading activity, and arms length allowance trading activity was observed in all fifteen of these states. Thirty-two states have not issued guidelines or generic orders, and no trading was observed in half of these states. Therefore, regulations should be issued in states without regulations in order to encourage allowance trading activity in those states.

[16] The EPA's Allowance Transaction System, the official record of allowance holdings for compliance purposes and the primary source for allowance trading data, does not require utilities to report prices or terms of trade. The only data required to be reported to the EPA is the quantity of allowances transacted and the names of the two transacting parties.

There are three inter-related rejoinders to this argument. The first two stem from this analysis and the third rests on basic economic principles. First, it is clear that PUC rulings on the treatment of allowances are not a prerequisite for allowance trading. As this paper discussed, thirty-one states have traded allowances, but only fifteen states have allowance regulations on the books. Put another way, sixteen states have traded allowances without a formal or informal ruling from their state public utility commission.

Second, no state public utility commission that was requested to rule on the ratemaking treatment of allowances from one of its utilities has flatly denied the request. In conversations with the staff of commissions that had yet to concern themselves with the ratemaking treatment of allowances, the reason a ruling had not been issued was typically that the commission had not received any requests for formal or informal guidance from utilities under their jurisdiction. While this is an imperfect, and perhaps biased, measure of the need for regulatory rulings, it does suggest that some utilities are comfortable trading without a formal ruling on how allowances will be treated for ratemaking purposes.

The third and final comment to the assertion that regulation is hindering allowance trading activity is that it is not obvious that more trading activity than that observed to date, in aggregate or in any particular state, should be occurring. That is to say, a large amount of trading, as measuring in terms of volume of allowances traded, number of allowance trades occurring, or simply as the number of states with utilities trading allowances, is not an indication of how well the market is functioning. It is important to remember that neither the volume of allowances traded, the number of trades, nor the number of states trading allowances reveals much about how well the

market is working. More allowance trading, or less for that matter, relative to what has been observed to date, without additional information on cost savings, says very little about the success of the allowance trading program.[17] Only if there are additional cost saving that could have been obtained if additional trading activity had occurred should state regulations, or the lack there of, be suspected to be the cause. Therefore, although the conclusion reached in this analysis is that regulation has had a strong positive effect on allowance trading activity in the early years of the Acid Rain Program, this study should not be interpreted as suggesting that the issuance of guidelines or orders by more state public utility commissions would have lead to more allowance trading.

In summary, it is clear utilities are trading allowances, and that commissions have, by and large, been responsive to utilities' requests for guidance. In addition, the language of the orders encourages, rather than restricts, allowance trading activity. The regulatory rulings that have been issued appear to have had the effect of minimizing the perceived risk of unfavorable rulings on the ratemaking treatment of allowances from trading activity. Until there is evidence suggesting that significant additional cost savings could have been obtained if additional allowance trading activity had occurred in states without regulations or that utilities in states with regulations are still not taking advantage of all cost saving trading opportunities, this analysis suggests that there is little reason to believe that allowance trading activity is impeded by public utility commission regulations.

[17] An analysis of emissions trading under the U.S. Acid Rain Program by Ellerman et. al. 1997 evaluates compliance costs and allowance market performance and finds that utilities did take advantage of the cost-saving flexibility provided by emissions trading. Whether additional cost saving could have been obtained if additional trading activity had occurred is not addressed.

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APPENDIX
PUBLIC UTILITY COMMISSION GUIDELINES AND GENERIC ORDERS

Review of FERC Accounting Guidelines

On March 31, 1993 the Federal Energy Regulatory Commission (FERC) issued Revisions to the Uniform System of Accounts in order to account for allowances. The revisions are not intended to promote or discourage particular ratemaking treatment for allowances, and FERC leaves the revisions open to state PUC variations. Deliberately distinguishing allowances from fuel or financial instruments, allowances are to be classified as Allowance Inventory or Allowances Withheld. Allowances acquired for speculative purposes must be accounted for in "Other Investments". Allowances must be expensed monthly based on each month's SO2 emissions. The FERC revision states that historical cost is the appropriate measure of the accounting value of allowances, but makes clear the distinction that historical cost is not necessarily the best measure for the ratemaking value of allowances and leaves open the option for alternate treatments with respect to ratemaking. All allowances, including those purchased and sold between affiliates, are be accounted for at the purchased price (read historical cost). Other revisions include a call for weighted average cost methods for allowance inventory accounting, and a decision to decline to adopt below the line sharing of gains or losses on the purchase or sale of allowances (except for allowances used for speculative purposes whose gains or losses are kept entirely by the utility).

An Overview of Commission Guidelines and Generic Orders

While all utilities must follow FERC accounting practices, the state public utility treatment of allowances for ratemaking purposes has been varied. Though the majority of states issuing generic ratemaking treatment of allowances are those that are affected most immediately by Phase 1, there are two Phase 2 states, Connecticut and North Carolina, which have taken significant steps to define the treatment of allowances for ratemaking purposes. Ratemaking treatment varies widely among those states which have issued a generic order but tend to require revenues and expenses are passed on 100% to the ratepayers via offsets to fuel costs. The informal guidelines in states which are working on a case by case basis are similar in theme to those developed by states with formal orders. Most state guidelines have requested that allowance expenses and gains to flow to the ratepayers one for one through some type of fuel adjustment clause.

Two Phase 1 states have not concerned themselves with the ratemaking treatment of allowances nor with the revenue generated from the pro rata return of moneys from the EPA annual auctions. Kansas has only one Phase 1 utility, Quindaro, a municipal, which is not subject to the jurisdiction of the Kansas Public Utility Commission. In Tennessee, the Tennessee Valley Authority (TVA) generates electricity for all units in Tennessee. In addition, TVA self-regulates all its electric generating units. As a consequence, TVA simply factors in sulfur dioxide allowances as a cost of doing business and no concern has been raised as to how, or if, revenue from allowance sales (or purchases) should be considered in the ratemaking process. Beyond Kansas and Tennessee, two

other Phase 1 states have yet think about the treatment of allowances. Both the Michigan Public Utility Commission and the Minnesota Public Utility Commission are not currently dealing with the issue. Not surprisingly, both Michigan and Minnesota have only one unit each affected in Phase 1.

Public Utility Commissions: Generic Orders

CONNECTICUT

The Connecticut Public Utility Commission ruling establishes an incentive based approach to the ratemaking treatment of allowances encouraging the sale of allowances. In 1993, Connecticut issued a generic order requiring that 85% of the costs and benefits resulting from allowance transactions on non-bonus allowances be returned to the ratepayers with the other 15% of the benefits retained by the utility. Non-incentive revenue, such as revenue from the pro-rata return of moneys from the EPA advance auctions as well as revenue from the sale of bonus Conservation and Renewable Energy Reserve (CRER) allowances that Connecticut utilities received, were ordered to be returned 100% to the ratepayers. All revenue is returned to the ratepayers by offsetting rate increases due to the costs incurred from state regulations which require utilities to undertake conservation load management.

GEORGIA

In April of 1994, the Georgia Public Service Commission issued a procedural response as a way to answer questions raised by Savannah Electric and Power and Georgia Power Company regarding these utilities plans for compliance with the CAAA. With respect to the accounting and ratemaking treatment of allowances, Georgia Power Company, a Phase 1 operating company, will include emissions allowances in inventory at cost and will expense them as they are consumed. Utilities are required to flow any allowance gains or losses at market value (rather than at FERC historic cost accounting) through the fuel adjustment clause on an annual bases, and will be treated as a rate reduction for ratemaking purposes. Any allowance profits or losses made on below the line transactions would be kept entirely by the utility. The commission also denied Georgia Power its request to keep fifty percent of all profits on allowances sales from those allowances that Georgia Power acquired from joining the Phase 1 Extension Pool. The PSC ruled that all profits (or losses) from those allowances would flow to the ratepayers.

INDIANA

Indiana Utility Regulatory Commission has issued a statute which requires up front approval of all allowance purchases and sales, as well as an order which dictates that allowances are the property of ratepayer. As a consequence of a PSI Energy petition for approval of its Environmental Compliance Plan, the Indiana Utility Regulatory Commission ruled that PSI Energy must conform its emissions allowances accounting practices to those laid out by the FERC final rules issued in 1993. Emission allowances used to satisfy off-system loads will be accounted separately from other allowances. A tariff rider will be used to recover allowance costs. Since FERC rules did not explicitly treat banked allowances the Commission decided to make its own rulings on the treatment of banked allowances; the Commission rejected PSI Energy's proposal to add incremental costs to the historic costs of the banked emissions allowances ruling such allowance

costs are to be recorded at their acquisitions costs. The Commission goes on to note it will defer issues of carrying charges on allowances purchased specifically for banking to future hearings.

IOWA

In Iowa, all moneys generated from the purchase or sale of allowances flow through to the ratepayer one for one through an energy adjustment clause. In order to recover the cost of purchasing allowances, a rate-regulated utility must file monthly reports with the commission indicating the number and cost of allowances used per month, as well as the number and price of all allowances purchased or sold in that month, and the dollar amount of any gains or losses.

MISSISSIPPI

Until December 1995, the Mississippi Public Service Commission had allowed the recovery of all revenues and expenses from allowance transactions to be recovered (or rebated) through an environmental compliance plan. At the request of the Mississippi Power Company, the Commission has revised the means by which revenues and expenses are recovered and has instead incorporated the costs and gains from allowance purchases and sales into the fuel adjustment clause (FAC) and are now recovered in the same manner as other direct fuel expenses. All moneys continue to be recovered (or rebated) one for one to ratepayers.

MISSOURI

The state of Missouri has a statute which requires any part of utility used to make electricity to be subject to regulation. As a result, the Missouri Public Service Commission issued an order that requires utilities to get prior approval to sell allowances. The order recognizes sales may be decided quickly so in practice the PUC gives blanket permission for all sales. Missouri has had three cases which have raised the issue of allowance expenses and revenues. In each case, the ratemaking treatment of allowances was handled differently. Kansas City Power and Light's allowance sale was approved by the PUC and required KCP&L to defer all revenue until a future rate case. Empire District Electric Company was required to subtract off all annual EPA auction revenue from its fuel costs calculations. The decision in the Union Electric Case was to allow the utility to retain all profits from allowance sales if the profit was less than 11% with any profits in excess of 11% to be split fifty-fifty between the utility and the ratepayers.

NORTH CAROLINA

Prompted by a request from Duke Power to accrue a carrying cost on its net investment in allowances purchased in the 1993 EPA auctions (Duke Power purchased 25,000 vintage 2000 allowances for $3,675,000) the North Carolina PUC began discussions on issuing a generic order for allowance treatment. Carolina Power and Light had also notified the North Carolina commission of its purchase of allowances requesting, and receiving, permission to issue a promissory note for the purchase of allowances. In response to the requests, the North Carolina Commission ordered that allowances would be allowed to accrue a carrying charge on those allowances acquired for the purpose of achieving Phase 2 compliance in an analogous way to the accrual charge allowed on cost of work in progress (CWIP). The North Carolina Commission also ordered that no portion of the net investment in allowance inventory would be considered by the Commission for inclusion in the rate base prior to the year 1999. Sales of allowances must be reported to the Commission and the proceeds from such sales are to be used to offset the net investment in allowance inventory.

PENNSYLVANIA

In Pennsylvania, the Public Utility Commission's order dictates that any costs associated with pollution control technologies can only be considered a non-revenue producing investment, and recovered through the cost of work in progress (CWIP) clause, if any benefits from the sale of allowances related to that technology are passed on to the utility customers. This clause rings of the allowances that Pennsylvania received as a result of the Phase 1 Extension Bonuses. The Pennsylvania order goes on to require that allowances issued by the EPA be valued at original cost (i.e. zero cost) while purchased allowances will be valued at their full purchase price inclusive of broker fees. Emission allowances are treated as fuel inventory for ratemaking purposes and are recovered through the utility's energy cost rate (ECR). Furthermore, allowances in inventory are to earn a return in the same way as other rate base investments. The order does prohibit two significant actions, both of which Commissioner Wendell Holland dissented with when he announced the formal order. First, the commission's order explicitly prohibits the purchasing of allowance options and futures. Second, the order prohibits cost recovery incentives as part of a utility's compliance plan such as the retention of the gains from the sale of allowances funded from below the line sources.

WISCONSIN

Wisconsin requires utilities to report to the state a filing on what they expect to do over the next twenty years with respect to the use of their allowances including annual streams of allowances expected from the EPA, annual allowance use for compliance, and annual reserve banks. The purpose, says the Public Service Commission of Wisconsin, is to prevent a utility from selling too many allowances and finding itself short in future years. Net revenues from allowance transactions are credited entirely to the ratepayers and are accounted for in materials and supplies in the net investment rate base. A utility is required to notify the Commission after a trade has been made including price, quantity, and the second party(s) involved. The Commission explicitly states no aspect of the sale will be permitted to be confidential unless revealing the second party would cause harm to the ratepayers. Wisconsin makes specific the accounting treatment of allowance transactions between a utility and its holding company or one of its affiliates. Allowance trades between utilities and affiliates in a holding company system require that services or assets provided by a utility to an affiliate be priced at the greater of cost or fair market value.

Public Utility Commissions: Informal Guidelines

ALABAMA

Until allowances come into question during a ratemaking hearing or otherwise become an issue in Alabama, currently only Alabama Power Company units in the lower half of Alabama are affected in Phase 1, the Alabama Public Service Commission rebates revenues and costs from allowance purchases and sales one for one to ratepayers through an Energy Cost Recovery clause. Pro rata auction revenues are returned to ratepayers entirely through a separate accounting clause. All other accounting practices such as historic cost accounting follow straight from the FERC policy statement on the ratemaking treatment of allowances.

FLORIDA

In Florida, the two Phase 1 affected utilities collect allowance expenses and rebate allowance revenues through cost recovery clauses. Gulf Power recovers through an environmental compliance cost recovery clause while Tampa Electric recovers its net revenues through a fuel adjustment clause. Both clauses are adjusted every 6 months, once in the spring and once in the fall. Revenue from the EPA auctions is currently being deferred. The Florida PUC currently allows net revenues generated from below the line allowance transactions to be retained 100 percent by the utility.

ILLINOIS

The Illinois Commerce Commission has issued two orders requiring all gains and losses from allowance purchase and sale be passed on 100 percent to the ratepayers through the fuel adjustment clause. Expenses and revenues are recovered monthly as the allowances are used to match tons of sulfur dioxide emissions. The Commission will value allowances at historical cost. Gains and losses from below the line transactions are kept entirely by the shareholders.

MARYLAND

The Maryland Public Service Commission has issued no final disposition on how allowances will be treated for ratemaking purposes. Potomac Edison has significant amounts of excess allowances due to scrubber installation and are currently in discussion with the Maryland PSC on how to handle the revenues if they are sold. Currently Potomac Edison's allowance revenues and costs are swallowed up in a fuel cost clause. Potomac Electric Power Company (PEPCo) has a tariff (Fuel Rate-Rider) which allows pro rata revenues from the EPA auction to float through the fuel rate being returned dollar for dollar to the ratepayers.

NEW HAMPSHIRE

New Hampshire is poised to deal formally with the treatment of allowances in the next few months. It has been an ongoing issue which is only coming to a formal hearing the first week of December of 1995. Currently all pro rata revenue from the annual EPA auctions is being deferred until after the hearing.

NEW YORK

The New York State Department of Public Service issued an order in 1992 posing 22 questions regarding the ratemaking treatment and policy. The Commission has not acted on the responses to that order. On March 2 1994, the Commission issued a second order requiring all allowance moneys be deferred until a generic order is issued. The Commission is leaning towards revenue rebate and recovery one for one through a FAC, but their is still some question on that issue. Another strong point of contention yet to be resolved is how to treat allowance swaps and other allowance loans. This contention arises from trades which the Long Island Lighting Company has been involved in.

OHIO

Although Ohio has had four rate cases which have brought up the treatment of allowance revenue, Dayton Power and Light, Centerior Energy, Cincinnati Gas and Electric, and Monongahela Power, the Ohio Public Utilities Commission has yet to issue a generic order. Questions concerning the treatment of allowances have primarily been dealt with case by case because the PUC would like to integrate the treatment of allowances into utilities" Environmental

Compliance Plan and as part of their Integrated Resource Plan. The Commission issued a guideline which recognized that carrying charges related to the emissions allowance trading process are legitimate costs of doing business, but the PUC has not specifically addressed this issue. The Ohio guidelines also recognize that all reasonable trading mechanisms such as sales, purchases, futures, leases, and options are legitimate forms of trade and should be evaluated on an equal basis. The guidelines also mandate that each utility submit an allowance trading status report with its EFC audit documenting actual and foregone transactions, allowance holdings, an explanation for why a particular bank level has been maintained, and any adverse experience they have had in trading with other states or encounters with other regulatory authorities. Finally the guidelines suggest that all gains or losses on emission allowance transactions flow through to ratepayers on an energy basis unless the utility created the gain or loss from a below the line transaction in which case all gains may be retained by the utility.