Municipal Aggregation in the State of Illinois: An Examination of the Supply or Energy Component of Electric Service

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Abstract: This paper examines Municipal Aggregation or the bundling of residential and small commercial electric loads in the state of Illinois for competitive supply. Supply rate prices vary throughout the state for municipalities that have passed the Municipal Aggregation referendum. A log-log ordinary least squares cross-section model is used to estimate the fixed supply rate prices that are negotiated by municipalities that have passed the referendum. The findings suggest that the main drivers that influence the fixed price that municipalities receive are the referendum date and service territory. In addition, the grouping of electrical loads from differing municipalities is found to yield economies of scale and therefore results in lower supply rates. As a result of this study, some of the variables that were hypothesized to influence supply rate prices were found to have no influence on the price. The variables that were found to be irrelevant include *MHV* (Median House Value), *POP* (Population), *OHU* (Occupied Housing Units), & *PVL* (Poverty Level).

Introduction

Municipal Aggregation has been flourishing in the state of Illinois and this paper provides an analysis of why and how it has swept through the entire state. Municipal Aggregation in Illinois is defined as the process by which the residential and eligible small commercial demand of a municipality is aggregated together. Thus, all residential and small commercial electric customers act as if they are one consumer that represents the entire municipality. Therefore, those that implement Municipal Aggregation go through a process of negotiating a fixed price for their electric load by soliciting bids for their electric supply in the competitive retail electric market. Currently, there is little to no existing literature on this topic that can explain why Municipal Aggregation has become so prevalent in Illinois. As of April 9, 2013, 669 municipalities in Illinois have implemented Municipal Aggregation including the City of Chicago. To begin ***Section 1*** goes into the history of the electric market structure in Illinois by highlighting the evolution of the marketplace. The market structure has progressed significantly over time and currently moving into an environment characterized by ideal competition in the residential supply market. Next ***Section 2*** defines Municipal Aggregation, discusses Municipal Aggregation implementation in other states, explains why the use of Municipal Aggregation has grown tremendously in Illinois and how it is administered, and finally explains how suppliers serve municipalities that passed the referendum. The model that is used along with reasoning justifying the expected sign of the explanatory variables used to explain the supply rate price that municipalities receive that implement Municipal Aggregation is contained in ***Section 3.***

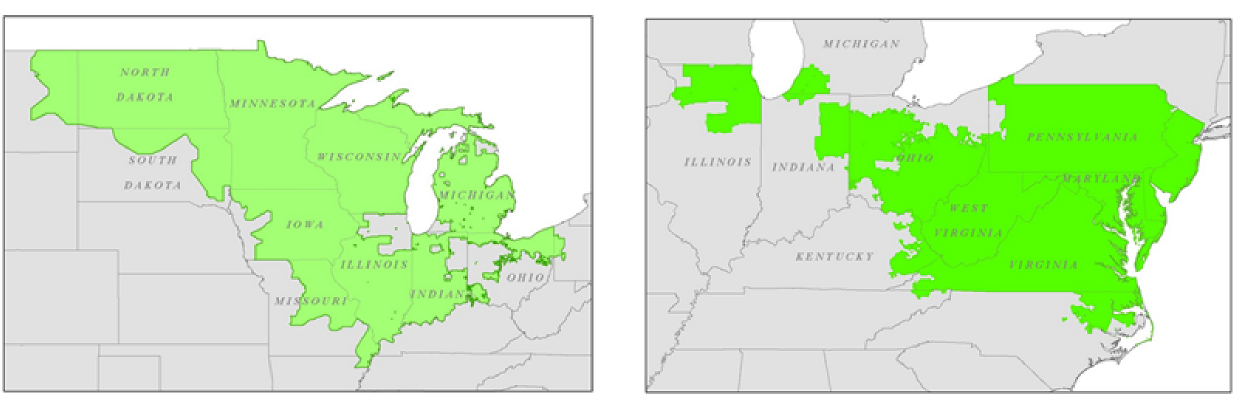
Section 4 presents and summarizes all of the data used in the study. The model results along with reasoning suggesting why the results turned out the way they did is explained in ***Section 5.*** Given that Municipal Aggregation has become so prevalent in Illinois, policy implications are discussed in **Section 6**. Furthermore, this section discusses the next steps that can be taken to evolve the residential supply market into a more competitive marketplace. Lastly, **Section 7** summarizes the contents of this study and states why municipalities have benefited from implementing Municipal Aggregation. Municipalities that pass that have implemented Municipal Aggregation in Illinois have received different supply rate prices. Currently the Municipal Aggregation supply rate price ranges from \$0.03909/kWh to \$0.0623/kWh. The purpose of this research is to explain what factors explain the supply rate price that municipalities receive that implement Municipal Aggregation. Furthermore, this research also looks into the effect of municipalities joining with other municipalities to form a group for electric supply procurement purposes. In other words, this research also determines if municipalities that group with other municipalities for the procurement of their residential and small commercial customer electric load receive lower supply rate prices than those who do not.

1. Illinois Electric Market Structure

Vertical integration has historically been the structure used in the electric industry in Illinois and all other U.S. states. In this structure the generation, transmission, and distribution of electricity is all under the control of one electric utility. Beginning in the late 1990s, some states began to restructure by removing the generation role of electric service away from the utility. In this scenario, transmission and distribution services are still provided by the electric utility. In December 1997, the Electric Service Customer Choice and Rate Relief Law of 1997 was enacted in Illinois. As a result, the electric industry in Illinois was restructured from a vertically-integrated structure to a competitive generation marketplace. A monopolized market that transitions to a competitive one will have to evolve over time before competition will truly exist in the marketplace. The passage of the Electric Service Customer and Rate Relief Law of 1997 began a transition period that lasted 10 years which allowed for the market to prepare to operate under the new structure.

Under the vertically integrated system, the investor-owned utilities – Ameren Illinois and Commonwealth Edison- were responsible for the generation, transmission, and distribution of electricity for their customers in their respective service territories. Therefore, Ameren Illinois and Commonwealth Edison had ownership of generating assets. In the restructured system, the ownership of generating assets was moved to Ameren Illinois and Commonwealth Edison subsidiaries. The generation segment of electric service is supplied into a wholesale market which is operated by an RTO or regional transmission operator which coordinates electricity generation and transmission within an integrated regional market. Ameren Illinois resides in the MISO (Midwest Independent System Operator) and Commonwealth Edison resides in PJM (Pennsylvania-New Jersey-Maryland). PJM-West is the most appropriate location to describe where Commonwealth Edison resides while PJM-East defines those states other than Illinois that reside in the PJM footprint. ***Picture 1*** below shows the regions that reside in the MISO and PJM territory.

Picture 1



The transmission and distribution of electricity still remains organized as a natural monopoly for efficiency purposes. During the Illinois transition period, industrial and large commercial customers were first granted the ability to choose an ARES (alternative retail electric supplier) in October 1999 for their supply or energy component of electric service. In May 2002, residential customers were granted the ability to choose an ARES. An ARES acts as a middleman between the production and consumption of electricity. Thus, ARES purchase or produce electricity at the wholesale level and sell it at the retail level. These suppliers compete in a competitive marketplace against each other to provide the supply or energy component of electric service to customers.

Initially, there were barriers that discouraged competition and prevented a competitive residential market from developing in Illinois. Rate reductions and rate freezes existed which limited the ability of ARES to enter the market and compete against the default IOU (investor-owned utility) rates at the residential level. The retail rate cap protected consumers from wholesale market prices which was one of the reasons why the residential market did not evolve very quickly because ARES had to compete against frozen retail rates that were not based on wholesale market prices. The industrial and commercial market became competitive rather quickly while competition in the residential market did come to fruition as fast. The majority of industrial and large commercial customers operate in competitive marketplaces where cost minimization is of significant importance. Therefore, these customers are profit maximizers and strongly desire to consume electricity at the lowest cost possible because their electric load is a production function component. Thus, the electricity input price is strongly desired to be of least cost.

In the early stages of retail choice, ARES realized the significant value that industrial and large commercial customers place on minimizing the cost of their electric load. Thus, ARES heavily marketed and sought to gain the business of these customers who are able to realize great gains from shopping around for the ideal supplier in the marketplace. Even as more and more ARES became certified to serve residential customers the market did not evolve because residential customers were not interested in switching from default service. As of June 2013, 20 ARES can serve residential customers in the Ameren Illinois service territory and 45 ARES can serve residential customers in the Commonwealth Edison service territory. Residential customers do not place as much value on minimizing the cost of their electric load relative to industrial and large commercial customers. The transaction cost that a residential customer must bear in order to understand how the competitive market place works coupled with shopping around for a competitive supplier may be more than the potential savings from switching away from the investor-owned utility default rate. Properly structured aggregation can reduce the cost barriers associated with a small consumer acting alone in the market (Hempling 3). Allowing municipalities to negotiate on behalf of consumers in their communities reduces the cost barriers (Hempling 4).

The Retail Electric Competition Act was enacted in 2006. The Act suggested that *for Illinois consumers to receive products, prices, and terms tailored to meet their needs, a competitive wholesale electricity market must be closely linked to a competitive retail electric market.* The Illinois Commerce Commission created the Office of Retail Market Development to promote a competitive retail electricity market. Following the rate freeze, Ameren Illinois and Commonwealth Edison began to sell power to residential customers based on wholesale market prices. The first wholesale electricity auction in Illinois occurred in September 2006 in which

IPPs or independent power producers bid to supply the residential and small commercial load of Ameren Illinois and Commonwealth Edison. The outcome of the initial auction lead to an increase in retail rates by an average of 36% to 53% percent for Ameren Illinois customers and 21% for Commonwealth Edison customers (Carlson). The dramatic increase in retail rates resulted in angry ratepayers who demanded action to be taken to do away with the higher default rates. As a result, the Illinois Power Agency was established in the summer of 2007 to procure power on behalf of Ameren Illinois and Commonwealth Edison residential and small commercial default service customers.

The Illinois Power Agency Act states: *The health, welfare, and prosperity of all Illinois citizens require the provisions of adequate, reliable, affordable, efficient and environmentally sustainable electric service at the lowest cost over time, taking into account any benefits of price stability. Escalating prices for electricity in Illinois pose a serious threat to the economic well-being, health, and safety of the residents of and the commerce and industry of the State. In order to protect against this threat to economic well-being, it is necessary to improve the process of procuring electricity to serve Illinois residents.* The structure of the initial IPA procurement plan consisted of purchasing bilateral contracts over a 3 year period by purchasing a third of the electricity of a given year two years prior to its delivery year. A bilateral contract is defined as an agreement between a buyer and seller to exchange electricity generation under agreeable terms over a specified period of time. The approach developed by the IPA was put in place with the purpose of establishing lowest cost default service over time.

2. Municipal Aggregation

As stated in the introduction, Municipal or Community Choice Aggregation is the process by which municipalities make purchasing arrangements through a negotiated process with power providers for the supply or energy component of electric service. The supply or energy component of electric service accounts for the generation of electricity. LSEs or load serving entities (Ameren Illinois & Commonwealth Edison) provide the transmission and distribution services. Aggregation in the state of Illinois includes residential customers and small commercial customers with up to an annual usage of 15,000 kWh. Legislation at the state level has made Municipal Aggregation available in 6 restructured electric states which include Massachusetts (1997), Rhode Island (1997), Ohio (1999), California (2002), New Jersey (2003), and Illinois (2009). On August 10, 2009, Public Act 96-0176 amended the Illinois Power Agency Act authorizing municipalities and counties to form residential and small commercial customer electrical aggregations.

The application of Municipal Aggregation varies widely across states that have enacted its legislation. Rhode and Island and Ohio were the first two states where Municipal Aggregation really took off and became widely used. Rhode Island contains REAP or the Rhode Island Energy Aggregation Program which is operated by a state entity (Rhode Island Cities and Towns) that represents the interests of cities and towns in Rhode Island. REAP was created in 1999 and is the only Municipal Aggregation plan in the state which serves 37 of 39 municipalities in Rhode Island. Thus, Municipal Aggregation essentially is utilized in the entire state of Rhode Island. Regarding Ohio, NOPEC or the Northeast Ohio Public Energy Council was created in 2001 forming the largest public energy aggregation in the United States which consists of 134 member municipalities. Cleveland (2001), Toledo (2001), and Cincinnati (2012) have all implemented Municipal Aggregation plans. Municipal Aggregation in Ohio has been and is currently being widely used making it the only state where its use is somewhat comparable to that of Illinois. Massachusetts has the longest running Municipal Aggregation plan in the United States, the Cape Light Compact, which began in 1997 and serves 200,000 customers in 21 towns in Cape Cod and Martha's Vineyard. (Lean Energy U.S.).

New Jersey has been rather slow as it only has two aggregation plans in the state which are similar to those in Illinois which only consist of residential and small commercial customers. Finally, California currently has one Municipal Aggregation program. In New Jersey, small commercial customers have to "opt-in" to aggregation programs thereby declaring that they want to be included in the plan. Marin Clean Energy was launched in May 2010 and currently serves 92,000 residential, commercial, and municipal customers in both Marin County and Richmond, California. *Clean Energy SF* or Clean Energy San Francisco is in the process of being rolled out with a tentative start day of the end of the calendar year 2013. *Clean Energy SF* will be the second Municipal or Community Choice Aggregation plan implemented in California. ***Table 1*** shows the applicable customer classes that may be included in a Municipal Aggregation plan by state. In those states where any and all customer classes may be included in the aggregation plan ARES can solicit different bids across customer classes. Furthermore, in some states municipalities utilize their own generating assets to supply some of the load within their aggregation plans.

Table 1
Customer Classes that may be Included in the Aggregation Plan
Massachusetts: Any and All Customer Classes
Rhode Island: Any and All Customer Classes
Ohio: Any and All Customer Classes
New Jersey: Residential & Small Commercial Customers
California: Any and All Customer Classes
Illinois: Residential & Small Commercial Customers

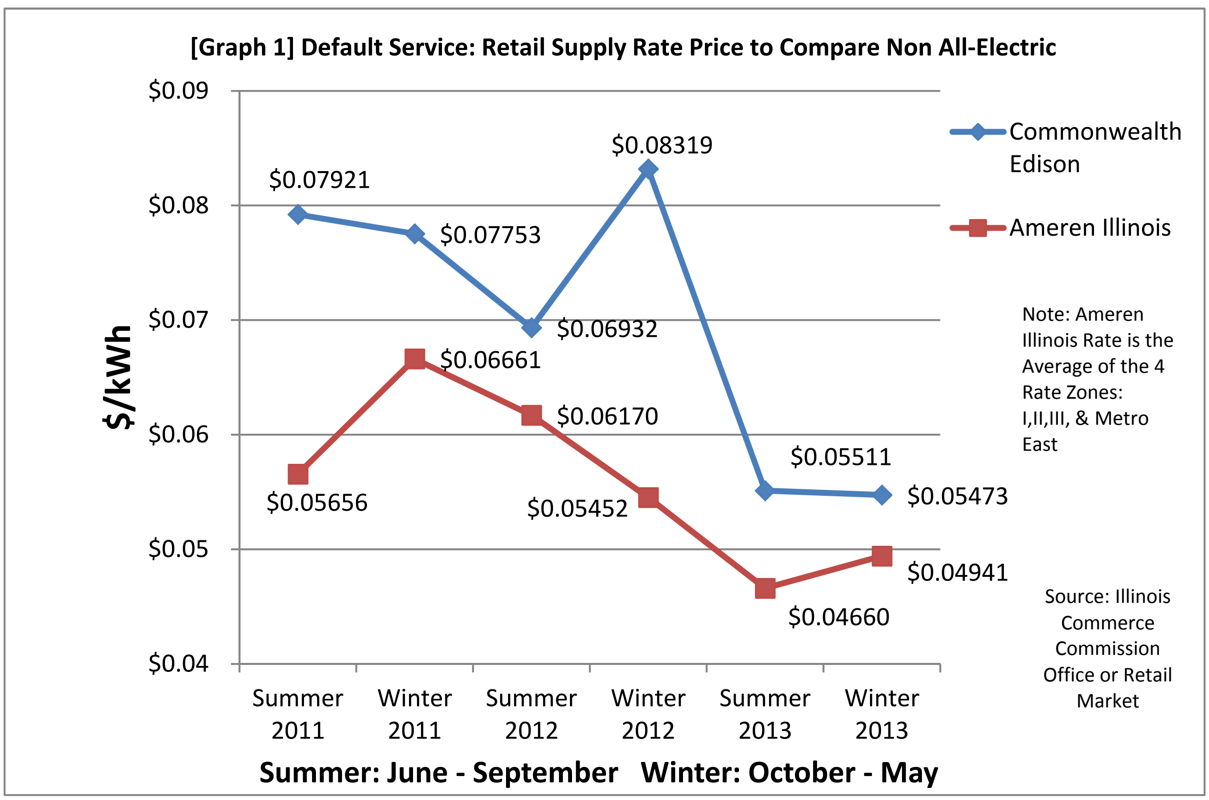
Municipal Aggregation became effective in Illinois on January 1, 2010. ***Table 2*** shows the number of municipalities that have passed the Municipal Aggregation Referendum over time. The numbers in the table show that the application of Municipal Aggregation has grown tremendously over time.

Table 2			
Number of Municipalities that Passed the Referendum			
Referendum Date	**Ameren Illinois**	**Commonwealth Edison**	**Total**
November 2, 2010	0	1	1
April 5, 2011	0	18	18
March 20, 2012	76	170	246
November 6, 2012	128	78	206
April 9, 2013	135	63	198
Grand Total	339	330	669
	Source: Illinois Commerce Commission Office of Retail Market Development		

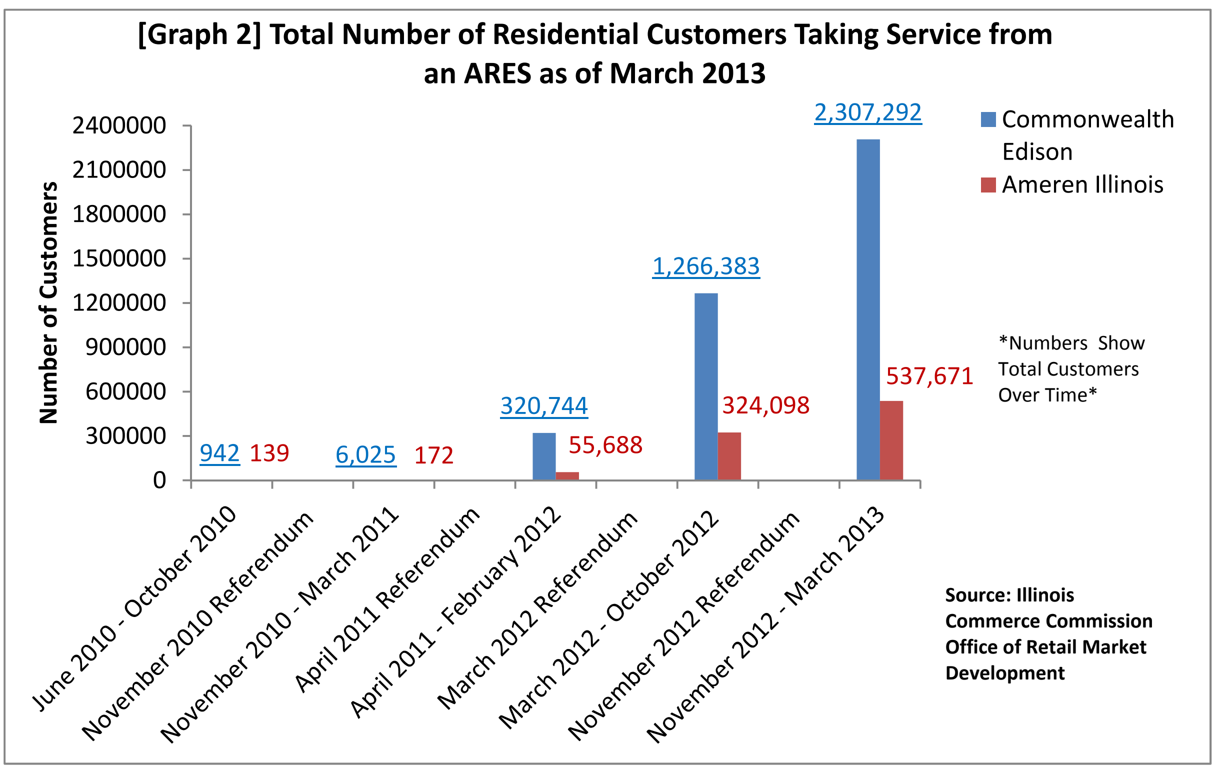
Municipal or county governments within states can approve aggregation programs through a local referendum, council vote, or local ordinance. The fact that most residential and small commercial customers were not switching prior to Municipal Aggregation becoming widely used suggests that residential and small commercial customers tend to shop the retail electric market less when the potential savings are small. Industrial and large commercial customers have been able to benefit from a competitive marketplace as they have been able to choose from several electric supply options to meet their electric needs. Municipal Aggregation allows for residential and small commercial customers to receive similar price benefits to those received by industrial and large commercial customers by being able to utilize a competitive marketplace. In simplest terms, Municipal Aggregation allows for municipality officials to make a decision on behalf of its residents and small commercial electric customers that is in the best interest of the municipality as a whole. *In addition, the corporate authorities, Township Board, or County Board may also exercise such authority jointly with any other municipality, township or county. Two or more municipalities, townships, or counties, or a combination of both, may initiate a process jointly to authorize aggregation by a majority vote of each particular municipality, township, or county.* Municipalities in this case form grouped aggregation programs with the intent of being able to establish a lower supply rate price as a result of having increased bargaining power by banding together. Municipalities that group with other municipalities believe that the procurement competitive bidding process will yield a lower supply rate price than would be received if they acted alone.

A key reason why Municipal Aggregation has become very prevalent in Illinois is because it has yielded lower supply rates than default service. ***Graph 1*** shows the default service retail price to compare over time for non-all-electric residential customers. The chart shows the behavior of the default rate price over time. As can be seen in the graph the Commonwealth Edison default service rate has been and is higher than the Ameren Illinois default rate. For wholesale prices are typically higher in Commonwealth Edison Territory as opposed to Ameren Illinois. The Purchased Electricity Adjustment (PEA) is applicable to default service but is not included in the graph. The PEA is used to collect the difference between what Ameren Illinois and Commonwealth Edison previously paid to acquire their electric supply via the Illinois Power Agency and the price that is charged for the supply or price of default service. Thus, the PEA is used as a "true-up" to ensure that Ameren Illinois and Commonwealth Edison receive default service revenue that is equal to the expenditures used to purchase power at the wholesale level via the IPA procurement plan. For example, suppose the Illinois Power Agency procures electricity on behalf of Commonwealth Edison for $60/MWh but default service may only be $0.055/kWh. In this case a $0.005/kWh PEA would be added to the default service rate price to make up for the difference between what Commonwealth Edison paid at the wholesale level and the revenue received via retail default service.

The vice versa event could occur in which Ameren Illinois or Commonwealth Edison receives too much revenue from default service and the PEA could be a credit or reduction in price per kWh. The PEA changes on a monthly basis which therefore changes the true default service retail price to compare on a monthly basis as well. For this reason, the true price to compare is difficult to know at all times making it difficult for residential customers to truly know what price they will be paying on a monthly basis. In addition, it makes it difficult for ARES to truly know what default service price they are competing against.



Graph 2 shows the total number of residential customers that are taking service from an ARES over time which includes those customers that reside in Municipal Aggregation programs. The growth in the number of residential customers being on competitive supply is attributed to the growth of Municipal Aggregation usage. Commonwealth Edison has a much larger residential customer base than that of Ameren Illinois. The higher number of residential customers taking service from an ARES in the Commonwealth Edison service territory relative to the number in the Ameren Illinois service territory is also attributed to the City of Chicago passing the November 6, 2012 Municipal Aggregation referendum.



In Illinois a Municipal Aggregation program can be put into action only after a referendum is passed by a majority vote in a local election. The question that is placed on the ballot is shown below:

Shall the (municipality) have the authority to arrange for the supply of electricity for its residential & small commercial retail customers who have not opted out of such program?

A municipality that decides to do an aggregation program authorizes its municipal government to procure the electric supply component of electric service on its behalf. Following the passage of the referendum, a municipality issues a *Plan of Operation and Governance* explaining the process and procedures of its aggregation program. Municipality authorities choose a consultant to assist with administering the program, the "opt-out" process, managing the competitive bidding process, and writing the RFP or Request for Proposal to help the municipality choose an ARES and supply product.

The RFP is made available to the ARES which specifies the terms and conditions that a municipality desires for its aggregation plan. Pricing options and supply mixes are the main components of the RFP. Some aggregation plans have a termination or exit fee which is either $25 or $50 if a customer in the plan desires to leave the plan before the contract terminates which is specified in the RFP. Municipalities in Illinois use "opt-out" aggregation programs. Therefore, all residential and small commercial consumers are automatically enrolled in the program unless a residence or small commercial consumer decides to not be in the program. The "opt-out" program eliminates having to individually enroll customers into the program thereby reducing transaction costs. The municipality can deem some customers to be ineligible for the program. The list below shows some of the typical customers that may be excluded.

1) **Customer is not Located Within the Municipal Territory Limits**

2) **Customer is Already Receiving Service from an ARES**

3) **Customer is Receiving "FREE" or Subsidized Service**

4) **Customer is on Real-Time Pricing**

5) **Customer is All-Electric**

6) **Small Commercial Uses More than 15,000 kWh Annually**

Cost savings may be achieved as a result of a municipality negotiating a bulk purchase. Thus far in Illinois, Municipal Aggregation has resulted in lower supply rate prices than default service as a result of municipalities aggregating their entire residential and small commercial load into a single municipal load for competitive bid. The competitive bidding process and declining prices in the wholesale electric market from 2010 up until after the November 2012 referendum has allowed for ARES to offer rates lower than those offered by As stated earlier, these rates are a function of the IPA procurement plan which is a portfolio of supply resources that is established to yield lowest cost default rates over time. A typical contract is for 1 – 3 years which results in price stability for municipalities that engage in Municipal Aggregation. Furthermore, Municipal Aggregation has been used as a way to promote environmentally friendly sources of electric generation as it allows for the source of generation to be chosen as well. There are instances in Illinois where municipalities have chosen 100% REC or renewable energy credit supported supply rates.

In order for ARES to design and market electric commodity products they must first procure electricity or generate electricity at the wholesale level. There are three supply procurement methods that can be used by ARES aside from generation which include bilateral contracts, the Day-Ahead Market, and the Real-Time or Spot Market. The Day-Ahead Market is a marketplace where electricity can be procured a day in advance. This forward market establishes LMPs or locational marginal prices for the next operating day based on generation offers, demand bids, and scheduled bilateral contracts. A LMP represents a unique marginal market clearing wholesale price that is established at a given geographic point. The Real-Time Market is a market that calculates current LMPs at 5 minute intervals based on current grid operating conditions. The LMP is equal to the cost to serve the next megawatt (MW) of load at a specific location, using the lowest production cost of all available generation, while observing all transmission limits.

An ARES can utilize generation and the three forms of procurement to build a portfolio of resources to supply the load it is responsible for. A forward bilateral contract can be established with an IPP or independent power producer. This approach has the advantage of price predictability with respect to the uncertain future or spot price. However, bilateral contracts also have a risk associated with them in that the price associated with them may become disadvantageous relative to the spot price. Bilateral contracts typically make up the majority of the ARES portfolio to satisfy base load requirements. The base load resources are supplemented with short-term bilateral contracts and purchases in both the Day-Ahead Market and Real-Time Market to satisfy the seasonal peak load requirements. Risk management techniques are employed by ARES to reduce their exposure to volatile electricity markets. The model shown below is a log-log cross-section ordinary least squares model which is used to estimate the supply rate price that is established for municipalities that have implemented Municipal Aggregation.

3. Model and Methodology

A log-log cross-sectional ordinary least squares model is used to estimate the supply rate price that corresponds to the negotiated contract supply rate price that is established for municipalities that have implemented Municipal Aggregation.

$$\boldsymbol{LSRP = c + \beta_1 AE\% + \beta_2 LCL + \beta_3 LRTLMP + \beta_4 LMHI + \beta_5 LMHV + \beta_6 POP + \beta_7 LOHU + \beta_8 PVL + dMar'12 + dApr'11 + dNov'10 + dAIU + dGroup + E_t}$$

Base Observations: Commonwealth Edison Service Territory & November 2012 Referendum Date

However, the *LMHV, LPOP, LOHU,* and *PVL* variables are dropped from the model because they are found to be insignificant. As a result of dropping these variables from the model, variables that intuition and reasoning suggests should be included are actually found to have no effect on the supply rate price. Thus, one of the successes of this research is the determination of the variables that do not affect the supply rate price even though at first thought they seem like they would have an effect.

The initial model is reduced to the model below which is also shown with the expected signs for all of the explanatory variables except the time dummy variables.

$$\boldsymbol{LSRP = C - \beta_1 AE\% + \beta_2 LCL + \beta_3 LRTLMP - \beta_4 LMHI + dMar'12 + dApr'11 + dNov'10 - dAIU - dGroup + E_t}$$

The variables defined in ***Table 3*** are used as in the model. The *Supply Rate Price* is the independent variable and the others are used as explanatory variables.

Table 3	
Variables Defined	
LSRP = Log Supply Rate Price	**LOHU** = Log Occupied Housing Units
AE% = All-Electric % of Occupied Housing Units	**PVL** = Poverty Level
LCL = Log Contract Length in Months	**dMar'12** = March 2012 Referendum Date
LRTLMP = Log Real-Time Locational Marginal Price	**dApr'11** = April 2011 Referendum Date
LMHI = Log Median Household Income	**dNov'10** = November 2010 Referendum Date
MHV = Log Median Household Value	**dAIU** = Ameren Illinois Service Territory
LPOP = Log Population	**dGroup** = Municipality Grouping
dTF = Termination Fee	
Included in a Different Version of the Model	

The *All-Electric%* variable affects the load profile or electricity usage over time of a municipality. The *LCL* variable reflects the amount of risk that an ARES bears by agreeing to supply a fixed price supply rate price over time. The *RTLMP* variable is a measurement of a wholesale price that ARES face when procuring electricity. Real-Time LMPs are used to account for the spot purchases that retailers must make to satisfy the load requirements that cannot be acquired via bilateral contracts or Day-Ahead market purchases. The *LOHU* is used as a proxy for the number of residential electric accounts in a municipality. Therefore this variable is included in the model to determine if the number of residential electric accounts in an aggregation plan has a significant effect on the supply rate price that is received. The *LMHI, LMHV, LPOP, and PVL* variables are used to determine how income, housing value, population, and poverty level effect residential electricity consumption. In addition, *LMHI* also has some explanatory power with respect to the selection of consultancy that a municipality chooses. Potentially, there may be a correlation between *LMHI* and the consultancy that is used by a municipality.

The *dMar'12*, *dApr'11*, and *d'Nov'10* variables are used to denote the time at which a municipality passes the referendum. The *dAIU* dummy variable is used to denote which service territory a municipality resides in. The two service territories reside in different RTO footprints and therefore have different characteristics which affect the fixed supply rate price that a municipality can receive from implementing Municipal Aggregation. The *dGroup* variable denotes the effect of being in a group with respect to the fixed supply rate price. Finally, the *dTF* variable is used to capture the effect of having a termination fee included in the aggregation plan.

The *All-Electric%* variable should be negative because all-electric households have a flattening effect on the municipality load profile or electrical usage over time. As a result, a more desirable usage pattern exists which is more attractive to supply from the perspective of an ARES. It is expensive to serve peak loads that coincide with overall system peaks because the most expensive forms of generation must be used to satisfy load thereby increasing wholesale LMPs. From the perspective of an ARES, the peak summer load is the most difficult to manage and supply at least cost. Prices in competitive markets are based on usage patterns because the cost to produce electricity varies hourly, daily, monthly, and yearly. Flatter load profiles are generally cheaper to serve. Suppliers place a high level of importance of the comparability of usage patterns with their portfolio of load supplying resources. Winter all-electric household electricity consumption lowers or shrinks the summer peak demand load shape relative to the annual level of consumption thereby increasing the load factor. The ratio of peak electricity usage to average usage is known as the load factor.

The *LCL* variable should be positive because ARES bear more risk as they are called to supply fixed supply rates over time. As a contract becomes longer in length it becomes more susceptible to volatile energy markets because the ARES has to supply a fixed rate which becomes more risky to do over longer periods. The *LRTLMP* should be positive suggesting that wholesale prices and the negotiated supply rate move in the same direction. Reasoning suggests that when an ARES is faced by increasing wholesale prices these increased procurement costs will be passed onto the consumer. The *LMHI* variable should be negative indicating that as income increases the supply rate should decrease suggesting that higher income municipalities have the ability to utilize top performing consultants to help orchestrate aggregation plans that can lead to lower supply rates. In addition, high income households consume electricity more efficiently than lower income household as a result of having more energy efficient homes and appliances. Thus, higher income households may consume less electricity than lower income households which would also suggest a negative *LMHI* coefficient.

For those municipalities that passed the referendum on November 6, 2012, the *Real-Time Locational Marginal Price* associated with it in the model is the average for the year of 2012. Likewise, for those municipalities that passed the referendum on March 20, 2012, the *Real-Time Locational Marginal Price* associated with it is the average for the year of 2011. Finally, for those municipalities that passed the referendum on either April 5, 2011 or November 2, 2010, the *Real-Time Locational Marginal Price* associated with it is the average for the year of 2010. The *Real-Time Locational Marginal Price* used for the Commonwealth Edison service territory is the ComEd hub price and for the Ameren Illinois service territory the Indiana hub is used. The Indiana hub is used because it is the most liquid trading hub in the MISO and a retailer would most likely transact at this hub if it needed to make bulk power purchases to serve a municipality in the Ameren Illinois service territory.

The sign on the *Group* variable should be negative but not significant denoting no economies of scale from combining multiple municipality electric loads together because the load that is aggregated includes that only of residential and small commercial consumers which have similar consumption patterns. In simplest terms, reasoning suggests that the difference in load shape across municipalities is rather small and therefore aggregating similar load shapes would not increase the attractiveness of the load shape from the perspective of an ARES relative to that of one of a single municipality. On the other hand, economies of scale would definitely exist if grouped aggregation plans were across customer classes that included residential, commercial, and industrial consumers. In this case, the aggregate load shape of multiple municipalities and customer classes could be improved because the load shape would be a function of differing consumption patterns thereby making it more attractive to supply from the perspective of an ARES.

The *Ameren Illinois Utility* variable should be negative for wholesale prices are generally lower in the MISO relative to that of PJM-West or in the Commonwealth Edison service territory. Therefore, retailers typically face higher wholesale Day-Ahead and Real-Time prices in PJM-West relative to those in the MISO because of higher congestion and transmission constraints in northern Illinois. The model is also estimated with a dummy termination fee variable (*dTF*). Only municipalities that are known to have or not have a termination fee are included in the model and those municipalities that are not known if they have a termination fee are excluded from the model. When *dTF* is added to the model *dGroup* is excluded from the model thereby reducing the number of municipalities in the model. Lastly, the *TF* variable should be positive because retailers apply termination fees to those municipalities that have a high risk of customers leaving the plan. Therefore, retailers offer higher rates to these communities and insert an exit fee into the plan to make it more costly for customers to leave. The model shown below includes the *Termination*

Fee variable with the expected signs for all of the explanatory variables except the time oriented dummy variables.

$$LSRP = C - \beta_1 AE\% + \beta_2 LCL + \beta_3 LRTLMP - \beta_4 LMHI + dMar'12 + dApr'11 + dNov'10 - dAIU + dTF + E_t$$

4. Data & Summary Statistics

Data for this study was acquired mainly through publicly available sources. The Illinois Commerce Commission Office of Retail Market Development provided the *Supply Rate Price*, *Termination Fee*, and *Referendum Date Data*. The four referendum votes were November 2, 2010, April 5, 2011, March 20, 2012, and November 6, 2012. Dummy variables are created to account for the referendum dates to illustrate the importance of expectations with respect to time from the perspective of a municipality and the risk that an ARES bears with respect to the period of time that the aggregation plan will be implemented. Furthermore, the time oriented dummy variables account for how wholesale prices have been behaving before, during, and after a municipality begins its contract. Wholesale prices provide a signal to IPPs to either sell their output in a bilateral contract or into the Day-Ahead or Real-Time market. Day-Ahead and Real-Time prices historically only differ by a couple % in either direction. IPPs desire to sell their output wherever they can get the highest $/MWh. An IPP and ARES form bilateral contracts if both parties believe they will be better off than buying or selling in the Day-Ahead or Real-Time market. An ARES almost always takes a futures approach to determine how prices will behave over the length of a Municipal Aggregation contract. Unfortunately, the approach that is taken in the industry could not be done for this study. As a result, a historic approach is used by taking into account wholesale price behavior before contracts begin as a proxy for the approach that is actually used by ARES.

The data set includes 377 municipalities of which 169 are located in the Ameren Illinois service territory and 208 are located in the Commonwealth Edison service territory. The 377 municipalities are a subset of those that have implemented aggregation. Unfortunately, this study does not cover municipalities that passed the referendum in April 2013 and data was not available for all of the municipalities that implemented aggregation as of November 2012. Eight different ARES established contracts to supply the 377 municipalities. The *Real-Time Locational Marginal Price* data for Commonwealth Edison was obtained from the PJM State of the Market Reports. The independent market monitor for PJM Interconnection (Monitoring Analytics) produces quarterly State of the Market Reports. The *Real-Time Locational Marginal Price* data for Ameren Illinois was obtained from the MISO produced Monthly Market Operations Reports. *Median Household Income* and *All-Electric* data was obtained from the 2007 – 2011 American Community Survey 5 – Year Estimates. Finally, the *Contract Length* data was acquired from ARES.

A group is defined as a municipality that aggregates its load with at least one other municipality and negotiates similar terms and conditions across the group. Therefore, groups have the same referendum date, supplier, contract length, and supply rate. ***Table 4*** below shows the number of *Groups* included in the data set. Each group is defined as one observation in the model.

Table 4		
Groups		
# of Municipalities in Group	# of Groups in Ameren Illinois Service Territory	# of Groups in Commonwealth Edison Service Territory
38	**1**	**N/A**
25	**1**	**N/A**
17	**1**	**N/A**
15	**N/A**	**1**
10	**2**	**N/A**
8	**N/A**	**2**
7	**2**	**1**
6	**1**	**N/A**
5	**1**	**1**
4	**2**	**1**
3	**N/A**	**3**
2	**3**	**7**
Number of Groups Formed		
November 2010	**N/A**	**N/A**
April 2011	**N/A**	**1**
March 2012	**4**	**12**
November 2012	**10**	**3**
Ameren Illinois: 14 Groups include 139 Municipalities & Commonwealth Edison: 16 Groups include 70 Municipalities		

Graph 3 shows the average supply rate price for municipalities that have implemented Municipal Aggregation that are included in the data set. As can be seen in the graph, the average supply rate price received in the Ameren Illinois service territory is less than that received in the Commonwealth Edison service territory.

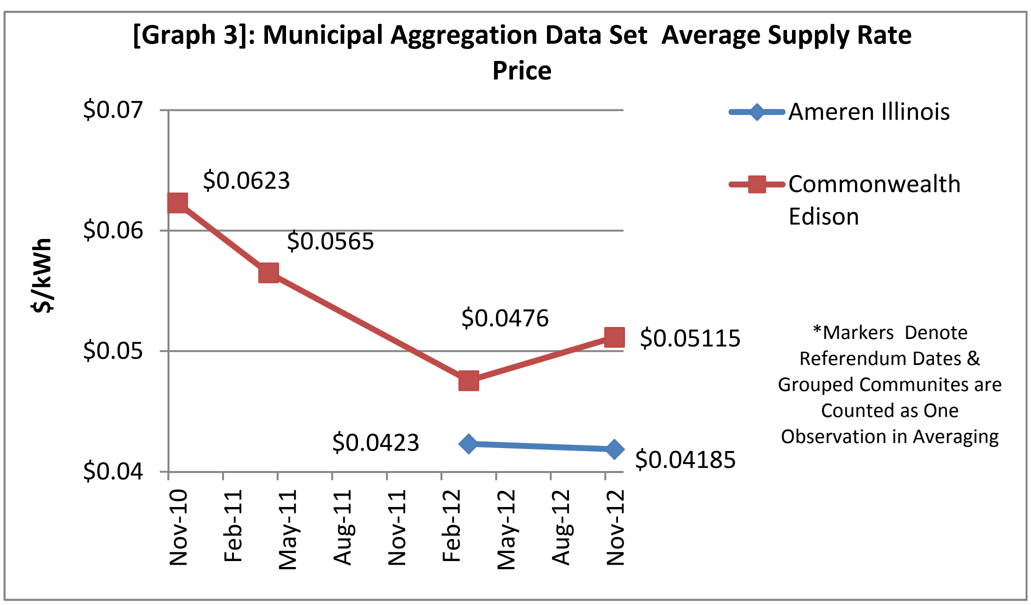


Table 5 shows the summary statistics for the *Supply Rate*, *AE%,* and *MHI* variables. As can be seen in the table, municipalities in the Commonwealth Edison service territory have higher values for *Supply Rate Price* and *MHI* while Ameren Illinois Service territory has a higher *AE%*.

Table 5			
Summary Data for Municipalities that have Implemented Municipal Aggregation in Data Set			
Variable	**All Ameren Illinois**	**Single Ameren Illinois**	**Group Ameren Illinois**
Mean Supply Rate Price	$0.04234/kWh	$0.04282/kWh	$0.04131/kWh
Mean AE%	21.9%	21.1%	23.7%
Mean MHI	$45,803	$43,215	$51,349
# of Observations	169	30	14
	All Commonwealth Edison	**Single Commonwealth Edison**	**Group Commonwealth Edison**
Mean Supply Rate Price	$0.04925/kWh	$0.04945/kWh	$0.04756/kWh
Mean AE%	10.9%	11%	10.1%
Mean MHI	$70,539	$69,671	$78,029
# of Observations	208	138	16

Graph 4 shows the behavior of the average Real-Time LMP from 2010 – 2012. The graph shows that the price has been declining over time. The MISO price is not included for 2010 because there were no municipalities that passed the referendum that warranted using the 2010 price in the model.

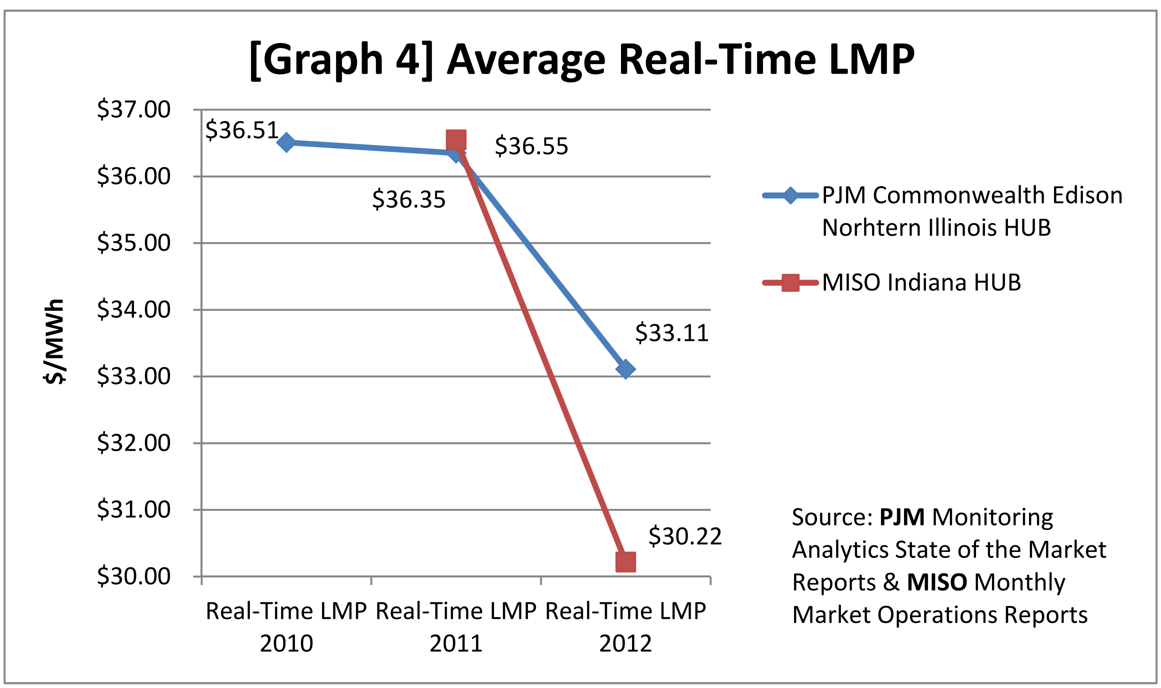


Table 6 shows the *Contract Length* summary statistics by length across the Ameren Illinois and Commonwealth Edison service territories. The majority of the contracts have been established for two years.

Table 6			
		Contract Length for Municipalities in Data Set	
	All Ameren Illinois	**Single Ameren Illinois**	**Group Ameren Illinois**
CL<12 Months	0	0	0
12 Months	3	3	0
12<CL<24	12	8	4
24 Months	23	15	8
36 Months	6	4	2
# of Observations	44	30	14
	All Commonwealth Edison	**Single Commonwealth Edison**	**Group Commonwealth Edison**
CL<12 Months	5	4	1
12 Months	20	18	2
12<CL<24	7	7	0
24 Months	107	95	12
36 Months	15	14	1
# of Observations	154	138	16

5. Estimation Results and Empirical Analysis

In this section, the results are displayed and interpreted followed by an analysis of the magnitude of the explanatory variables. The model was tested for heteroskedasticity and it was found to exist suggesting that the error term has the same variance given any value of the explanatory variables VAR (E_t|x) = σ^2. As a result, the standard errors of coefficients were biased which makes statistical inferences incorrect thereby making hypothesis tests results incorrect. For this reason, all models were estimated with the white correction to account for heteroskedasticity. **Table 7** shows the correlation amongst the explanatory variables and the numbers in the table suggest that there are no correlation issues of concern.

[Table 7] Correlation Matrix										
	LSRP	**LCL**	**AE_PER**	**LRTLMP**	**LMHI**	**DMAR**	**DAPR**	**DNOV**	**DAIU**	**DGROUP**
LSRP	1.000	0.301	-0.288	0.318	0.085	-0.186	0.498	0.203	-0.651	-0.295
LCL	0.301	1.000	0.079	0.022	-0.219	-0.042	0.088	0.021	0.034	-0.011
AE_PER	-0.288	0.079	1.000	-0.433	-0.482	-0.348	0.002	0.014	0.495	0.139
LRTLMP	0.318	0.022	-0.433	1.000	0.332	0.773	0.173	0.045	-0.563	-0.210
LMHI	0.085	-0.219	-0.482	0.332	1.000	0.215	0.089	-0.037	-0.430	0.039
DMAR	-0.186	-0.042	-0.348	0.773	0.215	1.000	-0.373	-0.096	-0.265	-0.100
DAPR	0.498	0.088	0.002	0.173	0.089	-0.373	1.000	-0.020	-0.147	-0.062
DNOV	0.203	0.021	0.014	0.045	-0.037	-0.096	-0.020	1.000	-0.038	-0.030
DAIU	-0.651	0.034	0.495	-0.563	-0.430	-0.265	-0.147	-0.038	1.000	0.248
DGROUP	-0.295	-0.011	0.139	-0.210	0.039	-0.100	-0.062	-0.030	0.248	1.000
	LSR	**LCL**	**AE_PER**	**LRTLMP**	**LMHI**	**DMAR**	**DAPR**	**DNOV**	**DAIU**	**DTF**
LSRP	1.000	0.312	-0.210	0.216	0.057	-0.329	0.505	0.225	-0.607	0.177
LCL	0.312	1.000	0.097	-0.008	-0.221	-0.094	0.090	0.022	0.041	-0.200
AE_PER	-0.210	0.097	1.000	-0.396	-0.470	-0.322	0.028	0.020	0.413	-0.052
LRTLMP	0.216	-0.008	-0.396	1.000	0.277	0.742	0.174	0.046	-0.480	0.179
LMHI	0.057	-0.221	-0.470	0.277	1.000	0.159	0.090	-0.039	-0.412	0.041
DMAR	-0.329	-0.094	-0.322	0.742	0.159	1.000	-0.418	-0.111	-0.176	0.090
DAPR	0.505	0.090	0.028	0.174	0.090	-0.418	1.000	-0.023	-0.132	0.084
DNOV	0.225	0.022	0.020	0.046	-0.039	-0.111	-0.023	1.000	-0.035	0.133
DAIU	-0.607	0.041	0.413	-0.480	-0.412	-0.176	-0.132	-0.035	1.000	-0.151
DTF	0.177	-0.200	-0.052	0.179	0.041	0.090	0.084	0.133	-0.151	1.000

Table 8 shows the results of the initial model. The initial results suggest that *Median Home Value*, *Population*, *Occupied Housing Units*, and *Poverty Level* are insignificant and therefore should be excluded from the model.

[Table 8] Observations: 198 (168 Single Municipalities & 30 Groups)			
White Correction for Heteroskedasticity			
Dependent Variable: Log Supply Rate Price			
Variable	Coefficient	Std. Error	Prob.
C	**-1.244****	**0.622**	**0.0469**
All-Electric % of Occupied Housing Units	**-0.145***	**0.033**	**0.0000**
Log Contract Length Months	**0.061***	**0.013**	**0.0000**
Log Real-Time LMP	**0.919***	**0.183**	**0.0000**
Log Median Household Income	**-0.048***	**0.014**	**0.0009**
Log Median Home Value	**-0.003**	**0.009**	**0.7366**
Log Population	**0.008**	**0.011**	**0.4978**
Log Occupied Housing Units	**-0.009**	**0.011**	**0.4112**
Poverty Level	**-0.000**	**0.015**	**0.9945**
Dum. Mar'12 Referendum	**-0.162***	**0.025**	**0.0000**
Dum. Apr'11 Referendum	**0.002**	**0.029**	**0.9505**
Dum. Nov'10 Referendum	**0.090***	**0.025**	**0.0004**
Dum. Ameren Illinois Utility	**-0.113***	**0.013**	**0.0000**

Dum. Group	**-0.021*** **	**0.011**	**0.0631**
R-Squared: 0.817			
Adjusted R-Squared: 0.804			
*Denotes Significance @ 99%, ** @ 95%, & ***@90%			

Table 9 shows the results of the final model excluding the irrelevant variables. The second set of results does not include the *All-Electric%* variable in the model. There are cases where aggregation plans do not include all-electric households in the plan. Unfortunately, it was not determined which plans include all-electric households and which plans do not therefore the model is estimated twice under two different assumptions. The first case assumes that all aggregation plans include all-electric households and the second case assumes that all-electric households are not included in any of the aggregation plans in the data set. Subsequent tables are structured in a similar manner and the results are discussed under the assumption that all-electric households are included in aggregation plans.

[Table 9] Observations: 198 (168 Single Municipalities & 30 Groups)						
White Correction for Heteroskedasticity						
Dependent Variable: Log Supply Rate Price						
Variable	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
C	**-1.245****	**0.602**	**0.0400**	**-1.387****	**0.617**	**0.0259**
All-Electric % of Occupied Housing Units	**-0.146***	**0.032**	**0.0000**	**N/A**	**N/A**	**N/A**
Log Contract Length Months	**0.061***	**0.012**	**0.0000**	**0.062***	**0.013**	**0.0000**
Log Real-Time LMP	**0.915***	**0.178**	**0.0000**	**0.914***	**0.183**	**0.0000**
Log Median Household Income	**-0.044***	**0.009**	**0.0000**	**-0.033***	**0.010**	**0.0007**
Dum. Mar'12 Referendum	**-0.162***	**0.024**	**0.0000**	**-0.156***	**0.025**	**0.0000**
Dum. Apr'11 Referendum	**0.001**	**0.028**	**0.9696**	**-0.001**	**0.029**	**0.9727**
Dum. Nov'10 Referendum	**0.087***	**0.023**	**0.0002**	**0.088***	**0.024**	**0.0004**
Dum. Ameren Illinois Utility	**-0.114***	**0.013**	**0.0000**	**-0.124***	**0.012**	**0.0000**
Dum. Group	**-0.023****	**0.009**	**0.0164**	**-0.026***	**0.010**	**0.0083**
R-Squared: 0.816				R-Squared: 0.803		
Adjusted R-Squared: 0.807				Adjusted R-Squared: 0.795		
*Denotes Significance @ 99% & ** @ 95%						
Residuals 1: 165 or 83.3% of the Observations have < 5% Error (AE% included)						
Residuals 2: 162 or 81.8% of the Observations have < 5% Error (AE% not included)						

The estimation results tend to correspond with the reasoning used to suggest the appropriate sign of all of the explanatory variables except *Group*. Upon looking at the residuals or percent error between the actual supply rate price and the price the model predicts, the model performs above 80% when *AE%* is both included and excluded. The magnitudes of the coefficients vary significantly and therefore deserve explanation. The A*E%* coefficient has a very significant effect on the supply rate because all-electric households are large consumers of electricity in the winter in Illinois. As stated earlier, winter heating load and summer cooling load tend to balance out in this case resulting in a flatter load profile. The results suggest that a one percentage point increase in the *All-Electric% of Occupied Housing Units* decreases the *Supply Rate* by 14.6%. The *Contract Length* variable is positive with a small coefficient suggesting that contract length does influence the supply rate but the effect is quite small. The best way to interpret the relationship between *Contract Length* and *Supply Rate* is noting that the variables move together in the same direction. A 1% increase in *Contract Length* increases the *Supply Rate* by 0.061%.

The *Real-Time Locational Marginal Price* coefficient suggests that a change in the spot price results in a smaller change to the supply rate. A 1% increase in the *Real-Time Locational Marginal Price* results in a 0.915% increase in *Supply Rate Price* which suggests that not all of the price increase is passed through to the fixed supply rate price. Reasoning suggests that this can hold true because spot market purchases are the marginal purchases that are made by retailers to satisfy their load requirements that have not already been acquired with bilateral contract base load purchases. Thus, when taking into account average Real-Time prices it appears that it is costly for ARES to have to procure electricity in the Real-Time market. Therefore, it would be imperative from the perspective of the ARES to only be subject to the

Real-Time market when prices are low or when ideal buying opportunities present themselves. The *Median Household Income* coefficient suggests higher income municipalities are able to utilize higher performing consultants which are able to yield lower supply rate prices assuming that top forming consultants are more costly than lower performing ones. The variable only has a small effect on the supply rate price. Furthermore, high income households tend to have more efficient household electric goods and more efficient homes with regards to heating and cooling needs. A 1% increase in *Median Household Income* results in a 0.044% decrease in *Supply Rate*.

The *March 2012* coefficient suggests that those municipalities that passed the referendum on March 20, 2012 relative to November 6, 2012 received a 16.2% lower rate. The majority of the municipalities in the data set passed the referendum in either November or March of 2012 with 202 passing the referendum in March and 137 passing the referendum in November. Thus, it appears that the majority of the municipalities that passed the referendum did so at the most opportune time. The *April 2011* coefficient is not statistically significant and therefore has no effect on the supply rate relative to the most recent base period of November 2012. The final referendum dummy variable *November 2010* states that Fulton, Illinois, the first municipality to pass the referendum in Illinois and the only one to pass the referendum on November 2, 2010 received an 8.51% higher rate relative to those municipalities that passed the referendum on November 6, 2012. As a matter of fact, Fulton, Illinois has the highest supply rate price of any municipality in the data set at $0.0623/kWh.

The *Ameren Illinois* variable states that those municipalities that reside in Ameren Illinois service territory receive supply rate prices 11.4% less than those municipalities that passed the referendum in Commonwealth Edison service territory. The *Group* variable suggests that there are economies of scale from municipalities grouping together which is inconsistent with expectations suggesting that aggregating similar load shapes into a larger one does not make the larger aggregated load shape any more cost effective to supply from the perspective of an ARES relative to a single municipality load shape. A municipality *Group* typically receives a 2.3% lower supply rate than a municipality that acts alone. The significance of the *Group* variable deserves further analysis.

Simple statistics show that the mean supply rate price for municipalities that act alone is $0.04827/kWh and $0.04464/kWh for municipalities that join with other municipalities. The difference between the mean supply rate price for single and grouped municipalities suggests a 7.5% lower price on average for municipalities that reside in a group. The 2.3% lower rate associated with the *dGroup* dummy variable is associated with holding all other variables constant therefore not taking into account the specific characteristics of the group. In order to take into account the characteristics of the groups, the model is estimated using only the 168 single municipalities and the characteristics of the grouped municipalities are multiplied by the coefficients of the mean equation for the single municipalities to determine what price the grouped municipalities would have received had they acted alone. ***Table 10*** shows the results of the mean equation for the municipalities that acted alone.

[Table 10] Observations: 168 Single Municipalities						
White Correction for Heteroskedasticity						
Dependent Variable: Log Supply Rate Price						
Variable	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
C	**-1.879***	**0.715**	**0.0094**	**-2.14***	**0.729**	**0.0038**
All-Electric % of Occupied Housing Units	**-0.154***	**0.034**	**0.0000**	**N/A**	**N/A**	**N/A**
Log Contract Length Months	**0.053***	**0.012**	**0.0000**	**0.053***	**0.013**	**0.0001**
Log Real-Time LMP	**1.112***	**0.207**	**0.0000**	**1.141***	**0.213**	**0.0000**
Log Median Household	**-0.046***	**0.001**	**0.0000**	**-0.034***	**0.010**	**0.0010**

Income						
Dum. Mar'12 Referendum	**-0.186***	**0.026**	**0.0000**	**-0.183***	**0.027**	**0.0000**
Dum. Apr'11 Referendum	**-0.028**	**0.030**	**0.3514**	**-0.031**	**0.031**	**0.3158**
Dum. Nov'10 Referendum	**0.064****	**0.026**	**0.0151**	**0.062****	**0.027**	**0.0236**
Dum. Ameren Illinois Utility	**-0.107***	**0.015**	**0.0000**	**-0.115***	**0.014**	**0.0000**
R-Squared: 0.801				R-Squared: 0.785		
Adjusted R-Squared: 0.792				Adjusted R-Squared: 0.775		
*Denotes Significance @ 99% &**95%						
Residuals 1: 142 or 84.5% of Observations have < 5% Error (AE% included)						
Residuals 2: 135 or 80.4% of Observations have < 5% Error (AE% not included)						

The results predicting what supply rate price grouped municipalities would have received had they acted alone while taking into account their characteristics is shown in ***Table 11***. The average saving is 2.83% when the all-electric variable is taken into account and 2.44% when it is excluded.

[Table 11] Observations: 30 Groups

					AE% Included		AE% Excluded	
Group	Territory	Municipalities Included	Referendum Date	Actual Cents/kWh	Expected Cents/kWh	Savings	Expected Cents/kWh	Savings
1	ComEd	5	Mar-12	4.169	4.831	**15.88%**	4.784	**14.76%**
2	ComEd	2	Nov-12	4.035	4.648	**15.20%**	4.639	**14.98%**
3	AIU	2	Mar-12	3.980	4.324	**8.64%**	4.329	**8.76%**
4	ComEd	2	Mar-12	4.280	4.634	**8.26%**	4.593	**7.30%**
5	AIU	38	Mar-12	4.080	4.375	**7.22%**	4.354	**6.71%**
6	AIU	10	Mar-12	4.010	4.283	**6.81%**	4.315	**7.61%**
7	AIU	17	Nov-12	3.909	4.129	**5.62%**	4.113	**5.23%**
8	ComEd	8	Nov-12	4.983	5.235	**5.05%**	5.202	**4.40%**
9	ComEd	3	Mar-12	4.660	4.875	**4.61%**	4.839	**3.84%**
10	AIU	10	Nov-12	4.194	4.379	**4.40%**	4.318	**2.95%**
11	ComEd	3	Mar-12	4.580	4.766	**4.06%**	4.770	**4.15%**
12	AIU	2	Nov-12	4.190	4.360	**4.05%**	4.332	**3.39%**
13	AIU	25	Nov-12	4.009	4.164	**3.86%**	4.142	**3.32%**
14	ComEd	2	Nov-12	5.083	5.222	**2.73%**	5.185	**2.01%**
15	AIU	6	Mar-12	3.999	4.067	**1.70%**	4.145	**3.66%**
16	ComEd	2	Mar-12	4.760	4.808	**1.01%**	4.753	**-0.16%**
17	ComEd	2	Mar-12	4.750	4.790	**0.83%**	4.786	**0.76%**
18	AIU	4	Nov-12	4.194	4.224	**0.71%**	4.208	**0.33%**
19	ComEd	2	Mar-12	4.840	4.874	**0.70%**	4.806	**-0.71%**
20	AIU	7	Nov-12	4.099	4.125	**0.64%**	4.100	**0.02%**
21	ComEd	2	Mar-12	4.780	4.786	**0.12%**	4.794	**0.30%**
22	ComEd	3	Mar-12	4.750	4.754	**0.08%**	4.723	**-0.57%**
23	ComEd	15	Mar-12	4.830	4.826	**-0.08%**	4.773	**-1.18%**
24	AIU	7	Nov-12	4.247	4.225	**-0.52%**	4.187	**-1.42%**
25	ComEd	8	Mar-12	4.836	4.798	**-0.78%**	4.797	**-0.80%**
26	AIU	2	Nov-12	4.330	4.288	**-0.98%**	4.195	**-3.12%**
27	AIU	5	Nov-12	4.246	4.189	**-1.34%**	4.230	**-0.38%**
28	AIU	4	Nov-12	4.346	4.182	**-3.78%**	4.234	**-2.58%**
29	ComEd	7	Nov-12	4.775	4.591	**-3.86%**	4.597	**-3.74%**
30	ComEd	4	Apr-11	5.990	5.636	**-5.91%**	5.588	**-6.71%**
Average				**4.464**	**4.579**	**2.83%**	**4.561**	**2.44%**

Table 12 shows the model including the *Termination Fee* and removing the *Group* variable. The sign of the *Termination Fee* variable is in line with intuition. A municipality that agrees to a contract with a termination fee typically has a 2.5% higher supply rate relative to a municipality that does not have a termination fee associate with its aggregation plan. The results for the rest of the variables are pretty similar except for the *Real-Time Locational Marginal Price* variable. In this case a 1% increase in the Real-Time LMP results in a 1.113% increase in the supply rate price suggesting that ARES on average pass on more than what they pay for Real-Time market purchases to the consumer or retail supply rate price.

[Table 12] Observations: 163 Single Municipalities						
White Correction for Heteroskedasticity						
Dependent Variable: Log Supply Rate Price						
Variable	Coefficient	Std. Error	Prob.	Coefficient	Std.Error	Prob.
C	**-1.863***	**0.622**	**0.0032**	**-2.204***	**0.643**	**0.0008**
All-Electric % of Occupied Housing Units	**-0.154***	**0.032**	**0.0000**	**N/A**	**N/A**	**N/A**
Log Contract Length Months	**0.061***	**0.011**	**0.0000**	**0.061***	**0.012**	**0.0000**
Log Real-Time LMP	**1.091***	**0.182**	**0.0000**	**1.142***	**0.189**	**0.0000**
Log Median Housing Income	**-0.044***	**0.011**	**0.0000**	**-0.031***	**0.010**	**0.0014**
Dum. Mar'12 Referendum	**-0.187***	**0.024**	**0.0000**	**-0.186***	**0.025**	**0.0000**
Dum. Apr'11 Referendum	**-0.033**	**0.028**	**0.2518**	**-0.038**	**0.030**	**0.2048**
Dum. Nov'10 Referendum	**0.045****	**0.024**	**0.0628**	**0.042**	**0.026**	**0.1093**
Dum. Ameren Illinois Utility	**-0.112***	**0.013**	**0.0000**	**-0.118***	**0.012**	**0.0000**
Dum. Termination Fee	**0.025***	**0.007**	**0.0009**	**0.024***	**0.008**	**0.0023**
R-Squared: 0.825				R-Squared: 0.816		
Adjusted R-Squared: 0.815				Adjusted R-Squared: 0.806		
*Denotes Significance @ 99% & **Denotes Significance @ 95%						
Residuals 1: 137 or 84% of the Observation have < 5% Error (AE% included)						
Residuals 2: 129 or 79.1% of the Observations have < 5% Error (AE% not included)						

6. Policy Implications

The big question that remains surrounding Municipal Aggregation in Illinois is whether the recent widespread adoption of it will continue in the long-run or be a short-run phenomenon as a result of ARES easily being able to undercut the price of default service. If a goal is established to create an even greater competitive residential electric retail supply market doing away with default service could accomplish this goal. In this scenario there would be two options (Municipal Aggregation and Retail Choice) instead of three (Municipal Aggregation, Retail Choice, and Default Service). A benefit of eradicating default service would be that residential and small commercial customers would have to gain a more thorough understanding of the retail marketplace and choose a supplier. History suggests that individual households tend to not utilize retail electric choice alone because of the transaction cost therefore Municipal Aggregation seems likely to be the best alternative to default service. However, perhaps in an environment in which default service has been eradicated individual households may choose to utilize retail choice on their own more. If not, an allocation mechanism could be created to assign a supplier to those residential customers who do not reside in an aggregation plan or choose a supplier on their own.

The key issues that will have to be addressed if default service became nonexistent are potential ARES failures and a situation where ARES are faced with a rising wholesale price environment. With regards to ARES failures, a regulatory mechanism would need to be established to address this issue. In a situation of rising wholesale prices, an ARES would have to alter its procurement method to procure power at least cost over time which is similar to the approach taken by the Illinois Power Agency. ARES operate in a dynamic wholesale price environment. In a situation of rising prices, procurement strategies would have to be implemented to mitigate the risk of having to procure power at higher cost. ARES procurement methods could evolve to accomplish this task to ensure that they will continue to be able to offer low price supply rates. Those ARES that would not be able to adapt to a changing wholesale price environment would be driven out of the market as a result of not being able to compete with those ARES who can adapt to a rising wholesale price environment and continue to offer low priced supply rates. If the potential issues of ARES failures and rising wholesale prices could be addressed if default service was no longer available, the residential and small commercial retail market would be able to reach a far superior level of competition that exists in the marketplace now resulting in consumer benefits as a result of an increase in competition.

7. Conclusion & Closing Remarks

There were several limitations that existed in this study for the model was not specified as well as it would have liked to have been. There is no explanatory variable used to account for the small commercial customers that reside in aggregation plans. Also a household square footage variable would have been nice to test to see if it had a significant effect on the supply rate price. Furthermore, consultancy was not taken into consideration which plays a role in determining the supply rate price that a municipality receives. Municipality authorities choose a consultant to assist with administering the program, the "opt-out" process, managing the competitive bidding process, and writing the RFP or Request for Proposal to help the municipality choose an ARES (alternative retail electric supplier) and supply product. Thus, the performance of a consultant could be tested to determine if it has a statistically significant effect on the price a municipality receives.

A cleaner measurement of the LMP could yield different results. The LMP data used was not consistent relative to the referendum date because it was not obtainable in a monthly frequency for both PJM and the MISO. Ideally it would have been nice to use the average LMP for the year previous to the referendum date. Also, one of the clauses that are included in some of the contracts include a "meet or beat" clause which states that if the default rate price falls below the fixed supply rate, the ARES must meet the default rate price or allow those in the aggregation plan to freely leave the plan. A contract with a "meet or beat" clause essentially ensures that those in the aggregation plan will not be "underwater" relative to the default service price. Intuition suggests that those contracts that have a meet or beat clause would be associated with a higher supply rate price relative to those contracts that do not have the clause.

Municipal Aggregation in Illinois has flourished recently as municipalities that have passed the referendum have been able to establish fixed supply rate prices lower than the price of default service. In addition, Municipal Aggregation has been the mechanism that has led to the residential retail electric market evolving into a competitive marketplace. Prior to Municipal Aggregation becoming widely used there were not very many residences on competitive supply. Municipal Aggregation has allowed for a choice to be made with respect to supply mix, supplier, contract length, and terms and conditions on the behalf of entire municipalities. As a result of being able to aggregate, residences and small commercial businesses have been alleviated from transaction costs as they have allowed their municipal leaders to act on their behalf to make the appropriate choice on behalf of the entire municipality.

The results from the model state the key variables that influence the supply rate. The key drivers that explain the price received by a municipality include: service territory, wholesale prices, referendum date, contract length, and grouping with other municipalities. In addition, some variables that logically seemed would have an effect on the supply rate have been found to have no significance. The variables that do not have any effect on the supply rate include *MHV* (Median Home Value), *POP* (Population), *OHU* (Occupied Housing Units), & *PVL* (Poverty Level). One of the achievements of this research established the fact that there are economies of scale from municipalities grouping together. Therefore, a municipality that joins other municipalities is better off than acting alone. Given this fact, reasoning suggests that it would be ideal for a municipality to group with other municipalities because it can establish a supply contract that will yield a lower supply rate than acting individual. Finally, Municipal Aggregation is currently flourishing in Illinois and the results from this research suggest that its use should grow and continue in the future.

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Data Sources

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