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Does Coordination Among Assessing Units Generate Returns to Scale? Evidence from New York State

Abstract

This paper explores (dis-)economies of scale in property value assessment via cooperative agreements among small tax assessing jurisdictions without consolidation. New York State incentivizes small neighboring towns to unify their assessment function while maintaining respective tax authority; we test whether such coordination reduces assessment expenditure. We apply the cost function approach, include instruments (border intersection and prior cooperation in service provision) to address potential bias in selecting coordination partners, and use 2003-2014 administrative data for analyses. Results show that coordination increases adjustment costs for small jurisdictions but reduces unit costs among relatively large ones. This study contributes to the returns-to-scale literature in service provision, especially to property tax administration.

JEL-Codes: H200, H700, R510.

Keywords: property tax, value assessment, local financial administration, economies of scale, cost function.

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1. Introduction

This paper focuses on the technology of the value assessment function by local governments in property tax administration. The property tax is the main source of revenue and the financial base of local autonomy in the United States. The administration of the property tax, mainly value assessment and levy collection, is a local responsibility. The *Tax Assessor's Office* of each assessing jurisdiction is tasked with estimating the tax base. We estimate the returns to scale in property assessment to test whether it exhibits economies or diseconomies of scale; that is, whether the cost of achieving a given level of assessment quality depends on the size of the assessing jurisdiction as measured by the number of parcels. Economies of scale in property assessment exist when the valuation cost per parcel falls as the number of parcels to assess increases. While there are several ways to define the tax assessing jurisdiction (or "assessing unit"), this study examines *economies of size*, defined as the relationship between per parcel assessment expenditure and total number of parcels in a tax assessing jurisdiction. The evidence therefrom bears implications for the establishment, consolidation or division, of assessing jurisdictions.

There exists a substantial literature on returns to scale in public services, for example, returns to population scale in education (Tholkes, 1991; Pratten, 1991; Duncombe & Yinger, 2007) and in police or fire services (Wasylenko, 1977; Duncombe & Yinger, 1993). This literature provides a guide for estimating the appropriate cost function, showing that the cost function may exhibit economies or diseconomies of scale in different population ranges and that changes in scale may lead to adjustment costs (Kenny, 1982; Cotton, 1996; Howley, 1996; Duncombe & Yinger, 2007). However, economies of scale in property assessment have not been adequately studied; the literature includes only a few papers like Wicks et al. (1967) and Sjoquist and Walker (1999). This study is an effort to substantiate this line of research.

Many states incentivize small tax assessing units to consolidate or centralize their assessment function to the county level, under the assumption that larger assessing units will achieve economies of scale. This paper takes advantage of a program in the state of New York that allows two or more local assessing governments to combine their tax assessor's offices while preserving respective autonomy in budgeting and levying taxes. The inter-municipal cooperation may be less costly than consolidation. We ask whether merging the property assessing function among neighboring jurisdictions leads to economies of scale. We estimate the magnitude of returns to scale using a unique panel data set of NY assessing jurisdictions from 2003 to 2014. We also examine the implication of our results for the arrangement of tax assessing jurisdictions. On a broader scale, this paper extends the perennial discussion on equity and efficiency in public service provision to the study of property tax administration.

2. Literature Review

The literature on returns to scale in the provision of public services shows mixed evidence of economies of scale. Early studies of fire, roads, police services and public libraries relied on *ad hoc* functional forms rather than drawing on economic theories to model costs (Ahlbrandt, 1973; Walzer, 1972; Deller et al., 1988). Subsequent research started adopting the Bradford et al.'s (1969) cost function framework, which adapted the economic theory of cost minimization at the firm level to the public sector (Fox, 1981). Duncombe and Yinger (1993) estimated a general cost function in fire protection services and formally defined various dimensions of returns to scale.

Empirical results in the education finance literature often vary by the type of spending (Ratcliffe et al., 1990; Downes & Pogue, 1994; Duncombe et al. 1995), which point to an optimal enrollment size that minimizes costs (Duncombe et al., 1996; Imazeki & Reschovsky, 2004). Tholkes (1991) and Pratten (1991) summarize the potential sources of economies of size in education that may apply to other public services. The sources are indivisibility of labor input, increased dimensions conducive to sharing capital or technology, specialization, price benefits of scale from input purchases, lower cost of innovation, and positive learning spillover effects. However, a related literature that also estimates education production functions does not find evidence that school size affects student performance (Deller & Rudnicki, 1993; Walberg & Fowler, 1987; Ferguson, 1991; Lee & Smith, 1977). While most studies rely on cross-sectional variation in size, Duncombe and Yinger (2007) estimate economies of scale based on the larger enrollment changes that accompany school district consolidation. This study uses a similar design to identify returns to scale in assessment. As a review of the returns-to-scale literature in education, Andrews et al. (2002) underline the methodological limitations across studies such as the measurement of performance, efficiency, and outcome, and highlight the importance of addressing simultaneity and omitted variable biases in cost function models.

Despite the long history of the property tax in the United States, few studies examine the returns to scale in property assessment. Netzer (1966) and Wicks and Killworth (1967) were the first to provide jurisdiction-specific cost estimates of property tax administration, which averages 1.5 percent of property tax revenue. Using a sample of 138 county-level assessment offices in Georgia and a translog cost function model, Sjoquist and Walker (1999) found evidence of significant economies of scale, with an assessment volume elasticity of 0.3, suggesting that consolidation of small assessing units would reduce total cost by approximately 20%. However, the paper does no discussion potential endogeneity in performance measures or consolidation decisions, which may have led to a biased estimate of the elasticity.

3. Property Assessment in the State of New York

As a strong home rule state, New York has a highly decentralized property tax system with a large number of small assessing jurisdictions. The number was 1,546 in 1983; after decades of reform efforts, it remained high at 994 as of 2017 (ORPTS, 2017), most being towns (932) with only a very small number (62) being cities. Many small, rural towns face challenges to conduct reappraisal on a regular basis. Across-jurisdiction variation is large in assessment practices and in the qualifications and status of assessors. For example, 180 assessors spread their services over 524 jurisdictions (ORPTS, 2011) and assessors in most jurisdictions (over 94%) are appointed by their municipal board, other jurisdictions (fewer than 6%) elect their assessors (ORPTS, 2017).[1] As noted in the empirical literature on property assessment, appointed assessors are better insulated from political pressure than their elected counterparts; dominance of appointed assessors reflects the trend toward professionalism (Bowman & Mikesell, 1989; 1990).

The New York *Real Property Tax Law* does not prescribe a uniform assessment cycle or assessment ratio for local assessing jurisdictions. Instead, the State provides three programs of financial aid to assist property assessment. The first program, *Cyclical Reassessment Aid*, (initially introduced as Attainment Aid in 1977 and replaced with the current program in 2010) incentivizes reappraisal at shorter intervals. The second, the *Consolidated*, *Coordinated and County Assessment Program*, encourages merger of small assessing units. The more recent *Coordination Assessment Program* (CAP), introduced in 1994, is an alternative to consolidation, since merging two or more local governments is a long process and may incur high political and adjustment costs. CAP participants receive a one-time lump sum state aid in the year they unify their assessing

[1] Among jurisdictions that elect their assessors, some either maintain a board of three elected assessors or elect a sole assessor. Whether appointed or elected, sole assessors serve six-year terms; the elected board of assessors serve four-year terms.

function. The maximum state aid for each municipality was capped at $140,000 until 2005, then limited to $100,000 since 2006.

The main components of a CAP include employing a single assessor, assessing at a uniform percentage of market value, using the same assessment calendar, and preparing a single assessment roll among participating jurisdictions. The sole assessor is employed by one jurisdiction; the total assessment cost, including assessor compensation, is shared among participants based on their respective parcel counts. The state reports identical equalization rates for jurisdictions in the same CAP. Each participating jurisdiction sets its own tax rate, maintains its own assessment appeal procedure, and can file its own complaints against the state's calculation of its equalization rate.

CAP agreements require a majority vote of the Town or City Board for approval. Between year 2000 and 2010, 101 jurisdictions formed 51 CAPs; in the same period, 17 CAPs dissolved. We translate the variation in CAP activities into changes in the size of assessing units to estimate the returns to scale.

4. Analytical Framework and Models

4.1. Cost Function Framework

We follow the standard cost function approach, developed by Bradford et al. (1969), for estimating returns to scale in public production. This approach is derived from the economic theory of cost minimization in the provision of public services; it uses a modified version of the standard private sector cost function at the firm level. We adopt the framework that is commonly used in the education finance literature for studying the cost effect of school district consolidation (Duncombe & Yinger, 1993, 2007, 2011; Duncombe et al., 1995; Downes & Pogue, 1994; Imazeki & Reschovsky, 2004) and adapt it to the context of property tax assessment.

In comparison to the provision of other public services that involve different types of resources and multiple actors with vested interests, property assessment is simpler though value assessment also requires inputs (denoted as vector $\boldsymbol{I_i}$) such as personnel costs for assessor and staff, and contractual expenses if external contractors are hired to conduct field visits. These inputs translate into an intermediate output which we call property assessment services, $G_i = g(I_i)$, such as data bases. The second stage of the Bradford et al. (1969) framework translates G_i into a final output, S_i, which is what voters care about. The most plausible measure of S_i is assessment uniformity – variation in assessment ratio across properties, measured as the coefficient of dispersion (COD). This final output is a function of the intermediate output (G_i), physical factors like the number of parcels (N_i), and environment variables at the neighborhood and jurisdiction levels such as population density (D_i). The second-stage production function can be written as: $S_i = h(N_i, G_i, D_i)$ or $h(N_i, g(I_i), D_i)$.

The *first-stage cost function* indicates that the minimum cost for a given level of G_i and given input prices (W_i) which is not directly observed, is often measured by spending, E_i. However, this approach requires controls for inefficiencies in assessment. Solving the second-stage for G and substituting into the first-stage gives the following *second-stage cost function*:

$$E_i = c[h^{-1}(N_i, S_i, D_i), W_i] = N_i^{\beta} {S_i}^{\tau} {D_i}^{\gamma} {W_i}^{\lambda} \quad (1)$$

We measure W_i with personnel costs of the Assessor's Office. Following Sjoquist and Walker (1999), we assume that the price of capital input is the same across jurisdictions in New York State. The multiplicative version of this cost function, consistent with Cobb-Douglas production technology, is a linear estimating equation:

$$ln(E_{it}/N_{it}) = \alpha + \beta\, ln(N)_{it} + \tau\, ln(S)_{it} + \gamma\, ln(D)_{it} + \lambda\, ln(W)_{it} + \varepsilon_{it} \quad (2)$$

which allows us to estimate the impact of parcel counts, N_{it}, on per-parcel total cost of assessment. Economies of size are identified if β, elasticity of E_{it}/N_{it} with respect to N_{it}, is negative.

The estimable expenditure model, as Equation (2), grants the flexibility to add interaction or nonlinear terms for the size variable. We add the square of $\ln(N_{\mathrm{it}})$ to test whether economies of size diminish with size. It will be informative if we can identify an inflection point that indicates the minimum size of assessing units where the total cost starts to decline instead of increasing. We also include the share of (wholly) exempted parcels as a control variable in vector $\boldsymbol{Z}_{it}$ to partially capture inefficiency in property assessment. This variable reflects complaints from town assessors about how the identification and verification of exempt parcels compete for their time and staff resources that could be spent on conducting assessment instead.[2] For convenience of modeling, we assume that unobserved bureaucratic inefficiencies do not vary over time, so that their impact is absorbed by the jurisdiction fixed effects, δ. The *baseline model* of assessment expenditure is:[3]

$$\ln(E_{it}/N_{it}) = \alpha + \beta_1\, ln(\,N_{it}) + \beta_2[ln(\,N_{it})]^2 + \tau\, ln(\,S_{it}) + \gamma\, ln(\,D_{it}) + \lambda\, ln(\,W_{it}) + \mathbf{Z}_{\mathrm{it}} + \theta_t + \delta_i + \varepsilon_{it} \qquad (3)$$

The literature underlines the importance of accounting for potential simultaneity bias of voters' demand for services that affects both the expenditure and outcome measures (Fox, 1981; Andrews et al., 2002). To address this issue, we treat S_i as endogenous and employ exogenous determinants of demand for assessment uniformity as instruments in our final structural equation. Following Duncombe and Yinger’s (2007) approach which is based on Case et al.’s (1993) classic

[2] In interviews with us and in our survey through the New York Association of Assessors, several town assessors list administering large quantities and categories of property tax exemptions as one of their major challenges. (Robert Bick, Assessor, Town of Clay, New York, Personal interview, September 27, 2017; Robert Harris, Assessor, Flat Creek of Montgomery County, New York & William F. Roehr, Managing Principal, Montgomery County, New York, April 21, 2017)

[3] An alternative is following Duncombe and Yinger's approach (1998, 2001, 2007) to model efficiency based on observable characteristics that may affect (in)efficiency via monitoring efforts among voters and local officials' incentives to assess more efficiently.

"copycat" theory, we assume that the demand for property assessment uniformity among median voters in a given jurisdiction may partly be influenced by neighboring jurisdictions' assessment uniformity. We use median tax share and average residential COD of neighboring jurisdictions in the same county to instrument for S_i, and use the determinants of county level labor market conditions – wage in the manufacturing industry and unemployment rates, to instruments for assessor salary.

4.2. Empirical Model

The main variation in jurisdiction size occurs when jurisdictions decide to enter a CAP. To address potential endogeneity in localities' decisions to join a CAP, we use a standard IV model with instruments on the intersection of geographic borders and the history of inter-municipal cooperation in providing public services. The *outcome equation* and *treatment equation* are expressed as (4) and (5), respectively:

$$Y_{it} = f_Y(P_{it}, \boldsymbol{V}_{it}, \boldsymbol{X}_{it}, \boldsymbol{U}_{\mathrm{it}}, \varepsilon_{it}) \quad (4)$$

$$P_{it} = f_P(\boldsymbol{Z}_{it}, \boldsymbol{X}_{\mathrm{it}}, \boldsymbol{U}_{\mathrm{it}}) \quad (5)$$

where Y_i denotes the dependent variable which is $\ln(E_{it}/N_{it})$; $\boldsymbol{V}_{it}$ is a vector of other endogenous determinants outlined in the cost function ($S_{it}, W_{it},\ A_{ict}$ and R_{ict}); $\boldsymbol{U}_{\mathrm{it}}$ is a vector of time varying unobservable traits of jurisdiction *i*; and $\varepsilon_{it}$is the error term. P_{it} is a binary of CAP decision that equals 1 once a jurisdiction enters a CAP or was already in a CAP during the sample period and 0 otherwise. $\boldsymbol{Z}_{it}$is a vector of instrument variables for the CAP decision which will be elaborated below. Our underlying *assumption of independence* is expressed as (6) which implies the *exclusion restriction condition* as (7):

$$Z_{it} \perp \boldsymbol{U}_{\mathrm{it}}, \varepsilon_{it} \mid \boldsymbol{X}_{\mathrm{it}} \quad (6)$$

$$Z_{it} \perp Y(p)_{\text{it}} \,|\boldsymbol{X}_{\text{it}} \text{ for all p} \in supp(P_{it}) \tag{7}$$

This paper estimates the economies of size among jurisdictions that became larger assessing units after joining a CAP; therefore, we construct a new measure of size to reflect the CAP decision, defined as the following:

$$\begin{cases} NC_{ict} = (N_{ict} + \sum_{j \neq i}^{J} N_{jct}) & \text{if } P_{ict} = 1 \; and \; P_{jct} = 1 \\ NC_{ict} = N_{ict} & \text{if } P_{ict} = 0 \end{cases}$$

where jurisdiction *i* and jurisdiction *j* are neighbors in county *c* that become CAP partners. P_{ic} is an indicator of CAP participation that is coded as 1 for years when a jurisdiction has entered a CAP. We assume that the size of jurisdiction j is exogenous to jurisdiction i. The size of a participating jurisdiction equals its original N_{ict} before it joined a CAP; it becomes the enlarged NC_{ict} only after it entered a CAP. For jurisdictions that never entered a CAP in the sample period, NC_{ict} is coded as N_{ict} (i.e., $P_{ict} = 0$) for all years. This adjustment in the measure of size is shown in the new measure of assessment expenditure, now defined as:

$$\begin{cases} EC_{ict} = (E_{ict} + \sum_{j \neq i}^{J} E_{jct}) & \text{if } P_{ict} = 1 \; and \; P_{jct} = 1 \\ EC_{ict} = E_{ict} & \text{if } P_{ict} = 0 \end{cases}$$

The final model to estimate with 2SLS is an extension of equation (3), where we replace size and cost per parcel with the adjusted measures defined above. This model includes additional time-varying, observable covariates that are (expected to be) correlated with both NC_{ict} and EC_{ict}. All covariates of CAP participants in years they are in a CAP ($P_{ict} = 1$) are adjusted accordingly. Specifically, the values of random variables in vector X_{ict} are converted to the average of CAP participants; demographic variables are weighted by population; and property related variables are weighted by number of parcels. The final structural expenditure model is:

$$\ln(EC_{ict}/NC_{ict}) = \alpha + \beta_1 \, ln(NC_{ict}) + \beta_2[ln(NC_{ict})]^2 + \beta_3 P_{ict} + \tau \, ln(S)_{ict} + \gamma \, ln(E)_{ict}$$

$$+\lambda \, ln(W)_{ict} + \rho \, ln(A)_{ict} + \varphi \, ln(R)_{ict} + \Pi \mathbf{X}_{\text{ict}} + \mathbf{Z}_{\text{it}} + \theta_t + \delta_{ic} + \varepsilon_{ict} \qquad (8)$$

where A_{ict} denotes *state aid* for property assessment, including the one-time, lump sum amount for joining a CAP; R_{ict} indicates *years since last reassessment* and $\boldsymbol{X}_{ict}$ represents a vector of exogenous *jurisdiction characteristics*.

In order to isolate an unbiased estimate of the returns to size in assessment, it is important to control for other potential channels through which CAP may affect assessment expenditure. One channel is state aid, since CAP participants receive financial assistance from the state. The direction of potential omitted variable bias in our elasticity estimate by excluding A_{ict} is ambiguous: Although significantly and positively correlated with CAP by construction, state aid that often comes along with technical assistance may help reduce costs or lead to an increase in assessment expenditure. Therefore, it is important to include state financial assistance in the model. We also control for the confounding effects of changes in the reassessment cycle, to account for the possibility that jurisdictions entering a CAP may be able to cut costs by conducting reappraisal more frequently with their partners.

Another channel is through changes in assessment ratio, since jurisdictions in a CAP are required to assess at a uniform ratio of true value. If entering a CAP leads to a rise in assessment ratio through conducting more frequent assessments, R_{ict} may partly capture its effect on cost. As a robustness check, we test whether our elasticity estimate is sensitive to the inclusion of a level-of-assessment variable, measured by state equalization rates.

The covariates in vector $\boldsymbol{X}_{ict}$ include shares of exempt parcels, commercial parcels, and industrial parcels as well as population density and population growth. Since over-time change of administrative environment is very limited at the town and city level, we expect the jurisdiction fixed effect δ_{ic} to capture adjustment costs that are not associated with NC_{ict} but with P_{ict} and the dependent variable. Several specifications also include a CAP specific linear time trend. We weigh our estimates by the original parcel count of each jurisdiction.

Drawing from the copycat or yardstick theory, we use instruments for A_{ict} and R_{ict}, as in Duncombe and Yinger (2007). The instruments are the average of state aid received for reassessment and the number of years since the previous reassessment among neighboring jurisdictions in the same county. Assuming that jurisdiction's decisions are influenced by decisions of their counterparts in the local labor market, we treat characteristics of neighboring jurisdictions as exogenous to the actual assessment cost of our sample.

We use three instruments for P_{it} and NC_{ict}. The first is the *number of CAPs* formed in county *c*, excluding the CAP that *i* is in, which reflects the exposure of a jurisdiction to an environment of collaboration among neighboring tax assessing jurisdictions. We hypothesize that the more CAPs are formed in a county, the higher the probability for a given jurisdiction to enter a CAP. Indeed, we observe positive correlation between this instrument and the predicted probability of joining a CAP as shown in Figure 1.

$$\mathrm{z}_{1,\mathrm{ict}} = \sum_{k \neq i} P_{kct} |\ k, i \text{ in same county}, c$$

The other two instruments measure jurisdictions' exposure and opportunities for inter-municipal cooperation in providing services other than tax assessment. We use administrative data on state aid to municipalities that are committed to collaborating with their neighbors. The second instrument is the *mean count of other jurisdictions k* that had experience in joint provision of services with neighbors in the same county, which is expressed as:

$$\mathrm{z}_{2,\mathrm{ict}} = \sum_{k \neq i} DSHARE_{kct} \ |\ k, i \text{ in same county}, c$$

where $\mathrm{z}_{2,\mathrm{ict}}$ denotes the second instrument; $DSHARE_{kct}$ is a dummy for jurisdiction *k* in county *c* that had experience in sharing services with other towns or cities in the same county and received state aid for such collaborative activities in year *t*. The underlying hypothesis, grounded on the assumption of path dependency, is that there would be a positive relation between this instrument and the decision to join a CAP.

The third instrument is inspired by the Bartik or "shift-share" instrument that utilizes the interaction between variation in nationwide inflow of immigrants and the geographic distribution of immigrants in the past at city level to identify a short-run causal effect of migration on various outcomes. We use variation at a higher-level government and interact it with jurisdiction level spatial variation that does not vary over time and is exogenous to a jurisdiction's spending decisions at time *t*. We construct this instrument, $z_{3,ict}$, as the frequency of county c's $DSHARE_{ct}$ with other counties [4] ($\mathrm{COUNTYSHARE_{ct}}$), multiplied by the relative size of neighboring jurisdictions whose borders are contiguous to that of a given jurisdiction i.

$$\mathrm{z_{3,ict}} = \frac{\#\text{ of } k \text{ with contiguous borders with } i, \text{ in county } c}{\#\text{ of } k, \text{ in county } c} \cdot \mathrm{COUNTYSHARE_{ct}}$$

We also instrument for the quadratic size variable, $[ln(NC)_{ict}]^2$, following Wooldridge (2000).[5] The first-stage model is expressed as equation (9); alternatively, we use a three-(recent-) year (until year *t*) average value of the three instruments in vector $\boldsymbol{Z}_{it}$ as the regressors in the first stages.

$$P_{it} = \pi_0 + \pi_1 \boldsymbol{Z}_{it} + \Pi \mathbf{X}_{\mathrm{ict}} + \theta_t + \delta_{ic} + \epsilon_{ict} \tag{9}$$

$$\ln(\mathrm{NC_{ict}}) = \pi_0 + \pi_1 \boldsymbol{Z}_{it} + \Pi \mathbf{X}_{\mathrm{ict}} + \theta_t + \delta_{ic} + \epsilon_{ict} \tag{10}$$

$$\ln(\mathrm{NC_{ict}}) = \pi_0 + \pi_1 \sum_{t=z-2}^{z} \boldsymbol{Z}_{it} + \Pi \mathbf{X}_{\mathrm{ict}} + \theta_t + \delta_{ic} + \epsilon_{ict} \tag{11}$$

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[4] This is the mean count of counties that a given county *c* shares public services with, in year *t*

[5] We first run the first stage regression with $ln(NC)_{ict}$ as the dependent variable and after obtaining the predicted outcome, use the squared term of the predicted value as an instrument for $[ln(NC)_{ict}]^2$ in the second stage regression.

As a robustness check, we use a control function approach, running separate first-stage regressions for each of the three key endogenous variables ($P_{ict}, ln(NC)_{ict}$ and $[ln(NC)_{ict}]^2$) as well as the four endogenous covariates (S_{ict}, W_{ict}, A_{ict} and R_{ict}) on all exogenous variables, then retrieve the residuals from each regression. The second-stage regressions include the residuals as additional regressors in equation (8).

5. Data

Our sample is comprised of 760 tax assessing towns and cities in New York State, 78 of which participated in 38 CAPs between years 2003 and 2014. We exclude counties of Tompkins and Nassau where the county conducts property assessment.[6] Appendix Table A1 lists the CAPs by their year of formation and dissolution.

Annual expenditure and tax revenue data are from *New York Local Financial Data* assembled and published by the New York State Comptroller's Office. We match these data to a rich set of jurisdiction-level administrative information related to assessment practices and local environment from the New York Office of Real Property Tax Services (ORPTS). Data provided by the ORPTS include total assessed value of exempt parcels, parcel count by property class, number of exempt parcels per property class, assessment ratio, year of reassessment and annual records of state aid receipt for property assessment by program. All financial variables are inflation adjusted to year 2003 values.

Performance variables of property assessment are COD, which we construct for each assessing unit, using parcel level sales data from the annual *New York Market Value Survey*.[7] Our

[6] A third county, Montgomery, centralized assessment to the county level in 2018, which is outside our sample period.
[7] The New York state Office of Real Property Tax Services (ORPTS) only reports COD for a sample of assessing units that have not conduced revaluation over the three years prior to the market value survey year.

calculation uses only arms-length sales in order to exclude outliers. We focus on three most representative sub-classes of residential property that account for 95% of the sample – one-family year-round residence, rural residence with acreage, and two-family year-round residence. We develop two CODs for use in the tests, one of all three classes and the other only of single-family year-round residences. The CODs are highly skewed. To address this issue, we normalize them to natural logarithm. Then we convert them into negative for ease of interpretation, such that a positive coefficient on $\boldsymbol{S}_{it}$ suggests improvement in assessment uniformity.

Data of inter-municipal cooperation is from the Division of Local Government and School Accountability in the State Comptroller's Office. State aid for inter-municipal cooperation was initiated in 2005, which cuts our observation of collaboration in service provision to years 2005-2014. We calculate border contingency among jurisdictions using the ArcMap10 software and the civil boundaries shape file provided by the NYS GIS Clearinghouse.

We construct median tax share with median housing prices from the *Market Value Survey*. Population density is from *American Housing Survey*, population growth from State Comptroller's Office. County-level unemployment rate is from the Bureau of Labor Statistics, county-level private sector wage from New York Department of Labor. Table 1 lists the variables and their data sources; Table 2 shows summary statistics of the variables.

Table 3 provides the descriptive changes in assessment costs among the 78 jurisdictions that participated in CAPs. The aggregate assessment costs seem to be low, on average, after combining their assessing functions with neighbors by participating in a CAP. Most of this reduction in total costs seems to be driven by savings in personnel cost, while contractual expenses increase. There also seem to be lagged effects: total costs increase in the first year of participating in a CAP, possibly due to various adjustment costs; cost savings emerge between the second and third years. Appendix Tables A2 and A3 list the total, personnel, and contractual costs of each CAP participant.

6. Results

6.1. Instrument Validity

In order to get unbiased estimates of returns to scale, we first examine whether the instruments employed in our analysis are valid. Valid instruments for the CAP decision and newly constructed size variables should be good predictors of the endogenous variables, but not directly determine the total expenditure on assessment. The same logic applies to the four endogenous covariates.

Figure 1 depicts the first-stage relationship between each instrument and the potentially endogenous decision to join a CAP. The vertical axis on the left-hand side of each graph indicates jurisdictions' probability of joining a CAP and the right-hand side vertical axis shows the density of each instrumental variable's histogram. Panel A shows a strong positive relationship between the count of other CAPs in a county and the decision of individual jurisdictions in the county to enter a CAP in a given year. Panel B suggests that there might be a quadratic relation between a jurisdiction's exposure to inter-municipal cooperation in providing services among neighbors and the likelihood of it deciding to combine the assessment function with its neighbors. Panels C and D suggest that county-level exposure to sharing service provision and the third instrument, $z_{3,ict}$, are both positively correlated with a jurisdiction's probability of joining a CAP.

In the main analysis, we assess whether our instruments are weak by checking conditional first-stage F-test statistics. Since we have multiple endogenous variables, we refer to the Cragg–Donald statistic and compare the F-statistic with simulated critical values from Stock and Yogo

(2005). The Cragg-Donald and F-statistics for all 2SLS models using these instruments are above the critical value and thus passed the weak instrument test.

Second, we check the exogeneity assumption by assessing whether the instruments and errors are uncorrelated in all periods. We conduct a balance test to see whether the exclusion restriction condition holds. Table 5 shows that there is no individual or joint statistical significance between covariates and the three instruments. The same holds for the four endogenous covariates.[8] Tables 5 and 6 report *p*-values of the Hansen *J*-test, the null hypothesis of which is that the excluded instruments are uncorrelated with the error term: We fail to reject this null hypothesis in all model specifications. We also show whether the instruments are orthogonal to jurisdiction level characteristics such as share of exempt, industrial and commercial parcels, population density, and average tax share.

6.2. Empirical Results

Tables 5 and 6 report the OLS and 2SLS estimates of the relation between the size of an assessing unit and per parcel assessment costs. Columns (1)-(3) show the same-year effect when a given jurisdiction joined a CAP; columns (4)-(6) show the one-year-lag effect; and columns (7)-(9) the two-year-lag effect. In 2SLS models, the size of assessing units, quadratic term of the size variable, and an indicator for the decision to join a CAP are all instrumented. The log of assessor wage per parcel, log of state aid, and assessment frequency as well as the negative log of COD are treated as endogenous variables.

The results in Table 5 show that assessment costs increase with jurisdiction size at a decreasing rate, significant at 95% confidence level. The coefficients on the size variables indicate

[8] These are not reported in Table 5. They are available upon request.

a hump-shaped relationship between size and cost per parcel. The main difference across specifications is the parcel count at which positive economies of size begin.[9]

In the baseline 2SLS model in column (2), for instance, increasing the unit size is positively associated with total cost for assessing units that have fewer than 3,385 parcels, while the marginal effect of size becomes negative for assessing units with more than this parcel count. Put another way, assessing units smaller than this turning point experience diseconomies of scale, while larger units benefit from economies of scale.[10] The 3,385-parcel count is smaller than the mean (3,936); it is between the median and top quartile in the distribution of parcels within each assessing unit. This count is larger than the average size (2,105) of CAP participants, but smaller than the average count (3,597) of non-participants, jurisdictions that never participate in CAPs during our sample period.

Figure 2 illustrates graphically the marginal effect of assessing unit size on assessment cost. The four graphs highlight the time trend and potential lagged effects of CAP participation, and compare the estimates across model specifications. Panel A summarizes the estimates from the first three columns in Tables 5 and 6. The negative relationship between assessment cost and size of assessing unit is more pronounced with 2SLS estimates. The bias in OLS estimates appears to attenuate the magnitude of diseconomies of size. The estimates are consistent across the joining year, lag-one year, and lag-two year.

Panels B through D show 2SLS estimates for three years across three specifications. Panel B depicts estimates from specification I, the baseline 2SLS models (columns 2, 5, 8 in Tables 5 and 6). These estimates show larger lagged effects with steeper negative slope in lag-one year

[9] Following the economies of scale literature, we calculate a turning point in each specification which is the minimum size of an assessing unit where the per parcel cost starts to decline instead of rising with additional parcels to enlarge the unit size.
[10] The turning points is where the marginal effect of N on expenditure is equal to zero.

(Year 2) than in the year of joining a CAP (year 1). The turning point is smallest in the first year, which implies that on average, more assessing units experience economies of scale in the first year than in the following year.

Panel C shows estimates from specification II, models that include a jurisdiction-specific linear trend (columns 3, 6, 9 in Tables 5 and 6), to account for local level characteristics in each jurisdiction that change in a linear way and are correlated with both assessment costs and the decision to enter a CAP. Here the marginal effect of size on assessment cost is smaller than that from other specifications, in year one when a jurisdiction joined a CAP (Panel A). Inclusion of a linear time trend should not affect the statistical significance of coefficients on the size variables across most specifications, although the turning point is smaller than for other 2SLS estimates in Table 5. However, β_1 and β_2 estimates in Table 6 are not all statistically significant with linear trends in the model, in any of the three years. Not including the linear trend would bias the coefficients of size and P_{ict} (indicator of entering a CAP), should there be a systematic relationship between the trend in assessment costs and participation in a CAP. For instance, we should be concerned about omitted variable bias if jurisdictions enter a CAP largely due to rising assessment budgets, which would lead to a positive bias of our estimates. However, the coefficient of P_{ict} is larger when controlling for time trend as in column (3) of Table 6, which is at odds with the aforementioned concern.

Panel D shows estimates from models that use three-year average, instead of yearly, values of the instrumental variables (Table 7). The estimates remain relatively stable, suggesting that the marginal effect is larger in the lag years relative to the year of joining a CAP.

7. Conclusion

This essay has tested whether larger tax assessing units incur lower assessment costs per parcel than smaller units, controlling for assessment quality. We take advantage of a New York State program that incentivizes expansion in the size of assessing units (by parcel count) when they combine their assessment function with neighbors. We use the cost function approach to conduct estimation and address potential selection bias with multiple instruments that we constructed using spatial intersection of jurisdiction boundaries and inter-municipal cooperation among neighboring jurisdictions in providing public services.

We find significant and unbiased evidence of diseconomies of scale among small units and economies of scale among larger units. The positive association between total assessment cost and jurisdiction size among smaller units suggests that they incur adjustment costs when merging with other assessing jurisdictions. The potential mechanism for diseconomies of scale for smaller units may be through higher transportation costs or changes in assessment practices such as more frequent reassessment or shifting from contracting-out to conducting in-house assessment. Although we have not fully dissected potential mechanisms in this paper, descriptive statistics suggest that the initial adjustment costs in the first three years are higher for smaller assessing units. On the other hand, 8 to 11 percent of assessing units that become sufficiently large (ranging from 3,385 to 4,355 parcels) post-CAP entry, benefit from positive economies of scale.[11]

This essay has explored an alternative policy for small tax assessing jurisdictions beside politically costly consolidation. The presence of economies or diseconomies of size has important policy implications on the design of local property tax systems and for collaborative governance among localities.

[11] 91 assessing units experienced positive economies of scale when the turning point was 4,355 and 116 units whose parcel size exceeded 3,385 benefited from cost savings due to CAP participation.

References

Altonji, Joseph G. and David Card, "The Effects of Immigration on the Labor Market Outcomes of Less Skilled Natives," in *Immigration, Trade and the Labor Market*, John Abowd and Richard. Freeman, eds. (Chicago, University of Chicago Press: 1991).

Bick, Robert & New York Association of Assessors, New York. (2016). *Assessment Staffing Survey*. Unpublished raw data.

Bick, Robert. (2017, September 27). Personal interview with the Assessor of Town of Clay, New York.

Andrews, M., Duncombe, W., & Yinger, J. (2002). Revisiting economies of size in American education: are we any closer to a consensus? *Economics of Education Review*. 21(3), 245-262.

Borland, Melvin & Steven Lile. (1980). "The Property Tax Rate and Assessment Uniformity." *National Tax Journal*. 33 No. 1 (March): 99–102.

Bowman, John H., & William A. Butcher. (1986). "Institutional Remedies and the Uniform Assessment of Property: An Update and Extension." *National Tax Journal*. 39 No. 2 (June): 157–69.

Bowman, John H., & Mikesell, John L. (1989). "Elected versus Appointed Assessors and the Achievement of Assessment Uniformity." *National Tax Journal*. 42:181-189.

Bradford, D. F., Malt, R. A., & Oates, W. E. (1969). The rising cost of local public services: Some evidence and reflections. *National Tax Journal*. 22(2), 185-202.

_______ (1990). "Assessment Uniformity: The Standard and Its Attainment." *Property Tax Journal* 9: 219–33.

______ (1990). "Improving Administration of the Property Tax: A Review of Prescriptions and Their Impacts." *Public Budgeting and Financial Management*. 2: 151-176.

Card, David. (2001). "Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration," *Journal of Labor Economics*. 19: 22–64.

Case, Anne C., James R. Hines, Jr., and Harvey S. Rosen. (1993). Budget spillovers and fiscal policy interdependence: Evidence from the states. *Journal of Public Economics* 53 (3): 285–307.

Chicoine, D. L., & Giertz, J. F. (1988). Uniformity in a dual assessment system. *National Tax Journal*, 247-256.

Cornia, G. C., & Slade, B. A. (2006). Horizontal inequity in the property taxation of apartment, industrial, office, and retail properties. *National Tax Journal*. 33-55.

Cotton, K., 1996. Affective and Social Benefits of Small-Scale Schooling. *ERIC Digest*.

Cotton, K. (1996). Affective and social benefits of small-scale schooling. *Eric Digest*. EDO-RC-96-5.

Deller, Steven C., David L. Chicoine & Norman Walzer. (1988). "Economics of Size and Scope in Rural Low-Volume Roads." *Review of Economics and Statistics.* 70 No. 3. 459–65.

Dornfest, Alan. (2010). "In search of an optimal revaluation policy: benefits and pitfalls" in Bahl et al eds. 2010. *Challenging the Conventional Wisdom of the Property Ta*x.

Downes, T. A., & Pogue, T. F. (1994). Adjusting school aid formulas for the higher cost of educating disadvantaged students. *National Tax Journal*. 89-110.

Duncombe, W., & Yinger, J. 1993. "An Analysis of Returns to Scale in Public Production, with an Application to Fire Protection." *Journal of Public Economics.* 52 No. 1 (August): 49–72.

Duncombe, W. D., Miner, J., & Ruggiero, J. (1995). Potential cost savings from school district consolidation: A case study of New York. *Economics of Education Revi*ew. 14, 265–284.

Duncombe, W. D., Ruggiero, J., & Yinger, J. M. (1996). Alternative approaches to measuring the cost of education. In H. F. Ladd, *Holding schools accountable: Performance-based reform in education* (pp. 327–356). Washington, DC: The Brookings Institution.

Duncombe, W., & Yinger, J. (2007). Does school district consolidation cut costs*? Education Finance and Policy*. 2(4), 341-375.

Ferguson, R. F. (1991). Paying for public education: New evidence on how and why money matters. *Harvard Journal of Legislation*. 28, 466–498.

Ferguson, R. F., & Ladd, H. F. (1996). Additional evidence on how and why money matters: A production function analysis of Alabama schools. In H. F. Ladd, *Holding schools accountable: Performance-based reform in education* (pp. 265–298). Washington, DC: The Brookings Institution.

Fox, William. (1981). "Reviewing Economies of Size in Education." *Journal of Education Fin*ance. 6. 273–96.

Geraci, V. J., & Plourde, J. L. (1976). The determinants of uniform property tax assessment. *Assessors Journal*. 11(4), 235-253.

Geraci, V. J. (1977). Measuring the benefits from property tax assessment reform. *National Tax Journal*. 195-205.

Harris, Robert. (2017, April 21). Personal interview with the Assessor of Flat Creek in Montgomery County, New York.

Howley, C. (1996). Compounding disadvantage: The effects of school and district size on student achievement in West Virginia. *Journal of Research in Rural Education*. 12, pp.25-32.

Imazeki, J & Reschovsky, A.(1997). The development of school finance formulas to guarantee the provision of adequate education to low-income students. In W. J. Fowler Jr, *Developments in school finance* (pp. 123–147). Washington, DC: US Department of Education

Netzer, Dick (1966). *Economics of the Property Tax*. Washington, D.C.: The Brookings Institution.

Netzer, D., & Berne, R. (1995). Discrepancies between ideal characteristics of a property tax system and current practice in New York. *Journal of Education Finance*. 21(1), 38-56.

Office of the New York State Comptroller. (Various Years). *New York State Open Book: Local Government and School Accountability Financial Data*. Albany, NY.

______. (Various Years) *Comprehensive Annual Financial Report.* Albany, NY.

______. (Various Years) *Annual Market Value Survey.* Albany, NY.

Ratcliffe, K., Riddle, B., & Yinger, J. M. (1990). The fiscal condition of school districts in Nebraska: Is small beautiful? *Economics of Education Review*. 9: 81–99.

Roehr, William. (2017, April 21). Personal interview with the Managing Principal of Montgomery County, New York.

Sanderson, E., & Windmeijer, F. (2016). A weak instrument F-test in linear IV models with multiple endogenous variables. *Journal of Econometrics*. 190(2): 212-221.

Sjoquist, David L. & M. B. Walker. (1999). "Economies of Scale in Property Tax Assessment." *National Tax Journal*, (June): 207-220.

Skidmore, M., C. L. Ballard & T. R. Hodge (2010). "Property Value Assessment Growth Limits and Redistribution of Property Tax Payments: Evidence from Michigan." *National Tax Journal*. 63(3): 509-538.

Stock, James H. and Motohiro Yogo. (2005). "Testing for Weak Instruments in Linear IV Regression," in Donald W. K. Andrews and James H. Stock, eds., *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg*. Cambridge University Press, 2005, pp. 80–108.

Tholkes, R. J. (1991). Economies of scale in rural school district reorganization. *Journal of Education Finance*. 16, 497–514.

Wasylenko, M.J. (1977). Some evidence of the elasticity of supply of policemen and firefighters. *Urban Affairs Quarterly*. 12(3):365-382.

Wicks, John H., & Michael N. Killworth. (1967). "Administrative and Compliance Costs of State and Local Taxes." *National Tax Journal*. 20(3): 309–15.

Wooldridge, Jeffrey M. (2000). *Econometric Analysis of Cross Section and Panel Data*. Cambridge, Mass.: MIT Press.

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Table 1. Variables and data sources

Variable	Source
Performance measure(S): Assessment quality	
Calculated COD	NY Market Value Survey
Resources (Expenditure and Revenue)	
Assessment Budget	
- Assessment operation (C) (Personal services, assessors fees, equipment & capital outlay, contractual expenses, employment benefits)	State Comptroller's Office
- Real property tax levy	
- State aid for real property tax	
- State aid for coordination/consolidation	
Institutional variables	
Level of assessment: locally reported AR	
State Equalization rate	
Log assessed value of exempt properties	ORPTS
Reassessment activity: frequency, dummy, first year	
Method of revaluation: CAMA, Appraise	
Property tax levy, nominal rate	
Parcel counts per class: Residential, commercial, industry, agricultural	ORPTS
Environment variables (E)	
Median house values as share of median income	Census, NY Market Value Survey
Population growth rate (annual)	Census Inter-censual dataset
Population density	American Housing Survey
Share of each property classes (annual)	ORPTS
Number of sales of single family houses	NY Market Value Survey
Log of county average wage per industry	NY Department of Labor
County unemployment rate	Bureau of Labor Statistics

Table 2. Summary Statistics

	2005		2011	
(Unit: Inflation adjusted $)	CAP	Non-CAP	CAP	Non-CAP
Assessment cost (per capita)				
Total assessment	17.80	24.09	16.88	21.51
Operating	12.19	18.66	11.63	17.64
Personnel	11.49	18.04	11.31	17.30
Contractual expense	5.61	5.42	5.24	3.86
State aid (per capita)				
Any assessment state aid	2.75	1.75	1.37	0.66
Frequent reassessment aid	0.44	0.46	0.10	0.24
County aid	0.007	0.004	0.005	0.001
Revenue and other spending				
Property tax levy	499	674	392	555
Non-assessment expenditure	1,132	1,616	1,048	1,547
	CAP	Non-CAP	CAP	Non-CAP
Assessment outcome				
COD	29.77	36.02	24.75	28.93
State EQR	89.19	72.24	92.56	73.71
Residential AR	82.23	64.99	91.26	72.39
Environment				
Agricultural/Total (%)	7.25	4.41	6.70	3.90
Residential/Total (%)	58.80	62.87	59.12	63.27
Commercial/Total (%)	3.03	3.79	2.93	3.76
Industrial/Total (%)	0.84	0.67	0.95	0.67
Exempt parcels/Total (%)	12.14	15.95	12.20	15.59
Population density	173.91	508.02	155.29	365.41
Total parcel	2,298	4,460	2,307	3,667
Median household income ($)	53,046	55,697	48,482	50,487
Median house value ($)	112,208	102,521	99,162	96,061

Table 3. Change in assessment costs among CAP participants

	Assessment costs			
(Unit: Inflation adjusted $)	Total assessment	Personnel	Contractual expense	# of parcel
Before	43,087	31,622	8,634	2,915
After (all post year average)	35,723	24,462	10,476	5,503
One year after	51,072	31,235	13,597	
Two years after	41,476	29,832	11,163	
Three years after	41,912	29,838	11,848	

Table 4. Validity of instruments for the decision to join a CAP**:** Balance test

	(1)	(2)	(3)
DV:	$Z_{1,ict}$	$Z_{2,ict}$	$Z_{3,ict}$
Share of exempt parcels	-10.4909	69.724	2.1901
	(6.9835)	(19.646)	(1.4473)
Share of commercial	-1.0356	-9.292	-0.6479
	(2.7864)	(13.701)	(0.4975)
Share of industrial	0.7209	-41.359	3.4162
	(12.5966)	(54.205)	(2.9287)
Population density	-0.0002	-0.00106	-0.0001
	(0.0005)	(0.00078)	(0.0001)
Mean tax share	-0.8383	6.597	-0.3332
	(1.9426)	(5.184)	(0.2185)
Year f.e.	Y	Y	Y
Jurisdiction f.e.	Y	Y	Y
F test	0.48	8.03	3.60

Note: Total number of observations is 8,464 (851 municipalities).

Table 5. Estimates from OLS and 2SLS models I

DV:	Same year as CAP $\text{Ln}(\text{Cost}/\text{NCAP}_{\text{ict}})$			One year after CAP $\text{Ln}(\text{Cost}/\text{NCAP}_{\text{ict+1}})$			Two years after CAP $\text{Ln}(\text{Cost}/\text{NCAP}_{\text{ict+2}})$		
	OLS	**2SLS**		**OLS**	**2SLS**		**OLS**	**2SLS**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\boldsymbol{Ln(NCAP)}$	1.177**	4.405**	5.217**	1.162**	6.100***	5.460**	1.286***	4.671***	5.6480**
	(0.4788)	(2.139)	(2.292)	(0.474)	(2.252)	(2.319)	(0.384)	(1.755)	(2.6302)
$\boldsymbol{Ln(NCAP)^2}$	-0.069**	-0.271**	-0.329**	-0.072**	-0.364***	-0.354**	-0.078***	-0.281***	-0.3825**
	(0.0305)	(0.1304)	(0.142)	(0.030)	(0.135)	(0.155)	(0.024)	(0.106)	(0.1656)
Turning point (N)	5,059	3,385	2,775	3,195	4,355	2,235	3,803	4,069	1,608
Year f.e.	Y	Y	Y	Y	Y	Y	Y	Y	Y
Jurisdiction f.e.	Y	Y	Y	Y	Y	Y	Y	Y	Y
Linear trend			Y			Y			Y
Cragg-Donald Fstat		10.938	12.508		8.669	7.938		7.478	13.244
Hansen J pvalue		0.074			0.1210			0.136	
Endogenous pvalue		0.153			0.355			0.512	
Observations		8,466			8,449			7,737	

Note: Other endogenous variables included in the 2SLS models are assessor wage per parcel, state aid, reassessment frequency and COD. Total number of observation are 8,466 (851 unique municipalities). Standard errors clustered at the jurisdiction level reported in parentheses. Exogenous covariates from the models include Share of exempt parcels, Share of commercial parcels, Share of industrial parcels, population density, population growth and Median tax share.
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Estimates from OLS and 2SLS models II

DV:	Same year as CAP $\text{Ln}(\text{Cost}/\text{NCAP}_{ict})$			One year after CAP $\text{Ln}(\text{Cost}/\text{NCAP}_{ict+1})$			Two years after CAP $\text{Ln}(\text{Cost}/\text{NCAP}_{ict+2})$		
	OLS	**2SLS**		**OLS**	**2SLS**		**OLS**	**2SLS**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\boldsymbol{Ln(NCAP)}$	1.177**	5.829**	1.963	0.7070	5.829**	3.926*	1.396***	4.958**	3.016
	(0.478)	(2.932)	(3.384)	(0.4669)	(2.932)	(2.178)	(0.392)	(2.456)	(2.922)
$\boldsymbol{Ln(NCAP)^2}$	-0.069**	-0.400**	-0.151	-0.0464	-0.400**	-0.260**	-0.078***	-0.339**	-0.224
	(0.030)	(0.181)	(0.203)	(0.0299)	(0.181)	(0.130)	(0.024)	(0.153)	(0.174)
$\boldsymbol{P_{ict}}$	-0.070	0.944**	3.508*	0.0409	0.944**	2.586	-0.108	0.807**	21.202
	(0.062)	(0.432)	(2.103)	(0.0817)	(0.432)	(7.241)	(0.067)	(0.395)	(34.112)
Turning point (N)	5,059	1,455	2,713	3,195	1,455	1,900	3,803	1,501	
Year f.e.	Y	Y	Y	Y	Y	Y	Y	Y	Y
Jurisdiction f.e.	Y	Y	Y	Y	Y	Y	Y	Y	Y
Linear trend			Y			Y			Y
Cragg-Donald Fstat		7.243	6.087		7.068	7.987		7.995	8.617
Hansen J pvalue		0.942			0.127			0.837	
Endogenous pvalue		0.049			0.093			0.095	
Observations		8,466			8,449			7,737	

Note: Other endogenous variables included in the 2SLS models are assessor wage per parcel, state aid, reassessment frequency and COD. Total number of observation are 8,466 (851 unique municipalities). Standard errors clustered at the jurisdiction level reported in parentheses. Exogenous covariates from the models include Share of exempt parcels, Share of commercial parcels, Share of industrial parcels, population density, population growth and Median tax share.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 7. Robustness checks

Panel A. Estimates from 2SLS models with 3-year average values of IVs

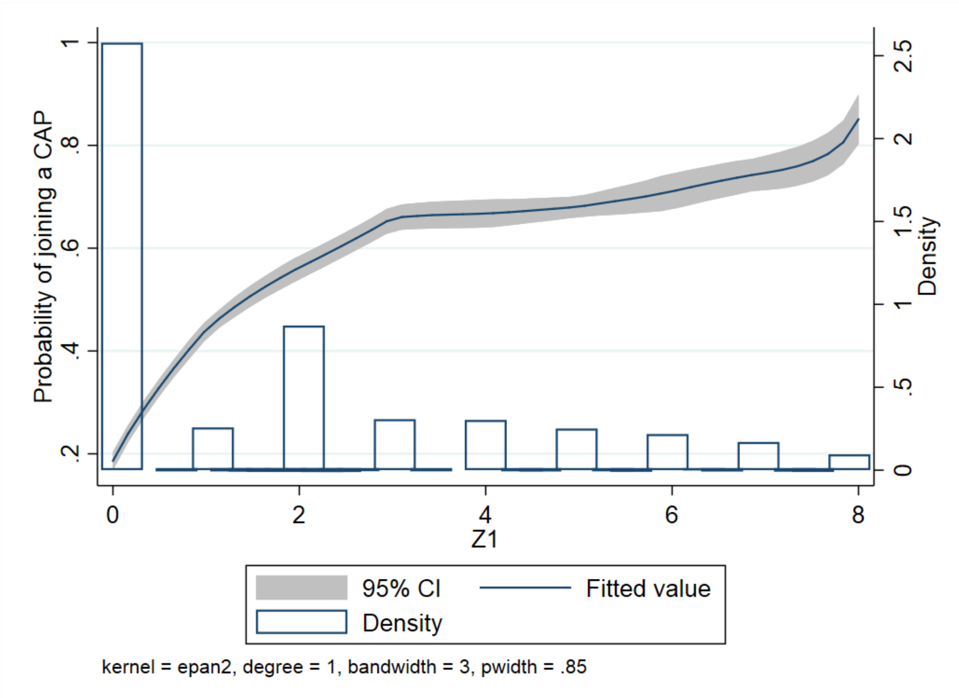
DV:	$Ln(Cost/NCAP_{ict})$		$Ln(Cost/NCAP_{ict+1})$		$Ln(Cost/NCAP_{ict+2})$	
	(1)	(2)	(3)	(4)	(5)	(6)
$\boldsymbol{Ln(NCAP)}$	5.387**	3.492	6.538***	7.117**	4.120**	5.765**
	(2.324)	(2.458)	(2.530)	(3.156)	(1.712)	(2.760)
$\boldsymbol{Ln(NCAP)^2}$	-0.325**	-0.252*	-0.390***	-0.467**	-0.249**	-0.384**
	(0.138)	(0.147)	(0.150)	(0.196)	(0.107)	(0.173)
$\boldsymbol{P_{ict}}$		0.972*		0.898		0.858*
		(0.547)		(0.601)		(0.494)
Turning point (N)	3,975	1,526	4,368	2,019	3,917	1,791
Cragg-Donald F-stat	11.217	7.995	8.284	6.303	13.366	5.798
Hansen J p-value	0.381	0.837	0.118	0.179	0.268	0.742
Endogenous p-value	0.306	0.095	0.306	0.098	0.524	0.117
Observations	8,466		8,449		7,737	

Panel B. Robustness check: Control function estimates

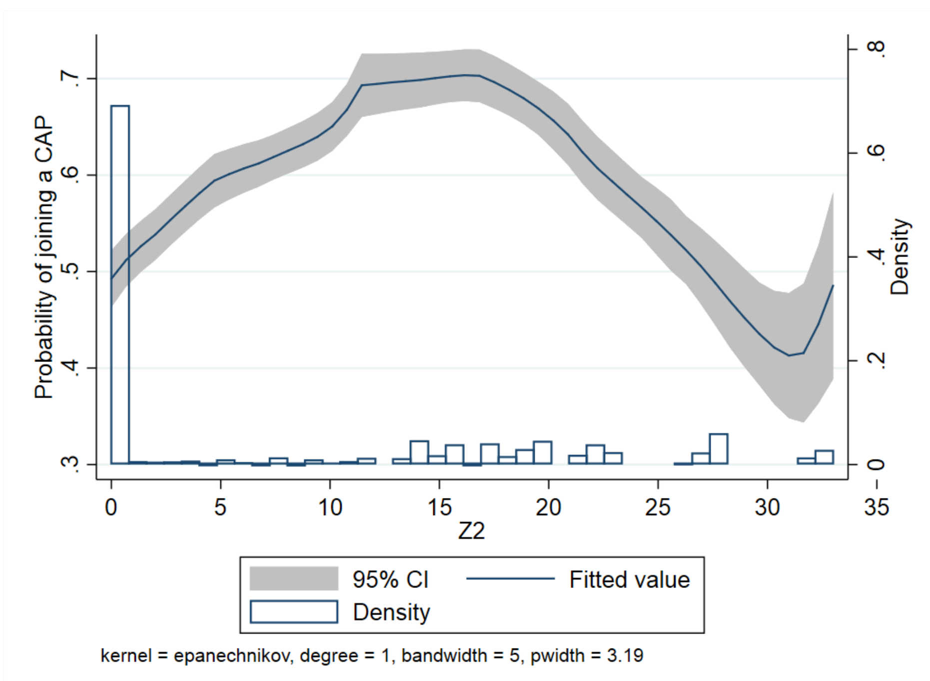
DV:	$Ln(Cost/NCAP_{ict})$	$Ln(Cost/NCAP_{ict+1})$	$Ln(Cost/NCAP_{ict+2})$
	(1)	(2)	(3)
$\boldsymbol{Ln(NCAP)}$	1.5999***	0.8497**	1.2960***
	(0.3862)	(0.3848)	(0.4713)
$\boldsymbol{Ln(NCAP)^2}$	-0.0800***	-0.0507**	-0.0830***
	(0.0224)	(0.0245)	(0.0297)
Observations	8,466	8,449	7,737
Number of muni_id	880	877	870

Note: All models include year and jurisdiction fixed effects/ Standard errors clustered at the jurisdiction level. *** p<0.01, ** p<0.05, * p<0.1

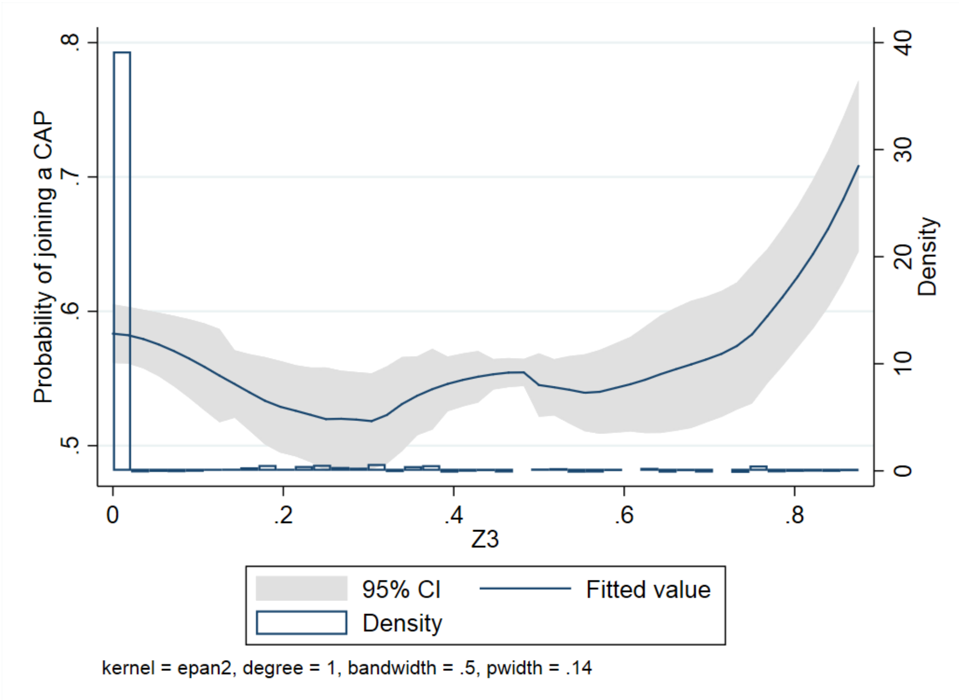
Figure 1. Relation between instruments of CAP decision and likelihood of joining a CAP



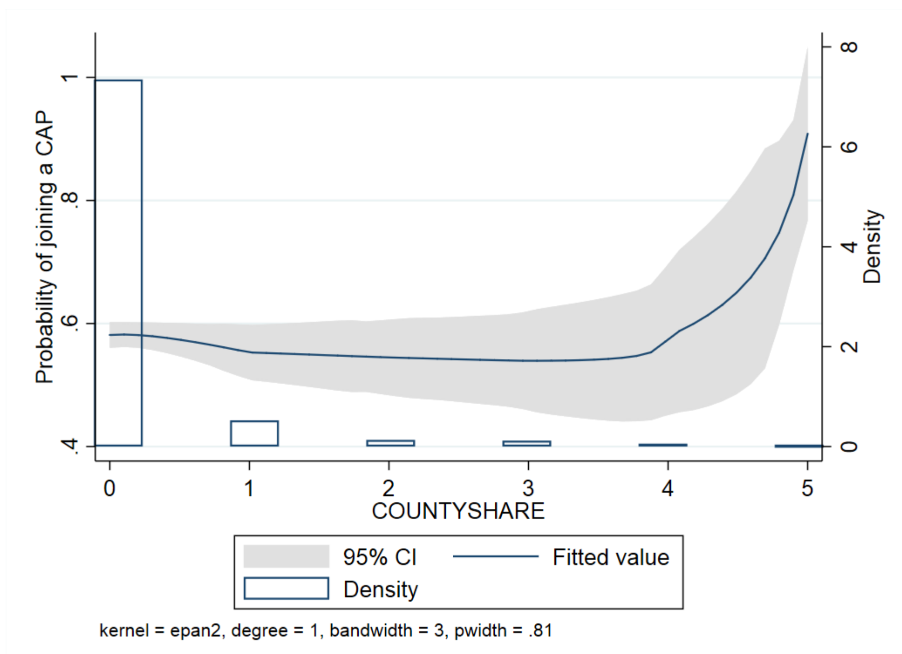
Panel A. $Z_{1,ict}$ (count of other CAPs) as instrument



Panel B. $Z_{2,ict}$ as instrument

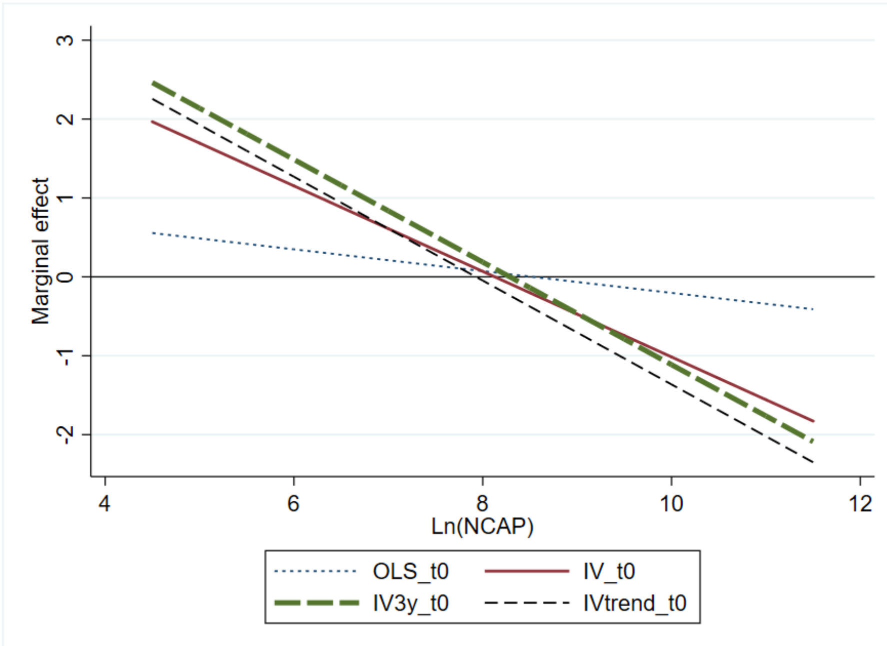


Panel C. $Z_{3,ict}$ as instrument

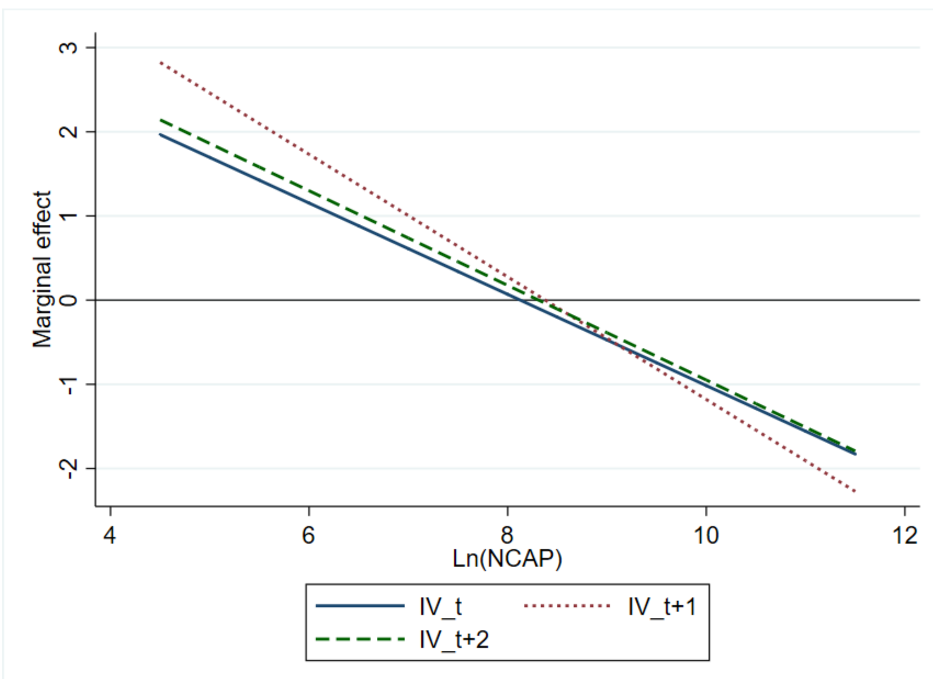


Panel D. $COUNTYSHARE_{ict}$

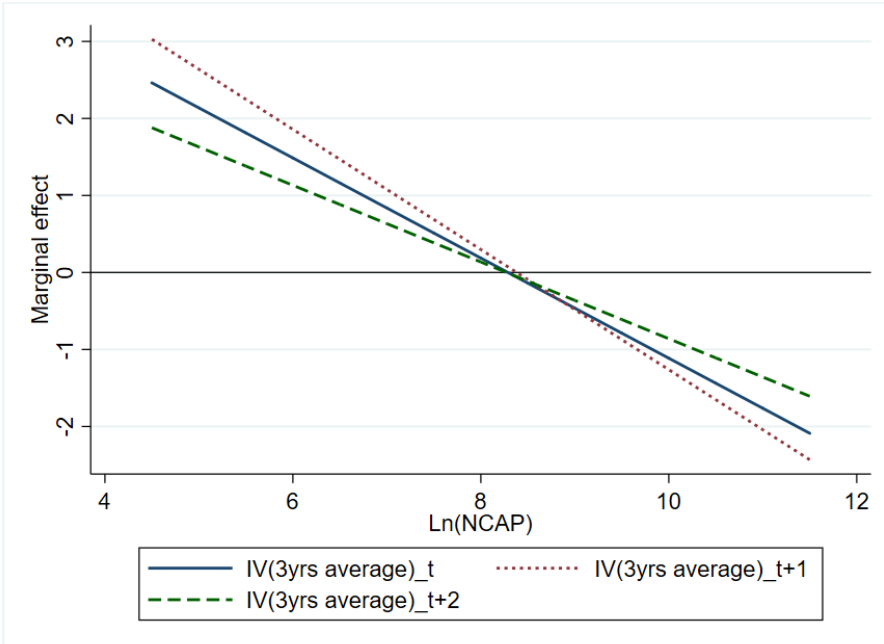
Figure 2. Marginal effects



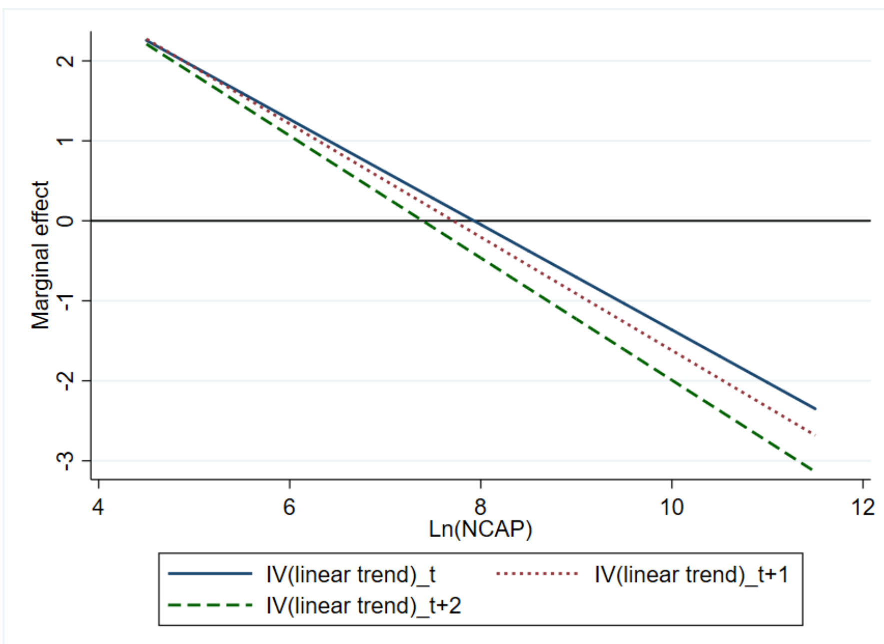
Panel A. Estimates from baseline year



Panel B. Specification 1 with lagged effects



Panel C. Specification 1I with lagged effects



Panel D. Specification III with lagged effects

Appendixes

Table A1. Creation of coordinated units over time

Name of Coordinated unit(CAP)	Start year	End year	# of muni
Allegany County C.A.P. #2	2002 (7)	2018	2
Cayuga County C.A.P. #2		2016	2
Herkimer County C.A.P. #2			3
Madison County C.A.P. #2			3
Ontario County C.A.P. #1		2008	2
Warren County C.A.P. #3		2014	2
Washington County C.A.P. #1		2013	2
Nassau County Assessing Unit	2003 (3)		5
Schoharie County C.A.P. #2			3
Schuyler County C.A.P. #2			5
Hamilton County C.A.P. #1	2004		3
Genesee County C.A.P. #1	2005		3
Lewis County C.A.P. #1	2006 (3)	2019	2
Livingston County C.A.P. #3		2018	2
Washington County C.A.P. #2		2016	2
Allegany County C.A.P. #3	2007 (15)	2008	2
Cattaraugus County C.A.P. #2		2014	2
Delaware County C.A.P. #2			2
Dutchess County C.A.P. #1			2
Dutchess County C.A.P. #2			2
Dutchess County C.A.P. #3			2
Genesee County C.A.P. #2			2
Genesee County C.A.P. #3			2
Jefferson County C.A.P. #1			2
Jefferson-Lewis County CAP #2		2019	2
Lewis County C.A.P. #2		2014	2
Livingston County C.A.P. #4			2
Madison County C.A.P. #3			4
Niagara County C.A.P. #1			2
Orleans County C.A.P. #2			2
Chautauqua County C.A.P. #2	2008 (10)		3
Chemung-Tioga County C.A.P. #1		2015	3

Columbia County C.A.P. #1			2
Erie County C.A.P. #1		2014	2
Essex County C.A.P. #1		2014	3
Jefferson County C.A.P. #3		2014	2
Lewis County C.A.P. #3			2
Montgomery County C.A.P. #1			2
Schuyler County C.A.P. #3		2010	2
Schuyler County C.A.P. #4		2014	2
Genesee County C.A.P. #4	2009		2
Onondaga County C.A.P. #3	(2)		2
Onondaga County C.A.P. #4	2010		2
Schuyler County C.A.P. #1	(2)		5
Cattaraugus County C.A.P. #3	2011		2

Table A2. List of municipalities participating in CAPS (78 jurisdictions in 38 CAPs)

Municipality	Start Year	End Year	Last $reassess_t$	Reassess years	N_{t-1}	N_t	Total spending ($ 2016) Total $_{t-1}$	Total $_t$	Total $_{t+1}$	Total $_{t+2}$
ALLEGANY ALMA Town	2002	2018	2002	2002-2007	1,047	5,184	4,523	16,454	404	9,058
ALLEGANY WELLSVILLE Town	2002	2018	2002	2000-2007	3,777	5,184	44,260	104,578	70,842	55,089
ALLEGANY ALLEN Town	2007	2008	2007	05-07,09-11	564	1,145	4,875	4,925	4,900	5,187
ALLEGANY BIRDSALL Town	2007	2008	2007	2001-2011	568	1,145	4,714	5,452	11,785	5,966
CATTARAUGUS ELLICOTTVILLE Town	2007	2014	2007	2000,05-12	2,798	5,990	55,834	42,454	65,816	73,129
CATTARAUGUS ALLEGANY Town	2007	2014	2007	2004-2012	3,167	5,990	77,768	79,186	80,782	65,664
CATTARAUGUS HINSDALE Town	2011		2010	2007-2010	1,417	2,181	15,905	15,511	14,895	14,479
CATTARAUGUS ISCHUA Town	2011		2010	2010	756	2,181	7,166	7,060	7,062	7,215
CAYUGAIRA Town	2002	2016	2000	2003-2011	1,214	2,144	10,311	10,165	10,729	13,463
CAYUGA VICTORY Town	2002	2016	1997	2003-2011	912	2,144	5,969	24,592	20,225	21,331
CHEMUNG CHEMUNG Town	2008	2017	2008	08-11,13,15	1,456	6,565	48,555	43,771	21,678	24,045
CHEMUNG VAN ETTEN Town	2008	2017	2008	08-11,13,15	11,49	6,565	27,954	14,384	9,620	9,867
TIOGA BARTON Town[12]	2008	2013	2008	08-11,13,15	3,966	6,565	58,306	52,692	36,549	44,466
COLUMBIA AUSTERLITZ Town	2008		2005	2011,13-15	1,500	3,142	20,208	23,320	17,864	19,249
COLUMBIA HISSDALE Town	2008		2005	2011,13-15	1,635	3,142	26,698	29,963	30,416	73,762
DELAWARE KORTRIGHT Town[13]	2007		2007	07-11,13-15	1,601	2,937	17,243	16,034	18,929	18,697
DELAWARE MEREDITH Town	2007		2007	08-11,13-15	1,317	2,937	16,407	15,892	18,668	18,582

[12] Pre CAP period: Annual reassessment in 2002, 2003 ; initial assessment in 1985
[13] Pre CAP period: Annual reassessment in 2005-2006 ; initial assessment in 2001

DUTCHESS FISHKILL Town	2007		2008		7,041	16,842	386,099	228,349	202,435	225,016
DUTCHESS WAPPINGER Town	2007		2007		9,381	16,842	262,605	234,002	149,415	119,736
DUTCHESS EASTFISHKILL Town	2007		2007	2007-2015	11,403	15,971	401,104	461,920	231,866	210,274
DUTCHESS BEACON City	2007		NA	NA	4,470	15,971	119,968	136,927	82,324	79,174
DUTCHESS LAGRANGE Town	2007		2007	2007-2015	6,311	8,402	230,336	200,103	128,980	124,350
DUTCHESS UNIONVALE Town	2007		2007	2007-2015	2,014	8,402	27,458	30,144	33,425	35,020
ERIE EVANS Town	2008	2014	2008	2008-2010	9,727	11,746	256,838	230,345	117,009	108,852
ERIE NORTHCOLLINS Town[14]	2008	2014	2008	2008-2010	2,017	11,746	18,851	19,916	20,991	20,233
ESSEX ELIZABETHTOWN Town	2008		2008	2008-2015	1,409	5,002	12,000	19,843	22,711	22,336
ESSEX WESTPORT Town	2008		2008	2008-2015	1,428	5,002	28,961	52,096	53,817	61,665
ESSEX WILLSBORO Town	2008	2014	2008	2008-2014	2,157	5,002	28,508	28,006	39,721	32,534
GENESEE BETHANY Town	2005		2005	05,08,11,14	978	5,030	17,981	19,162	18,733	19,292
GENESEE DARIEN Town	2005		2005	05,08,11,14	1,740	5,030	28,446	30,812	27,504	28,481
GENESEE PEMBROKE Town[15]	2005		2005	05,08,11,14	2,281	5,030	32,609	33,200	32,974	34,307
GENESEE BYRON Town	2009		2009	2009-2015	1,340	2,866	18,645	17,349	17,787	18,750
GENESEE OAKFIELD Town	2009		NA		1,510	2,866	26,119	19,920	23,213	24,011
HAMILTON BENSON Town	2004		2004	2004-2007	587	2,657	7,820	NA	5,367	5,177
HAMILTON HOPE Town	2004		2004	2004-2007	596	2,657	12,521	13,995	6,670	7,161
HAMILTON WELLS Town	2006		2006	2006-2007	1,479	2,645	20,554	17,393	13,994	14,613
HERKIMER COLUMBIA Town	2002		1997	2003-2007	997	2,973	4,007	8,970	13,547	23,115

[14] Pre CAP period: Annual reassessment in 2001-2007 ; initial assessment in 1986
[15] Pre CAP period: Annual reassessment in 2002 ; initial assessment in 1976

HERKIMER LITCHFIELD Town	2002		1991	2003-2007	903	2,973	6,879	8,696	12,466	21,396
HERKIMER WINFIELD Town	2002		1997	2003-2007	1,051	2,973	7,497	10,314	16,514	24,124
JEFFERSON LORRAINE Town	2007		2007	2007,2012	660	1,394	6,405	7,790	7,646	7,159
JEFFERSON RODMAN Town[16]	2007		2007	2007,2012	726	1,394	10,355	9,296	11,245	8,148
JEFFERSON CHAMPION Town	2007	2019	2007	2007-2014	1,979	3,529	27,732	37,438	37,335	39,154
LEWIS DENMARK Town[17]	2007	2019	2007	2007-2014	1,504	3,529	15,552	19,738	16,362	16,569
JEFFERSON CLAYTON Town	2008	2014	2008	2008-2014	3,932	6,284	67,536	92,219	96,558	92,298
JEFFERSON ORLEANS Town[18]	2008	2014	2008	2008-2013	2,730	6,284	97,691	156,226	86,404	88,847
LEWIS NEWBREMEN Town	2007	2014	2007	2007-2013	1,597	3,935	23,008	31,313	29,761	30,564
LEWIS WATSON Town	2007	2014	2007	2007-2015	2,308	3,935	28,968	38,409	37,268	38,943
LEWIS OSCEOLA Town	2008		2008	2008-2014	866	1,402	7,003	7,325	7,281	7,200
LEWIS MONTAGUE Town[19]	2008		2008	2008-2014	535	1,402	4,874	5,623	5,481	5,219
LIVINGSTON WESTSPARTA Town	2006	2018	2006	06,10,14	828	2,469	13,906	12,750	12,607	13,301
LIVINGSTON SPRINGWATER Town[20]	2006	2018	2006	06,10,14	1,629	2,469	19,379	20,506	21,361	21,476
MADISON LINCOLN Town	2002		2002	02-05,08,12	1,031	6,864	8,253	8,313	1,189	15,493
MADISON LENOX Town	1997		2002	02-05,08,12	5,806	6,864	51,100	43,768	50,163	62,442
MADISON STOCKBRIDGE Town[21]	1997		2002	02-05,08,12	5,806	6,864	9,034	8,867	9,361	8,761
MADISON SMITHFIELD Town	2007		2006	2006,2010	775	5,339	8,872	6,838	6,948	7,222

[16] Pre CAP period: Annual reassessment in 2002 ; initial assessment in 1982
[17] Pre CAP period: Annual and initial reassessment from 2003 until 2006
[18] Pre CAP period: Annual reassessment in 2002(CLAYTON) and 2006 (ORLEANS) ; initial assessment in 1982 for both
[19] Pre CAP period: Annual and initial reassessment in 2002(OSCEOLA) and 2000-2001(MONTAGUE; initial assessment in 1998)
[20] Pre CAP period: Annual reassessment in 2002; initial assessment in 1980
[21] Pre CAP period: Annual reassessment in 2000-2001 ; initial assessment in 1981

MADISON NELSON Town[22]	2007		2006	2006,2010	1,776	5,390	15,384	15,208	15,396	26,634
MONTGOMERY CHARLESTON Town	2008		2008	08-10,15	1,143	4,268	15,794	17,362	19,506	14,991
MONTGOMERY ROOT Town[23]	2008		2008	08-10,15	1,304	4,268	17,619	15,078	20,063	21,408
NIAGARA WILSON Town[24]	2007		2006	NA	3,106	26,246	35,838	52,212	57,843	37,479
NIAGARA NIAGARAFALLS City	2007		2003	NA	23,135	26,246	474,682	557,465	427,235	433,104
ONONDAGA LYSANDER Town[25]	2009		2009	2009-2015	9,184	15,003	156,144	149,245	153,831	159,874
ONONDAGA VANBUREN Town	2009		2009	2009-2015	5,634	15,003	119,368	100,029	106,070	102,436
ONONDAGA CAMILLUS Town	2010		2010	2010-2012	10,391	10,402	194,493	167,905	182,689	171,345
ONTARIO GORHAM Town[26]	2002	2008	2002	02-11,14	2,606	4,089	55,644	51,326	57,375	55,939
ONTARIO SENECA Town	2002	2008	2002	02-13,15	1,461	4,089	37,588	31,911	39,670	43,102
ORLEANS GAINES Town[27]	2007		2007	07,10,13	1,258	5,237	17,820	577	0	0
OSWEGO ALBION Town	2007		2007	2007-2012	1,426	5,237	13,587	14,748	14,868	25,215
SCHOHARIE CARLISLE Town	2003		NA	NA	1,023	3,411	8,780	9,330	10,116	9,335
SCHOHARIE SEWARD Town	1996		NA	NA	2,372	3,411	9,733	9,769	9,941	9,635
SCHOHARIE SHARON Town	1996		NA	NA	2,372	3,411	11,006	11,586	11,794	11,208
SCHUYLER CAYUTA Town[28]	2008	2010	2008	2008-2015	413	8,016	3,911	7,125	7,896	6,373
SCHUYLER HECTOR Town	2008	2010	2008	2008-2015	3,498	8,016	74,605	40,987	51,436	54,417

[22] Initial assessment in 1981
[23] Pre CAP period: Annual reassessment in 2006-2007 (CHARLESTON ; initial assessment in 2006) and 2002-2007 (ROOT ; initial assessment in 1982)
[24] Pre CAP period: Annual reassessment in 2000-2006 (WILSON ; initial assessment in 1982) and 2003 (NIAGARAFALLS ; initial assessment in 1983)
[25] Pre CAP period: Annual reassessment in 2000-2008 ; initial assessment in 1988 and 1989
[26] Pre CAP period: Annual reassessment in 2000-2001 ; initial assessment in 1997 and 1999
[27] Pre CAP period: Annual reassessment in 2001 and 2004(GAINES; initial in 1980) and 2000-2006 (ALBION; initial assessment in 1998)
[28] Pre CAP period: Annual reassessment in 2002, 2007 (HECTOR; initial in 1990); in 2002(CAYUTA and TYRONE; initial in 1996) and 2000-2002 (MONTOUR; initial assessment in 1999)

SCHUYLER TYRONE Town	2008	2014	2008	2008-2015	1,698	8,016	24,336	19,953	2,451	28,112
SCHUYLER CATHARINE Town	1999	NA	2010	2010-2015	2,364	8,016	16,233	12,016	11,801	12,868
SCHUYLER MONTOUR Town	1999	2018	2008	2008-2015	2,364	8,016	17,466	13,223	13,105	14,127
SCHUYLER DIX Town[29]	2003		2002	2009-2015	2,174	4,594	26,717	28,373	29,570	31,326
SCHUYLER READING Town	2003		2002	2009-2015	1,234	4,594	16,197	16,213	17,412	17,943
SCHUYLER ORANGE	2008	2014	2002	2008-2015	1,206	4,752	18,967	NA	NA	19,092
ORANGE CHESTER Town[30]	2002	2014	NA	NA	4,766	11,105	102,992	106,757	112,392	127,412
WARREN CHESTER Town	2002	2014	2002	02,04,08	3,769	11,105	95,992	99,202	71,191	85,017
WARREN HORICON Town	2002	2014	2002	02,04,08	2,481	11,105	71,4680	53,749	37,665	54,436
WASHINGTON DRESDEN Town[31]	2002	2013	2001	NA	856	1,859	17,640	15,491	15,667	16,696
WASHINGTON PUTNAM Town	2002	2013	2001	2013	1,000	1,859	17,596	15,888	13,592	14,544
WASHINGTON GREENWICH Town	2006	2016	NA	NA	2,500	2,506	35,071	36,716	39,232	39,845
WASHINGTON KINGSBURY Town[32]	2006	2016	2006	2005-2015	4,723	4,735	70,709	73,048	76,971	82,927

[29] Pre CAP period: Annual reassessment in 2002 (DIX; initial in 1992); Initial assessment in 2001 (ORANGE) and 2002(READING)
[30] Initial assessment in 1989 (Town of CHESTER) and in 1993 (Town of HORICON)
[31] Initial assessment in 1997 in both towns
[32] Pre CAP period: Annual reassessment in 2000-2001,2003-2004 and initial assessment in 1998

Table A3. Assessment cost by category among CAP participants

Municipality	Start Year	Personnel costs Pre (t-1)	Personnel costs Post (t)	Personnel costs Post(t+1)	Contractual expenses Pre (t-1)	Contractual expenses Post (t)	Contractual expenses Post(t+1)
ALLEGANY ALMA Town	2002	4,140	0	0	383	16,454	404
ALLEGANY WELLSVILLE Town[33]	2002	39,336	45,676	47,328	4,199	9,785	4,588
ALLEGANY ALLEN Town	2007	4,750	4,750	4,750	125	175	150
ALLEGANY BIRDSALL Town[34]	2007	4,300	4,636	0	414	816	11,785
CATTARAUGUS ELLICOTTVILLE Town	2007	24,777	25,212	28,539	31,057	17,242	37,278
CATTARAUGUS ALLEGANY Town	2007	12,328	11,487	4,643	64,240	66,789	75,439
CATTARAUGUS HINSDALE Town	2011	12,300	12,878	12,878	3,605	2,633	2,017
CATTARAUGUS ISCHUA Town	2011	7,000	7,000	7,000	166	60	62
CAYUGA IRA Town	2002	9,300	750	750	1,011	9,415	9,979
CAYUGA VICTORY Town	2002	5,725	12,900	12,900	244	11,692	7,325
CHEMUNG CHEMUNG Town	2008	18,966	20,780	19,405	28,845	21,513	1,833
CHEMUNG VAN ETTEN Town	2008	10,070	9,500	9,500	17,884	4,884	120
TIOGA BARTON Town	2008	46,037	32,022	28,781	12,268	16,815	7,334
COLUMBIA AUSTERLITZ Town	2008	18,287	19,463	17,670	1,921	3,857	194
COLUMBIA HISSDALE Town	2008	24,593	25,149	27,758	2,105	4,814	1,655
DELAWARE KORTRIGHT Town	2007	14,428	14,861	17,500	2,365	1,173	1,429
DELAWARE MEREDITH Town	2007	15,240	15,690	17,500	1,167	202	1,168
DUTCHESS FISHKILL Town	2007	228,780	128,608	117,442	6,305	64,741	84,992
DUTCHESS WAPPINGER Town	2007	74,405	132,632	128,038	3,690	8,537	15,816
DUTCHESS EASTFISHKILL Town	2007	135,284	188,910	185,448	38,368	37,818	46,418
DUTCHESS BEACON City	2007	26,207	34,753	38,069	92,458	101,868	44,255

[33] 0 for personnel cost from 2002 until 2015
[34] 0 for personnel cost from 2008 until 2015

DUTCHESS LAGRANGE Town	2007	109,672	117,168	122,938	33,588	5,536	6,042
DUTCHESS UNIONVALE Town[35]	2007	27,458	29,241	31,890	0	903	1,535
ERIE EVANS Town	2008	102,420	132,997	108,819	4,224	7,946	8,190
ERIE NORTHCOLLINS Town[36]	2008	0	0	0	18,851	19,916	20,991
ESSEX ELIZABETHTOWN Town[37]	2008	10,000	0	0	2,000	19,843	22,711
ESSEX WESTPORT Town	2008	26,636	50,000	51,240	2,325	2,096	2,578
ESSEX WILLSBORO Town	2008	26,869	23,240	32,526	1,639	4,766	7,195
GENESEE BETHANY Town	2005	14,740	15,182	15,637	2,996	3,820	3,096
GENESEE DARIEN Town	2005	18,820	21,000	21,500	7,130	9,812	6,004
GENESEE PEMBROKE Town	2005	31,632	32,472	32,412	977	727	562
GENESEE BYRON Town	2009	16,500	16,800	16,800	1,479	549	987
GENESEE OAKFIELD Town	2009	16,000	17,790	17,801	9,367	1,378	4,660
HAMILTON BENSON Town	2004	5,000	NA	5,000	2,820	NA	367
HAMILTON HOPE Town	2004	7,100	5,300	6,300	5,422	8,696	370
HAMILTON WELLS Town	2006	19,875	15,390	13,390	679	2,003	604
HERKIMER COLUMBIA Town[38]	2002	3,936	8,273	11,172	71	697	2,376
HERKIMER LITCHFIELD Town	2002	0	0	0	6,879	8,696	12,466
HERKIMER WINFIELD Town	2002	6,228	0	0	1,269	10,314	16,514
JEFFERSON LORRAINE Town	2007	6,200	6,800	6,800	205	990	846
JEFFERSON RODMAN Town	2007	7,500	7,725	7,725	2,855	1,571	3,520
JEFFERSON CHAMPION Town	2007	18,715	35,530	36,264	7,614	1,213	1,071
LEWIS DENMARK Town	2007	14,000	15,000	15,180	1,552	4,738	1,182
JEFFERSON CLAYTON Town	2008	7,681	25,312	13,662	58,855	66,006	82,397

[35] 0 contractual expense in 2006
[36] 0 for personnel cost from 2006 until 2013
[37] 0 for personnel cost from 2008 until 2015
[38] 0 for personnel costs for all years in LITCHFIELD Town; from 2008 until 2015 in COLUMBIA Town; from 2002 until 2015 in WINFIELD Town

JEFFERSON ORLEANS Town	2008	59,740	62,000	63,860	37,951	94,226	22,544
LEWIS NEWBREMEN Town	2007	19,128	25,621	26,010	3,880	5,692	3,751
LEWIS WATSON Town	2007	24,651	35,050	35,450	4,317	3,359	1,818
LEWIS OSCEOLA Town	2008	6,900	6,900	6,900	103	425	381
LEWIS MONTAGUE Town	2008	4,000	5,000	5,000	874	623	481
LIVINGSTON WESTSPARTA Town	2006	11,050	11,400	11,900	790	1,350	707
LIVINGSTON SPRINGWATER Town	2006	18,000	18,550	19,300	1,379	1,956	2,061
MADISON LINCOLN Town[39]	2002	2,002	753	588	7,500	7,725	0
MADISON LENOX Town	1997	45,591	37,696	33,623	4,390	3,332	14,484
MADISON STOCKBRIDGE Town[40]	1997	7,600	7,800	0	1,383	837	9,326
MADISON SMITHFIELD Town	2007	7,500	6,600	6,800	1,372	238	148
MADISON NELSON Town	2007	14,465	14,465	14,900	919	743	496
MONTGOMERY CHARLESTON Town	2008	12,525	11,000	13,700	3,269	6,362	5,806
MONTGOMERY ROOT Town	2008	12,000	12,264	12,630	5,619	2,814	7,433
NIAGARA WILSON Town	2007	21,260	15,873	19,291	14,578	36,339	38,552
NIAGARA NIAGARAFALLS City	2007	328,130	381,582	404,279	146,319	147,279	22,439
ONONDAGA LYSANDER Town	2009	124,308	121,140	117,890	31,691	28,105	35,941
ONONDAGA VANBUREN Town	2009	100,532	94,490	96,872	16,137	5,539	9,198
ONONDAGA CAMILLUS Town	2010	129,682	130,961	140,611	64,268	36,945	41,087
ONTARIO GORHAM Town	2002	47,937	43,737	47,499	7,706	7,589	5,377
ONTARIO SENECA Town	2002	28,986	26,606	34,570	5,933	5,305	4,905
ORLEANS GAINES Town[41]	2007	10,925	495	0	6,040	82	0
OSWEGO ALBION Town	2007	11,650	12,200	12,275	1,287	1,898	2,593

[39] 0 contractual expense for a single year in 2003
[40] 0 personnel cost from 2003 until 2015
[41] 0 for all costs from 2007 until 2015

SCHOHARIE CARLISLE Town	2003	8,160	8,184	8,232	620	1,146	1,884
SCHOHARIE SEWARD Town	1996	8,488	8,608	8,656	1,246	1,162	1,285
SCHOHARIE SHARON Town	1996	10,376	10,376	10,400	1,080	630	1,187
SCHUYLER CAYUTA Town	2008	5,550	5,825	6,049	1,638	1,300	1,847
SCHUYLER HECTOR Town	2008	25,587	19,727	1,436	49,018	21,260	50,000
SCHUYLER TYRONE Town[42]	2008	297	17,401	0	24,039	2,553	2,451
SCHUYLER CATHARINE Town	1999	375	375	375	15,858	11,641	11,426
SCHUYLER MONTOUR Town[43]	1999	0	0	0	17,467	13,223	13,105
SCHUYLER DIX Town[44]	2003	0	0	425	26,717	28,373	29,145
SCHUYLER READING Town[45]	2003	0	0	0	16,197	16,213	17,412
SCHUYLER ORANGE[46]	2008	13,708	NA	NA	2,071	NA	NA
ORANGE CHESTER Town	2002	91,923	95,883	99,168	11,069	10,874	12,103
WARREN CHESTER Town	2002	56,304	59,365	62,849	39,297	38,378	8,343
WARREN HORICON Town	2002	42,074	25,640	12,435	27,353	27,885	25,230
WASHINGTON DRESDEN Town	2002	14,000	14,000	14,000	3,639	1,491	1,667
WASHINGTON PUTNAM Town	2002	14,500	14,940	12,000	3,096	948	1,592
WASHINGTON GREENWICH Town	2006	29,037	30,940	32,650	5,904	5,776	6,009
WASHINGTON KINGSBURY Town	2006	64,545	67,786	69,691	6,164	5,262	7,280

[42] 0 personnel cost from 2009 until 2015
[43] 0 personnel cost for all years
[44] 0 personnel cost for all years except 2004
[45] 0 personnel cost for all years
[46] Missing budget values for 2008 and 2009; 0 personnel cost in 2010, 2013-2015