Marvin Ward Jr.

Spatial Implications of Tax and Expenditure Limitations in Colorado

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Contents

0.1 Introduction

The economic potential of any system is not only driven by the presence of natural and/or developed capital, but also the institutions that govern the exploitation of these valuable assets. In this sense, the term economic potential is misleadingly incomplete. The mechanism that drives resource allocation is a function of both the distribution of purely economic value and the feasible range of activities governed by political institutions. The goal in institutional design for economic growth, therefore, ought to be the facilitation of those activities that increase the marginal product of value extraction efforts. If the objective is the maximization of economic growth, this broad goal is unlikely to draw many detractors. The devil, however, is in the details.

Among the multitude of policy innovations that have been advanced in service of increasing economic growth, institutional reforms that act on the property tax base have materially altered local government finance for more than a century. As early as the 1880s, these reforms were dominated by efforts to target specific populations via circuit breakers and homestead exemptions. [Bowman(2008)] However, starting in large part with the Tax Revolt of the 1970s, more interest has taken root in implementing reforms that target the base in a general way: tax and expenditure limitations. The impact of these and other measures has been noticeable. While property tax revenue remains fairly buoyant with respect to the economy, it has declined in importance, dropping as a percentage of general revenue from 34% to 27% over the 1977-2002 period. [Edwards(2006)]

This paper is one component of a larger study seeking to understand the unintended consequences of tax and expenditure limitations. The broad study is a three part empirical examination of the differential impact of tax and expenditure limitations in Colorado (henceforth COTELs) on counties of with different economic foundations. Each section is characterized by exploration of three thematic hypotheses:

- COTELs create wedges between desired and realized expenditure behavior;
- COTELs decrease variation among similarly constrained counties and increase variation among disimilarly constrained counties; and,
- COTELs decrease resident and employment growth in constrained counties.

The unifying principle across each of these inquiries is the idea that COTELs have constraint levels that vary both cross-sectionally and temporally. This paper explots this variation to explore the extent to which fiscal clustering (measured as fiscal capacity and revenue generation in this context) is driven by this “COTEL intensity” concept.

0.2 COTELs & Fiscal Clustering

From a theoretical standpoint, there are two main features of COTELs that would promote fiscal clustering among low-capacity jurisdictions. First, COTELs impose asymmetric pressure on revenue yields over time. The rate of increase is limited by an explicit growth limit, but decreasing yields are not so constrained. Furthermore, once a drop in revenue has been experienced in one year, the baseline is "ratcheted" down because current year allowable revenue is measured against only the previous year's revenue (and not the long term trend). Low revenue years have a disproportionate impact on the long-term revenue capacity of the jurisdiction.

The second impact is related to the first. To the extent that COTELs bias revenue downward (in a manner quite uncoupled with demand projections), it becomes increasingly difficult for constrained jurisdictions to invest in the human and physical capital needed to support robust economic growth. The first effect impacts the revenue generation, while the second impacts the capacity of the economic base itself.

A complicating factor is the existence of spillovers. Both the provision of public goods and the economic vitality of neighboring jurisdictions impact the fiscal and economic capacity of the primary jurisdiction. This externality network has the potential to dynamically reinforce economic growth behavior, whether it be a high or low growth regime. If COTELs exacerbate this effect, there could be undesirable long-term consequences for low capacity counties seeking to create the conditions for economic growth. Insofar as the relationship between COTEL intensity and spatial dependency is evaluated, this paper explores this phenomenon directly.

0.3 TEL Structure in Colorado

This analysis focuses on Colorado, a state characterized by one of the most restrictive TEL regimes in the country. Two properties of the TEL structure make Colorado an attractive empirical source. First, while much of the literature regarding TELs in Colorado focuses on the Taxpayer Bill of Rights (TABOR), in reality TABOR is only one piece of the puzzle. [Staff(2003)] In addition to TABOR, Colorado features a general statewide limit on property tax revenue, the Gallagher Amendment, Amendment 23, and a general spending limit.

- **General Statewide Limit on Property Tax Revenue (SLPTR)**: Local property tax revenues may not increase by more than 5.5% in a given year (the limit was 7% before 1988)
- **Gallagher Amendment (GA)**: Assessment rates for residential property are set statewide, calculated to keep historical ratios of residential and non-residential property tax revenue consistent
- **TABOR**: Annual growth in revenues is limited to inflation plus a measure of growth (new construction for local governments and enrollment for school districts; the *statewide* revenue limit was relaxed via the 2005 Referendum C)

- **Amendment 23 (A23)**: Minimum increases in school funding are mandated and a portion of revenue is removed from the TABOR base
- **General Spending Limit (GSL)**: Annual growth in expenditures is limited to inflation plus a measure of growth

Furthermore, explicit voter approval is required for both mill levy increases and debt obligations. Our focus here is on the explicit revenue limitations. These overlapping reforms are a double-edged sword. On the one hand, they complicate the model insofar as none of them are observed independently in the period of time studied. On the other hand, they provide a means to incorporate variation in policy application and impact across space and time.

Colorado is also a desirable state because of “De-Brucing”. Since the inception of TABOR, a number of counties have passed local legislation designed to avoid the constraints established by this and prior legislation. This practice is known as De-Brucing, and to the extent that it creates differential policy application across Colorado’s 64 counties, it is a major source of horizontal variation.

0.4 Measuring the Impact of COTEL Intensity

A major characteristic of this analysis is the effort to capture variation in COTEL impact. An ideal intensity measure would capture three primary characteristics of any given county at time t:

- The cumulative effect of overlapping policies;
- The proliferation of locally derived exemptions from TABOR and the SLPTR; and,
- The local dynamics that may trigger a breach in the ceilings imposed by the aforementioned legislation.

The indicator used in a previous iteration of this analysis was simply an ordinal score that captured only the first two characteristics. Effectively, the score added a point for each additional constraint. For example, all counties in 1987 would have possessed a score of two given the general application of the SLPTR and the Gallagher Amendment. The scores were subsequently modified by De-Brucing, which occured in 47 of 64 counties over the 1993-2009 period. If only one of the policies was exempted, only one point would be removed. In effect, it was a cumulative indicator function. The reason it has value in this paper is because it provided a clear view of variety policy application. Observe the score distribution by the year 2009.

While this score was a useful starting point, the measure used in this study better incorporates the county specific dynamics that drive whether or not the TELs in Colorado have a binding effect. To achieve this, one can abstract away from the policies themselves and evaluate only their impact on fiscal variables. In particular, the measure was constructed based comparing the property tax base to the limit imposed by the conjunction of the SLPTR and TABOR limits when both apply to

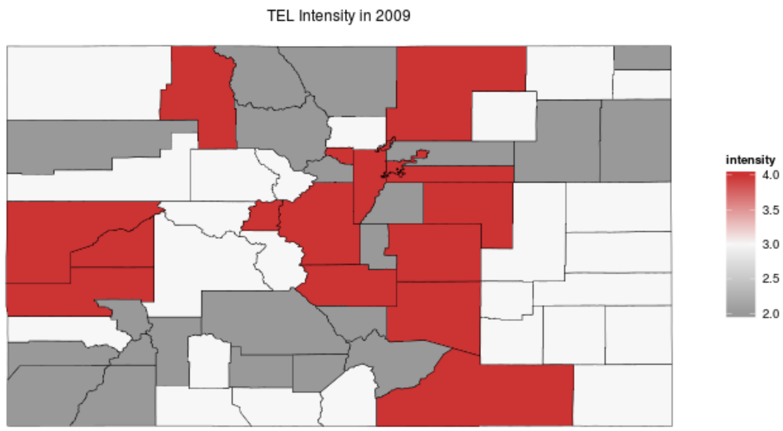

Fig. 0.1 Distribution of COTEL Policy Application by County

a given county-year. If only one or the other applies (due to De-Brucing) in a given county-year, then the limit is just that imposed by the relevant policy. The reason for the composite measure is that only one of the two policies is binding at any given time. To get a sense for how this occurs, the figure below plots the limits of both TABOR and SLPTR over time for Adams County.

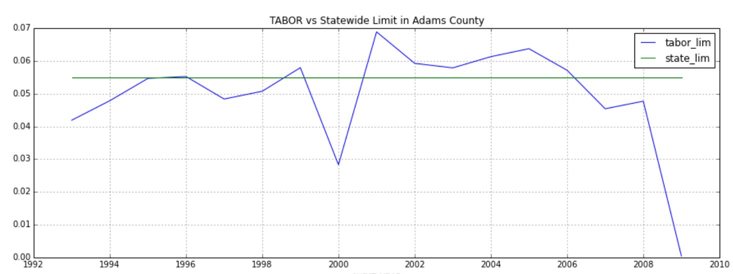

Fig. 0.2 Temporal Variation in the Binding Provision

If the difference between the TABOR constraint and the SLPTR constraint is negative (TABOR - SLPTR), it indicates that TABOR was dominant in a given county-year. Visualizing the distribution of this difference across counties and years reveals non-trivial variation in which policy was the effective constraint.

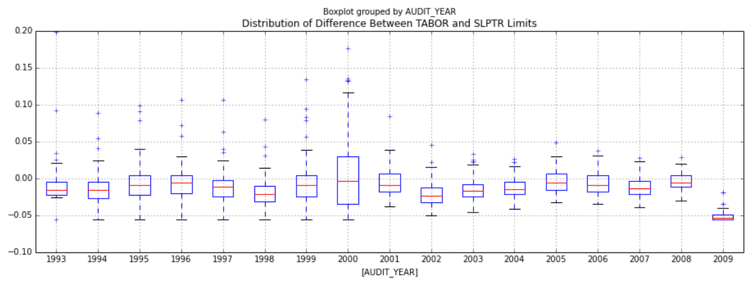

Fig. 0.3 Distribution of Distance Between TABOR and SLPTR Constraints

The constraint, then, was calculated as the minimum between the two for each county-year. The Gallagher Amendment (GA), by contrast was modeled separately as simply the ratio between the residential and non-residential tax bases. The idea here was to capture the impact of disparities between county ratios and the statewide mean used to calculate allowable assessment rates. The distribution of these ratios can be seen below.

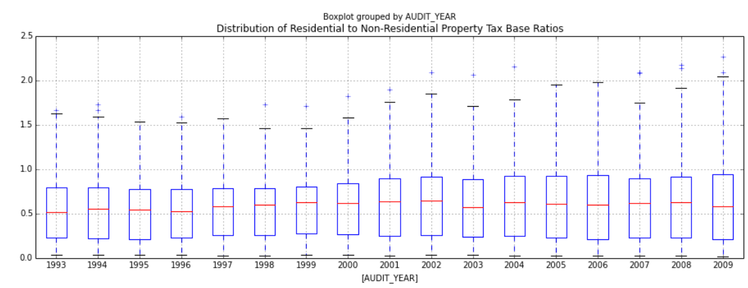

Fig. 0.4 Distribution of Residential Dominance by Year

0.5 Analysis of Spatial Clustering

Testing whether or not the constraints imposed by COTELs lead to fiscal convergence is difficult to achieve with the prevailing models in this area. Most of the empirical work attempts to study TELs across states, and as such, focuses on statewide definitions of TELs. This tends to cover up local variation, but perhaps more interestingly, this choice in geographic scope encourages certain questions. What is the impact of TELs on revenue volatility? [Clair(2012)] Do TELs constrain property taxes? [Dye and McGuire(1997)] Do TELs constrain growth in employment and wages? [Poterba and Rueben(1995)] Exploration of such questions can rely on binary indicators of TEL presence, or indices that incorporate information about legal basis, ease of circumvention, and scope of appication among other characteristics.

Comparatively little research examines the within state dynamic. Once one asks the question about local differences, modeling the parameter of interest is a different game altogether. In this case, the researcher must tease out variation among fiscal circumstances of jurisdictions for which the statewide legislation is a common denominator. Once this issue come to the fore, one is immediately confronted with the following question: if the statewide legislation does not vary cross-sectionally, do we expect uniform impact across all local jurisdictions at time t? The unlikely nature of this situation is the motivating factor for this study. Fiscal behavior is a function of economic circumstance, and given the variation in economic bases across a given state, one would expect that COTELs have different impacts in different jurisdictions. In identifying patterns in the variation of local revenues and expenditures, Mullins [Mullins(2004)] stands out as an important example of why higher resolution is needed.

A second, and related, question is whether or not we expect a temporal element in the impact of TELs. Is it more constraining as a jurisdiction spends more time operating within the TEL environment? Furthermore, given the fact that the COTEL environment is composed of overlapping policies, do we expect interaction effects to play a significant role? To shed light on such questions, this study employs spatial techniques to examine a panel dataset of county-level fiscal and economic data in Colorado over the 1987-2009 time period (the econometric exploration begins in 1995). First, we will establish that temporal variation in clustering exists, and then we will employ econometric techniques to uncover the impact of COTEL intensity.

0.6 Variation in Clustering Activity

The hypothesis rests on the idea that not only does spatial clustering of fiscal behavior occur, the nature of the clustering must vary over time. To capture this we will take snapshots of fiscal and economic hotspots every five years, starting with 1987. These hotspots will be identified using Local Indicators of Spatial Autocorrelation (LISAs) developed initially in Getis & Ord [Getis and Ord(1992)] and Anselin [Anselin(1995)]. These are Getis & Ord's G* and Local Moran's I statistics, respectively.

To evaluate clustering, LISAs require a definition of the linkages of importance between jurisdictions. Said differently, they require an explicitly defined local neighborhood. Spatial analysis is generally sensitive to choice in weight matrices, so we will test multiple neighborhood criteria (both contiguity- and distance-based) and look for corroboration among the tests. Neighborhoods are defined by the following metrics:

- Rook Contiguity (*w_rook*)
- Queen Contiguity (*w_queen*)
- Distance Band - Binary (*w_db_b*)
- Distance Band - Continuous (Inverse Distance Decay; *w_db_c*)
- Kernel (Gaussian Decay; *w_kern*)

The following charts provide a view of the carindality of each of the utilized weight matrices.

Fig. 0.5 Weight Matrix Cardinality for Colorado Counties

Each of the panels above features a histogram of neighbor counts for each weight matrix. For example, for Rook Contiguity (w_rook), five is the most frequent neighborhood size. This is in sharp contrast to the Kernel matrix (w_kern), which has only six counties with a neighborhood size of five. Visual inspection of the neighborhood size distribution demonstrates the substantive variation in the definitions employed by each weight matrix.

With the neighborhoods defined, LISAs can be evaluated. There are two primary measures used to establish spatial clustering for each weight matrix/year combination. Local Morans' I measures the global spatial autocorrelation in an attribute y over a given neighborhood. The local version is implemented as follows:

$$I_i = \frac{\sum_j z_i w_{i,j} z_j}{\sum_i z_i^2} = \frac{\sum_j (y_i - \bar{y}) w_{i,j} (y_j - \bar{y})}{\sum_i (y_i - \bar{y})^2}$$

Fig. 0.6 Local Moran's I Equation

This formula is calculated for each of **i** observations.

Local Moran's I permits a kind of topological view of autocorrelation. Just as providing a single moment of a data set masks distributional content, providing a global parameter masks regional dynamics. In this way, one may identify clusters of counties with similar per capita revenue values. That being said, as noted by Anselin (1995), the interpretation of Local Moran's I is insufficient for a comprehensive knowledge of the clustering behavior of spatially related activities.

Getis & Ord's G* is a natual complement in this regard, because it explains a fundamentally different kind of spatial association.

$$G_i(d) = \frac{\sum_j w_{i,j}(d) y_j - W_i \bar{y}(i)}{s(i)\{[(n-1)S_{1i} - W_i^2]/(n-2)\}^{(1/2)}}, j \neq i$$

Fig. 0.7 Getis Ord's G* Equation

Local Moran's I returns high values when *similar* values are clustered and low values when *disimilar* values are clustered. Whether or not they are high or low does not impact the magnitude of the statistic. By contrast, G* returns high values when *high* values are clustered and low values when *low* values are clustered. If one were to rely solely on the former, it would bot be possible to determine the distinction between fundamentally different clusters. For example, clustering of low revenue capacity would be indistinguishable from clustering of high revenue capacity. If one were to rely solely on the latter, it would not be possible to detect unusual patterns of discontinuity (discontinuities that were beyond that which would occur with a random shuffling of values). In this instance, local anomoly detection would be made more difficult, and the measure does not lend itself to identification of spatial non-stationarity.

The spatio-temporal plots below display spatial clustering over time for each weight matrix. The first collection features clustering as measured by Local Moran's I while the second features Getis & Ord's G*. In both collections, the first plot matrix displays clustering of per capita revenue and the second displays per capita annual payroll.

While the intensity of clustering does vary to some extent across different weight matrices (as indicated by varying color intensity), the general patterns persist. Not

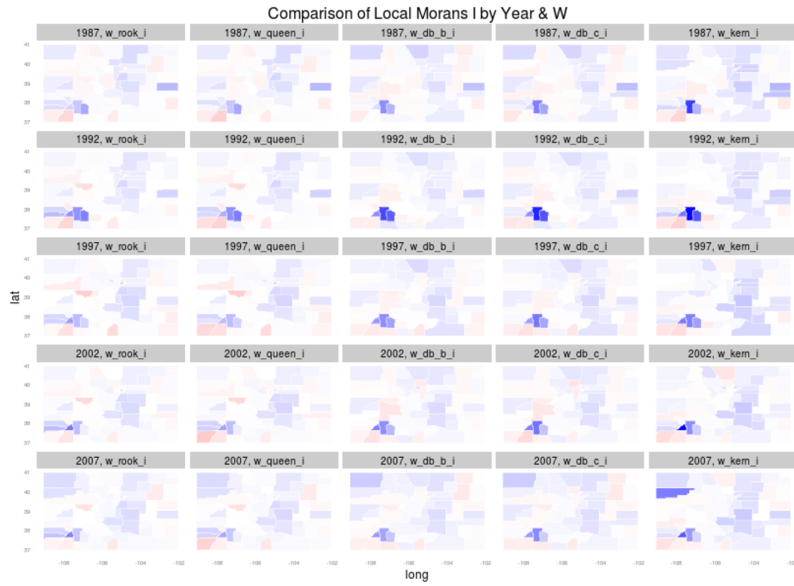

Fig. 0.8 Per Capita Revenue - Local Moran's I

only does revenue yield clustering occur, the extent of the clustering changes over time. Furthermore, upon closer examination of the data (kernel density plots are not shown), three main properties stand out.

- Variation is substantially higher in G*, which indicates relative consistency in clustering activity, with larger variation in the magnitude of clustering values. This could mean correlated revenue capacity shifts across multiple counties within given neighborhoods.
- Variation is generally more substantial in the higher values for both statistics. For Local Moran's I, this indicates varying intensity of spatial association amongst similar values. For Getis & Ord's G* this indicates low capacity counties are more tightly coupled than high capacity counties.
- Central tendency generally leans right of zero for Local Moran's I, while leaning left of zero for Getis & Ord's G*. This suggests a tendency towards the existence of spatial clustering, but this clustering occurs more often among low capacity jurisdictions.

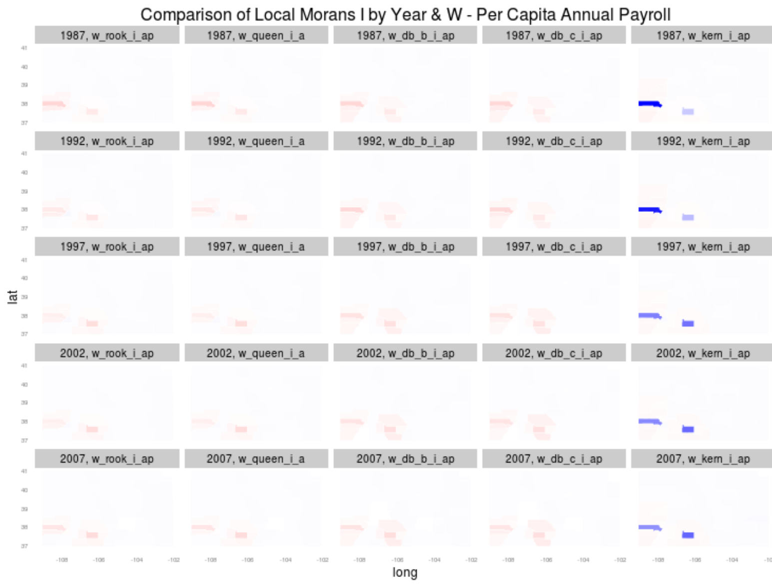

Fig. 0.9 Per Capita Annual Payroll - Local Moran's I

0.7 Econometric Modeling

Globally consistent trends in clustering are far from clear in the plots above, but it is clear that there exists variation in the intensity of clustering as time passes. Extracting the marginal effect of COTEL intensity requires econometric exploration. In this analysis we employ three approaches to explore this impact on measures of both revenue yield (per capita revenue, `pcrev`) and fiscal capacity (per capita annual payroll, `pcap`).

Pooled OLS serves as the baseline specification. It is an exploratory modeling exercise to place the integration of spatial and temporal dependency in context. Furthermore, given the absence of an explicitly modeled spatial dependency structure, the pooled OLS approach allows us to explore the impact of COTEL intensity on the LISAs defined above. This subset of models sets as a dependent each LISA/fiscal indicator/weight matrix combination. For example, `w_db_b_i` corresponds to the Local Moran's I values for each county generated with the Binary Distance Band weight matrix for clustering of per capita revenue.

Repeated Cross-Sectional Spatial Lag Models provide year-specific assessments of COTEL intensity impact while incorporating the fiscal behavior of the local neighborhood. All of these models were evaluated with the Rook Contiguity weight matrix (`w_rook`). This series of models (one model per 15 years for both

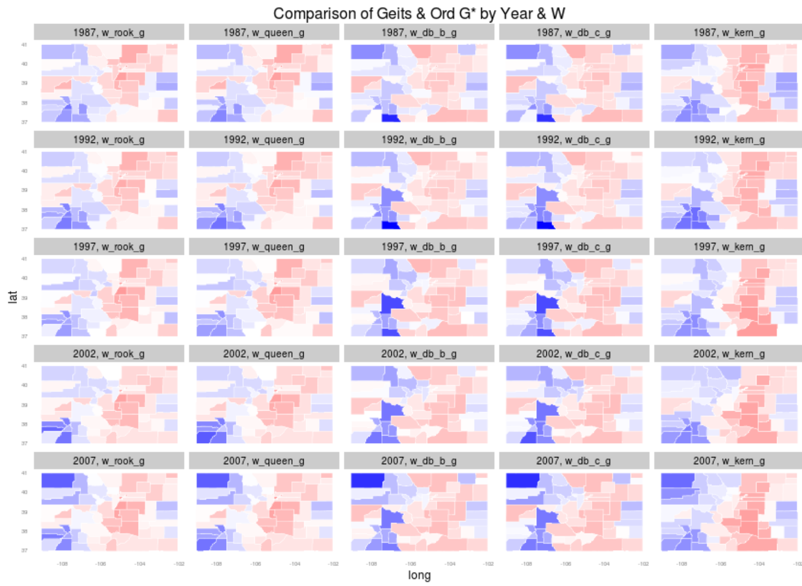

Fig. 0.10 Per Capita Revenue - Getis Ord's G*

per capita revenue and per capita annual payroll) provide some sense of temporal variation in impact over time.

Fixed Effects Panel Analysis does not contain a spatial component, but it does enable us to incorporate county-specific unobservables. In so doing, we are afforded a clearer signal of the impact of COTEL intensity on changes in the fiscal indicators.

The goal in utilizing this model ensemble is to seek common patterns from a variety of data views. That being said, in each of these models, the specification is consistent within either of the fiscal yield (`pcrev`) and fiscal capacity (`pcap`) model sets. The independent variables for the fiscal yield models are as follows:

- Gross State Product (`gsp`) provides a measure of statewide economic activity. It is meant to capture some notion of the available resources in the state. It is omitted in the repeated annual cross-sections because it adds no variation.
- Lagged Population Growth (`lpop_growth`) provides a measure of demand for public services and housing. In the case of the former, public service demand is a determinant of the revenues desired by a county. The latter demand drives up the price of housing.
- State Level Unemployment Rate (`st_unempr`) captures the business cycle.
- Housing Permits per Unit Housing (`permit_rate`) is related to population growth, but it provides a more direct, concurrent measure for housing market pressures. More importantly, it captures the TABOR growth measure (new construction) in a clear way.

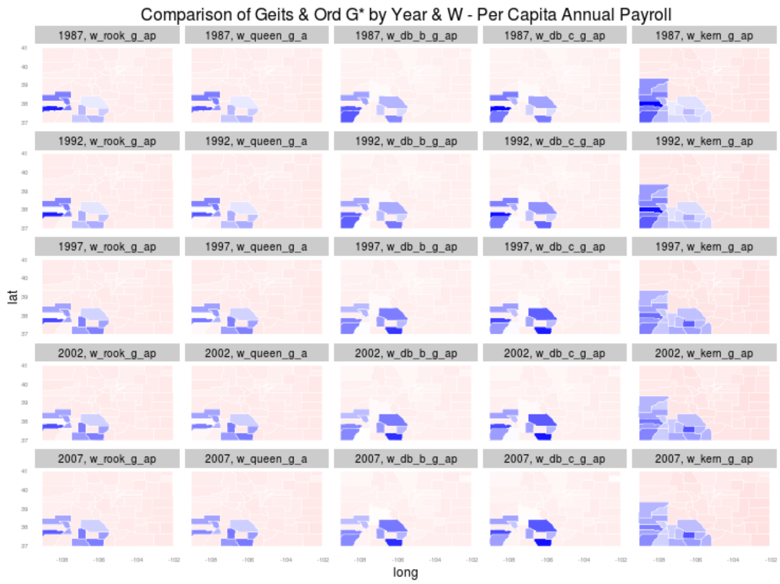

Fig. 0.11 Per Capita Annual Payroll - Getis Ord's G*

- Vacancy Rate (`vac_rate`) is the most direct measure of housing demand. There are reasons for both the population growth and permit rate indicators to separate from stock utilization. For example, population growth may be accompanied by increases in household size and permit rates may increase due to developer forecasting assumptions. Neither is possible with the vacancy rate.
- Residential/Non-Residential Assessment Base Ratio (`prop_ratio`) captures the county-specific value of the measurement used to set statewide assessment rates due to the Gallagher Amendment.
- Cumulative Impact of TABOR & SLPTR (`intensity_stock`) is our primary variable of interest.

The fiscal yield models include all of the above covariates and fiscal capacity (`pcap`), while the fiscal capacity models use `pcap` as the dependent variable. Dollar related values have been inflation adjusted (base year = 2009).

0.8 Results

In total, there are 54 models, but for our purposes, the first 52 are treated as exploratory. Consequently, they will be shared visually. Summary visualizations of the LISA models are shared, each of which represents the average estimate, p-value, and

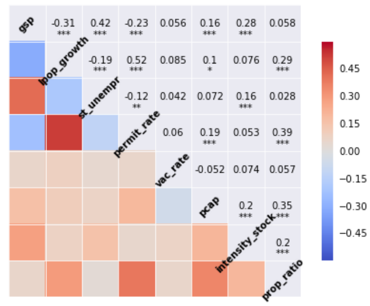

Fig. 0.12 Regressor Correlation Matrix

model fit for all weight matrices considered. In all of the visualizations that follow, the following interpretations apply:

- Coefficient estimates are represented by the y-axis value;
- p-Values are represented by the color; and,
- Model fit (R squared) is represented by the size of the bubble.

With respect to the p-values, a diverging color scale is used. Values below 0.1 are a shade of blue, while those above are red.

0.8.1 Pooled OLS

As we will see throughout the rest of the models, the pooled models provide a view to a consistent yet counterintuitive narrative. While the COTEL intensity measure (`intensity_stock`) has the expected negative and statistically significant effect on revenue yield (`pcrev`), higher values of the intensity measure are consistently associated with *higher* levels of fiscal capacity (`pcap`). This is a curious result that directly challenges the notion that COTELs limit the fiscal capacity of a given county. Furthermore, the same revenue yield relationship holds for the ratio of residential and non-residential property (`prop_ratio`) used to capture the impact of the Gallagher Amendment. Again, higher relative amounts of residential property are associated with lower revenue yields. This accords with intuition to the extent that the Gallagher Amendment *is designed to limit residential property tax liability*. Fiscal capacity, on the other hand, is higher in counties which have higher relative levels of residential property in the assessment base.

Note also the large disparity in model fit. This is a persistent characteristic of this analysis. All of the revenue yield models explain a larger portion of the variance than do their fiscal capacity counterparts. This suggests that a more complicated path linking fiscal behavior to economic growth should be pursued in future analysis. In truth, this is the subject of the third empirical section in the broader study.

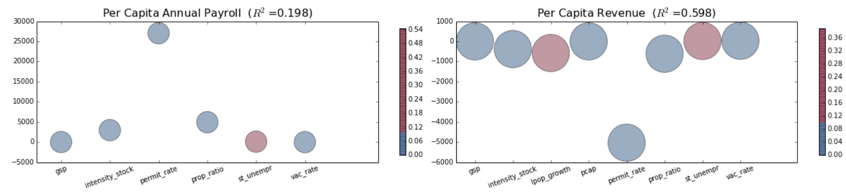

Fig. 0.13 Pooled OLS Results - Fiscal Capacity (left) Revenue Yield (right)

0.8.2 Local Indicators of Spatial Autocorrelation

Using the LISAs as dependents provides an idea of how the independent variables impact the spatial clustering of revenue yield and fiscal capacity. The visualization of these results are averages across the five weight matrices used in this analysis, an effort to limit the sensitivity of the results to matrix choice.

To reiterate, high values of Local Moran's I indicate the clustering of *similar* values, while low values indicate the clustering of *disimilar* values. In other words, high values of Local Moran's I can indicate the presence of a local neighborhood of counties characterized by *either* high revenue yield (fiscal capacity) or low revenue yield (fiscal capacity). In contrast, high values of Getis & Ord's G* indicate clustering of *high* values, while low values of Getis & Ord's G* indicate clustering of *low* values. Thus, Local Moran's I reveals more about the strength of clustering while Getis & Ord's G* reveals more about the type of clustering.

When controlling for other factors, COTEL intensity (`intensity_stock`) has very limited impact on the clustering of revenue yield (`pcrev`). Said differently, if a county is highly constrained, the constraint is not a significant driver of the clustering that we know already exists. This is interesting because one could reasonably expect that the inflexibility of achievable expenditures in the constrained county would limit the flow of potentially positive externalities stemming from increased public service provision. It is possible that such an effect is obscured by collaborative efforts to provide complementary services in a given area. That being said, the only reasonably clear impact of COTEL intensity is a negative association with fiscal capacity clustering values (Getis & Ord's G*), which accords with the idea that COTELs ultimately limit fiscal capacity.

On the other hand, the Gallagher Amendment variable (`prop_ratio`) behaves precisely as we would expect. Insofar as it increases the strength of clustering (higher values of Local Moran's I) and decreases the values associated with said clustering (lower values of Getis & Ord's G*), the evidence suggests that the measure is a limiting factor on revenue yield in the local neighborhood.

In both the revenue yield and fiscal capacity models, the model fit is modest at best (particularly with respect to the latter) and categorically lower than any of the other models considered in this analysis.

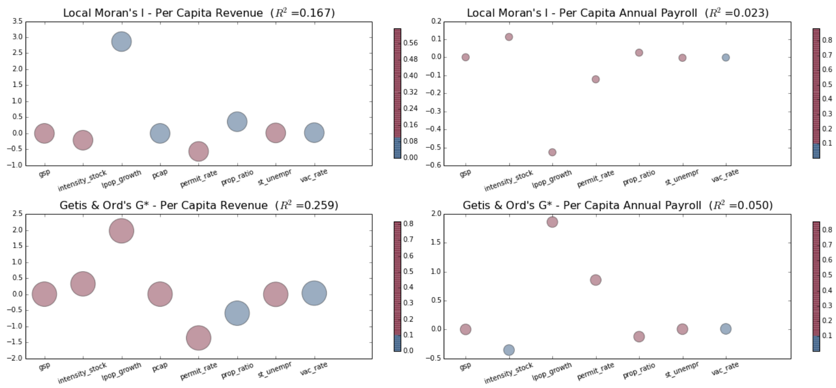

Fig. 0.14 LISA Results - Revenue Yield (left) Fiscal Capacity (right)

0.8.3 Spatial Lag Models

Repeated SLM analysis allows us to incorporate the local neighborhood explicitly because the spatial lag of the dependent variable is the weighted average of the dependent in the neighboring jurisdictions. Evaluating annual cross-sections is useful insofar as it provides a view of the variation of regressor impact over time, both in magnitude and statistical significance. The non-trivial downsides are two-fold:

- It does not control for year-specific factors; and,
- To the extent that "De-Brucing" is an ongoing phenomenon, there is temporal variance in the sample properties.

As a consequence, the technique can only be useful as a complementary component in a larger analysis. With respect to revenue yield, both COTEL intensity (`intensity_stock`) and the Gallagher ratio (`prop_ratio`) accord with the pooled OLS results. They both materially decrease the revenue per capita in a county, even after controlling for the revenue dynamics in the local neighborhood. In other words, these are reductions over and above the preferences that may be shared with neighboring jurisdictions. The interesting dynamic revealed by the repeated cross-sectional approach is that COTEL intensity appears to get less significant, both in statistical and substantive terms, as time proceeds. In contrast, the Gallagher ratio is doing precisely the opposite. This could indicate either a shift in the composition of counties subject to binding COTEL constraints or a shift in the composition of the property assessment base (or both).

Evaluating fiscal capacity from the repeated SLM approach reveals the tenuous nature of any direct connection between our COTEL variables and per capita annual payroll. COTEL intensity (`intensity_stock`) is insignificant in every single year, while the Gallagher ratio (`prop_ratio`) demonstrates substantial variation in magnitude and statistical clarity. With respect to the latter, it is also worth noting that the sign of the Gallagher ratio estimate has switched from the pooled OLS run. Even when controlling for the other factors, the underlying positive bivariate correlation between per capita annual payroll and the Gallagher ratio persists.

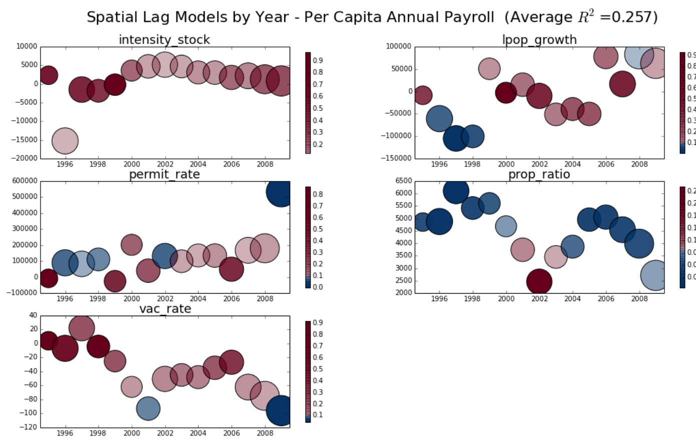

Fig. 0.16 Repeated SLM Results - Fiscal Capacity

0.8.4 Fixed Effect Panel Model

Pivoting from the modeling of spatial to temporal dependency, we can control for county-specific unobservables that may obscure the mechanism by which changes in COTEL intensity (`intensity_stock`) and the Gallagher ratio (`prop_ratio`) effect changes in revenue yield and fiscal capacity. The panel results plot for revenue yield reveal similar results for most variables (although `permit_rate` has inuitively switched signs). Both COTEL intensity and the Gallagher ratio are modestly depressing forces on revenue yield in a given county.

The explicit coefficient estimates shown below provide some idea of the substantive significance, but a standardized relationship would be easier to interpret (particularly due to the scales of COTEL intensity and the Gallagher ratio). In the panel model, one standard deviation shift in COTEL intensity accounts for a shift in revenue yield of approximately 4% of one standard deviation. The Gallgher ratio accounts for approximately 9%. These figures are roughly three times as large in the pooled OLS model, and twenty times as large in the spatial lag models (on average). (Recall that this is the average response to a shift in standard deviation and would not scale linearly.)

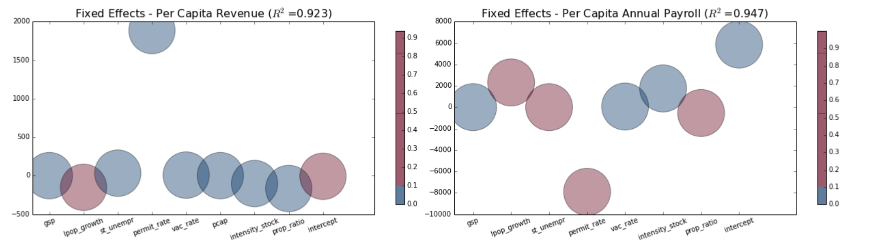

Fig. 0.17 Fixed Effect Panel Resuts - Revenue Yield (left) Fiscal Capacity (right)

	beta	p-value	std err	t-stat	rsq
gsp	0.001062	3.112123e-05	0.000254	4.184171	0.922816
lpop_growth	-151.486290	5.409105e-01	247.670040	-0.611646	0.922816
st_unempr	32.103323	3.194432e-07	6.238182	5.146262	0.922816
permit_rate	1883.634246	1.177657e-02	746.474307	2.523375	0.922816
vac_rate	6.791988	5.783343e-03	2.455758	2.765740	0.922816
pcap	0.039629	6.413903e-17	0.004659	8.506713	0.922816
intensity_stock	-102.841065	1.580228e-02	42.539371	-2.417550	0.922816
prop_ratio	-167.068602	2.137383e-02	72.483436	-2.304921	0.922816

Fig. 0.18 Fixed Effects Panel Results Table - Revenue Yield

The results of the panel analysis of fiscal capacity do little to sort out a pattern in the earlier estimates. While COTEL intensity is still positive (and significant once again), the Gallagher ratio is now negative (in contrast to the pooled OLS model and the SLM models).

	beta	p-value	std err	t-stat	rsq
gsp	0.028473	3.806761e-72	0.001460	19.504854	0.947363
st_unempr	-8.535448	8.380617e-01	41.753193	-0.204426	0.947363
permit_rate	-6382.604116	1.949399e-01	4921.186648	-1.296964	0.947363
vac_rate	55.273886	7.603009e-04	16.366895	3.377176	0.947363
intensity_stock	1755.172107	7.434706e-10	282.346050	6.216386	0.947363
prop_ratio	-576.021908	2.394235e-01	489.346746	-1.177124	0.947363

Fig. 0.19 Fixed Effects Panel Results Table - Fiscal Capacity

0.9 Conclusion

This analysis was designed to evaluate the impact of the cumulative, composite limit imposed by TABOR and the Statewide Limit on Property Tax Revenue (a.k.a.

COTEL intensity), as well as the Gallagher Amendment, on two fiscal indicators: revenue yield (revenue per capita) and fiscal capacity (annual payroll per capita). To pursue this objective, the analysis employed pooled OLS, spatial lag models, and panel analysis to identify patterns in the COTEL impacts from a variety of perspectives. While there was non-trivial variation in the magnitude of the impact, COTELs consistently depressed revenue yields. This accords with intuition, and empirical exploration has borne this out.

In contrast, the fiscal capacity models consistently explained less variation relative to the revenue yield models, *and the impacts of COTELs were inconclusive across models*. The implication is that COTELs do not have direct impacts on fiscal capacity. Rather, the ultimate impact is likely a function of how individual counties respond to the constraints placed on them by statewide COTEL policies.

It should also be noted that the analysis in this paper makes clear that differential impacts across counties are non-trivial. These disparities in the impacts of COTELs are driven by dynamic economic characteristics of each county. Furthermore, the economic circumstances of counties display spatial dependency, and spatial clustering occurs more strongly among low revenue/capacity counties. Consequently, policies that depress revenue yield or fiscal capacity exacerbate this phenomenon. With respect to revenue yield, it is clear that COTELs do just that. The impact of COTELs on fiscal capacity, however, warrants greater study.

References

Anselin(1995). Anselin L (1995) Local Indicators of Spatial Association-LISA. Geographical Analysis 27(2):93–115, DOI 10.1111/j.1538-4632.1995.tb00338.x, URL http://dx.doi.org/10.1111/j.1538-4632.1995.tb00338.x

Bowman(2008). Bowman J (2008) Property Tax Circuit Breakers in 2007: Features, Use, and Policy Issues

Clair(2012). Clair TS (2012) The Effect of Tax and Expenditure Limitations on Revenue Volatility: Evidence from Colorado. Public Budgeting Finance 32

Dye and McGuire(1997). Dye R, McGuire T (1997) The Effect of Property Tax Limitation Measures on Local Government Fiscal Behavior. Journal of Public Economics 66

Edwards(2006). Edwards M (2006) State and Local Revenues Beyond the Property Tax

Getis and Ord(1992). Getis A, Ord JK (1992) The Analysis of Spatial Association by Use of Distance Statistics. Geographical Analysis 24(3):189–206, DOI 10.1111/j.1538-4632.1992.tb00261.x, URL http://dx.doi.org/10.1111/j.1538-4632.1992.tb00261.x

Mullins(2004). Mullins D (2004) Tax and Expenditure Limitations and the Fiscal Response of Local Government: Asymmetric Intra-Local Fiscal Effects. Public Budgeting Finance 24

Poterba and Rueben(1995). Poterba J, Rueben K (1995) The Effect of Property-Tax Limits on Wages and Employment in the Local Public Sector. American Economic Review 85

Staff(2003). Staff CLC (2003) House Joint Resolution 03-1033 Study: TABOR, Amendment 23, the Gallagher Amendment, and Other Fiscal Issues. Tech. rep., Colorado Legislative Council Staff