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Community Development-Fiscal Interactions: Theory and Evidence from the Chicago Area

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Community Development-Fiscal Interactions: Theory and Evidence from the Chicago Area

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This study assesses the relationship between residential tax burdens and the process of business growth in Chicago metropolitan area suburbs. It corrects for the methodological shortcomings of previous studies through the development of an explicit model of local community behavior and through the use of a more complete measure of local tax burdens. The fragmented character of local government in the Chicago area provides an excellent laboratory for studying the local fiscal impacts of growth.

This study is not limited to this single, albeit important, issue. It also addresses the question of the mechanism through which business development impacts local taxes and expenditures. Is the fiscal impact of business development primarily through its effects on the community tax base, or does it also have important expenditure effects? Are the fiscal benefits of economic development manifested in greater public services or private goods and services? Only in the former case would the fiscal benefits take the form of lower local tax rates.

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We also address the issue of whether favorable fiscal consequences of economic development come partly at the expense of neighboring communities. This can happen if job creation in one community leads to population increases in other communities which in turn give rise to higher service demands than increased tax revenues. Such an eventuality raises the specter that growth policies that look attractive to one land-use authority may lead to negative economic consequences for the region as a whole.

The Theoretical Model

Budget constraint

The most basic relationship influencing the relationship between property tax rates and business development stems from the budget identity. This states that

$$(1) \qquad t(B^r + B^n) + O = E,$$

where:

- t = property tax rate,
- B^r = assessed value of residential property,
- B^n = assessed value of business property,
- O = other revenues, and
- E = expenditure.

By the budget identity, if other factors on the right-hand side of (1) remain the same, an increase in business property would allow the community to reduce its tax rate. These other factors, however, may not remain the same. Thus, it is necessary to incorporate expenditure behavior into the model.

Expenditure Behavior

An increase in business activity may require a community to increase its outlays for business services, such as highways, police, fire, etc. If there remains any surplus revenue, the community may also choose to expand services to its residents. Spending for residential services may also increase if new population is attracted by the increased employment opportunities. Finally, an increase in business tax base may cause a reduction in the "price" of residential public services. In effect, a larger share of any *additional* tax levies would be borne by the business community. Hence, the public may support an expansion of public consumption. Thus, there are several avenues through which an increase in business activity can stimulate public expenditures. These remarks can be formalized as follows:

(2) $E = E^n + E^r,$

(3) $E^n = E^n(W),$

(4) $E^r = E^r(N,p,Y,C,H),$

where

E^n = business public services,

E^r = residential public services,

W = employment within the jurisdiction,

N = population of the jurisdiction,

Y = per capita income within the jurisdiction,

C = other relevant community demographics,

H = average house value within the jurisdiction, and

p = residential share of property tax base, $B^r / (B^r + B^n)$.

Equations (3) and (4) correspond to the demand for services by the business and residential sectors, respectively. Business services depend upon employment within the jurisdiction. Residential services depend upon community population, "price" of public services, income, and wealth within the community. The latter is represented by average house price while the "price" of public services is measured by the residential share of the property tax base.[1] Like the demand for private goods and services, a reduction in the price of public services is expected to lead to an expansion in the public's demand for such services.

To sum up, the expansion of business activity can impact expenditures through several routes: (1) directly, by increasing the need for services to support the business; (2) indirectly, by increasing the local population; and (3) indirectly, by lowering the "price" of public expenditures.

Population

The population of a community will reflect the number of people who seek to live there, population supply, and the number of people existing residents would like to accommodate, that is population demand.

The population seeking residence within a community will depend upon the job opportunities both within the community and in its environs. The latter is a potential important source of fiscal inter-relationship among neighboring communities, particularly if new population fails to cover its full expenditure costs.

Population supply may also respond the fiscal environment; high tax rates will discourage population while ample and high quality public services will attract population. Finally, environmental quality and access to the CBD will influence population supply levels.

$$(5) \qquad N^s = N(t, W, W^n, e, Q),$$

where

N^s = population supply,

W^n = employment in surrounding jurisdictions,

e = per capita public expenditures, and

Q = community amenities (distance to CBD, crime rate, congestion, etc.).

Population demand, on the other hand, is more difficult to pin down, to a large measure because such behavior is associated with tastes, as opposed to objective factors. Some communities may seek to excluae new residents because of the fear of congestion or crime. They may also fear that the new residents will not cover their full fiscal costs. Or they simply may seek exclusivity. All of these factors are likely correlated with income and wealth. A community predominantly inhabited by high-income individuals would have to subsidize the public services of new entrants whose incomes fall short of the community norm. They would also lose exclusivity if less fashionable housing were to accompany new migrants. To avoid such outcomes, the governing authority may enact large lot zoning and restrictions to rental property. Thus,

(6) $N^d = N^d(H,Y).$

The actual population of a community (equilibrium) will balance the supply and demand factors. Unlike most markets, where price adjusts to equate demand and supply, no such mechanism exists. Rather, the outcome will be a weighted outcome of the two sides, with the weights reflecting the relative political strength of developers and existing residents. Thus,

(7) $N = a*N^s + (1-a)*N^d,$

with $0 < a < 1.$

Business activity

Like population, there are separate forces controlling the demand for business location and the supply of business sites within a community.

On the demand side, the level of business activity within a community will depend, in part, upon the tax rate it faces. While local taxes may not be the most significant element of a firm's costs, it is one over which it may have considerable control through its choice of business location. While labor costs may be more important to a firm's bottom line, there is little they can do to control them; wage levels tend to be relatively uniform within a metropolitan economy.

Business demand may also be stronger if there is an ample labor pool from which to draw employees, and if there is good access to markets. Examples of the latter are: distance to the CBD, proximity to freeway interchanges, and amount of economic activity nearby.

$$(8) \qquad W^d = W^d(t,N,N^n,W^n,A),$$

where

N^n = neighboring population, and

A = business amenities.

On the supply side, businesses will be attractive to communities because of the tax revenue they provide as well as job opportunities for residents. However, communities may have to pay a price for these advantages. Greater business activity may be accompanied by increased congestion and environmental degradation. The willingness to trade off such amenities for the fiscal advantages will be inversely correlated with income wealth, and existing employment levels (congestion) and positively with the prevailing tax rate (measuring the need for fiscal relief).

$$(9) \qquad W^s = W^s(t,Y,H).$$

The actual outcome will be a weighted average of the demand and supply factors

$$(10) \qquad W = b*W^d + (1-b)*W^s$$

$$0 < b < 1.$$

It will be noted that the tax rate enters both the demand and supply sides, with opposite effects. It is because of this that studies sometimes find little relationship between fiscal policies and business location. Communities may be willing to eschew the fiscal windfalls provided by business, being more concerned with environmental matters. Often such communities have low property tax rates, thereby confounding the empirical relationship between tax levels and business location.

Recapitulation

The four relationships described above provide a general equilibrium framework within which the issue of the fiscal consequences of economic development can be investigated. This model makes explicit the important interrelationship between economic development, public expenditures, tax rates, and population. It further enables us to identify and understand the various linkages that exist between these important magnitudes. Finally, it demonstrates the potential weaknesses of empirical studies which fail to allow for important feedback effects. Not only would this result in statistical bias, but it may lead to misunderstanding of cause and effect relationships.

Some Complications

The preceding theoretical model identifies those variables that impinge on the relationship between the property tax rate and commercial and industrial development. The theoretical model will have to be modified to reflect data availability and the fact that property taxes within a municipality are levied by numerous overlapping governments.

Beginning with overlapping government, an increase in business property will influence the tax rate of the municipality by the amount indicated by the budget identity in equation (1). However, for those overlapping jurisdictions, the potential reduction in the property tax rate depends upon the size of the property tax base within the municipality in comparison with that of the overlapping district. Suppose, for example, that new business development would increase the size of the municipal property tax base by 50%. This could potentially reduce the tax rate levied by the municipality by 50%. However, suppose that the new business development only amounts to 10% of the property tax base of the school districts which overlap the municipality. This would only permit a reduction in the school tax rate of only 5%.

The reason for the discrepancy between the two effects is that the tax base benefits of the new business development is shared with residents outside of the municipality for school tax purposes but accrues entirely to municipality residents for the municipal levy. In effect, the municipality creates an externality for surrounding residents. Not only does this reduce the fiscal benefits from business development, but it will also influence its willingness to supply business sites as hypothesized in equation (9) of the theoretical model.

To take into account the possible dissipation of the fiscal benefits of business development, a measure of the dispersal of tax base benefits needs to be developed. For this purpose, we employed a similar land area imputation as used to obtain the composite municipal property tax burden. Here, however, we computed the fraction of the area served by the overlapping government which is located within the municipality. These will be aggregated using the overlapping government tax rate as weights. The resulting variable will mirror the degree to which the tax benefits of business development are captured by the municipality. In turn, this variable will influence equations (1) and (10).

The demand for services provided by overlapping jurisdictions

The fact that there are numerous overlapping governments serving the municipality will also influence the demand for public services by residents, as described by equation (4). The share of taxable property which is residential may vary across type of government. This is apt to be most important for school districts. Thus, the tax price of a municipality will be a composite which reflects the respective tax prices of the school district and municipality governments which serve municipal residents. Similar considerations apply to income and the other demographic variables influencing residential demand for public services. However, data limitations preclude a correction for such potential diversity.

While our data set is rich, it is unlikely that we will have enough information to fully account for inter-jurisdictional variations in fiscal behavior. It is possible, therefore, that we might erroneously impute to business development, effects which are caused by other variables which we cannot observe, or to errors in data measurement. Fortunately, the availability of data at multiple time points allows us to sidestep this issue by focusing upon changes in fiscal behavior over time. Many of those variables we cannot observe will not change significantly over our sample period; for example, relative locational advantages are slow to change. Similar errors in measurement caused, say by our land area imputations, may be relatively constant, and thus not influence changing behavior over time.

Focusing upon changes over time is also compatible with our interest in the fiscal effects of business growth. Communities which choose to have different levels of commercial development say because of environmental consideration, may nevertheless react similarly to changes in business activity. Moreover, the impacts of development are likely to evolve with time. Such adjustments are best captured by an approach which focuses upon change as opposed to differences in behavior among disparate communities.

Does Business Development Raise Taxes: Methodology

The unit of observation for the study is the municipality. Our sample consists of incorporated municipal governments in the six counties which share a common border with Cook County, including Cook itself, with a population in excess of 10,000. Because of its size and economic maturity, the city of Chicago is excluded from the sample. The municipality is chosen, rather than say, school districts, because significant control over land use is vested with this governmental entity. Because the sample excludes the many smaller municipalities in the six county region, the study's results may not apply to such areas.

The period of observation is roughly 1980-1990. The period is not precise because some data were available only for the Census years 1979 and 1989, or for the fiscal years 1981 and 1991.

For each municipality, an aggregate property tax rate has been compiled. The existence of numerous overlapping local jurisdictions make it necessary to estimate an aggregate tax rate or tax burden, which would reflect the combined burden of the separate property tax levies imposed within the boundaries of a municipality. This was accomplished by overlaying maps of each type of jurisdiction upon that for the municipality in question. The fraction of a municipality's tax base which was subject to the property tax levy of an overlapping jurisdiction of a particular type (for example, school district) is assumed equal the fraction of municipal land area accounted for by that particular jurisdiction.

These aggregate tax rates burdens have been further refined to reflect differences in assessment practices and differences in the incidence of major tax exemptions, such as the homeowners exemption. This enables us to estimate an effective rate of tax on residential property as well as an effective tax rate relative to income.

Business growth within a municipality will be measured by the growth of commercial and industrial assessed value and by aggregate employment.

Measures of tax burden

Three measures of tax burden are considered: (1) the statutory property tax rate that is applied to equalized assessed value, and hereafter denoted as **trate**; (2) effective tax rate on owner-occupied housing, denoted as **rate**; (3) effective tax rate in terms of income, denoted as **burden**. Each of these measures is interesting in its own right. **Trate** is of interest because it is the measure set by local governing authorities; it is also the tax rate applied to commercial and industrial property. **Rate** is of significance because it reflects the degree to which residential property is taxed and is relevant to decisions to build or improve residential property. Finally, **burden** is of significance because it measures the average sacrifice required of homeowners within a community; increases in this measure imply that less funds are available for private consumption.

Mathematically, these can be represented as follows:

$$\text{trate} = \text{RPTAX} / \text{EAVRES},$$

$$\text{rate} = \text{RPTAX} / \text{FVRES},$$

$$\text{burden} = \text{RPTAX} / \text{INC},$$

where

RPTAX	=	aggregate residential property tax payments,
EAVRES	=	aggregate equalized assessed value of residential property,
FVRES	=	aggregate market value of residential property, and
INC	=	aggregate income.

Simple algebraic manipulation reveals the following relationships among these measures of tax burden.

trate = rate * (EAVRES / FVRES)

burden = rate * (FVRES / INC)

The term (EAVRES/FVRES) is commonly known as the assessment ratio, while (FVRES/INC) is the average ratio of house value to income. The assessment ratio differs among communities despite efforts by the State Board of Equalization to keep them uniform. The ratio of housing value to income will differ because of underlying differences in land values and the average age of housing stock. Conceivably, movements in these indicators of tax burden may not necessarily agree.

Empirical Model Specification

The empirical model consists of four major sections; (1) tax burden; (2) population; (3) employment; (4) housing appreciation. All but (4) have been developed in the theoretical model. The last, being static, is unable to treat dynamic elements such as changes in housing price. Like the simple correlation analysis, focus will be upon explaining percentage changes in tax burden measures. Consequently, many of the model's variables will themselves be expressed in terms of percentage changes.

Tax burden

The tax burden section consists of two major relationships and a quasi-reduced form. The first relationship is predicated upon the community's fiscal budget constraint. By this condition, **trate** can be expressed as

(11) trate = (Expenditure - Other Revenue) / EAV.

Ignoring, for the moment, other revenue, **trate** is seen to depend upon expenditure behavior and tax base growth. In growth terms, we have

(12) chtrate = grexp - grEAV,

where ch or gr signify percentage change. The two components of the tax burden section, then, are estimating equations for expenditure and EAV.

By our previous discussion in the theoretical section, **grexp** is assumed to depend upon the growth of population, growth of income, growth of employment, tax price, and relevant demographics.

(13) grexp = (grinc(+),grpop(+),gremp(+),taxprice(+),demo) + u_{exp},

where, for notational economy, we have chosen to suppress the coefficients of the right-hand side variables, and **u** is an error term. The expected sign of the variable is indicated in parenthesis. It should be noted that we have included the *level* of tax price rather than its change as the model might otherwise suggest. The level variable is included to capture compositional effects upon expenditure. This will occur if expenditure demands by existing residents and business increase at different rates. Such would be the case if growing real income leads to higher residential demands for services, with business demands holding relatively constant. In this case, communities with high tax prices will, other things constant, also experience higher tax rate growth. Hence, our expected sign for tax price is positive. A change in tax price variable is deliberately omitted from the specification of (13) because its effects would be captured by the gremp and grpop variables. To include it as a separate factor would be to invite serious multi-collinearity, if not singularity.

The variable **grEAV** is assumed to depend upon those factors influencing the growth of the tax base: growth of population, employment, income, and house price. In addition, it will depend upon the level **assrat** and change in the assessment ratio (**chass**) for residential housing. Finally, since Cook County has a classified assessment system under which business property is more highly assessed, it will depend upon whether the municipality is located in Cook County, for which we use a dummy variable.

(A1) grEAV=(grinc(+),grpop(+),gremp(+),grhpric(+),

cook(+),assrat(+),(grass(+)) + u_{eav}.

All variables in this equation are expected to have a positive sign.

Because we are not able to observe expenditures, we cannot estimate (13) directly. We can only estimate it indirectly through substitution into (12). Accordingly, our two "structural" equations in the tax burden section are (A1) and

(A2) grtrate=(grinc(+),grpop(+),gremp(?),taxprice(+),demo,grEAV(-)

trate(-),cook(?) + e_1.

The change in **taxprice** term is suppressed in (17) because, given grEAV, it is highly correlated with **gremp**. Specifically,

chtaxprice = grbus - grEAV,

Because we are unable to include the change in tax price as a separate variable, we are unable to separate the taxprice and direct business service demand associated with **gremp**. Since taxprice changes should have a dampening effect on expenditure (due to elasticity), we are unable to place a prior on the sign of **gremp** in (A2). Finally, we add two terms, the initial statutory tax rate and a dummy for Cook County. The former is included because the expenditure equation is a relationship for "desired" increases in expenditure. If a community already has a high tax rate, it may fear losing tax base to competing jurisdiction. Moreover, some communities operate at their tax rate limits, beyond which they must seek voter approval for tax rate increases. Officials in high tax rate localities may hesitate to seek such approval and/or voters may refuse to grant such approval. Tax rates for many special districts are defacto mandated by state law and thus cannot be changed. The Cook County dummy variable is introduced because of its classification system for business property. Here the statutory tax rate understates business tax levels and overstates residential tax levels. Therefore, resistance to higher tax rates will be lower in communities with a relatively large non-residential base. Thus, it is not possible to place a prior sign on the Cook County dummy variable in (A2).

In addition to the two structural equations, we also have the semi-reduced form for this sector which we obtain by combining (A1) and (A2).

(A) grtrate=(grinc(?),grpop(?),gremp(?),grhpric(-),taxprice(?),demo,

chass(-),trate(-),cook(?)) + u_A.

Empirically, **chass** is highly correlated with **cook** and **assrat** and is as well correlated with other elements of (A). Hence, it is not explicitly included in the estimation process. Similarly, **cook** and **assrat** are very highly correlated, leading us to include one or the other, but not both when estimating (A).

It appears that economic theory provides us with few priors on the signs of this semi-reduced form. As a result, we may well find the absence of statistically significant relationships between the growth in tax burden and such variables. However, theory does predict that the sign of house price appreciation will be positive and that the sign of the initial tax rate will be negative. Otherwise, the data will have to speak for themselves.

Alternative tax burden measures

The specification of the tax burden sector for the alternative measures of tax burden follow directly from the preceding model. For the effective tax rate on house value, we have the relationship

chrate = chtrate + grass.

In other words we need only add a term to reflect the growth of the assessment ratio to the right hand side of (A) above. But, since, it already exists, we have basically the same equation, with the exception of the initial tax rate term, which would substitute **rate** for **trate**.

Similarly, for the effective tax rate on income, **burden**, we have the following

chburden = chrate + chpric,

where **hpric** is the ratio of average house price to per capita income. But in

chhprinc = grhpric - grinc,

each of the right-hand terms is already included in (A). Note, however, that the prior sign on grinc will be changed if the coefficient in (A) assumes a value less than one. In this case, the sign of income will be negative.

Population

Following the theoretical model, the following equation can be developed for population.

(B) $grpop=(gremp(+),gremp_n(+),grhpric(-),chtrate(-),trate(-),schexp(+),$
$hprice(-),renters(+),density(-),annex(+)) + u_n,$

where

gremp$_n$ = growth of nearby employment,

grhpric = growth of home prices,

trate = statutory tax rate 1981,

schexp = per pupil current expenditure, 1981,

hpric = average housing price 1981,

renters = percentage renters,1980,

density = population density,1980, and

annex = change in land area.

The renters and density variables are included to proxy for community attitudes towards new residents. Low density may be a signal that a community advocates large lot zoning, while a low rental share may identify communities seeking to keep out high-cost populations. Growth in land area is included for obvious reasons. Otherwise, the specification of (B) follows directly from the theoretical argument.

Employment

The theoretical model suggests the following equation for the growth of community employment.

$$\text{(C)} \quad gremp=(grpop(+),grpop_n(+),gremp_n,trate(?),chtrate(?),$$
$$cook(-),locat(+),inc(-),dissip(-)) + u_c,$$

where:

$grop_n$ = growth of nearby population,

cook = dummy variable for cook county,

locat = locational advantages,

inc = average income, 1980, and

dissip = dissipation index.

The population terms are included to reflect access to labor markets, while the employment variable attempts to measure inter-industry supply relationships. Cook County is included to reflect its classified assessment practice which discriminates against business and industry. The income variable represents demand for environment, and the dissipation index reflects the degree of leakage of business tax base to surrounding jurisdictions. The latter variables attempt to measure the willingness to supply sites to new businesses. Various measures of locational advantage are used, including the standard distance from CBD and highway access variables. Housing price, since it is heavily influenced by land values, will be used as a proxy for locational advantages. Finally, no prior sign is placed on the tax variables because high taxes may increase supply of sites in addition to raising costs of doing business.

Price appreciation

Up to this point we have not specifically addressed the determinants of price appreciation. Like most things, house prices reflect supply and demand considerations. This, together with data availability, led to the following specification.

$$\text{(D)} \quad grhpri=(grinc(+),chtrate(-),gremp(-),trate(-),inc(+),hprice(?)$$
$$emppop(-),density(+),distance(+),highway(+)) + u_D,$$

where:

emppop	= ratio of employment to population, 1980,
density	= population per sq mile, 1980,
inc	= per capita income, 1980,
hprice	= average housing price, 1980,
distance	= distance to the Loop, and
highway	= access to expressway.

Housing appreciation should be more rapid the greater the growth in resident income, but lower the greater the growth of tax rates (capitalization effect). It should also be lower in communities with rapid economic development, reflecting congestion growth and environmental degradation. Also included are a group of amenity variables: including the existing tax rate, income, employment saturation, population density, density, and highway access. These variables could be expected to influence the level of house prices, and also their rate of growth if prices adjust gradually.

Statistical Results

Each of the models A-D above, as well as the structural equations A1 and A2, was estimated using ordinary least squares (OLS) and two-stage least squares (2S).

Tax burden sector-structural relationships

(A1) growth of assessed value (see Table A1)

The OLS estimates all carry the expected sign and are all but one significant at the 99% level of confidence, and the last, **cook**, is significant at the 95% level. Moreover, the overall fit is quite good, with 82% of the variance in EAV having been accounted for. This suggests that the proxies for tax base growth are quite adequate.

Coefficients can be interpreted as partial elasticities. Thus, a 1% increase in population is associated with a .66% increase in EAV. Similarly, a 1% increase in employment is leads to a .17% increase in the taxable base. Thus economic development has clear tax base impacts. The discrepancy in size of elasticity with population should not be overstated because the two movements are likely to go hand in hand. Commercial development often follows residential development, while industrial development may give rise to residential development. The coefficient on **cook** suggests that growth of taxable base is 4.3 percentage points higher than otherwise.

The 2S estimates are not quite as accurate, nor are the coefficients of **grhpri,chass**, or **cook** significant at the same levels of confidence as for OLS. However, two of the three are still significant at the 90% level. The fact is that there is considerable colinearity among these three variables. The point estimates for population growth and employment growth are close to their OLS counterparts, suggesting the specification is robust. The upshot is that the pre-conditions necessary for favorable tax consequences of economic development are met--an increase in the community's tax base.

(A2) Statutory tax rates (see Table A2)

The OLS estimates reveal a good fit with nearly 60% of the variance accounted for.[2] As expected, the growth of the tax base, **GREAV**, exerts a strong and negative influence on statutory tax rates, when expenditure effect are held constant. The initial tax rate, **trate81** also performs as expected, demonstrating the power of fiscal constraint and tax rate limitations. The coefficient points to strong regression to the mean. The Cook dummy is strongly positive and significant, implying a positive tax rate growth differential of nearly 15 percentage points. This suggests that spending caps in Cook county may be less binding than in the "collar" counties.

As for expenditure determinants, population growth clearly places a strong, positive demand upon local public services. The situation for employment growth, however, is less certain. While the coefficient is positive, it is not significant using normal standards for statistical significance. Moreover, its absolute size is less than one tenth of the population figure, suggesting only modest service demands by business. As mentioned above, however, the coefficient on employment may reflect tax price effects as well as business service effects. As for tax price, it contributes to the growth of taxation, as expected. Those communities with low business shares suffered higher tax increases over the period. Thus, there may be a dynamic benefit from business growth not anticipated by static models. Initial average home value is negatively correlated with expenditure growth. This is less surprising than for income, since it may simply reflect reduced need for public services in bedroom communities with large, expensive homes. Finally, a renter variable, measuring the share of housing units rented, is designed to test whether renters are more likely to support public services than homeowners. The OLS estimates suggest some support for this hypothesis, though significance falls marginally short of the 90% level.

All in all, the OLS equation is consistent with prior expectations and fails to show significant expenditure burdens imposed by business growth, while pointing to sizeable expenditure effects of population growth.

As with the EAV equation, the 2S estimates are less precise than for the OLS. By and large, however, the qualitative findings are unchanged. Certain of the coefficients, however, are seen to be sensitive to the estimation technique. The coefficient on EAV is considerably increased in absolute value. This should not be surprising since the OLS estimates are influenced by feedback from tax rate growth to EAV growth. Hence, the 2S coefficient may be more representative. A similar observation applies to population growth, though to a lesser degree. The 2S estimates suggest an even larger expenditure effect of population growth. Furthermore, any marginal influence of employment growth disappears altogether.

Tax burden sector--semi-reduced forms (see Table A3)

Statutory tax rates

Once the EAV variable is eliminated from the estimating equation, the precision of the estimates falls. Nevertheless, the OLS equation continues to explain more than 50% of the variance of the dependent variable. Unfortunately, the coefficients of a number of key variables, such as population and employment become statistically insignificant. This is not surprising given the offsetting effects of these variables through expenditure and tax base effects.

As predicted, housing appreciation has led to a decrease in statutory tax rates, although it barely fails the 90% test of significance in the 2S model. Initial housing price continues to depress tax rate growth, but with half of the force as in the structural equation. The Cook dummy and initial tax rate have similar effects as in the structural equation. The coefficient of population growth is positive, though not significant. The key variable, growth of employment is approximately significant in the OLS estimate at the 90% confidence level. Its coefficient is negative, implying some tax rate benefits from employment growth. However, it fails the test for significance in the two-stage version. Thus, these results are too marginal to serve as definitive evidence for immediate favorable tax rate effects of economic development.

However, the positive and significant coefficient on taxprice suggests long term tax rate benefits of economic development. Together with the negative coefficient on employment growth, this places the burden of proof of negative fiscal consequences of economic development squarely on those who posit it.

Effective tax rate on housing

When account is taken of assessment variations, there is a much clearer connection between employment growth and tax burden. In both the OLS and 2S versions, the coefficient of **gremp** is negative and significant at the 95% level of confidence. The 2S estimate is larger that the OLS, implying that a 1% change in employment growth is accompanied by a .12% reduction in effective tax rate growth. While this effect is modest, it is by no means trivial.

The coefficient on population growth, another variable of great interest, is positive but fails the significance test. Thus, it is not possible to infer that population growth will have immediate negative effective property tax rate consequences. However, the positive coefficient on taxprice points to long term costs of population growth (without accompanying employment growth). Thus, the weight of evidence would seem to be against the proposition that population growth typically has **positive** effective tax rate consequences.

Housing appreciation has negative tax effects in the OLS version, providing some that assessment lag hypothesis. However, in the 2S version, the coefficient is insignificant.

Finally, the rental variable is strongly significant for both the OLS and 2S methods. This adds credence to the contention that renters are more prone to support public expenditure, perhaps because they believe their landlord pays the tax.

Effective rate on income

For the income measure, there is apparently little connection between employment growth and tax burden. For neither estimation technique is **gremp** statistically significant. Indeed, in the 2S version, the coefficient is *positive*!

Here, however, there is evidence of a positive tax burden impact of population growth. A 1% increase in population growth appears to result in a .25% increase in tax burden growth.

That income growth and house appreciation have opposite, significant impacts on tax burden comes as no surprise, because of the dependence of **chburden** on the (house price)/income ratio. Thus, income growth, holding price appreciation constant, leads to an decrease in this key ratio, and hence a decrease in tax burden. Given that the absolute value of the coefficient is less than one, it suggests positive expenditure effects of income growth.

For this measure of tax burden, both the Cook dummy and the 1980 assessment ratio are included in the equation. While the negative sign of **cook** was anticipated, the negative sign on **assrat** comes as a surprise. Perhaps the answer lies with some interaction with price appreciation.

Summary--tax burden effects

Our empirical analysis, while largely supporting the underlying model, has provided mixed evidence concerning the impact of economic development upon property tax burdens. If we hold constant the tax base consequences, employment growth appears to have no tax rate impact. If we couple this with the fact that employment growth has significant tax base effects, and the fact that the expansion of tax base, holding expenditure determinants constant, will tend to reduce tax rates, we arrive at the conclusion that the employment growth leads to a reduction in statutory tax rates.

If we test this hypothesis directly, through a semi-reduced form, we also find a negative association. However, at best, the statistical significance of this relationship is marginal. Thus, the errors in the relationship between employment growth and base growth and that between base growth and tax rate growth are sufficient to weaken the ultimate relation between employment growth and tax rate growth. Nevertheless, there appears to be significant long-run benefits of employment growth through its impact on taxprice. These benefits do not accrue immediately, but are felt as taxprices are gradually lowered, reducing tax rate burden of income growth.

For the effective property tax rate, however, there is no ambiguity. There appears to be a statistically significant negative relationship between employment growth and tax rate growth. For many purposes, effective property tax rates are a better measure of burden than statutory rates. Hence, we can advance the proposition that economic development has led to a reduction in property tax burdens in the five county Chicago area.

The tax consequences of the other major type of development, that arising from population growth, has similar ambiguities. The evidence is clear that population growth both increases expenditures and increases property tax revenues. Hence, the impact on property tax rates will depend upon the relative strength of these forces. With respect to statutory rates, there is some evidence of an adverse impact on tax rate, but the effect fails the test of statistical significance. We cannot reject the hypothesis that there is no immediate positive effect on tax rates. However, we can reject the hypothesis that there are major immediate tax rate **benefits.** Moreover, like employment growth, population growth has long run implications via the taxprice effect. Here, however, the result is to increase long-run tax rates.

The same remarks apply with regard to the effective tax rate on owner-occupied property--the coefficients of the semi-reduced form are positive but not statistically significant from zero. It is only if we measure tax burden with regard to income can we unequivocally argue that population growth increases tax rates. Ironically, we are unable to find positive tax consequences under this measure for employment growth.

Population sector (see Table B)

The most striking aspect of our estimates of population growth concerns its relationship to employment growth. Whether we use OLS or 2S, employment growth, both locally and nearby, appears to have a strong positive influence on population growth. Thus, population follows jobs. (Whether the reverse is also true will be taken up in the next section.) It is also apparent that neighboring job growth has a larger effect than local job growth--nearly four times as strong. Thus, economic development activities of one's neighbors powerful have implications for one's own residential development. This in turn may have negative fiscal consequences depending upon the measure of tax burden adopted. Thus, even if it is true that employment growth provides **local** fiscal benefits, this does not insure that it will provide **global** fiscal benefits.

The rest of the population equation goes just about as expected, with the exception of per pupil education spending (**wopexop**). The sign of this variable is the reverse of what was expected. It may well be that those communities which spend above the average also engage in population growth control measures to avoid having to subsidize the children of new migrants.

Employment sector (see Table C)

Unlike the findings of a recent study of the Philadelphia area, there appears to be little impact of nearby population growth upon employment expansion. While the OLS version points to a relationship to **own** population growth, this likely mirrors the finding in the population equation. When the 2S procedure is employed, the result disappears. Thus, it is apparently not true that employment follows population--which contradicts a piece of contemporary public wisdom. Perhaps this is due to the fact that much of the employment growth over the period was due to increased labor force participation. Such jobs may thus have little to do with population expansion.

It is interesting to note that high statutory tax rates appear to deter development. Curiously, the Cook dummy, is positive, contrary to expectations. As expected, high-income communities tend to repel development. At the same time, those communities with high property values tend to attract new development; high property values may be a proxy for locational advantages. The manufacturing density variable, which was designed to represent community tolerance for environmental disamenities, has the wrong sign. Communities rich in manufacturing tend to have slower employment growth. This variable may be proxying for an older suburb, with little vacant space for new development.

Housing appreciation (see Table D)

Lastly, we consider the growth of inflation adjusted housing prices. Our estimates suggest powerful capitalization effects. Both high initial and rapidly growing statutory rates are associated with decreased price appreciation. Growth of income, a major demand for housing services also increases housing inflation. Richer communities, measured by initial income benefit disproportionately from housing price growth. However, holding income constant, those areas with higher initial housing prices enjoyed less rapid appreciation. The environmental variables, employment saturation (employment/population) and population density both had the expected sign. The former is a measure of congestion and other forms of environmental degradation associated with business development. Finally, it appears that the outlying suburbs benefited most from housing appreciation during the 1980s.

Study Conclusions

Our empirical analysis, while largely confirming the underlying model, has provided mixed evidence concerning the impact of economic development on property tax burdens. If we hold constant the tax base consequences, employment growth appears to have no observable tax rate impact through expenditure channels. If we couple this with the fact that employment growth has significant positive effects on the local property tax base, we arrive at the conclusion that the employment growth leads to a reduction in statutory tax rates. If we test this hypothesis directly, we also find a negative association. However, at best, the statistical significance of this relationship is marginal. Apparently, there is sufficient noise in the relationship between employment growth and base growth and between base growth and tax rate growth so as to weaken the observable relationship between employment growth and tax rate growth.

For the effective property tax rate, however, this matter has resolved itself. There appears to be a statistically significant negative relationship between employment growth and tax rate growth. For many purposes, effective property tax rates are a better measure of burden than statutory rates. Hence, we can advance the proposition that economic development has led to a reduction in property tax burdens in our sample of Chicago's suburbs.

The tax consequences of the other major type of development, that arising from population growth, has similar ambiguities. Population growth increases expenditures, but it also increases property tax revenues. Hence, the impact on property tax rates will depend upon the relative strength of these forces. With respect to statutory rates, there is some evidence of an net adverse impact on tax rate, but the effect fails the test of statistical significance. We cannot reject the hypothesis that there is no effect on tax rates. However, we can reject the hypothesis that there are major tax rate benefits. A similar result is found with regard to the effective tax rate on owner-occupied property. It is only if we measure tax burden with regard to income can we unequivocally argue that population growth increases tax rates.

Both local and nearby employment growth are found to exert a strong positive influence on population growth, that is, people follow jobs. Moreover, neighboring job growth is found to have a larger effect than local job growth--nearly four times as strong. Economic development activities of one's neighbors can have significant implications for one's own residential development. And if it is the case that residential growth is accompanied by costly fiscal consequences, then business development in a neighboring community has been found to indirectly place added pressure on residential property tax rates. Thus, even if it is true that employment growth provides *local* fiscal benefits, this does not insure that it will provide *global* fiscal benefits.

Footnotes

[1]This assumes that residents believe that, at the margin, increases of business taxes are exported outside the jurisdiction. This is a strong assumption, but one commonly made in the literature.

[2]In percentage change models, fits tend to be notoriously low.

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Table A1
Regression analysis of growth in equalized assessed values (OLS and two stage least squares)

	Growth in equalized assessed value (OLS)	Growth in equalized assessed value (2SLS)
Intercept	42.44	41.16
	(19.71)	(11.87)
Growth in population	0.66	**0.59**
	(9.17)	(4.30)
Growth in employment	0.17	**0.21**
	(6.59)	(3.13)
Growth in average home price	0.17	***0.1***
	(4.63)	(1.62)
Growth in income	0.55	0.61
	(6.50)	(4.45)
Change in assessment ratio	0.30	***0.213***
	(4.27)	(1.75)
Cook County dummy variable	4.30	4.38
	(1.97)	(1.22)
R sq (adj)	0.80	0.65

NOTES:
The variables "Growth in population", Growth in employment", "Growth in home prices" and "Change in assessment ratio' are jointly dependent variables in the two-stage least squares (2LS) model. Values are given in bold face type.
Estimated t-values are given in parentheses

Table A2
Regression analysis of changes in tax rates

	Change in statutory tax rates (TRATE) OLS	**Change in statutory tax rates (TRATE) 2SLS**
Intercept	47.19	57.90
	(6.32)	(4.82)
Growth in equalized assessed value	-0.49	**-0.74**
	(-6.60)	(-3.47)
Growth in population	0.42	**0.59**
	(5.42)	(3.90)
Growth in employment	0.03	**0.04**
	(1.30)	(0.77)
Growth in income	-0.01	0.19
	(-0.08)	(0.96)
Statutory tax rate, 1981	-3.87	-4.38
	(-5.05)	(-4.50)
Average home price	-0.0010	-0.0010
	(-2.96)	(-2.07)
Tax price (EAV res/EAV total)	0.84	1.05
	(3.96)	(3.68)
Percentage of renters in jurisdiction	0.11	0.13
	(1.60)	(1.59)
Cook County dummy variable	15.16	16.38
	(6.46)	(5.84)
R sq (adj)	0.56	0.44

NOTES:
Jointly dependent variables are given in bold face type.
Estimated t-values are given in parentheses.

Table A3
Regression analysis of changes in tax rates (2SLS)

	Change in statutory tax rates (TRATE)	Change in effective tax rates (RATE)	Change in effective tax rates relative to income (BURDEN)
Intercept	33.00 (4.17)	58.29 (5.98)	92.31 (7.43)
Growth in population	0.10 (1.36)	0.11 (1.29)	0.27 (3.46)
Growth in employment	-0.04 (-1.64)	-0.07 (-2.33)	-0.01 (-0.37)
Growth in income	-0.15 (-1.28)	0.15 (1.11)	-0.52 (-4.04)
Growth in average home price	-0.13 (-3.38)	-0.11 (-2.25)	0.62 (10.04)
Statutory tax rates, 1981	-3.07 (-3.60)		
Effective tax rate, 1981		-0.29 (-6.40)	
Tax payment as a share of income, 1981			-11.23 (-6.41)
Average home price, 1981	-0.001 (-3.24)	-0.002 (-5.58)	-0.0002 (-0.29)
Tax price (EAV res/EAV total)	0.50 (2.16)	0.94 (3.28)	0.54 (2.30)
Assessment ratio			-1.81 (-3.55)
Percentage of renters in jurisdiction, 1981	0.05 (0.63)	0.20 (2.17)	0.19 (2.13)
Cook County dummy variable	9.36 (3.32)	-13.33 (-3.90)	-17.27 (-3.74)
R sq (adj)	0.43	0.49	0.88

NOTES:
Estimated t-values are given in parentheses.

Table A3 (continued)
Regression analysis of changes in tax rates (OLS)

	Change in statutory tax rates (TRATE)	**Change in effective tax rates (RATE)**	**Change in effective tax rates relative to income (BURDEN)**
Intercept	30.25 (3.52)	54.24 (5.31)	101.72 (5.89)
Growth in population	**0.15** (1.37)	**0.17** (1.35)	**0.26** (1.78)
Growth in employment	**-0.06** (-1.24)	**-0.12** (-2.02)	**0.09** (1.16)
Growth in income	-0.25 (-1.69)	0.05 (0.35)	-0.55 (-2.54)
Growth in average home price	**-0.08** (-1.49)	**-0.04** (-0.68)	**0.61** (4.63)
Statutory tax rates, 1981	-3.10 (-3.35)		
Effective tax rate, 1981		-0.29 (-6.15)	
Tax payment as a share of income, 1981			-12.34 (-4.01)
Average home price, 1981	-0.001 (-2.22)	-0.002 (-4.37)	-0.0002 (-0.23)
Tax price (EAV res/EAV total)	0.53 (2.13)	0.99 (3.32)	0.51 (1.68)
Assessment ratio			-2.10 (-2.71)
Percentage of renters in jurisdiction	0.06 (0.78)	0.25 (2.52)	0.19 (1.60)
Cook County dummy variable	10.80 (3.40)	-12.43 (-3.34)	-18.31 (-2.98)
R sq (adj)	0.39	0.46	0.80

NOTES:
Jointly dependent variables are given by bold face type.
Estimated t-values are given in parentheses.

Table B

Regression analysis of growth in population (OLS and two-stage least squares)

	Growth of population (OLS)	Growth of population (2LS)
Intercept	2.06 (0.23)	5.95 (0.51)
Growth of employment	0.10 (3.99)	***0.123*** (2.50)
Growth of employment in nearby jurisdictions	0.42 (4.20)	0.41 (3.70)
Statutory tax rate, 1981	-0.11 (-0.14)	-0.23 (-0.25)
Change in statutory tax rate	0.08 (0.80)	***-0.014*** (-0.08)
Average home price, 1980	0.0003 (0.93)	0.0001 (0.25)
Growth in average home price	0.06 (1.63)	***0.023*** (0.47)
Population density 1980	-0.001 (-1.81)	-0.001 (-1.55)
Change in land area of jurisdiction, 1980 to 1990	2.75 (4.18)	2.75 (3.97)
Percentage of renters in jurisdiction	0.18 (2.36)	0.15 (1.88)
Per pupil education spending	-0.001 (-2.51)	-0.001 (-2.28)
R sq (adj)	0.64	0.61

NOTES:
The variables "Growth in employment", "Growth in average home price" and "Change in statutory tax rates" are predicted values in the two-stage least squares (2LS) model and are given by bold face type.

Estimated t-values are given in parentheses.

Table C
Regression analysis of growth in employment (OLS and two-stage least squares)

	Growth in employment (OLS)	Growth in employment (2LS)
Intercept	77.95 (2.52)	111.56 (2.70)
Growth in population	0.82 (2.79)	***0.182*** (0.36)
Growth in nearby population	-0.60 (-1.16)	-0.11 (-0.18)
Growth of employment in nearby jurisdictions	0.39 (0.92)	0.44 (0.97)
Manufacturing employment per square mile, 1980	-0.02 (-4.37)	-0.02 (-4.50)
Per capita income 1980	-0.02 (-3.60)	-0.02 (-3.90)
Statutory tax rates, 1981	-4.11 (-1.41)	-6.34 (-1.87)
Change in statutory tax rates	-0.39 (-1.20)	***-1.003*** (-1.58)
Average home price, 1981	0.01 (3.87)	0.01 (3.91)
Access to highways	0.58 (0.18)	-0.51 (-0.15)
Cook County dummy variable	15.76 (1.43)	26.43 (1.93)
Index of tax base dissipation	-0.94 (-1.22)	-0.88 (-1.08)
R sq (adj)	0.44	0.41

NOTES:
The variables "Growth in population" and "Change in statutory tax rates" are jointly dependent variables in the two-stage least squares (2LS) model and are given by bold face type.

Estimated t-values are given in parentheses.

Table D

Regression analysis of housing appreciation (OLS and two-stage least squares)

	Appreciation of housing (OLS)	**Appreciation of housing (2LS)**
Intercept	20.67	21.06
	(1.14)	(0.88)
Per capita income 1980	0.02	0.02
	(7.30)	(5.30)
Population density 1980	0.003	0.003
	(3.063)	(2.84)
Employment to population ratio, 1981	-24.10	-20.78
	(-3.40)	(-2.09)
Growth of employment	-0.06	**-0.01**
	(-1.25)	(-0.05)
Growth in per capita income	0.68	0.58
	(3.64)	(2.59)
Statutory tax rates, 1981	-7.46	-7.38
	(-5.21)	(4.55)
Changes in statutory tax rates	-0.64	**-0.82**
	(-4.04)	(-2.94)
Average home price, 1981	-0.01	-0.01
	(-6.42)	(-4.55)
Access to highways	-0.33	-0.36
	(-0.20)	(-0.21)
Distance to the loop	0.68	0.73
	(3.51)	(3.46)
R sq (adj)	0.64	0.61

NOTES:

The variables "Growth in employment", "Change in statutory tax rates" are predicted values in the two-stage least squares (2LS) model and are given by bold face type.

Estimated t-values are given in parentheses.

Appendix I

County locations of municipalities in study

Municipality name and government form	Location: County(ies)
Addison village	DuPage
Alsip village	Cook
Arlington Heights village	Cook, Lake
Aurora city	DuPage, Kane
Bartlett village	Cook, DuPage
Batavia city	DuPage, Kane
Bellwood village	Cook
Bensenville village	Cook, DuPage
Berwyn city	Cook
Bloomingdale village	DuPage
Blue Island city	Cook
Bolingbrook village	DuPage, Will
Bridgeview village	Cook
Brookfield village	Cook
Buffalo Grove village	Cook, Lake
Burbank city	Cook
Calumet City city	Cook
Calumet Park village	Cook
Carol Stream village	DuPage
Carpentersville village	Kane
Chicago Heights city	Cook
Chicago Ridge village	Cook
Cicero town	Cook
Country Club Hills city	Cook
Crestwood village	Cook
Crystal Lake city	McHenry
Darien city	DuPage
Deerfield village	Cook, Lake
Des Plaines city	Cook
Dolton village	Cook
Downers Grove village	DuPage
Elgin city	Cook, Kane
Elk Grove Village village	Cook, DuPage

Appendix I *(continued)*
County locations of municipalities in study

Municipality name and government form	Location: County(ies)
Elmhurst city	DuPage
Elmwood Park village	Cook
Evanston city	Cook
Evergreen Park village	Cook
Forest Park village	Cook
Franklin Park village	Cook
Geneva city	Kane
Glencoe village	Cook
Glendale Heights village	DuPage
Glen Ellyn village	DuPage
Glenview village	Cook
Glenwood village	Cook
Hanover Park village	Cook, DuPage
Harvey city	Cook
Hazel Crest village	Cook
Hickory Hills city	Cook
Highland Park city	Lake
Hinsdale village	Cook, DuPage
Hoffman Estates village	Cook, Kane
Homewood village	Cook
Joliet city	Will
Justice village	Cook
La Grange village	Cook
La Grange Park village	Cook
Lake Forest city	Lake
Lake Zurich village	Lake
Lansing village	Cook
Libertyville village	Lake
Lincolnwood village	Cook
Lisle village	DuPage
Lombard village	DuPage
Lyons village	Cook
McHenry city	McHenry

Appendix I *(continued)*
County locations of municipalities in study

Municipality name and government form	**Location: County(ies)**
Markham city	Cook
Matteson village	Cook
Maywood village	Cook
Melrose Park village	Cook
Midlothian village	Cook
Morton Grove village	Cook
Mount Prospect village	Cook
Mundelein village	Lake
Naperville city	DuPage, Will
Niles village	Cook
Norridge village	Cook
Northbrook village	Cook
North Chicago city	Lake
Northlake city	Cook
Oak Forest city	Cook
Oak Lawn village	Cook
Oak Park village	Cook
Orland Park village	Cook
Palatine village	Cook
Palos Heights city	Cook
Palos Hills city	Cook
Park Forest village	Cook, Will
Park Ridge city	Cook
Prospect Heights city	Cook
Riverdale village	Cook
River Forest village	Cook
River Grove village	Cook
Riverside village	Cook
Rolling Meadows city	Cook
Romeoville village	Will
Roselle village	Cook, DuPage
Round Lake village	Lake
St. Charles city	DuPage, Kane

Appendix I *(continued)*
County locations of municipalities in study

Municipality name and government form	Location: County(ies)
Sauk Village village	Cook, Will
Schaumburg village	Cook, DuPage
Schiller Park village	Cook
Skokie village	Cook
South Holland village	Cook
Streamwood village	Cook
Summit village	Cook
Tinley Park village	Cook, Will
Villa Park village	DuPage
Waukegan city	Lake
Westchester village	Cook
West Chicago city	DuPage
Western Springs village	Cook
Westmont village	DuPage
Wheaton city	DuPage
Wheeling village	Cook, Lake
Wilmette village	Cook
Winnetka village	Cook
Wood Dale city	DuPage
Woodridge village	DuPage, Will
Woodstock city	McHenry
Worth village	Cook
Zion city	Lake

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