Do Wisconsin Tax Increment Finance Districts Stimulate Growth in Real Estate Values?

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Abstract

Economic development is one of the central tasks of local government in the United States. In recent years local governments around the country have made wide use of a somewhat obscure and indirect tool call “tax increment finance” (TIF) as a major mechanism to promote real estate development. In this paper we use data on all Wisconsin municipalities with and without tax increment finance (TIF) districts during the period 1990 to 2003 to study the effect of TIF on economic development. We use panel data estimation techniques to regress non-TIF and aggregate property values on variables that measure TIF use and control variables. We also use appropriate techniques to examine the potential endogeniety of TIF use. We find evidence in support of three primary hypotheses: (1) EAV grows faster in TIF than non-TIF portions of the municipality; (2) non-TIF portions of municipalities with a TIF grow more slowly than they would have in the absence of TIF; and (3) TIF has no net effect on aggregate land values within a municipality.

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Do Wisconsin Tax Increment Finance Districts
Stimulate Growth in Real Estate Values?

I. Introduction

"Economic development," however defined, is one of the central tasks of local government in the United States. With a mobile citizenry, government may most effectively promote growth by targeting policies to enhance fixed assets within its borders. In recent years local governments around the country have used a somewhat obscure and indirect tool call "tax increment finance" (TIF) as a major mechanism to promote real estate development.

While the details differ over time and across states, the establishment of a TIF district always begins with the specification of a set of geographical boundaries that delineates the TIF area. TIF districts vary in size but are generally only a small fraction of any particular municipality. Once the TIF district boundaries are established aggregate property tax assessments in the area determine the "base" value of the TIF district. The TIF increment at any particular time is the total value of property tax assessments within the borders of the TIF district minus the base value. Real estate parcels within the TIF district continue to pay property taxes on their full assessed value (base plus increment) according to all of the standard procedures of overlying governments. The revenue generated by these property tax payments is split into two revenue streams. Revenues generated by the base value go to overlying governments in the usual fashion. However, property tax revenues generated by the increment go to a special single purpose quasi-government called a TIF district. This district's sole responsibility is economic development within the boundaries of its particular TIF district. Often, new TIF districts sell bonds early in the life of the TIF district and pledge to repay the debt with revenues that bondholders expect the increment to generate in the future.

This fiscal institution has grown rapidly and widely across the United States. It is now used in at least 48 states and accounts for a very substantial amount of revenue. The existence and growth of TIF raises some important questions for those who have an interest in local public finance. Does TIF stimulate real estate appreciation? Are there important negative side-effects of TIF? Why have local governments chosen to use the complex TIF mechanism rather than directly appropriating funds for economic development?

In this paper, we try to gain insight about these questions through the study of tax increment financing in the State of Wisconsin over the past one and a half decades. While there are several instructive studies of TIF, we believe our analysis adds to the existing research in several ways. First, we examine the impact of TIF over an extended timeframe (1990-2003) for all Wisconsin municipalities, which includes cities that never use TIF, cities that create a TIF district for the first time, and cities that previously used TIF and create new TIF districts during the period of analysis. This extended period during which new TIF districts were created allows us to examine the affect of TIF from the initial date of creation over a number of years. In addition to evaluating the impact of TIF on aggregate property values, we also examine the impact of TIF creation on TIF district property value growth and non-TIF property value growth. This enables us to examine whether property value growth within TIF districts comes at the expense of property value growth in other areas of the city. We also examine the impact of TIF use on residential, commercial and manufacturing property separately to determine whether use of TIF has differential effects on several types of land use. Last, in Wisconsin the state government limits local government autonomy with regard to the use of various development tools. In other states, local governments may have at their disposal various tax abatement and other development tools. Thus, the evaluation of a particular policy tool such as TIF may be confounded by the use and effect of other policy tools. In Wisconsin, this concern is reduced because local governments do not have the authority to offer tax abatements, etc.

The next section offers a brief discussion of the use of TIF in Wisconsin. Section III provides a conceptual overview of TIF and explains why governments may prefer it to direct appropriations. This section also provides a brief review of some of the empirical literature about TIF and describes the questions we will address econometrically. Section IV describes our data and econometric analyses. Section V concludes.

II. The Use of TIF in Wisconsin

In Wisconsin a TIF project typically begins when a municipality's development authority draws up a development plan. This plan forecasts development within the TIF district and projects costs. The TIF plan is legally required to demonstrate that private funds are insufficient to move a redevelopment project forward and that the development would not occur "but for" the TIF district. The "but for" qualification creates a potential for abuse because of its subjective nature and because of the difficulty in evaluating proposed TIF projects.

Once the broad outline of the district is created, a financial feasibility study is conducted. This study projects the anticipated creation of new property value, determines the method of financing the project, and reports a cash flow analysis. The proposal is then forwarded to a Joint Review Board consisting of one public advocate and representatives from the school board, the county, the community and the local technical college. The meetings of the review board are public and decisions are based on majority vote.

TIF funds are often used to pay for real estate improvements including sidewalks, utility upgrades, or the construction of a parking garage near the proposed development. Generally, bond proceeds are spent on infrastructure and/or land acquisition. However, monies also can be spent on development incentives as well as for administrative and organizational expenses. Finally, expenditures are allowed for required tax payments to the township for annexed lands.

In Wisconsin as well as in other states, the prevention or removal of blight is a predominant feature that drives TIF legislation. However, it is important to note that in

Wisconsin TIF use is not limited to blight removal. Because of this, communities facing competition for tax base from their neighbors may feel compelled to use TIF. Along the same lines, businesses, looking for the "best deal" in locating a project, see the TIF program as a way to shift infrastructure costs to the municipality. In shopping for the best opportunity, businesses use TIF as a negotiating tool in discussions about relocation or redevelopment with municipal planning departments.

An important issue in the creation of any TIF district is the determination of its boundary. In Wisconsin, the boundary of a TIF district must be a contiguous "redevelopment" area created by ordinance or resolution of the municipality. The municipality must inform any overlapping taxing entity of their intention to create a TIF district. Objections are addressed through public hearings in order to receive community input regarding the proposal. After public opinion is weighed, community leaders decide whether to proceed.

A maximum of 12 percent of a municipality's assessed value may be included in TIF districts. The current use of the property is also a consideration because no more than 25 percent of the land can have been vacant for the preceding seven years (except in the instance of environmentally contaminated lands).

The various types of TIF districts have different maximum life spans. The maximum life is 27 years if the TIF district is designed to remediate blight.[1] The maximum life of an industrial district and a mixed use development is 20 years.[2] However, it is permissible for each of these districts to receive a three year extension to its maximum life. Environmental TIF districts have a maximum expenditure span of 15 years, with a repayment period of 16 years and no possibility of extension. Districts can be closed when the maximum life is expended, the total tax increments collected are sufficient to pay the district's cost, or when the municipality passes a resolution to close the district. In all types, if there are any remaining cost obligations, they become a general liability of the municipality.

III. Conceptual Overview

When a TIF district is established the taxable real estate value of the area is segmented into the "base"—the value of taxable real estate at TIF district designation—and the "increment"—the nominal increase in taxable real estate since designation of the TIF district. The same tax rate is applied to both the "base" and the "increment". Revenue generated by the application of the tax rate to the "base" is distributed to overlying governments in the usual way but revenue generated by the increment is reserved for economic development activities within the geographic boundaries of the TIF district.

Should we expect a TIF district to increase real estate values in the community when compared to a counterfactual in which TIF is not allowed? Brueckner (2001) has articulated the most complete theoretical model of TIF. His model provides a logically consistent rationale for the use of TIF rather than direct appropriations of economic

[1] In October 2004, the maximum life increased from 23 to 27 years.
[2] In October 2004, the maximum life decreased from 23 to 20 years.

development funds in some circumstances. He models a community with two neighborhoods (A and B) and an overlying, co-terminus school district. Residents are completely mobile so their level of welfare (utility) is exogenously determined. Thus, maximizing the value of the immobile resource—real estate—is equivalent to maximizing social welfare. Brueckner postulates the existence of local public goods that benefit neighborhood A but do not have any direct effect on neighborhood B. Expenditures for local public goods will result in appreciation of land values in neighborhood A which will, in turn, generate increased property tax revenue that benefits both neighborhoods. In order for a local public goods expenditure in neighborhood A to garner the political support of real estate holders in neighborhood B it must be self-financing in the sense that the increased real estate values must generate sufficient revenue at the current tax rate to pay for the cost of the improvement. Brueckner shows that, in the absence of TIF legislation, the change in the municipal tax rate (τ) required to finance an increase in the local public good (z) in neighborhood A (z_a) is $\frac{\partial \tau}{\partial z_a} = k\left(C_a^{'} - \left(\frac{\tau}{\tau + t + r}\right)R_a^{'}\right)$, where k is a constant, $C_a^{'}$ is the annualized marginal cost of the local public good, t is the school district tax rate, r is the discount rate and $R_a^{'}$ is the increase in aggregate rent in neighborhood A as a result of the increase in the public good[3]. A marginal local public goods expenditure will be welfare-enhancing so long as its annualized cost is less than the increase in rents $\left(C_a^{'} < R_a^{'}\right)$. Since $\left(\frac{\tau}{\tau + t + r}\right) < 1$ some welfare-enhancing local public good expenditures require an increase in the tax rate in Brueckner's model. Since neighborhood B does not benefit from local public goods in neighborhood A, property owners there may oppose them even when tax rate increases would finance expenditures with benefits exceeding cost.

In Brueckner's model, TIF is a device to exclude the overlying school district from revenue increases as a result of the public goods expenditure. As a result, the tax wedge creates a smaller distortion and makes more expenditure for local public goods in neighborhood A acceptable to residents of neighborhood B. Brueckner shows that when TIF is used the tax rate change required to finance an increase in local public goods in neighborhood A is $\frac{\partial \tau}{\partial z_{a|TID}} = k\left(C_a^{'} - \left(\frac{\tau + t}{\tau + t + r}\right)R_a^{'}\right)$. $\frac{\partial \tau}{\partial z_{a|TID}} < \frac{\partial \tau}{\partial z_a}$. TIF permits some welfare-enhancing public goods expenditures that otherwise would not have been viable (i.e. they would have required a tax increase). Brueckner further demonstrates that TIF will not be a viable mechanism for financing excessive (non welfare-enhancing) marginal expenditures. These results imply that, all else equal, a municipality that uses TIF will provide at least as high a level of local public goods as a municipality that does not.

[3] Brueckner assumes that the school district's spending and tax rate are unaffected by the increase in real estate values brought about by additional public spending. Although he recognizes that an increase in real estate values ought to generate additional a surplus in the school district budget, Brueckner argues that this "may still be the appropriate reference point… [because it] avoids the need to speculate about what steps the school district would take to eliminate the surplus" (p.322). .

Since local public goods enhance land value, Brueckner's basic model predicts that TIF will increase aggregate real estate value.

Brueckner (p.335) summarizes his basic findings by saying TIF "cannot be used to finance a marginal public improvement when one is not socially desirable [although] [t]he converse … does not hold: TIF fails in some situations where a public improvement would be desirable." Brueckner also provides several extensions of his basic model. He shows that when nonmarginal increases in spending on the local public good are considered TIF may result in a level of spending above the optimum. He also provides an intertemporal extension showing that, if cities are allowed to capture the nominal rather than real appreciation in real estate (as they are in Wisconsin) "the previous analysis no longer applies." (p.341) Thus, Brueckner concludes, "the public good level ultimately chosen under TIF need not be efficient with both under- and overprovision being possible outcomes." (p.341-2).

While Brueckner's model allows for the possibility that TIF can lead to non-optimal government spending, all versions of his model unambiguously predict that TIF raises aggregate real estate values in the municipality. One of our main objectives in this paper is to subject that prediction to an empirical test.

Consistent with other economic models, Brueckner framework necessarily abstracts from some issues that may be relevant in an empirical investigation. We think that there are several potential extensions of Brueckner's model that could rationalize a fall in aggregate real estate values as a result of TIF. We first provide a somewhat detailed discussion of extending Brueckner's model to allow inter-neighborhood spillovers and then provider briefer, informal discussions of two other potential extensions.

The use of TIF to upgrade blighted neighborhoods might result in positive spillovers because the esthetic and commercial appeal of adjacent areas is increased. However, spillovers also may be negative. Increased investment in adjacent neighborhoods may reduce the value of residential real estate if it causes an increase in traffic, noise, or incompatible uses. The value of commercial real estate also may be reduced if the investment in adjacent neighborhoods reduces market power by stimulating competition.

There is substantial empirical evidence that TIF districts have a significant effect on adjacent neighborhoods. Dye and Merriman (1999) show that Illinois municipalities with TIF have slower real value growth in the non-TIF portion of their communities than communities without TIF. In Dye and Merriman (2003), they demonstrate further that TIF districts that house commercial real estate result in reduced commercial real estate growth in the non-TIF portion of the municipality. In contrast, there is little impact on non-TIF manufacturing real estate growth as the result of a manufacturing TIF. In a recent paper Weber, Bhatta and Merriman (forthcoming) find that Chicago commercial and manufacturing TIF districts reduce the rate of appreciation of nearby residential real estate while proximity to mixed-use TIF districts raises the rate of appreciation. In all three cases, the authors find that the effects decrease rapidly with distance to the TIF district.

A generalization of Brueckner's formal model to allow public goods expenditures in neighborhood *a* to spillover to neighborhood *b* is straightforward (see appendix 1) and leaves the fundamental result—TIF permits a greater level of public spending—unaltered[4]. As noted in Brueckner (p.342) if the spillovers are positive their presence will "dilute the political opposition arising from neighborhood *b* landowners" and therefore will allow additional socially beneficial public spending. Our formal analyses (again see appendix) shows that TIF can be a valuable tool to stimulate socially desirable public expenditures even when there are negative spillovers from them. We show that a TIF district in neighborhood *a* might garner support from landowners in neighborhood *b* despite negatives spillovers if the tax rate in the overlying district is sufficiently high. In a municipality with three or more neighborhoods we show that a TIF may be viable even when it causes *aggregate* municipal real estate values to decline. To see this, consider a municipality with three neighborhoods *a*, *b* and *c*. A TIF is proposed that would increase real estate values in neighborhood *a* while lowering real estate values in *b* by a greater amount. In the appendix we show that it is still possible for the municipal tax rate to decline since part of the cost is shifted to the overlying government. In this case, the TIF district may be viable since neighborhoods A and C will support it.

There are several other potential extensions of Brueckner's model. First, and most straightforwardly, in a world with limited information and an imperfectly democratic political process, TIF might make it easier for some minority constituencies (neighborhood A) to obscure the government spending they are receiving from the majority (neighborhood B). Elected officials might support such spending in exchange for personal or political favors. This could result in increased spending and tax rates that might lower aggregate real estate values.

Secondly, even if all parties were completely aware of the benefits and costs of TIF spending, in a world with imperfect mobility, TIF might become a device to target redistributional spending to a particular neighborhood. Spending in the TIF district neighborhood (A) might stimulate private investment that would substitute for investment in the non-TIF neighborhood (B). Citizens might support this even though the cost of the spending exceeded real estate appreciation. In fact, the most literal reading of TIF legislation suggests that this was exactly its intended purpose—to target government funds to blighted areas and stimulate economic development that would not be economically viable with private funds alone.

[4] Brueckner (2000) p.342 noted that his model could be extended to include spillovers but did not present any formal analyses.

IV. Review of the Empirical Literature

There have been a number of empirical studies of the effect of TIF on the growth of real estate values. The primary question researchers have attempted to answer is whether real estate values are higher with TIF then they would have been without TIF. A challenge that is present in the evaluation of any policy focused on development is ascertaining whether any observed correlations between a given policy tool and development is indeed causal. As previously discussed, in principle the "but for" clause assures that any TIF development would not otherwise occur, but in practice this seems doubtful. Thus, as early researchers such Huddleston (1981) and Anderson (1990) recognized assessments of TIF necessitate estimates of what would have happened in the absence of TIF.

A second hurdle in the analysis is that TIF districts may be chosen with prior knowledge of their growth potential: areas which are expected to grow rapidly may be disproportionately designated for TIF districts because these districts can safely be presumed to have the wherewithal to pay off the accompanying debt (Anderson, 1990). In addition, growth in property value may actually begin in anticipation of a TIF. Ginsburg (2003) found that property values in one area of Chicago rose in anticipation of investment that would be brought about by the creation of a TIF district. As a result, the TIF may begin with a higher base value, so that its impact is underestimated.

The earliest comprehensive empirical analysis of TIF is Anderson (1990). He compared aggregate property value growth of Michigan municipalities over the 1987-1989 period using a sample of data from both TIF and non-TIF municipalities. A paramount concern is selection bias: Do cities that utilize TIF have higher economic growth than non-TIF cities? In order to control for selectivity bias, the author examined the determinants of TIF use in his sample. His analysis demonstrated that Michigan cities using TIF had higher property value growth than non-TIF cities. The coefficient for the selectivity bias variable was negative and significant, thus he argued that the property value growth in TIF communities was higher than for cities not electing to have TIF.

Dye and Merriman (2000) studied municipalities in the metropolitan Chicago area over the 1980 through1995 period. They take a novel approach for addressing the endogeneity issue by using past property value growth in the 1980s to predict TIF use in the 1990s. They find little evidence of endogeneity. Dye and Merriman find that TIF adoption actually had a negative impact on aggregate property value growth and conclude that property value growth within TIF districts comes at the expense of reduced rates of growth in other areas within the community. Dye and Merriman (2003) extends this work to the entire state of Illinois and examines the effect of the type of real estate contained in the TIF district. Dye and Merriman (2003) continue to find that development within a TIF district substitutes for development outside the district, although they no longer show a significant decline in aggregate city property values as a result of TIF. Dye and Merriman (2003) find strong evidence that commercial development within a TIF district substitutes for commercial development outside the TIF district but that manufacturing development in the TIF does not reduce the amount of manufacturing real estate growth outside the TIF.

Man and Rosentraub (1998) use data about Indiana communities some of which used TIF. Contrary to Dye and Merriman (2000 and 2003), they conclude that TIF had a positive impact on the median property value growth of owner-occupied housing. A limitation of this research, however, is that they do not examine the relationship between TIF and manufacturing or commercial property value growth.

Recent papers by Smith (2006) and Byrne (2006) find evidence that TIF stimulates growth in real estate value Byrne (2006) finds that more blighted (disadvantaged) TIF districts have a faster rate of growth than those that are less blighted at the start. Smith (2006) compares house sales within a TIF to sales of properties outside the TIF and to sales of property in the TIF district prior to TIF designation. He finds being in TIF district post-designation raises real estate values. Neither paper provides evidence about how growth in the TIF district effects growth outside of the TIF district.

As we describe briefly in the introduction, our analysis adds to existing research in several ways. First, we examine the impact of TIF over an extended timeframe (1990-2003) for all Wisconsin municipalities. Our analyses include cities that never use TIF, cities that create a TIF district for the first time, and TIF cities that both previously used TIF and created new TIF districts during the period we analyze. This allows us to examine the affect of TIF from the initial date of creation over a number of years. In addition to evaluating the impact of TIF on aggregate property values, we examine its impact on non-TIF property value growth. This enables us to determine whether property value growth within TIF districts comes at the expense of other areas in the city. We also examine the differential impact of TIF districts on residential, commercial and manufacturing property. In Wisconsin the state government places stringent restrictions on local governments' use of development incentives. In other states, local governments may have at their disposal various tax abatement and other development tools. In other states, the evaluation of a particular development incentive such as TIF may be confounded by the use/effect of other development tools. In Wisconsin, this concern is greatly reduced because local governments do not have the authority to offer tax abatements, etc…

V. Empirical Analysis

The theoretical discussion presented above suggests that under certain conditions, TIF use will lead to a net gain in municipal property valuation. Our empirical analysis tests this hypothesis. Below, we present some stylized facts about use of TIF in Wisconsin. We then proceed to examine more rigorously the effect of TIF use on property values in Wisconsin municipalities.

Stylized Facts

As shown in Figures 1 and 2, TIF is used extensively in Wisconsin. In fact, by 1990 (the first year in our data set and the earliest year for which reliable data are available) TIF was widely used in the state, especially in the larger cities. While a number of smaller communities throughout the state established TIFs for the first time over the 1990-2003 period, most new TIF districts were located in communities that previously had established TIFs. On average, municipalities had about 1.12 TIF districts, but municipalities that had at least one TIF district in 1989, had an average of 2.89 TIF districts during the 1990-2003 period. Figures 1 and 2 also show that TIF has been more heavily used in counties with higher household incomes and higher population densities.

The growth in TIF value is high relative to the TIF base. As shown in Table 1, residential property within TIF has grown by a factor of 35. Commercial and manufacturing property value growth also has been substantial; value in these categories of real estate has grown by factors of 10 and 23, respectively. Figure 3 shows that Wisconsin's largest cities increasingly have relied on TIF over the period of analysis. In fact, a number of state and local policy makers have pointed to the exceptional growth of property values within TIF districts as evidence of the development tool's success. As pointed out by Dye and Merriman (2000), however, TIF districts may grow while the municipality as a whole suffers. TIF districts could draw development at the expense of the rest of the community. In addition, it is possible that much of the growth within TIF would have occurred anyway. As noted earlier, Brueckner's (2001) model of TIF suggests that if TIF is used to attract development that would not have otherwise occurred the total property value in the community must increase. In the analysis presented next, we econometrically decompose the increase in property values that occurred within TIF districts, outside TIF districts and in the municipality as a whole to the existence of TIF districts as well as other factors.

Methods

The primary question we seek to address is whether TIF has increased the overall property value in Wisconsin municipalities. We use time series data on municipal property values within TIF districts, outside TIF districts and for all property within the municipal jurisdiction to evaluate the impact of TIF on aggregate property values in the municipality. We estimate a within-group model that exploits the panel nature of our data and controls for fixed municipality and time effects. We also include a limited array of control variables, and examine several dimensions of TIF impact.

In particular, we hypothesize that a one dollar increase in the value of property in a TIF district causes a less than one dollar increase in the total property value in a municipality. We have assembled a data set composed of observations on 537 Wisconsin municipalities. Nearly all municipalities are observed for each year during the period 1990 to 2003.

Our core econometric models are as follows.

(1) $$\text{Total\_value}_{it} = \mu_i \eta_t \left(1 + \text{TIF\_value}_{it}\right)^{\alpha} e^{X_{it}\beta\varepsilon_{it}}$$

where Total_Value=total property value in municipality i at time t and TIF_value=value of property in TIF districts within municipality i at time t. μ_i is a municipality specific fixed effect, η_t is a time-specific fixed effect, X_{it} is a vector of exogenous variables, and ε_{it} is an unobserved zero-mean error term.

Equation (1) implies that:

(2) $\ln\left(\text{Total\_value}_{it}\right) = \alpha \ln\left(\text{TIF\_value}_{it} + 1\right) + X_{it}\beta + \mu_i + \eta_t + \varepsilon_{it}$

Also,

(3) $\ln\left(\text{TIF\_value} + 1\right)^{*} = \pi_1 \ln \text{Total\_value}_{it} + \pi_1 Z_{it} + \gamma X_{it} + c_i + y_t + \upsilon_{it}$ where

(4) $\upsilon_{it} \left| X_{it}, Z_{it} \sim N\left(0, \sigma^2\right)\right.$ and

(5) $\ln\left(\text{TIF\_value} + 1\right) = \max\left(0, \ln\left(\text{TIF\_value} + 1\right)^{*}\right)$

Z_{it} is an instrument that is excluded from the X vector, c_i is a municipality specific fixed effect, y_t is a time-specific fixed effect.[5] We estimate the parameters of equations (2) and (3). Note that equations (3), (4) and (5) are estimated using a panel corrected standard errors procedure as well as a random effects Tobit model.[6]

In addition, because we are also interested in examining the degree to which growth within TIF districts substitute for growth outside designated TIF areas, we estimate an analogous set of regressions for total municipal property value net of TIF district property value (NonTIF_Value).

The fixed-effects model is appropriate because much of the variation in property valuation is between rather than within municipalities. Although it would be difficult to specify all the institutional, economic, and demographic characteristics that determine the differences across municipalities in TIF use and property valuation, we can capture permanent differences between municipalities with municipality-specific fixed-effects. Similarly, there are a variety of factors that may affect property valuation across the entire state over time. We capture those differences with year-specific time-effects. A second reason for using the fixed-effects model is that TIF use may be correlated with increasing property valuation; that is, municipalities that anticipate property valuation growth may be more (or less) likely to use TIF to capture the potential growth in property value that might have occurred with or without the TIF. Suppose, for example, that there is some unobserved fixed attribute of a municipality that causes it to expect to have a higher (or lower) growth in property values than other municipalities. Suppose further that municipalities with this attribute are also more likely to use TIF. The unobserved attribute will be captured by municipality-specific fixed effects as long as it is constant over time within a municipality. Omitting municipal fixed-effects could yield biased estimates because an omitted variable would be correlated with both TIF use and our dependent variable.[7]

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[5] We add one to TIF_value in equation (1) because $\text{TIF\_value}_{it}=0$ in about (1/3rd) of our observations. We think double-log specifications like equations (2) and (3) are most appropriate but could not estimate these without adding one to TIF_value since log(0) is undefined.

[6] Since about one-third of our observations are truncated at zero, we would like to estimate the Tobit model within the fixed effects framework. Unfortunately, the Tobit with fixed effects generates biased parameter estimates. For this reason, we estimate a regression using the panel corrected standard errors procedure, which provides a basis for comparison. It should be noted, however, that Honoré (1992) has developed a semi-parametric estimator for the fixed effects tobit model.

[7] Hsiao (1986) presents an excellent discussion of panel data estimation procedures.

Despite the use of the fixed effects framework, there remains a concern that TIF use may be endogenously determined. We further examine this issue with the use of Hausman's specification to test the hypothesis that TIF use is endogenous.[8] The Hausman test requires that we specify a variable that is a determinant of TIF use but does not directly determine property valuation. Importantly, given that we are using a fixed effects framework, we must use an instrument that varies over time. Given these criteria, we follow Anderson (1990) and others and use the municipality's share of the aggregate property tax bill (in the case of Wisconsin this includes county, technical college, school district, and municipal taxes) to predict TIF use. As discussed in Anderson (1990), cities with a relatively small share of the total property tax have the greatest incentive to use TIF because it can extract relatively more revenue from other local governments to fund infrastructure related to TIF development. Brueckner's (2000) model also suggests this variable should explain TIF use.

In order for the city's share of property taxes to be a valid instrument it must predict TIF use. In the first stage of the Hausman specification test, we estimate equation (3) above where Z_{it} indicates the city's share of the total property tax bill. In regressions that we present in Appendix Table B, the estimates of μ_I is both negative and statistically significant. That is, municipalities with a smaller share of the aggregate property tax bill are more likely to experience growth in TIF property values. If Z_{it} is to be a statistically valid instrument, it also must not be a statistically significant determinant of TOTAL_VALUE. In estimates that are not presented here we confirm that Z_{it} is not significantly correlated with municipal property value. Thus, we use Cityshare as an exogenous instrument to explain TOTAL_VALUE. Note that Z_{it} is also a valid instrument to explain NonTIF_Value.

To complete the Hausman specification test, the estimated **as well as the observed** value of TIF_value generated from equations (6) is included as an explanatory variable in the TIF_value equation. If TIF use is endogenous, then the coefficient on the predicted value of TIF_value should be significantly different from zero. From this examination, we reject the null hypothesis that TIF_value is exogenous. We therefore estimate the equations using the two-stage least squares procedure. However, for comparison we also present estimations with and without the correction for endogeneity.

Given that our panel consists of annual data on 537 municipalities over 14 years[9], it is likely that the errors are correlated over time and across space. Not correcting such correlations when it exists yields consistent but inefficient estimates of the coefficients

[8] See Kennedy (1992) for a description of the Hausman specification test.

[9] Due to missing data, we do not have all 14 years for a few municipalities. Thus, the panel is unbalanced. Also, the municipalities of Kronenwetter and Weston were omitted from the analysis because they both came into existence during the period of analysis. Finally, several municipalities cross county borders. For these municipalities, we treat the sections crossing borders as a single jurisdiction. The panel includes more than 95 percent of the possible observations over the period.

and biased standard errors. We therefore use the panel corrected standard errors procedure for our core analysis.[10]
Data

The main dependent variables are the inflation adjusted value of property outside the TIF (NonTIF_Value) and the total value of property (Total_Value) in municipality i during period t.

We include several independent variables to explain the variation in property valuations across municipalities and over time. Central to our analysis is the variable that measures the use of TIF: TIF_Value. TIF_Value is the current value of all property within TIF districts in a given municipality. Given that development within TIFs are subsidized, we expect to see growth in TIF property valuation, but we also expect to see some substitution for development elsewhere in the community so that the net effect is uncertain. We also present regressions for the disaggregated categories of residential, commercial and manufacturing property valuation.

It is important to control for other factors that could individually and/or jointly affect property value growth. However, because fixed effects control for demographic and economic variables that do not change over time we do not include demographic and economic variables that are available only in census years. Thus, it is necessary to include only a few independent variables in addition to time and fixed effects: the natural logarithm of municipal population, the effective aggregate property tax rate faced by households in a given municipality, and the ratio of residential property value to total property value. We provide more detailed definitions and sources of all variables used in the analysis in Appendix Table A. Table 1 provides summary statistics for all variables.

Results

We present two sets of regressions for each of the two primary dependent variables in Table 3: two NonTIF_Value regressions and two Total_Value regressions. We estimate regressions using a panel corrected standard error procedure (with no correction for endogeneity) as well as two-stage least squares.[11] The Non_TIF regressions estimate the effect of an increase in the TIF_Value on property value outside designated TIF areas. We hypothesize that as property value within a TIF increases, property value outside the

[10] We correct for serial correlation and spatial autocorrelation using STATA's "panel corrected standard error" panel regression option. Beck and Katz (1995) provide a detailed description of the panel corrected standard error estimation method and how it deals with the contemporaneous correlation of errors. Unfortunately, because the estimated VCE is not positive definite in the disaggregated residential, commercial and manufacturing property value regressions we could not utilize the panel corrected standard errors estimation technique. In these regressions we address serial correlation by estimating a two-way fixed effects AR1 regression (Prais-Winsten transformation).
[11] The two-stage least squares procedure also utilizes the panel corrected standard errors procedure. Also, because we use panel corrected standard errors, we estimate the two-stage least squares manually. We first estimate a TIF_Value regression, estimate a predicted value from that regression, and then use the predicted value of TIF_Value in the second stage regression.

TIF grows more slowly. The last set of Total_Value regressions estimates the effect of an increase in the TIF_Value on the total municipal property valuation.

Before turning to a discussion of the coefficient estimates, note that in all regressions the Adjusted R^2 exceeds 0.73—the regressions explain most of the variation in property value growth across municipalities and over time. Also estimates of rho (auto correlation coefficient) ranges between 0.86 and 0.88.

Consider first the NonTIF_Value regressions. For both regressions, we see a negative and significant coefficient on TIF_Value. As property value within TIF districts grow, other areas within the city grow more slowly. The two-stage least squares procedure yields a much larger coefficient (in absolute terms) than the estimates that do not correct for endogeniety. The TIF_Value regressions also exhibit differences between the two econometric approaches. The estimates without the correction for endogeneity yield a positive and significant coefficient on TIF_Value. However, the two-stage least squares estimates suggest that TIF use has no significant effect on overall property values.

Because we use a double-log specification, the estimates are most easily interpreted by presenting the predicted impact for, say, the average municipality. We present the predicted effects in Table 4. Consider the effect of doubling TIF_Value which, for the average sized municipality, can roughly be interpreted as adding a new TIF district. We find that when TIF property value doubles ($9 million) non-TIF property value falls by about $6.6 million, and again there is no significant impact on total municipal property value. Taken together these results suggest that TIF may serve to target development to TIF districts, but the there appears to be a cost: the rest of the community grows more slowly such that the net effect on total municipal property valuation is negligible.

The coefficients on the control variables are generally consistent with expectations. The coefficient on population is positive and highly significant, indicating that population growth leads to increased property values. Higher property tax rates and a higher share of residential property to total property reduce growth in property value. These coefficients suggest that increasing property tax rates and reliance on residential development tend slow municipal property value growth.

In Table 5 we present the regressions for residential, commercial and manufacturing property values separately. Unfortunately, in these regressions the Cityshare variable only qualifies as a valid instrument in the manufacturing property value regression.[12] Although these results are consistent with our core estimates, there is some useful additional information. First, TIF, as it is implemented in Wisconsin, appears to be an ineffective development tool if the goal is to increase overall residential development. In contrast to Man and Rosentraub (1998), while TIF used for residential purposes increases valuation of property within TIF districts, non-TIF property value growth suffers such that the aggregate effect is zero. On the other hand, TIF for commercial and especially

[12] While Cityshare is a significant determinant of residential and commercial TIF valuations, it is also significant in the residential property and commercial property value regressions. Thus, for the residential and commercial TIF value regressions Cityshare does not qualify as a valid instrument.

manufacturing purposes appears to generate positive aggregate property valuation growth. Note that the coefficient on TIF-Value in the two-stage least squares estimation for the manufacturing property valuation equation is larger than the panel corrected standard errors estimate, suggesting that TIF use has a positive effect on manufacturing property value, but the coefficient is not significant. In Wisconsin, the use of industrial parks in the outskirts of a given municipality are common. Often times, the creation or expansion of an industrial park begins with the annexation of undeveloped property. The municipality then provides the necessary infrastructure upgrades and then may sell the property to a prospective business at a subsidized price (the figure often amounts to a $1 per acre). Further, given that the undeveloped land may have previously been used for agricultural purposes, TIF district base value is determined by property value for agricultural purposes as opposed to its true market value. This interaction between use value and TIF policies further serves as a subsidy and enables the TIF district increment to grow more quickly. This scenario, which has occurred throughout Wisconsin over the period of analysis, has implications for land use: it suggests that TIF provides a strong incentive for municipalities to annex property and then subsidize its development. In short, TIF policy may encourage expansive land use policy…or sprawl. In future research we will focus on this issue.

V. Conclusion

Our analysis suggests that use of TIF in Wisconsin has served to focus development efforts in the designated TIF district areas. Focusing on aggregate changes in total municipal property valuation, however, demonstrates generally that TIF development has come at the expense of development elsewhere in the municipality. The net effect of TIF use on municipal property values as it is implemented in Wisconsin has, on average, been negligible. The disaggregated property value regressions offer additional insight. In these regressions, TIF for commercial and especially manufacturing appears to have had a positive overall effect on property value growth, whereas TIF for residential purposes has no effect on residential property value growth. We are cautious in drawing conclusions with the disaggregated property value regressions (especially the residential and commercial property value regressions) because of our inability to examine endogeneity in these regressions. Regardless, despite the positive overall effects observed with the commercial and manufacturing regressions, the pattern of substitution from non-TIF areas to designated TIF areas is consistent. Policymakers have pointed to the documented tremendous growth in TIF districts as evidence of success. However, more systematic analysis suggests qualified story of modest success and a story of property value reallocation. The analysis also suggests that TIF has had a differential effect depending on land use: TIF has had no impact on residential property value growth, whereas the TIF may have had some positive impact on commercial and manufacturing property values. Given our analysis reveals significant reallocation of property value growth, it may prove worthwhile to consider more carefully who it is that benefits (or is hurt) by TIF policy. Finally, the interaction between use value and TIF policies may have encouraged the annexation and subsequent development of agricultural property. In our next report, we utilize data and land area and annexation records to examine this issue more carefully.

Appendix 1

History of TIF in Wisconsin

Wisconsin enacted TIF Legislation in 1975 partly as an effort to stimulate economic growth that had lagged since the economic recession of the early 1970's.[13] TIF also was designed to provide an additional funding source for redevelopment during a period in which many Federal programs that had been targeted for urban renewal were folded into block grant and general aid programs. In addition, many legislators in Wisconsin believed that all levels of local government benefited from urban renewal and ought therefore to share in the costs of redevelopment.

Wisconsin municipal governments (cities and villages) were empowered to create TIF districts. In order for an area to qualify as a TIF district, legislators required that the land must be: (1) blighted; (2) in need of rehabilitation or conservation work; or (3) suitable for industrial development. The legislators also included the standard qualifier of TIF legislation nationwide that development would not have occurred "but for" the establishment of the TIF.

Within a few years of the initiation of TIF, research conducted by the State of Wisconsin Legislative Audit Bureau revealed that TIF was subsidizing development that would have occurred even without public funding (Maryl, 2005). In reaction, legislators enacted more restrictive guidelines for the use of TIF. In 1981, policymakers increased the percentage of land within a proposed TIF district that must meet the criteria of being blighted, in need of rehabilitation or conservation, or suitable for industrial development. The legislature also required that land zoned for industrial purposes, remain zoned industrial throughout the life of the TIF district. Finally, officials required that no more than 25 percent of land within a TIF district was vacant for more than seven years prior to the creation of the TIF district. Land used for industrial development was exempted from this vacancy requirement.

Prior to 1995, TIF projects were limited to an expenditure period of seven years and a payback period of 23 years. In conjunction with changes in school finance[14], TIF law was amended to allow for a longer payback period for existing TIF districts. For districts created before October 1, 1995, project expenditures could be made for up to ten years after creation, but districts created after this date were still restricted to a seven year expenditure period. In a similar fashion, pre-1995 districts were allowed a lengthened payback period of 27 years but post-1995 districts were subject to the 23 year payback requirement. An additional change allowed successful TIF districts s to subsidize less successful districts for up to ten years. Finally, the 1995 amendments allowed district boundaries to be amended once during the first seven years of a TIF district's existence.

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[13] Although California enacted TIF legislation as early as 1952, use of TIF across the states did not proliferate until the 1970s. See Runde (2001) for a detailed account of the history and use of TIF in Wisconsin.

[14] Beginning in 1996, state government in Wisconsin assumed a greater responsibility in funding K-12 education while at the same time mandating a reduction in local property taxation.

In 1999, the State of Wisconsin created a TIF option for certain cities, villages, towns and counties to recover the costs of environmental pollution remediation. There are also numerous additional exceptions to TIF law that legislators have created for specific communities.[15]

In 2004, state legislators again substantially revised TIF policy. One change allowed the expenditure period on TIF districts created after October 1, 1995 and designed to eliminate blight and or stimulate rehabilitation to be extended for up to five years. Other changes included an increase in the equalized value requirement. Prior to October 1, 2004 the sum of the property value within all TIDs could not exceed 5 percent of the municipality's equalized value. However, after October, 1, 2004, this limit was raised to 12 percent.

[15] A number of these exceptions are highlighted in a report by the Legislative Fiscal Bureau, 2001.

Appendix II

Modified Version of Brueckner with Spillovers

In this appendix, we extend Brueckner's (2000) model to consider formally the case of a TIF district with inter-neighborhood spillovers. We show that TIF may be viable even when there are negative spillovers. In a municipality with many neighborhoods a viable TIF district could cause a decline in aggregate real estate values.

I. TIF may be viable when there are negative spillovers

Case 1: No TIF

Modify equation (4) of Brueckner to read

$V_b = \frac{R_b\left(z_a, z_b\right)}{\tau + \theta}$ (3') where V_b equals aggregate real estate value in neighborhood *b* and $\theta = t + r$,

For a TIF to be socially desirable we must now modify equation (6) of Brueckner to read:

$R_a^{'}\left(z_a\right) + R_b^a = C_a^{'}\left(z_a\right)$ (6') where $R_b^a = \frac{\partial R_b\left(z_a, z_b\right)}{\partial z_a}$.

In the absence of a TIF the municipality's budget constraint is:

$\tau\left(V_a + V_b\right) = \tau\left(\frac{R_a\left(z_a\right) + R_b\left(z_a, z_b\right)}{\tau + \theta}\right) = C\left(z_a\right) + C\left(z_b\right)$ (5). Solve for the tax rate to get

$\tau = \frac{\theta\left(C_a + C_b\right)}{\left(R_a - C_a + R_b - C_b\right)}$.

The change in the tax rate necessitated by a marginal increase in public goods spending in neighborhood *a* is:

$\frac{\partial\tau}{\partial z_a} = \frac{\left(\tau + \theta\right)\left(C_a^{'} - \frac{\tau}{\tau + \theta}\left(R_a^{'} + R_b^a\right)\right)}{\left(R_a - C_a + R_b - C_b\right)} = k\left(C_a^{'} - \left(\frac{\tau}{\tau + t + r}\right)\left(R_a^{'} + R_b^a\right)\right)$ which generalizes equation (7) of Brueckner.

Where $k = \frac{\left(\tau + \theta\right)}{\left(R_a - C_a + R_b - C_b\right)}$

Case 2: TIF

Then the budget constraint becomes

$\tau\left(\frac{R_a\left(z_a\right) + R_b\left(z_a, z_b\right)}{\tau + \theta}\right) + t\left(\frac{R_a\left(z_a\right) - R_a\left(z_a^0\right)}{\tau + \theta}\right) = C\left(z_a\right) + C\left(z_b\right)$ (13') where z_a^0 is level of the public good in neighborhood *a* prior to the TIF. Solve for the tax rate to get

$\tau = \frac{(\theta)\left[C(z_a)+C(z_b)\right]-t\left(R_a(z_a)-R_a(z_a^0)\right)}{\left(R_a(z_a)+R_b(z_a,z_b)-C(z_a)-C(z_b)\right)}$. The change in the tax rate necessary to balance the budget is then

$$\frac{\partial\tau}{\partial z_{a|\text{TIF}}} = \frac{(\theta+\tau)\left[C_a' - \frac{t+\tau}{(\theta+\tau)}R_a' - \frac{\tau}{\theta+\tau}R_b^a\right]}{\left(R_a(z_a)+R_b(z_a,z_b)-C(z_a)-C(z_b)\right)} = k\left[C_a' - \left(\frac{\tau}{(\tau+t+r)}\right)\left(R_a'+R_b^a\right) - \frac{t}{(\tau+t+r)}\left(R_a'\right)\right] \quad (17')$$

Since $\left[-\frac{t}{(\tau+t+r)}\left(R_a'\right)\right] < 0 \quad \frac{\partial\tau}{\partial z_{a|\text{TIF}}} < \frac{\partial\tau}{\partial z_a}$ Therefore, with spillovers (as with no spillovers) a TIF reduces the amount by which the municipal tax rate must increase to pay for additional public goods in neighborhood *a.*

However, with spillovers a decline in the tax rate is not sufficient to establish that a TIF in neighborhood *a* will be supported by landowners in neighborhood *b*. For neighborhood *b* landowners to support the TIF real estate values in neighborhood *b* must rise. Mathematically, we must have:

$$\frac{\partial V_b}{\partial z_{a|TIF}} = \frac{\partial\left(\frac{R_b(z_a,z_b)}{\tau+\theta}\right)}{\partial z_{a|TIF}} = \frac{R_b^a}{\tau+\theta} - \frac{R_b(z_a,z_b)}{(\tau+\theta)^2}\left(\frac{\partial\tau}{\partial z_{a|TIF}}\right) = \frac{R_b^a}{\tau+\theta} - \frac{V_b}{(\tau+\theta)}\left(\frac{\partial\tau}{\partial z_{a|TIF}}\right) \geq 0$$

The equation above says that a TIF will be viable as long as the change in rent in neighborhood *b* is greater then or equal to the change in the present value of neighborhood *b*'s tax payment. A negative spillover $\left(R_b^a \leq 0\right)$ does not necessarily mean that a TIF will be unviable.

II. In a municipality with three or more neighborhoods, a TIF that reduces aggregate real estate values may be viable

In a municipality with only two neighborhoods a TIF that caused real estate values to decline in either neighborhood would not be viable. However, if there are three (or more) neighborhoods and spillovers are localized a TIF could cause *aggregate* real estate values to fall and still be viable. To see this consider a municipality with three neighborhoods (*a,b,c*) and suppose that there are spillovers between neighborhood *a* and *b* but not between *a* and *c*. Then any neighborhood *a* TIF that causes the municipal tax rate to fall will be viable since it will get the support of neighborhoods *a* and *c*.

With these three neighborhoods and spillovers aggregate real estate value is:

$V = V_a + V_b + V_c = \frac{R_a(z_a)+R_b(z_a,z_b)+R_c(z_c)}{\tau+\theta}$ so

$$\frac{\partial V}{\partial z_{a|TIF}} = \frac{R_a^{'} + R_b^a}{\tau + \theta} - \left(\frac{R_a\left(z_a\right) + R_b\left(z_a, z_b\right) + R_c\left(z_c\right)}{\left(\tau + \theta\right)^2} \right)\left(\frac{\partial \tau}{\partial z_{a|TIF}} \right) = \frac{R_a^{'} + R_b^a}{\tau + \theta} - \left(\frac{V}{\left(\tau + \theta\right)} \right)\left(\frac{\partial \tau}{\partial z_{a|TIF}} \right)$$

In orde to show that $\alpha = \frac{\partial V}{\partial z_{a|TIF}} \leq 0$ and $\left(\frac{\partial \tau}{\partial z_{a|TIF}} \right) \leq 0$ are simultaneously possible consider the special case of equation (17') in which 2α of real estate value are sacrificed from neighborhood *b* to create α of value in neighborhood *a* at a cost of 0. Then $C_a^{'} = 0$ and $\alpha = R_a^{'}$ and $-2\alpha = R_b^a$. Substitute these values into equation (17') to get

$$\frac{\partial \tau}{\partial z_{a|\mathrm{TIF}}} = k\left[C_a^{'} - \left(\frac{\tau}{\left(\tau + t + r\right)} \right)\left(R_a^{'} + R_b^a\right) - \frac{t}{\left(\tau + t + r\right)}\left(R_a^{'}\right) \right] = k\left[-\frac{\tau}{\left(\tau + t + r\right)}\left(-\alpha\right) - \frac{t}{\left(\tau + t + r\right)}\left(\alpha\right) \right] = \alpha k\left[\frac{\tau - t}{\left(\tau + t + r\right)} \right]$$

The balanced-budget municipal tax rate declines if $t > \tau$.

Substitute the parameters for this special case into the equation for the change in total real estate values to get

$$\frac{\partial V}{\partial z_{a|TIF}} = \frac{-\alpha}{\tau + \theta} - \left(\frac{V}{\left(\tau + \theta\right)} \right)\alpha k\left[\frac{\tau - t}{\left(\tau + t + r\right)} \right] = \left(\frac{\alpha}{\tau + \theta} \right)\left(-1 - Vk\left(\tau - t\right)\right)$$

Since $\left(\tau - t\right) < 0$ a decline in aggregate real estate value requires that $-Vk\left(\tau - t\right) < 1$

$$Vk = \frac{\left(\tau + \theta\right)}{\left(R_a - C_a + R_b - C_b\right)} \frac{R_a + R_b}{\left(\tau + \theta\right)} = \frac{R_a + R_b}{\left(R_a - C_a + R_b - C_b\right)}$$

so we must have $\left|\left(\tau - t\right)\right| < \frac{\left(R_a - C_a + R_b - C_b\right)}{R_a + R_b}$

Thus, for this special case $0 < \left(t - \tau\right) < \frac{\left(R_a - C_a + R_b - C_b\right)}{R_a + R_b}$ assures that aggregate real estate values and the balanced-budget municipal tax rate will both fall. Thus, a viable TIF can be associated with a decline in aggregate real estate values.

Brueckner, J.K, 2000. Tax Increment Financing: A Theoretical Inquiry. *Journal of Public Economics*, 81, 321-343.

Appendix Table A
Variable Definitions and Sources

Variable Name	Definition	Source
TIF_Value	Valuation of Property in all operating TIFs within a Municipality	WDOR
NonTIF_Value	Valuation of Property excluding TIFs within a Municipality	WDOR
Total_Value	Total Valuation of Property within a Municipality	GREAT
ResTIF_Value (thousands of $)	Valuation of Residential Property in all operating TIFs within a Municipality	WDOR
ResNonTIF_Value (thousands of $)	Valuation of Residential Property excluding TIFs within a Municipality	WDOR
ResTotal_Value (thousands of $)	Total Valuation of Residential Property within a Municipality	GREAT
ComTIF_Value (thousands of $)	Valuation of Commercial Property in all operating TIFs within a Municipality	WDOR
ComNonTIF_Value (thousands of $)	Valuation of Commercial Property excluding TIFs within a Municipality	GREAT
ComTotal_Value (thousands of $)	Valuation of Commercial Property in all operating TIFs within a Municipality	WDOR
ManTIF_Value (thousands of $)	Total Valuation of Manufacturing Property within a Municipality	WDOR
ManNonTIF_Value (thousands of $)	The sum of all Manufacturing Property excluding TIFs within a Municipality	WDOR
ManTotal_Value (thousands of $)	Total Valuation of Manufacturing Property within a Municipality	GREAT
Municipal Population	Total Population within a Municipality	GREAT
Property Tax Rate	The Sum of Property Tax Rates for Municipal, k-12 School, County and Technical College Taxing Jurisdictions	GREAT
City_Share	The Municipality's Share of the Total Property Tax	GREAT
Residential_Share	The Ratio of Residential Property Value to Total Property Value	GREAT

Sources:
GREAT-Graphing Revenues, Expenditures and Taxes CDROM, University of Wisconsin-Extension
WDOR-Wisconsin Department of Revenue

Appendix Table B
Results for Active_TIF and TIF_Value
Regressions with City_Share as Instrument
(z-score in parentheses)

	Dependent Variable:			
	Panel Corrected Standard Errors	Fixed Effects Poisson	Panel Corrected Standard Errors	Random Effects Tobit
Independent Variable	***Active_TIF***	***Active_TIFs***	***Ln(TIF_Value)***	***Ln(TIF_Value)***
Municipal Population	0.599*** (12.51)	0.862*** (4.41)	2.868 (16.50)	5.606*** (33.92)
Property Tax Rate	23.89*** (6.48)	28.29 (3.44)	221.92 (7.97)	373.46 (6.53)
City_Share	**-0.899*** (-4.64)**	**-1.588*** (-3.73)**	**-13.04 (-7.38)**	**-25.05*** (10.47)**
Share_Residential	-1.011 (-3.95)	-0.280*** (-0.63)	-13.40 (-8.22)	-23.94*** (-10.77)
Log Likelihood		-4870.59		-13906.18
Estimated ρ	0.893		0.865	
Adjusted R^2	0.141		0.108	

n=7349 (For the Poisson regression, n=4872. 2475 observations were dropped due to all zero outcomes)

Note: All regressions include time effects.

* Indicates significance at the 90 percent confidence level for a two-tailed test.
** Indicates significance at the 95 percent confidence level for a two-tailed test.
*** Indicates significance at the 99 percent confidence level for a two-tailed test.

Figure 1a

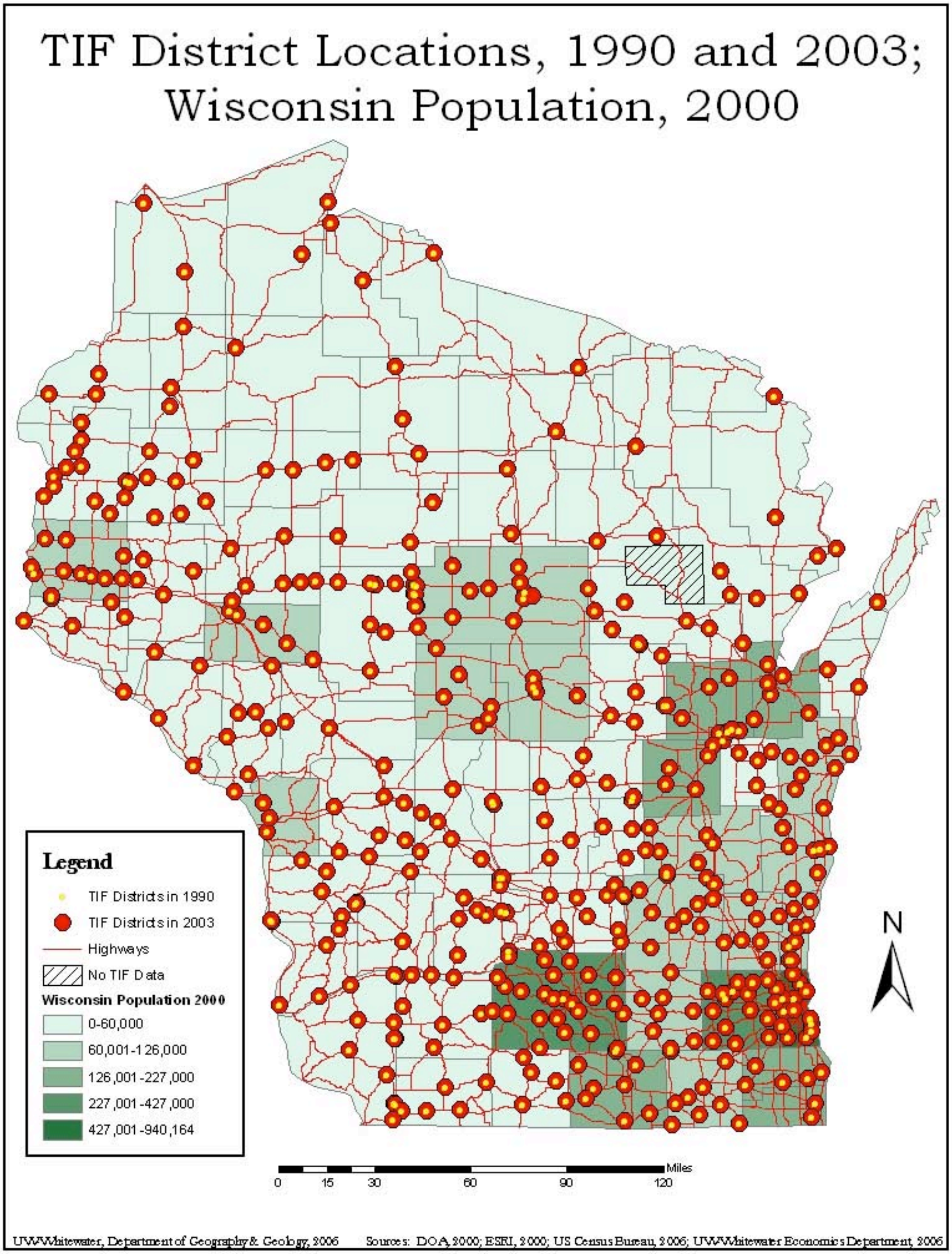
TIF District Locations, 1990 and 2003;
Wisconsin Population, 2000
Legend
TIF Districts in 1990
TIF Districts in 2003
Highways
No TIF Data
Wisconsin Population 2000
0-60,000
60,001-126,000
126,001-227,000
227,001-427,000
427,001-940,164
N
Miles
0 15 30 60 90 120
UW-Whitewater, Department of Geography & Geology, 2006
Sources: DOA, 2000; ESRI, 2000; US Census Bureau, 2006; UW-Whitewater Economics Department, 2006

Figure 1b

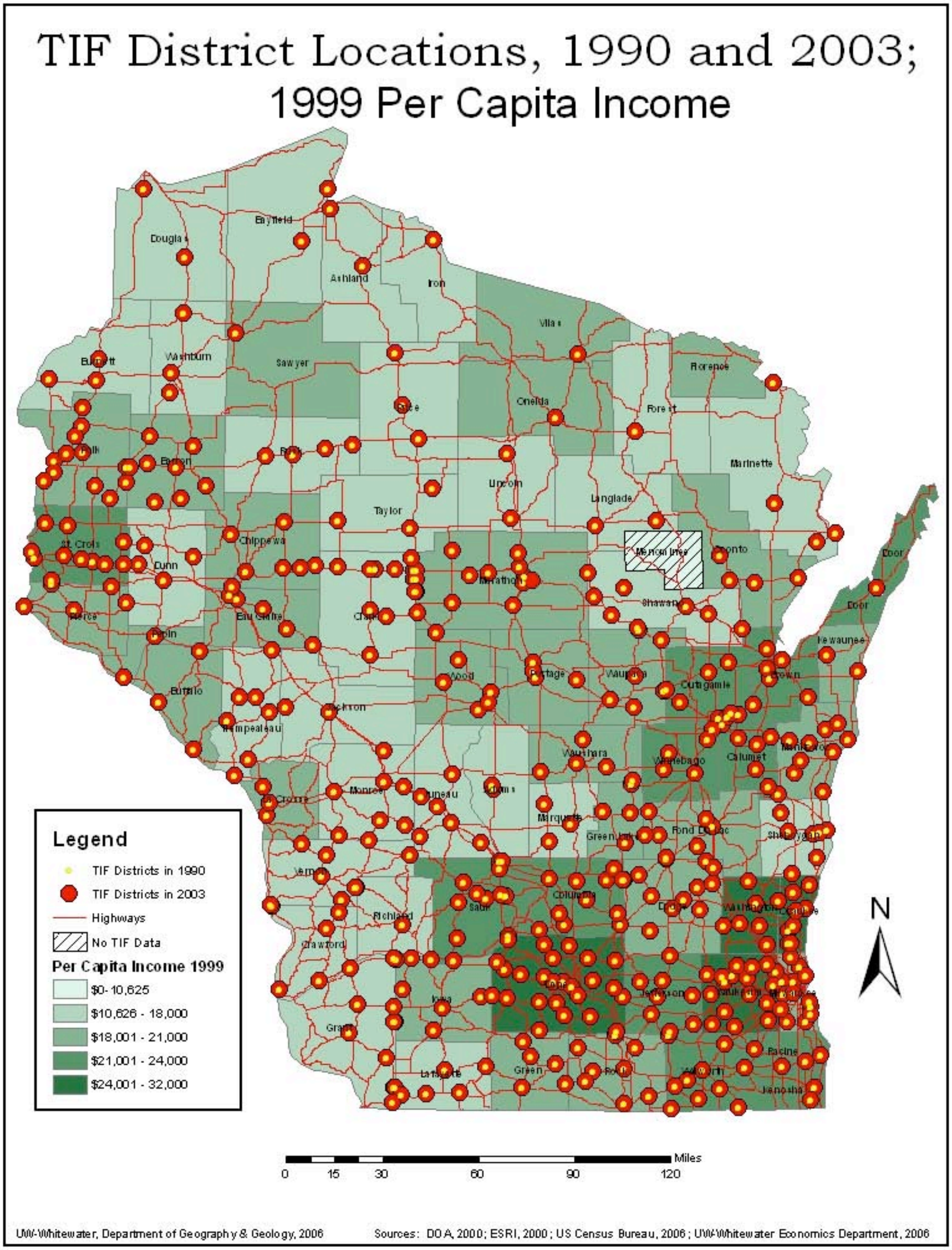
TIF District Locations, 1990 and 2003;
1999 Per Capita Income
Legend
TIF Districts in 1990
TIF Districts in 2003
Highways
No TIF Data
Per Capita Income 1999
$0- 10,625
$10,626 - 18,000
$18,001 - 21,000
$21,001 - 24,000
$24,001 - 32,000
N
Miles
0 15 30 60 90 120
UW-Whitewater, Department of Geography & Geology, 2006
Sources: DOA, 2000; ESRI, 2000; US Census Bureau, 2006; UW-Whitewater Economics Department, 2006

Table 1 Growth of City level TID 2003						
Cities/Villages with at least one TID						
Variable	N	Mean	SD	Min	Max	Median
Growth in Residential TIF Base	293	35.09	279.68	0	3380.06	1.76
Growth in Commercial TIF Base	329	9.79	20.68	0	187.41	3.11
Growth in Manufacturing TIF Base	215	23.48	85.16	0	932.95	3.05
Growth in Total TIF Base	364	11.8	26.82	0	276.23	3.37

Figure 2
Change in TID Share over Time in 14 Wisconsin Cities with Population Exceeding 50,000

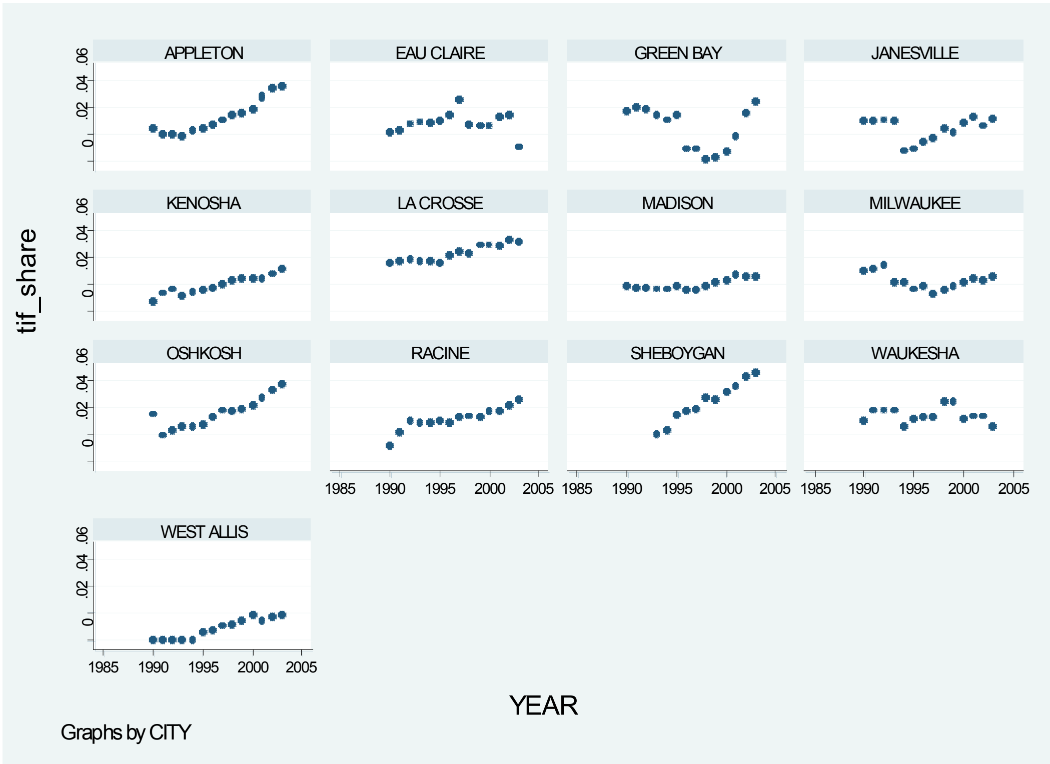

Table 2
Summary Statistics of Data from Municipalities, 1990-2003

Variable	Mean	Standard Deviation
Number of Active TIFs	1.125	1.908
TIF_Value (thousands of $)	8,753	28,000
NonTIF_Value (thousands of $)	252,000	940,000
Total_Value (thousands of $)	261,000	962,000
ResTIF_Value (thousands of $)	2,108	8,374
ResNonTIF_Value (thousands of $)	164,000	548,000
ResTotal_Value (thousands of $)	166,000	557,000
ComTIF_Value (thousands of $)	7,168	29,300
ComNonTIF_Value (thousands of $)	47,800	187,000
ComTotal_Value (thousands of $)	54,100	204,000
ManTIF_Value (thousands of $)	2,211	6,715
ManNonTIF_Value (thousands of $)	10,000	34,800
ManTotal_Value (thousands of $)	12,600	385,000
Municipal Population	6,166	28,582
Property Tax Rate	0.025	0.005
City_Share	0.218	0.083
Residential_Share	0.701	0.125
See Appendix Table A for sources and details.		

Table 3
Regression Results for Property Valuation Models
(t-statistics in parentheses)

	Dependent Variable			
	Panel Corrected Standard Errors	PCSE Two-Stage Least Squares	Panel Corrected Standard Errors	PCSE Two-Stage Least Squares
Independent Variable	***Ln(NonTIF_Value)***		***Ln(Total_Value)***	
Ln(TIF_Value)	-0.004*** (-20.17)	-0.026*** (-3.83)	0.0006*** (3.06)	-0.006 (-0.83)
Number of Active TIFs				
Municipal Population	0.114*** (6.73)	1.200*** (52.72)	0.122*** (7.94)	1.153*** (48.19)
Property Tax Rate	-9.04*** (-18.44)	-12.69*** (-6.18)	-7.50*** (-16.95)	-13.88*** (-6.97)
Residential_Share	-0.265 (-7.79)	-0.292** (2.82)	-0.422*** (-0.422)	-0.181* (-1.88)
Estimated ρ	0.857	0878	0.873	0.878
Adjusted R^2	0.729	0.996	0.791	0.996

n=7349
Note: All regressions include time effects.

* Indicates significance at the 90 percent confidence level for a two-tailed test.
** Indicates significance at the 95 percent confidence level for a two-tailed test.
*** Indicates significance at the 99 percent confidence level for a two-tailed test.

Table 4
Predicted Effects of Doubling TIFProperty Valuation for the Average Municipality*

	Predicted Change in Dependent Variables	
Change in Independent Variable	NonTIF_Value	Total_Value
Increasing TIF_Value by $8.7 million	-$6.6 million	not significant
*Calculations are based on the two-stage least squares estimates.		

Table 5
Regression Results for Disaggregated Property Valuation Models
(t-statistics in parentheses)

	Dependent Variable			
Method	AR1Fixed Effects	AR1 Fixed Effects with 2SLS	AR1Fixed Effects	AR1 Fixed Effects with 2SLS
Independent Variable	***Ln(ResNonTIF_Value)***		***Ln(ResTotal_Value)***	
Ln(ResTIF_Value)	-0.004*** (-17.61)	na	0.0003 (1.47)	na
Estimated ρ	0.861	na	0.872	na
Adjusted R^2	0.500	na	0.561	na
Independent Variable	***Ln(ComNonTIF_Value)***		***Ln(ComTotal_Value)***	
Ln(ComTIF_Value)	-0.014*** (26.75)	na	0.001** (2.59)	na
Estimated ρ	0.793	na	0.794	na
Adjusted R^2	0.307	na	0.348	na
Independent Variable	***Ln(ManNonTIF_Value)***		***Ln(ManTotal_Value)***	
Ln(ManTIF_Value)	-0.067*** (11.71)	0.057 (-1.21)	0.022*** (4.72)	0.049 (1.28)
Estimated ρ	0.748	0.757	0.771	0.782
Adjusted R^2	0.011	0.006	0.092	0.001

N = 6954, 6961,6966 depending on the regression
na Not Available. The Cityshare variable does not qualify as a valid instrument in these cases.

Note: All models include the following control variables: Municipal Population, Property Tax Rate, Residential_Share and time effects.

* Indicates significance at the 90 percent confidence level for a two-tailed test.
** Indicates significance at the 95 percent confidence level for a two-tailed test.
*** Indicates significance at the 99 percent confidence level for a two-tailed test.

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