A Duration Analysis of Tax Increment Finance District Lifespans: The Case of Wisconsin

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Abstract

This paper uses hazard analysis tools to examine the factors that influence the lifespans of tax increment finance (TIF) districts. As the nation emerges from its real estate crisis, it is clear that property value recovery will be slow. Further, in those communities where tax increment is used as a development tool, it appears that the growth of increments generated in TIF designated areas will be much slower than anticipated. This in turn suggests that the tax increment district (TID) lifespans will have to be extended, perhaps for many years in order for the increment to cover the costs of the initial TIF investment. Using detailed data on TID in Wisconsin over the 1988-2009 period to evaluate the factors that determine the TID lifespans. Early in this period, the nation experienced a recession: This event is used to evaluate the degree to which the timing of TID district creation over the business cycle had an effect on TID lifespans. Evidence suggests that TIDs introduced in the wake of the recession had longer lifespans, relative to TIDs created before or after the recession. TID lifespans are also influenced by factors such as the city share of the aggregate tax rate of all overlying jurisdictions, TID type (commercial, manufacturing, residential), and number of competing TIDs in the municipality.

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Introduction

One unexamined issue confronting those striving to understand the effectiveness of tax increment finance (TIF) policy is the potential importance of the timing of formation of a new tax increment district (TID) over the business cycle. The lifespan of any given tax increment district depends on a variety of factors, only some of which are within the local authority's control. During periods of regional or national recession, the growth of property value is flat or can decline even in subsidized TID areas. Thus, the growth path of property value within TIDs is, to some degree, dependent on broader economic circumstances.

For example, if a TID is formed at the peak of a business cycle it is less likely to experience significant appreciation early in its life and may thus require a longer period over which to generate an increment sufficient to pay back the initial investment in the TID. On the other hand, a TID that is formed during a period of growth might realize relatively rapid rates of appreciation so as to generate a larger increment early on and thus shorten the life of the TID. The issue of the factors that affect TID lifespans has not been a focus of researchers. While in some states TIDs appear to last indefinitely, Wisconsin TIF policies offer clear guidelines regarding the maximum TID lifespans and the use of tax increment dollars. In Wisconsin there is a pattern of TID creation and closure as the initial cost of the investment in TID and the accompanying interest is eventually recovered by tax revenues generated from the increment. What factors lead to successful (or unsuccessful) completion of TIDs? What national, community, and TID-specific characteristics influence the lifespan of TIDs?

As the country emerges from the recent real estate crisis, communities across the country must not only react to the sudden decline in property values, but also the reality that projections about future growth suggest an anemic and slow recovery. This paper evaluates TIF policy using detailed data on TIDs in Wisconsin over the 1988-2009 period to better understand the factors that determine the TID lifespans. The analysis of TID lifespans includes national factors such as recession, community characteristics such as population, per capita tax base, tax rates, and the number of competing TIDs in the municipality, and TID specific characteristics such whether the TID contains primarily commercial, manufacturing, or residential properties.

A significant body of research examines the degree to which TIF promotes economic development. Generally, the faster the rate of growth within a given TID, the sooner the revenues generated from the increment will be returned to the municipality's general fund (as well as to the overlying jurisdictions). In Wisconsin these jurisdictions include school districts, county governments, and technical college districts. As a result, revenues can meet the broader needs of the community. TID closure returns a significant portion of the tax base back to supporting the general funds of the municipality and the other overlying jurisdictions. Understanding the factors that contribute to TID success (and ultimately closure) can project future revenues. In the context of the most recent recession, anemic growth in TIDs driven by national forces can exacerbate an already difficult fiscal environment as it may prolong the duration of TIDs and thus the period over which the local governments do not have access to that

portion of the tax base for general purposes. As a result, broader economic forces may lead to outcomes unanticipated by consultants, planners, and local officials. If a TID is introduced during a business cycle upswing, the TID could outperform the pro-forma to the benefit of the district (ideally resulting in an early payoff). On the other hand, a TID introduced during a business cycle downturn could underperform the pro-forma. In some cases, a TID might not generate an increment sufficient to cover the investment, thus risking failure. In a reaction to the bursting of the real estate bubble, policymakers in the State of Wisconsin recently altered tax incremental financing laws, allowing municipal authorities to extend the payback period to 40 years, and/or to apply the excess revenues produced by successful districts to those that have been less successful.

Is the extension of the payback period warranted? Should the modification apply to all TIDs or should it be limited to those TID's that have greater exposure to this crisis? In earlier research conducted for the Lincoln Institute of Land Policy (Kashian and Skidmore, 2010), it was shown how the legally allowed maximum lifespan of a TID has been gradually extended since the initial introduction of TIF policy in Wisconsin. While changes in the laws provide for an extended lifespan of TIDs, it is not clear that the average lifespan of TIDs has actually increased. This paper presents new research that examines the determinants of TID lifespans in Wisconsin.

The Tax Increment Finance Tool

TIF is an economic development tool used widely throughout the United States to finance development in community improvement projects. For a more comprehensive description of how TIF works, see Merriman, Skidmore, and Kashian (2011). When a TID is created and an initial investment made, there is typically a subsequent increase in property value within the district, with which comes increased tax revenue (a tax increment). The anticipated tax increment generated within the designated TID is the basis to finance debt issued to support development/redevelopment in distressed or underdeveloped areas where development might not otherwise occur. TIF economic development subsidies are generally used to pay for real estate improvements including but not limited to sidewalks, utility upgrades, and construction projects. They can also be used for direct subsidies to the developer.[1]

In Wisconsin, TID creation typically begins when a city's development authority draws up a development plan. A forecast of anticipated development within a particular geographic area and the associated project costs is part of the TID plan. This study projects new (incremental) property values, proposes the project's financing strategies, and projects the cash flow analysis. A joint review board's approval requires majority support of the board relies on these projections and expectations. Bonds are usually allocated to infrastructure and land acquisition. But, funds can also be spent on development incentives. Lastly, tax payments to the township for any annexed land can be made from TID expenditures.

Established in 1975, the Wisconsin TIF law is a program that allows municipalities to fund redevelopment without utilizing current taxes. Anticipated future revenue streams are earmarked to pay back the debt's principal and interest. The legislation, as it evolved over the past 36 years, is now a relatively complex set of rules and regulations that apply differently depending

[1] For example, a common practice is to sell land in TID to developers at a subsidized price, say, for $1.

on the type of government (cities, villages, and townships), origination dates (pre-2004 and post 2004), and types of development (agriculture, residential, commercial, and industrial). While a maximum of 12 percent of a municipality's assessed value may be included in TIF designated areas with no more than 25 percent of the land having been vacant during the previous seven years, the allowed lifespan of different TIF districts has changed four times in Wisconsin with the most drastic extension taking effect in 2010.

Over time, these changes have extended the allowable life of a TID. For example, the 2004 law increased the maximum payback period of a redevelopment TID created between Sept. 30, 1995 and Oct. 1, 2004 from 23 to 27 years. Redevelopment TIDs created after Oct. 1, 2004, however, have maximum lifespans of up to 27 years with the availability of a three year extension. While there has been no change to the allowable lifespan of existing industrial TIDs, industrial TIDs created after Oct. 1, 2004 will have a lifespan up to 20 years. In addition, a municipality may apply for a three year extension. In May of 2010, Wisconsin enacted SB 291 into law which extended the allowable lifespan of severely distressed TIDs from 27 to 40 years. A severely distressed TID is one in which the district's projects cost exceeds the expected revenue (Runde, 2011).

A primary objective of this research seeks to determine whether and under what conditions the extension allowable lifespan is warranted. For example, in urban areas such as Milwaukee the change in the law is not expected to have an impact on actual TID lifespans. In 2009, Milwaukee had 49 TIF districts covering 4.06 percent of the city's property value (Wisconsin state average is 3.6 percent.). Currently, no Milwaukee TID currently qualifies for an extension of the payback period to 40 years. According to the Department of City Development Report, the average payback period for TIDs in Milwaukee is about 18 years, and 13 of Milwaukee's current districts are expected to pay off their debts and generate positive tax revenues within the next three years.

Table 1 displays the average annual statewide nominal appreciation rates of property values within TIDs. While the average annual rate of appreciation of TID over the 21 year period (1988-2009) is over 10%, growth is quite variable and unequal over time. There are some years with exceptionally high rates of growth (especially from 1997 to 2001 and from 2005 to 2007); there are also some years with very low or even negative rates of growth. It appears that rates of appreciation track, to some degree, with the national business cycle (the short recession of 1992, the implosion of the "dot-com bubble" in 2001, and the recent "Great Recession" in 2008). As a result of the reduction of TID growth rates, the period to pay off the initial investment may increase. For example, a TID dominated by commercial real estate created in 1995 witnessed significant expansion through the end of the century. However, TIDs created following the 2001 recession experienced a contraction as real estate values fell. It appears that the timing of TID creation may be a very important determinant of TID lifespans.

Table 2 presents the statewide percent of TIDs whose aggregate assessed value is below the initial base value four years after TID creation. This circumstance is referred to as being "under water". One of the outcomes of an economic downturn is that an increasing number of TIF

projects may end up "under water".[2] In these TIDs, the real estate value is actually lower after four years than when the TID was first established.

Table 3 presents data on municipal and nominal TID property values taken from Runde (2002) and Runde (2011). It is clear that property value within TIDs as a percentage of the City/Village equalized value has gradually increased over the past two decades. These data also highlight the possibility that appreciation (or depreciation) may be unequal between TID designated areas and areas outside TIDs. In the event that the community leaders selected the more attractive real estate to be included in TIDs (technically a violation of the "but for" clause), during a recession the city's tax rolls might suffer more than property values in TID designated areas. To illustrate, from Table 1 in 2009 the real estate within the TID experienced positive appreciation, but as shown in Table 3 real estate outside the TID experienced overall declines.
The imbalanced growth of real estate within and without TIDs over time diverts resources that might have benefited the general community through the tax increments that pay for debt and investment in the TID designated areas. In addition, if that the overall slowdown in the real estate market affects TIDs, it limits the ability of the TID to pay down the debt incurred in the redevelopment process, and could extend of the lifespan of the TID.

The Literature on Tax Increment Finance

The literature on TIF predominately examines the relationship between TIF and economic development. The focus of this research is on whether property value within TID designated areas grew at a faster rate than properties outside TID, and whether the relationship between TIF use and property value growth was indeed causal. The existing research has not explicitly evaluated the related question of TID duration. Also, the existing research has not focused on how TIDs perform over the business cycle.

While there are now numerous empirical studies on TIF, the work of Brueckner (2001) offers the primary formal theoretical treatment of TIF policy. Specifically, Brueckner (2001) provides a logically consistent rationale for the use of TIF as opposed to the direct appropriation of funds to economic development. Brueckner explores several aspects of TIF, but all variations of his model predict that TIF raises aggregate real estate values of the municipality as a whole. However, in the context of the present study his model's design does not explicitly address factors that affect TID duration.

Huddleston (1981) shows how TIF enables municipalities to subsidize development with incremental revenues taken from the overlying taxing jurisdictions. Anderson (1990) takes advantage of this insight, and devises an empirical strategy that allows him to predict TIF adoption independent of expected assessment growth. In the context of real estate bubble expansion and collapse, it may be that areas expected to grow rapidly are disproportionately designated into TIDs in order to ensure that these districts have the wherewithal to pay off the

[2] The term "Under water" means that the value of the TID is less than when the TID was first established. Such a situation can occur for two reasons. First, redevelopment may require tearing down some structures, and this can lead to a temporary lower value within the TID. Second, a property values in the TID could decline due to a regional or national economic downturn.

accompanying debt. In addition, a study by Ginsberg shows that property value growth may actually begin in anticipation of a TID investment.

In their analysis of TIF in Wisconsin, Merriman, Skidmore, and Kashian (2011), found that TIF stimulated economic development inside TIDs, but did not increase the overall community property values. They conclude that TIF serves to concentrate development in TID designated areas, but at the expense of growth outside the TIDs. TID growth may be sufficient to pay off the debt, but it appears to come at a cost borne by the remainder of the community which experiences relatively slower growth.

While this literature provides some context for the present research, it does not explicitly address one of the specific questions considered: Can unanticipated structural changes in the economy generate different amortization potential and thus extend (or shorten) the lifespan of TID? A hazard analysis of TID lifespans is conducted to determine the factors that affect TID duration. This analysis includes all 362 TIDs created in Wisconsin during the 1988-1995 period, tracking them from inception to closure, tracking TIDs through 2009. TIDs created after this period are excluded because the hazard analysis approach used requires that the use of a period over which TIDs are created and then have sufficient time over which they have opportunity to close. Over the period of analysis, TIDs exhibit significant variation in lifespans. As previously outlined, national trends, community characteristics, and specific TID characteristics in this analysis of TID duration are also considered.

Determinants of Tax Increment District Lifespans

The factors that might affect the lifespan of a TID are illustrated in a stylized equation the helps present the typical pattern of initial investment in a TID and a corresponding payback schedule:

$$C_0 = \sum_{t=0}^{n} Inc_t * r_t$$

C_0 is the cost of the subsidy or initial investment in the TID in the initial period. Inc_t is the increment accrued by the TID in every year through the life of the TID, and r is the aggregate tax rate of all overlying jurisdictions which may change from year to year. The TID's lifespan therefore depends on the size of the initial subsidy (C), size of the increment in each period, and the tax rate in each period. These factors in turn depend on national, local, and TID-specific factors.

TID administrators are required to develop a business model that projects the TID's tax increment and to determine whether the anticipated revenues are sufficient to pay off the initial subsidy within the maximum lifespan of the TID. Administrators therefore select the size of the subsidies based on both the needs of the TID, as well as anticipated revenues from increment. However, these increments may be under- or over-estimated.

Unexpected changes in economic activity can result in these mis-estimations. For example, a recession can cause the value of property to grow more slowly than anticipated for several years. As demonstrated by the most recent recession, the TIF base can even decrease. Importantly, this effect is compounded throughout the life of the TID. Thus, the administrators over-estimate of the anticipated increment growth result in an inappropriate subsidy package and a longer debt

repayment lifespan of the TID. Conversely, a TID introduced during a boom period could generate increments in excess of anticipated revenues, thereby reducing the TID lifespan. While there is significant expectations literature, a detailed discussion of expectation formation is beyond the scope of the present work. Nevertheless, the current and past experiences play an important role in all economic decisions.[3] With TIDs, if administrators base future activity on recent past experiences, it is conceivable that they could mis-estimate the anticipated increment. This context leads to a discussion of that factors that might play a role in determining TID lifespans.

This analysis focuses on the 362 TIDs created and closed over the 1988-2009 period. However, only the closure of TIDs created in the earlier years of the data set can be observed. The early years observed one mild recession in 1991. To capture the effect of having been created in the wake of this recession, a dummy variable (Rec) that is equal to one in two years immediately following the recession is included. As discussed in the empirical analysis, different sets of years are explored to signify the recession period to explore sensitivity and robustness.

Turning to community specific factors, the tax rate may impact TID lifespans. An extensive body of research has shown that all else equal, higher tax rates tend to deter development (See Wasylenko, 1997 for example). Thus, communities with relatively high tax rates may have lower rates of property value appreciation in the jurisdiction as a whole, as well as within TIDs. Owners of property within TID designated areas are still required to pay the full tax rate on property. On the other hand, if the subsidy is sufficient to generate a significant increment, a higher tax rate applied to the increment could generate more revenue than in communities with lower tax rates. The effect of the tax rate is therefore uncertain. In addition, with TIDs a portion of the tax increment is generated by the overlying jurisdictions (county, school districts, and technical college districts) and not simply the municipal tax rate. The degree to which a municipality can offset the subsidy depends on the share of the municipality's tax rate relative to the aggregate tax rate of all overlying jurisdictions: A small municipal share means that a greater portion of the subsidy will be paid for by the overlying jurisdictions. Assuming municipal authorities operate in a position of strength due to information advantages relative to their county, school district ,and technical college district officials, it may be that the greater the share paid by the overlying jurisdictions, the larger the investment in the TID will be, and thus the longer the potential payback period. In contrast, municipalities bearing a larger share of the cost have an incentive to reduce the payback period in order to more rapidly fold the revenues from increment back into the municipality's general fund. In addition to these two factors, it is helpful to control for size (population), as well as wealth (per capita property value), though there is no *a priori* expectation regarding the expected impact of population and wealth on TID duration.

Finally, the characteristics of the TID may also determine the length of the pay off period. Two factors are considered. First, when a municipality decides to use a TID for the first time, it may select properties that have the greatest potential pay-off in terms of property value growth. If this is the case, TIDs adopted early might generate a higher increment, and close successfully in a relatively short period of time. Along the same lines, TIDs introduced in subsequent years might require a longer payoff period because they had lower potential returns. On the other

[3] The work of Muth (1961) is one of the earlier papers on the formation of expectations. The body research on the topic is too expansive to review here.

hand, over time TIDs have become more common such that use has increasingly extended beyond just redevelopment. Thus, it is possible that TIDs created in later years might have shorter lifespans. The type of TID may also influence the TID property value growth. Merriman, Skidmore, and Kashian (2010) show that commercial TIDs have higher returns than residential or manufacturing TIDS. Thus it is possible that commercial TIDs will have shorter lifespans, all else equal. The next section summarizes some of the most relevant TIF research.

Duration Analysis

Duration analysis estimates the determinants of the length of time elapsed between the creation and the termination of the TID. These models were originally developed and used in the medical and biological sciences to evaluate the effectiveness of certain patient treatments. Today, this technique is used in many fields, including economics. Within economics, duration analysis has been used to study issues such as new business start-ups, the life cycle of products, and policy innovation (See for example, Alm, McKee, and Skidmore, 1993; Barros, Carolos P., R. Butler, and A. Correia, 2010; Holmes, P., A. Hunt, and I. Stone, I. 2010**)**.

The present study hopes to increase the understanding of the factors that influence the lifespan of TIDs using this empirical approach. Specifically, a proportional hazard model that links the closure of TIDs to a number of factors as previously discussed is developed. The hazard model is defined as:

$$h_i(t|x_i(t), \beta_i) = \bar{h}(t)\exp(x_i(t)\beta)$$

where h(t|X) is the hazard of a TID closure at time t, X_1 ... X_i are predictor variables, and $\bar{h}$ is the baseline hazard at time t, which represents the hazard of closure for a TID. Given that some factors considered are time invariant, the independent variable is defined as the number of years from TID creation to closure (Life). The baseline hazard, which is the hazard for the respective TID when all independent variable values are equal to zero, corrects for initial differences between TIDs that might influence the likelihood of closure. Specifically, the Cox proportional hazard regression model produces an adjusted hazard ratio that takes into account any baseline differences between TIDs that may have influenced lifespan and are not captured in the predictor variables. With the hazard analysis framework, the goal is to capture the factors that determine the likelihood of TID closure. In this context, the "at risk" set includes those TIDs in which there is sufficient time to be created, mature, and close. Making the appropriate substitutions into the equation above, taking logs, and summing across all TIDs, yields the partial log likelihood function:

$$log\,L(\beta) = \sum_{i=1}^{N} \left\{ f_i x_i(t_{fi})\,\beta - \log\left[\sum_{m \in R_i} \left[\exp(x_m(t_{fi})\,\beta \right] \right] \right\}$$

The advantage of this partial likelihood approach is that in estimating the vector of parameters β, only part of the hazard needs to be specified. As a result of the structure of the partial likelihood function given in equation above and the proportional hazards assumption, the density or survivor functions are not specified. In addition, since it drops out of equation, the baseline hazards are not specified. This feature of the model is particularly useful in estimation, as it

allows a direct estimate on the vector of parameters β in the hazard function without needing to specify the underlying density or survivor functions.

Data and Empirical Analysis

Detailed information on TID (lifespans, increments, TID base values, etc…) comes from the Wisconsin Department of Revenue. In addition, information on municipal finances and population come from the GREAT database (Great—Graphing Revenue, Expenditures and Taxes CDROM, University of Wisconsin-Extension). For reasons previously discuss, the data is restricted to include those TIDs created between 1988 (the beginning of data availability on TID) through 1995. This data runs through 2009; thus providing at least 21 years to observe TID lifespans. This covers the 383 TIDS created and then closed over this period. However, for two reasons the sample is restricted to aforementioned 362 TIDs. First, for several TIDs full data was unavailable and so they could not be included in the analysis. A majority of the omissions, however, were purposeful because these TIDs open period was so short it seemed that no investment was actually made in the TID. Rather, it appears that some TIDs opened and closed quickly with no development activity or investment. For this reason, all TIDs opened and then closed within a three years of creation are omitted. Summary statistics of the variables are presented in Table 4. The average lifespan of TIDs in the sample is about 12 years. However, there is considerable variability. While the discussion of summary statistics in limited, a few points are worth noting. First, average municipal population is much higher than the statewide average since larger cities typically have more TIDs than smaller cities. Second, on average the municipality's share of property taxes is about 29 percent. That is, tax dollars generated by overlying jurisdictions pay for about 71 percent of TID investment/bonding.

Several variables require additional explanation. A primary variable in the analysis is an indicator for years following the 1991 recession. Specifically, this variable equals one for the years 1991 1992, and 1993, and zero otherwise. This is a rough measure of the recession, and the estimates may be sensitive to the definition of the recession period. To examine result's robustness to the timing/definition of the recession period, several combinations of years were considered. These various combinations resulted in qualitatively similar results.[4] The recession variable examines whether negative/slow growth and low consumer confidence in the wake of the recession led to longer lifespans for TIDs created during that period.

The variable TIDRank also requires explanation. TIDRank numbers every TID from one to n with one being the first TID introduced in a given jurisdiction, and n representing the last TID introduced. TIDRank is defined as the number of the TID in question divided by the total number of TIDs. To illustrate, consider TID #2 in a municipality with four TIDs. TIDRank for TID #2 would therefore equal 2/4=0.5. TID #4 in the same community would receive a TIDRank of 4/4=1. Thus, a lower ranking means earlier TID. As noted, the expected effect of TIDRank is ambiguous.

[4] Alternative definitions for the recession variable were considered: 1991; 1990-1991; and 1992-1993. All of the alternative time periods generate estimates similar to those presented in the paper. As discussed later, TIDs create during and around the recession had a longer duration than those created before or after the recession. These results are available from the authors upon request.

Figure 1 presents the cumulative hazard estimate based on the length of life of the TIDs in the sample. The average life of a TID is about 12 years. However, there is some variation in lifespans. This variation provides an opportunity to examine the underlying characteristics that determine TID closure.

The hazard function presents three estimations in Table 5: Estimation 1 includes two control variables (Population and Property Value Per Capita) along with two community policy variables (property tax rate and the city's share of the aggregate property tax rate); estimation 2 adds the recession indicator variable; and regression 3 adds TID specific characteristics (TIDRank, indicators for residential and commercial TIDS[5]). With the exception of the property tax rate variable, these results show that the variables have hazard ratios above one, indicating a positive effect on TID closure. That is, a positive change in these variables brings TID to closure sooner.

Consider first the coefficients on property value, property tax rate, and the city share of the overall tax. Two of the three regressions find statistically significant coefficients on per capita property value, indicating that TIDs have shorter lifespans in municipalities with higher property values. However, the magnitude of the coefficient is small and it is not always significant. The tax rate variable is not statistically significant either. Property tax rates are not an important determinant of TID lifespans. However, TIDs in cities that have a larger share of the overall tax rate tend have shorter lifespans, as expected. This result suggests that municipal authorities are willing to accept a longer pay pack period if the TID investment is more heavily subsidized by the other overlying jurisdictions.

The recession indicator variable, a primary variable of interest shows that TIDs introduced in the years following the 1991 recession (1991-1993) tend to have longer lifespans. Relative to TIDs opened prior to or after the recession, TIDs that opened in the wake of the recession, lasted about a third longer relative to expansionary TIDs. For the average TID in the sample, this increases the lifespan from about 12 to 18 years. This result suggests that TIDs opened during the wake of the most recent recession are likely to have significantly longer durations than those created in prior years. As noted earlier, this is only a rough approximation of the effect of the recession on survival time. Further, the results might be sensitive to the period defined as being a recession. There is a challenge in getting the timing of the recession correct such that changing expectations are considered. Also considered are the lagged effects on links between changes in GDP, employment/unemployment, and property values, as well as the lag between property value changes and assessment changes. To examine the finding's robustness, a set of different periods defining the recession as described in footnote 4 are examined, and all estimates are qualitatively similar to those presented here.

Turning to the TID specific characteristics, TIDs introduced first within a community tend to have longer lifespans than later TIDs (TID Rank). One interpretation of this result is that in the later years municipalities possessed more TID site selection experienced and used TID to enhance development in places that generate returns sufficient to recover the TID investment more quickly. Finally, commercial and residential TIDs (relative to the omitted manufacturing TIDs) had relatively shorter lifespans. This is finding is consistent with earlier research that

[5] Manufacturing TIDs are omitted to avoid perfect multicolinearity.

shows that Wisconsin residential and commercial TIDs had much faster rates of growth than did manufacturing TIDs. (Merriman, Skidmore, and Kashian, 2011)

A question of interest is the degree to which TID creation over the business cycle affects lifespan. This analysis suggests that TIDs opened in the wake of the Great Recession are likely to have significantly longer durations than TIDs created in previous years. Given current predictions about the slow property value recovery, it appears that TID increments in general will lag behind what original and anticipated projections. If, as a result, it is likely that a number of TIDs will languish for years, the 2010 extension of the allowable TID life was necessary and warranted.

Conclusions

These finding offer new insight into the factors that determine TID lifespans. Serving as the first study to focus specifically on this issue, this study offers a general contribution to the existing body of research on tax increment finance. In addition, this research also informs policies in Wisconsin and in other states where there is a concern about languishing TIDs in the wake of the Great Recession. In 2010, Wisconsin policymakers expanded the allowable lifespan of TIDs to 40 years if the TID met the specified criteria. While this study does not offer estimates precise enough to inform the appropriate length of the expansion, it does provide evidence that TIDs created during recession periods tend to last longer than those created during periods of growth. In this context, these findings affirm legislators' concerns. Other states may also want to consider expanding the allowable lifespan of TIDs in order to avoid placing undue hardship on municipalities. On the other hand, unnecessary TID lifespan extensions can cause strain on the overlying jurisdictions as it prolongs the period during which their tax revenues are diverted TID debt repayment. When first introduced in Wisconsin, TID debt and interest was required to be paid and TID property value returned to the general fund tax base within 20 years. Today, for some TIDs this period can last up to 40 years. The challenge is in creating a policy where extensions are made available only to those TIDs that are truly in distress. Otherwise, TID captures resources for a longer period during which non-TID programs such as public schools, public safety, and public recreation suffer.

This research presents evidence showing that TIDs opened in the wake of a recession tend to have longer lifespans. TIDs opened during the relatively small recession of 1991-1992 have lifespans that are about six years longer, on average, than those opened prior to or after the recession. Given the severity of the most recent recession, and its effects on property values are expected to continue for years to come, it is expected that TIDs created during this period will languish for years. Given that revenues from the property value growth is not likely to improve very much in the years to come, extending the allowable life of TIDs may have been necessary to avoid placing an additional layer of fiscal stress on already highly stressed cities. However, it is important to acknowledge a tradeoff: The other overlying jurisdictions must manage affairs for a longer period with a narrower tax base.

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Appendix

Table 1
One Year Percentage Change in TID Value

Year	Total	Residential	Commercial	Manufacturing
1988	12.83%	20.41%	13.28%	9.78%
1989	7.87%	-5.19%	15.08%	12.27%
1990	15.24%	5.70%	17.46%	18.41%
1991	12.04%	8.60%	23.71%	10.53%
1992	10.48%	8.03%	29.98%	6.25%
1993	4.52%	12.44%	1.90%	2.61%
1994	-4.14%	-21.75%	1.12%	0.77%
1995	14.40%	18.07%	21.39%	11.17%
1996	7.91%	-1.81%	22.07%	6.11%
1997	14.68%	4.02%	23.52%	14.23%
1998	11.04%	-1.95%	15.19%	12.65%
1999	11.71%	24.88%	3.41%	12.30%
2000	14.72%	24.04%	13.80%	12.68%
2001	21.56%	20.49%	18.32%	23.15%
2002	6.73%	7.81%	-0.07%	9.07%
2003	8.05%	20.12%	0.34%	7.52%
2004	5.36%	19.17%	-9.46%	6.30%
2005	20.42%	29.48%	5.24%	21.89%
2006	17.82%	24.60%	2.85%	19.14%
2007	17.87%	24.84%	8.17%	17.51%
2008	1.76%	0.62%	11.62%	0.59%
2009	4.06%	-6.65%	-1.30%	9.49%

Source: Wisconsin Department of Revenue – Tax Incremental Value Report

Table 2
Percentage of TIDs Underwater After Four Years

Year	Total	Residential	Commercial	Manufacturing
1990	28.57%	21.43%	30.00%	16.67%
1991	15.00%	14.29%	7.14%	14.29%
1992	10.53%	33.33%	14.29%	13.33%
1993	8.11%	36.36%	12.50%	8.33%
1994	16.22%	16.00%	11.54%	18.75%
1995	12.12%	20.00%	31.58%	16.67%
1996	7.69%	15.38%	15.63%	21.43%
1997	13.16%	9.09%	28.00%	23.53%
1998	19.72%	27.91%	27.08%	27.27%
1999	10.53%	16.33%	15.38%	13.04%
2000	8.00%	30.56%	9.52%	6.67%
2001	11.43%	20.41%	17.78%	18.18%
2002	13.16%	28.57%	15.15%	12.50%
2003	16.67%	16.13%	20.59%	5.88%
2004	11.86%	8.82%	18.37%	26.09%
2005	19.57%	29.41%	12.12%	33.33%
2006	7.69%	35.14%	7.14%	0.00%
2007	7.81%	5.56%	1.92%	25.00%
2008	11.36%	11.11%	14.81%	60.00%
2009	9.28%	18.18%	7.35%	35.29%

Source: Wisconsin Department of Revenue – Tax Incremental Value Report

Table 3
Equalized Value Growth and TID Values

Year	City/Village Equalized Value (In $1,000s)	% Change	TID Value as a % of City/Village Equalized Value
1991	98,816.9		3.16%
1992	105,106.0	6.36%	3.26%
1993	111,823.4	6.39%	3.13%
1994	119,898.3	7.22%	2.77%
1995	129,379.4	7.91%	2.94%
1996	138,113.3	6.75%	2.97%
1997	142,258.6	3.00%	3.28%
1998	155,723.1	9.46%	3.30%
1999	164,215.9	5.45%	3.34%
2000	177,340.5	7.99%	3.52%
2001	192,182.2	8.37%	3.91%
2002	205,679.1	7.02%	3.89%
2003	220,716.4	7.31%	3.89%
2004	243,100.2	10.14%	3.95%
2005	267,479.4	10.03%	4.25%
2006	292,130.5	9.22%	4.52%
2007	310,168.1	6.17%	5.00%
2008	319,125.1	2.89%	4.99%
2009	317,576.8	-0.49%	5.06%
2010	306,854.9	-3.38%	4.98%

TABLE 4
Summary Statistics, TIDs Beginning 1988-1995 & Ending by 2009

Variable	Mean (Std. Deviation)
Length of TID Life (Life)	12.13 (3.26)
Municipal Population (Pop)	63,862 (156,807)
Per Capita Real Property Value (ValuePC)	1,790,007 (6,546,222)
Effective Property Tax Rate (Rate)	0.0253 (0.0045)
City Share of the Property Tax (City Share)	0.283 (0.071)
Indicator for Years Following 1991-92 Recession (Rec)	0.303 (0.460)
TID Number/Total Number of TIDs (TID Rank)	0.539 (0.260)
Residential TID Indicator (Res)	0.081 (0.273)
Commercial TID Indicator (Com)	0.525 (0.450)
Observations:	362

Figure 1

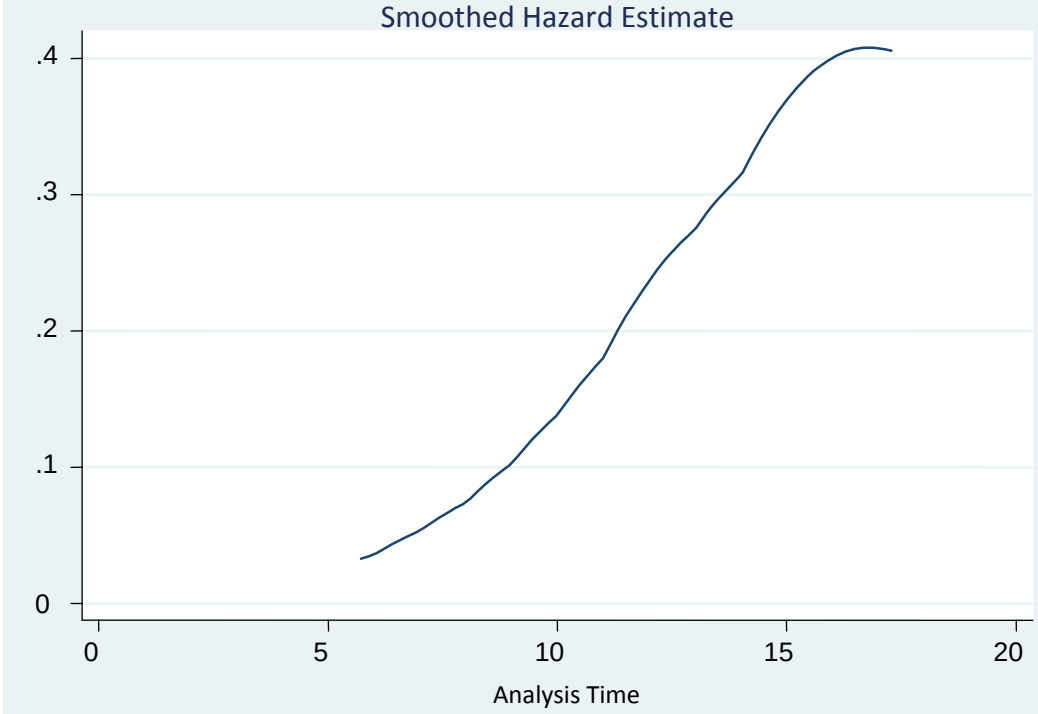

TABLE 5
TID Lifespan: Estimates from a Proportional Hazard Model

	Hazard Ratios for TID Lifespan		
Variable	1	2	**3**
Municipal Population (Pop)	1.00 [0.63]	1.00 [0.89]	**1.00** **[2.67]**
Per Capita Real Property Value (ValuePC)	**1.00** **[3.72]**	**1.00** **[2.44]**	**1.00** **[0.52]**
Effective Property Tax Rate (Rate)	.544 [1.56]	0.627 [1.19]	0.710 [0.273]
City Share of the Property Tax (City Share)	**1.001** **[2.13]**	**1.00** **[1.90]**	**1.000** **[1.84]**
Indicator for Years Following 1991 Recession (Rec)		**1.344** **[6.64]**	**1.296** **[5.13]**
TID Number/Total Number of TIDs (TID Rank)			**2.050** **[7.61]**
Residential TID Indicator (Res)			**1.730** **[6.09]**
Commercial TID Indicator (Com)			**1.294** **[5.88]**
Observations	362	362	362
z-values are reported in brackets. All standard errors (not shown) are robust.			
Estimates that are statistically significant at the 0.10 level or less are highlighted in bold.			