1-1-2009

# Does Tax Increment Financing (TIF) Favor Properties Adjacent to the Development Site?

Atang Gilika
*Macalester College*, agilika@macalester.edu

# Does Tax Increment Financing (TIF) Favor Properties Adjacent to the Development Site?

Atang Gilika

Economic development[1] is one of the central tasks of local government in the United States (Dye & Merriman, 2000). Often, economic development practitioners face fiscal pressures, which hinder attempts to reduce central city deterioration and promote growth. Several documented cases exist of projects being left midstream without funding (Carroll & Eger, 2006). Local units of government with development projects pending but without federal funding have had to explore new development financing tools. One such tool has been Tax Increment Financing. Tax Increment Financing, also known as TIF, was first introduced in Minnesota in 1946 as a public development financing tool; it was not popularly used until the 1970s when federally assisted housing and urban development programs began to be phased out.

While the details of TIF adoption differ across states, the establishment of a TIF district always begins with the specification of a set of geographical boundaries that delineate the TIF area. Once the TIF district boundaries are established, aggregate property tax assessment that is taxable by all overlapping jurisdictions is capped at the base year. Any additional tax (increment) revenues[2] generated by an increase in property values within the TIF district are captured by the TIF administrator[3]. These tax revenues can then be used to finance public improvements within the district. Often, TIF administrators sell bonds early in the life of the TIF district and pledge to repay the debt with expected future TIF revenues. These increment revenues allow the retirement of bonds without raising surrounding property tax rate. Tax increment revenues can only be

[1] In this study, I define *Economic Development* per Dye & Merriman (2000) as; "local government's aiding of economically distressed or "blighted" geographic areas to redistribute income based on the belief that poor people benefit disproportionately from subsidies to these areas." (p. 307)

[2] The property's assessed value is the basis for calculating tax increment (Carroll, 2008).

[3] Different types of TIF districts have different duration limits (life spans). Under statute, Redevelopment districts are permitted for 25 years, Economic Development districts for 8 years, Housing districts for 25 years, and Renewal & Renovation districts for 15 years. The TIF administrator is able to capture tax increment revenues for the specific TIF district type only for the duration specified under Statute.

captured for the duration of the TIF district. Once the duration expires, the entire assessed value is again taxable by the overlapping jurisdictions, which then experience increased tax revenue.

Today, TIF is one of the most widely used local economic development tools. Since 1999, TIF has been used to finance tax base expansion in 48 states (Gibson, 2003). The widespread usage of TIF raises some important questions for those who have an interest in local public finance. Of particular interest to me is whether or not TIF adoption has an impact on non-TIF property value growth. In this paper, I try to gain insight into a variation of this question by asking the question: Does TIF favor properties adjacent to the development site?

The remainder of the paper is divided into five sections. The next section offers a discussion of existing literature relating to TIF. Section Two outlines the theoretical framework employed in this paper. Section Three describes the data used in the empirical work. Section Four presents estimation issues, regression results and a discussion of robustness issues. Section Five concludes the study.

**Review of Existing Literature**

Research examining the effect of TIF on property values offers mixed results (Carroll, 2003). Brueckner (2001), Dye & Merriman (2000), and Weber et al. (2007) find that municipalities adopting TIF programs experience slower property growth after adoption than cities that do not adopt TIF. Anderson (1990), Dye & Merriman (2000), Byrne (2006), Carroll & Eger (2004), and Man & Rosentraub (1998), on the other hand, examine property value growth and TIF adoption, and find that TIF adopting cities experience greater property value growth than non-TIF adopting cities.

Previous studies contradict each other because one group believes that TIF may channel real estate investment into less productive areas in the city, lowering the overall growth rate of property values within the municipality (Byrne, 2006). The other group believes that the incentives provided by TIF are effective in attracting business investment, thereby increasing economic activity, employment opportunities, wages, property values, and tax revenues (Man, 1999). They find these TIF spillover effects to be especially true when TIF adoption is focused on industrial and commercial development.

A number of studies have focused quite narrowly on whether TIF adoption causes property value growth in infrastructure across the municipality (Byrne (2004), Carroll (2007), Weber et al. (2003), Gibson (2003), Man & Rosentraub (1998)). These studies do not address whether TIF programs favor property value appreciation of homes adjacent to the district. Moreover, studies have rarely taken into consideration structural and location characteristics when assessing the impact of TIF on property values. Consequently, they have lacked generality or sound empirical evidence that would aid in the adoption of TIF in "prime" locations that would ensure the optimal removal of blight.

Byrne (2006) and Weber et al. (2007) demonstrate that property characteristics within TIF districts influence the benchmark of TIF success measured by property value appreciation. I draw on this finding in examining the growth of adjacent property values that results from TIF districts. Whereas previous research asks whether TIF increases property value growth at the municipal level, the question I ask is this: Does TIF favor properties adjacent to the development site? I attempt to answer this question by examining the second derivative, $d^2\text{Value}/d\text{TIF}d\text{Char}$, to determine the nature of the homes adjacent to TIF districts. I try to gain an insight into this question through the study of tax increment financing in the City of Minneapolis. This is the first paper of its kind to focus on Minneapolis.

While several instructive studies of TIF exist, I believe that this paper will fill in the gap in TIF literature in several ways. First, I look at the effect of TIF on adjacent homes. This is significant, as no prior study has done so. Second, I go beyond Man & Rosentraub (1998) and Carroll (2007) by taking TIF adoption as a given and isolating housing structure characteristics, neighborhood characteristics and accessibility characteristics. While prior studies are restricted in examining how various housing characteristics interplay with TIF district proximity to affect property value growth, this study will address this issue.

**Theoretical Framework**

Supply and demand, perhaps one of the most fundamental concepts of economics, is the backbone of a market economy. When supply and demand of a good are equal, the economy is said to be in equilibrium. At this point, the allocation of a good is at its most efficient point because the amount of the good being supplied is exactly the same as the amount of the good being demanded[4].

In the context of the housing market, the principle of supply and demand refers to the ability of people to pay for housing coupled with the relative scarcity of real estate. The demand for homes comes from potential homeowners, whose willingness to pay for housing is based on utility gains constrained by cost (Glaeser et al., 2008). When making a purchase decision, homeowners attempt to get the greatest value possible from expenditure of least amount of money. The objective is to maximize the total value derived from available money.

According to Rosen (1974), a differentiated product, such as a home, Z, is a product of its various attributes $z_1, z_2, z_3, \ldots, z_n$. The change in price of the product is related to the change in

[4] Refer to Figure 1 for an illustration of the supply and demand graphs in equilibrium.

price of its attributes. The implicit price of each attribute is given by the partial derivative of the product's price function with respect to that desired attribute:

$$\frac{\partial p(Z)}{\partial (z_i)} = p(z_i)$$

Consumers gain satisfaction from the attributes of the differentiated product, *Z*, and a composite good, *x*. Consumers, however, differ according to socioeconomic characteristics, υ, and their ability to bid on the price products (Anderson, 2001). Given these parameters, consumers will maximize utility $U(x,z_1,z_2,z_3,\ldots,z_n;\upsilon)$ subject to the budget constraint $Y = x + p\ (,z_1,z_2,z_3,\ldots,z_n)$, where *n* represents the number of attributes, *y* is the consumer's income and the price of *x* equals 1. The consumer's utility is maximized by setting up the Lagrangian[5] (a function that summarizes the dynamics of the system) and setting the marginal rate of substitution[6] between one of the product's attributes and the composite good equal to the marginal price of the characteristic:

$$\frac{\frac{\partial U}{\partial z_i}}{\frac{\partial U}{\partial x}} = \frac{\partial Z}{\partial z_i} = p(z_i)$$

A consumer's actions in the housing market can then be represented by the bid function: $\theta(Z,u,y,\upsilon)$, where $\theta$ is the individual's willingness to pay for a home with characteristics *Z*, given a certain level of income and constant utility. This can be considered as the demand function for housing.

[5] The Lagrangian formulation of a system is a function that summarizes the dynamics of the system. It allows me to assess the marginal utility of an extra dollar of consumption of a desired housing attribute on expenditure (the marginal utility of income).

[6] For any two products: $(dU/dx_1)/(dU/dx_2) = p_1/p_2$. This implies that the optimal allocation of income, MRS (for $x_1$ and $x_2$) $= p_1/p_2$

Factors that influence demand for property include population growth, personal income, and individual preferences of potential homeowners. As population in an area increases, demand for homes will increase, and prospective homeowners will bid up the price of homes within the neighborhood. High population density in the inner city also acts as a push factor and encourages population movement within towns and cities to the rural-urban fringe. In this case, population growth leads to a decrease in demand for residential property. Higher personal income represents a greater ability to bid for choice homes and properties, so an increase in personal income will increase demand for desirable properties (Anderson, 2000). Individual preferences represent the tendency of potential homeowners to bid up the price of properties with desired attributes. Preferences, therefore, have an impact on demand for residential properties.

Proximity to a TIF site is another determinant of demand for residential homes and can be thought of as yet another housing attribute that the homeowner can bid on. It can affect demand in a number of ways. First, development initiated in an area can induce private capital investment and subsequently raise property values of surrounding firms (Donaghy et al., 1998). Second, new retail development may positively influence residential values because households are willing to pay for convenience shopping. Finally, the designation of a TIF district can signal future increases in general property values and induce a price war on surrounding properties.

The supply of homes includes new homes produced by developers and old homes sold by existing homeowners. In the long run (LR) supply of homes is elastic as home value increases coupled with growing demand for homes adjacent to TIF districts will induce developers to develop vacant lots adjacent to TIF districts. In the LR[7] when supply of residential homes is

[7] The concept of the long run, in this context, refers to the decision-making time frame of developers in which quantities of homes available for sale are relatively more elastic. The long run is a time period beyond the scope of this paper.

abundant and there are relatively few buyers, housing supply and demand will equilibrate at a low housing price. According to Hong et al. (2006), when the number of opulent buyers is limited, the extra supply means that the marginal buyer is more skeptical about home purchasing, and prices subsequently fall. The opposite can also be true, as demand for homes and prices fall, developers will be less inclined to construct new homes and supply will decrease.

The supply of homes surrounding TIF districts is fixed in the short run (SR)[8] as there are a limited number of zoned and developed parcels adjacent to TIF districts. This study assumes a fixed[9] supply of residential homes. I look at the current supply of homes and not supply over time. The limited supply of homes adjacent to TIF means that the benefits of living adjacent to a TIF district are "rivalrous" (Anderson, 2000). That is, if an individual chooses to live near a TIF district, he or she precludes others from doing so as well. Because the benefits of living near a TIF district are rivalrous, we expect prospective homebuyers to engage in a price war on surrounding properties and bid up homes values.

Rosen (1974) assumes that when choosing the number of units of a particular differentiated good to produce, costs vary from firm to firm by factor prices, $\beta$. The cost function can be represented by $c(M,Z;\beta)$, where $M$ is the number of units produced. Revenue depends on the quantity of the good sold and on the price schedule, so profits[10] are $\pi = M \cdot p(Z) - c(M,Z;\beta)$.

---

[8] The concept of the short-run, in this context, refers to the decision-making time frame of developers in which at least one factor of production is fixed, more specifically, developed land surrounding the TIF district.

[9] In this study, I focused on the short run (SR) supply of single-family residential homes adjacent to TIF districts. Homes surrounding TIF districts are in limited supply in the SR. Because of construction lags, the SR supply of homes will be fixed in the short run. This scenario allows me to focus more specifically on home value.

[10] A firm's profit is its revenue minus its cost. The firm chooses its output to maximize its profit, $\pi$, for a given price. Solving the profit maximization problem for all values of $p$, gives me the firm's supply function.

To determine the supply function, I set the marginal price of each attribute equal to the marginal cost per unit of increasing the quantity of that attribute. I find that a producer's actions in the housing market can be represented by the function $\phi(Z, \pi; \beta)$. This can be considered as the supply function of homes adjacent to TIF.

The market price for residential homes will result from equilibrium between supply and demand (the consumer bid function and producer offer function), based on known characteristics. In developing the equation for the value of homes I setup a system of simultaneous equations using the above supply and demand functions. The supply of homes is fixed in the SR, meaning that equilibrium price will be determined by a shift in the demand curve. The demand curve would shift due to changes in income or changes in preferences. A change in personal income will alter homeowners' ability to bid for choice homes and properties, altering demand for those homes. A change in individual preferences will represent a change in the tendency of potential homeowners to bid up the price of properties with desired attributes. In this context, if homeowners reduce preference for homes adjacent to TIF districts, then prices of those homes will fall; the opposite will occur if homeowners develop an increased preference for home adjacent to TIF sites.

Straszheim (1987) argues that hedonic regression[11] has led to a clear separation of demand from supply determinants, and that implicit prices of homes should be estimated from the relationship for each housing attribute. To evaluate the contribution of each housing attribute as well as the impact of TIF on property value performance, I will run a regression with single-

[11] The price contributions of different housing characteristics are not explicitly listed on the Realtor's website. I used hedonic regression to estimate the contributory value of different housing characteristics to the value of a home using regression analysis.

family, residential home property value estimated as a function of housing, neighborhood, and accessibility characteristics, as well as exposure to TIF. The core econometric model follows:

$$\text{Home Value}_i = \beta_0 + \beta_1\,\text{SCHOOL} + \beta_2\,\text{MINORITY} + \beta_3\,\text{DISTANCE} + \beta_4\,\text{HOME\_AGE} + \beta_5\text{FLOOR} + \beta_6\,\text{INCOME} + \beta_7\,\text{DENSITY} + \beta_8\,\text{VACANCY} + \beta_9\text{BED} + \beta_{10}\,\text{BATH} + \beta_{11}\,\text{GARAGE} + \beta_{12}\,\text{FIRE} + \beta_{13}\,\text{SPACE} + \beta_{14}\text{DECK} + \beta_{15}\,\text{WOOD} + \beta_{16}\,\text{LOT} + \beta_{17}\,\text{CBD} + \beta_{18}\,\text{TIF\_AGE} + \beta_{19}\,\text{TIF\_TYPE} + \varepsilon_i$$

Since TIF is intended to increase property values, properties adjacent to the TIF district should experience positive externalities from the district capitalized into property values. I hypothesize the sign DISTANCE will be negative, indicating that the further you move away from the TIF district, the lower the property value. Man & Rosentraub (1998) found evidence of a positive effect of TIF on property values after an initial period of two years of TIF being set up. Such increases in home values should exhibit diminishing returns with time, so the expected sign on TIF_AGE is negative. Prospective homebuyers will bid up prices of homes with greater accessibility to work and entertainment, so the sign on CBD is positive. Older homes will tend to show signs of wear and tear so the sign on HOME_AGE should be negative.

Homes with greater floor space and a larger lot size, as well as a greater number of bedrooms (BED), bathrooms (BATH), and fireplaces (FIRE) are highly desirable, so homebuyers will bid up prices on properties with more of these characteristics. The signs on these variables should therefore be positive. Homes with hardwood floors (WOOD) and those adjacent to open space (SPACE) are highly desirable to homeowners. The coefficients on these variables should be positive.

Neighborhoods with a better quality of education are desirable for parents with children, so the sign on SCHOOL should be positive. According to Anderson (2000), previous studies indicate that the expected sign on the MINORITY variable is negative. Different types of TIF districts should have a different impact on housing values. Weber et al. (2007) find that proximity to industrial TIF districts suppresses the general rate of property value appreciation. Scholderer & Grunert (2004) find that, because of convenience shopping offered by local stores, consumers will bid up values of properties closer to shopping centers to capture the location benefits. For this reason, the sign on TIF_TYPE is indeterminable. Finally, higher income represents a greater ability to bid for homes with more desirable attributes and hence the expected sign on INCOME is positive.

**Summary Statistics**

The empirical model employed in this study includes traditional property value determinants as well as vacancy rates, TIF age, TIF type and distance to the nearest TIF district. The traditional determinants of property value are decomposed housing structure, neighborhood, and accessibility characteristics. Housing characteristics include age of structure, lot size, floor size, number of bedrooms, bathrooms, garages, fireplaces and proximity to open space. Neighborhood characteristics include population density, median neighborhood income, vacancy rates, minority rates, and quality surrounding schools. The accessibility characteristic includes proximity to the central business district (CBD) measured by driving distance from the home to the CBD[12]. The ideal dependent variable is a measure that completely captures growth in property values over time beginning before the year the TIF district was adopted.

To study whether or not TIF favors properties adjacent to the development site, the listing price[13] and structural characteristics data for each of the 98 single-family, residential homes in

[12] Driving time to the Minneapolis Central Business District (CBD) is my proxy accessibility to entertainment, shopping and work. I obtained the driving time data from the Google Maps online site: www.maps.google.com. This site measures the shortest driving time between the two locations.

[13] Properties in Minneapolis are assessed at 100% of their market value. Assessed values are therefore comparable to the expected sales price of a home. For this reason I use the listing price of home in my study.

the study were entered manually from an online home listing site[14]. I included a dummy variable for DECK†, FIRE†, and WOOD† if the online information explicitly mentioned a presence of a deck, fireplace or hardwood floor respectively. Data for the TIF district's location and characteristics, TIF_Type and TIF_Age were obtained from the Minnesota Office of the State Auditor's TIF division[15]. MINORITY data for each neighborhood within Hennepin County were collected from the City of Minneapolis website[16]. Data on the driving time to Minneapolis' Central Business District (CBD), an overall measure of the accessibility of homes to employment, shopping centers and entertainment, were collected from the Google maps online directions site.

I performed an address geocoding technique[17] on ArcMap Version 9.3 software, using a UTM projection, to obtain the TIF_DISTANCE data. This variable is a measure of the straight-line distance between the home and the nearest TIF district. Neighborhood characteristics data were collected from the same online site as the listing price. The SCHOOL† variable is a proxy for the quality of education within the neighborhood and it measures the student-teacher ratio in each school district. The DENSITY† variable measures the population density within the neighborhood in people per square mile.

Using histograms and summary statistics I examined the data for irregularities and accuracy after compilation of the entire set. I made one change to the dataset to produce more

---

[13] † Data were obtained from the Edina Realty online site, http://www.edinarealty.com/

[15] TIF specific data (type, location and age) were obtained by contacting the Minnesota Office of the State Auditor and requesting the publicly available data.

[16] The City of Minneapolis online site is: http://www.ci.minneapolis.mn.us/

[17] I created a spatial layer of home locations using home addresses obtained from the Edina Realty online site. I created a second spatial layer with TIF district locations using addresses provided by the MN Office of the State Auditor. I then spatially joined the two layers and determined the shortest straight-line distance (Euclidean distance) between each home and the closest TIF district. I used a Universal Transverse Mercator projection so the distances provided by the software are in meters.

accurate results. The data for all 106 active TIF districts in Minneapolis, as of March 2009, collected from the MN Office of the State Auditor contained 11 TIF districts with no listed addresses. Because this created a situation in which I could not determine the location of these districts and hence their proximity to homes, the districts are excluded from the data set. The final data set contained 95 TIF districts for which the mean age is 18.108 years and the maximum value is 36 years. This makes sense since TIF was fully adopted in Minnesota in the 1970s, so the maximum value cannot be greater than 39 years. The mean value of homes is $232,006.80, which is expected, as a lot of the homes are large, with a mean lot size of 0.126 acres and a mean square foot of floor space of 1,749.539. This value, however, is significantly larger than the mean home value of $131,510 used by Weber et al. (2007) in their study.

MINORITY has a mean of 0.365, which is expected as the data set contains some homes from the inner city. Weber et al. (2003) in their sample find mean minority rate of 0.281. Median household income has a mean of $51,892.82 compared to $30,402 in a study by Byrne (2005). The two dummy variables, FIRE† and DECK†, have similar means at 0.402 and 0.421 respectively, which indicates that roughly a little under half of the homes in our data set have these properties. The mean vacancy rate of 0.0552 is much higher than the mean vacancy rate of 0.0473 in the study by Byrne (2005). Interestingly, 0.745 of all homes in Hennepin County have hardwood floors. Refer to Table I for a listing of the summary statistics for each variable included in the regression.

## Analysis

### (A) Estimation Issues

Table IIA presents coefficient estimates of the property value equation. The regression includes all housing, neighborhood, accessibility and TIF specific characteristics (TIF age and

TIF type) as explanatory variables. An examination of the simple correlation of each of the explanatory variables revealed no problems of multicollinearity[18]. An examination of the plotted residuals and the results of the White Test[19] revealed no problems of heteroskedasticity[20].

TIF implementation might be endogenously determined. That is, property values might influence the decision to designate an area a TIF district, and vice versa. Anderson (1990) shows that cities with high property value growth rates are more likely to adopt TIF than areas with low property value growth. If TIF is implemented in an area because property values are expected to appreciate, ordinary least squares (OLS) estimates of any TIF effect on home values might be biased. To overcome the potential endogeneity, I use the Hausman Specification Test[21] and then estimate coefficients using the 2 stage least squares technique (2SLS). The results presented in Tables IIA are consequently more reliable than those based solely on OLS.

---

[18] I used the simple correlation and then I calculated Variance Inflation Factors for each of the explanatory variables (VIF). VIFs are found by running OLS on each of the j explanatory variables as a function of the other j-1 explanatory variables. I found no values greater than 5. I concluded that no severe multicollinearity exists. When using the simple correlation the highest correlation (0.566) was between floor and bathroom. This make sense sinse a larger home will tend to have more number of bedrooms. I do not consider 0.566 to be severe multicollinearity so I did nothing with these two variables.

[19] The White Test computes the general test for heteroskedasticity in the error distribution by regressing the squared residuals on all distinct regressors, cross products, and squares of regressors. The test statistic is the distributed chi-squared under the null hypothesis of homoskedasticity. I found a p-value of 0.4411 and could not reject the null hypothesis. This test shows that the data are not heteroskedastic.

[20] The data used in the study are cross-sectional and for this reason I expected that no serial correlation would exist. I graphed observations of the residual and observed that different observations of the residual are uncorrelated with each other. I concluded that no serial correlation exists in the data.

[21] The Hausman Specification Test tests null hypothesis that the coefficients given by one estimator (in this case, OLS) are similar to those given by another estimator (in this case, Instrumental Variable (IV) estimation). The test yielded a p-value of 0.03685. If the p-value is insignificant (greater than 0.05) then we cannot reject the null. If the p-value is significant, as is the case here, then we have to reject the null concluding that OLS is not consistent. I then have to use the 2 stage least squares technique (IV estimation). The magnitude and significance of the coefficients show little change, however, the standard errors are slightly different than those of the original equation. Perhaps, this result is because the instrument I used in the IV estimation is not a "perfect" instrument.

In performing the IV estimation, the optimal instrument, TIF cost[22], was chosen based on two criteria. First, I looked for a variable that is highly correlated with home value. An examination of the simple correlation between home value and TIF cost yielded a correlation coefficient of 0.65. For the purpose of this study, a correlation of this magnitude is high enough. Second, I required that the instrument be uncorrelated with residuals. I graphed observations of the residual against TIF costs and observed that different observations of the residual are uncorrelated with instrument of choice[23].

**(B) Results**

The $R^2$ value in Table IIA indicates that the estimated model explains 56 per cent of the variation in value[24] of single-family, residential homes adjacent to TIF districts. DISTANCE to the nearest TIF, number of bathrooms (BATH) and distance to CBD are statistically significant at the 5 percent level. Structural AGE, percent MINORITY, FLOOR size, population DENSITY, and presence of hardwood floors (WOOD) are significant at the 1 percent level. All the other variables fail to reach significance at any conventional level. Each of these coefficients, with the exception of LOT, exhibits signs consistent with the hypothesized direction.

The neighborhood characteristics of MINORITY and VACANCY have among the greatest impact upon an individual home's value. Each percent increase in minority rate takes approximately $13,816 from the value of a home. A one percent increase in vacancy rates takes

[22] The optimal instrument for distance to the nearest TIF is the cost of TIF. That is, total construction and administration costs to required setup the TIF district. These data were obtained from the MN Office of the State Auditor.

[23] The instrument is not perfect, however, I chose to include it in the regression as the estimation results are less biased when using this instrument than they would be otherwise when running OLS alone.

[24] Taking the log of home value transformed data that are originally normally distributed to data that are left skewed. For this reason, I chose not use a semi-log form of the equation. Consequently, the interpretation of the coefficients is in dollars and not in percentage form.

approximately $17,440 from the value of a home. This result seems consistent with the suggestion that higher vacancy rates denote excess capacity. Excess capacity is accompanied by a lower demand for housing which will likely result in a slowdown in new construction and a decrease of rents and sales prices. Though not statistically significant, an additional dollar increase in median neighborhood income will increase home value by $0.25. A one-unit increase in the average number of teachers per student, and a one-person increase in the neighborhood population density per square mile add approximately $930.69 and $4.19 respectively.

Among housing characteristics, the lot size has the greatest impact on home value. In particular, a 1-acre increase in lot size removes approximately $216,757 from the value of a home. The coefficient sign on LOT is not as hypothesized and this result does not make sense as generally larger homes will fetch a higher value. The number of bathrooms and the presence of hardwood floors also have great explanatory power and significance. For every additional bathroom, home value increases by approximately $26,493. The presence of a deck and hardwood floors increase home value by approximately $4,430 and $45,932, respectively. Accessibility and proximity to open space each have a sizable impact on home values, $18,203[25] and $7,822.55 respectively. Finally, an additional garage will add approximately $5,227 to the value of a home.

The variable of greatest interest in Table IIA assesses the impact of TIF on property value. This variable achieves statistical significance at the 5 percent level. The result suggests that single-family, residential homes targeted with TIF will experience a decrease in value of approximately $13.12 for each one-meter increase in distance away from a TIF district. The type

[25] This finding stands in stark contrast to the finding of approximately $40,000 by Anderson (2001).

of TIF is not statistically significant but economically, Housing districts[26] add approximately $7,822 to home value, and Pre-1979 districts[27] add approximately $31,563. Uncodified law[28] districts, however, decrease home value by approximately $10,406.

**(C) Robustness**

Regression 1 (in Table IIB) drops TIF type and examines whether DISTANCE is able to withstand the specification stress. Comparing these results to those in Table IIA we see that proximity to TIF has a statistically significant impact on home value even with TIF Type omitted. The statistical significance on DISTANCE increases while the economic significance decreases. This may be explained by omitted variable bias, which might be picked up by DISTANCE variable. The coefficient on DISTANCE appears robust.

I performed the first regression using the original sample of 98 observations with poor results compared to previous studies. I observed that the sample had a high mean home value ($233,306) and a high standard deviation ($75,178.51) relative to previous studies (Weber et al. (2007) work with a sample of $131,510 mean home value while Carroll (2008) has a sample with mean home value of $206,833.70). I hypothesized that there might be something inherently different about high value homes that differentiate them from lower value homes and that my model does not capture this difference. For this reason, I introduced a dummy variable, MANSION, for all homes over $250,000 in value. The $R^2$ value indicates that the estimated

[26] Housing districts are created to assist the development of owner-occupied and rental housing for low- and moderate-income individuals and families (Source: MN OSA website).

[27] Pre-1979 districts are TIF districts created prior to the enactment of the TIF Act in Minnesota (Source: MN OSA website).

[28] Special law may be enacted permitting the generation of tax increment revenues from geographic areas not meeting the definition of any type of TIF district authorized under general law (Source: MN OSA website).

model explains 79 percent of the variation in the value[29] of single-family, residential homes adjacent to TIF districts. The coefficient on DISTANCE is roughly the same economically but in this case reaches significance at the 1 percent level. That is, single-family, residential homes targeted with TIF will experience a decrease in value of approximately $13.25[30] for each one-meter increase in distance away from a TIF district. The signs on FIRE and VACANCY, however, are no longer as expected. The results prove that the findings are robust. Refer to Regression 2 in Table IIB for complete coefficient estimates.

**Conclusion**

The purpose of this paper was to examine the impact, if any, of TIF proximity on single-family, residential homes in Minneapolis. Using cross-sectional data of homes listed on a local realtor's website, I estimated the price contributions of different housing characteristics using two stage least squares estimation. The findings suggest that the provision of public services offered within TIF districts is capitalized into property values of surrounding homes. The magnitude of this effect, however, is not as large as expected, as TIF contributes $13.12 to the value of a home per meter of proximity to the site. These results could be attributed to the fact that of the 106 active TIF districts in Minneapolis, location details were only available for 95 TIF districts. I could not determine the address of 11 districts and thus could not assess their impact on proximity to home value relative to homes. It might well be that the exclusion of these districts from the study led to an understatement of the effect of TIF on home values.

I also tested for the potential endogeneity in the adoption of TIF and found a likely association between property values and the selection of a TIF site. These findings suggest that

[29] This is compared with a result of 56 percent in Table IIA.

failure find the “perfect” instrument and hence the inability to completely correct for the bias in OLS estimation caused by endogeneity might lead to another source of potential underestimation of the impact of TIF on property values.

The relatively low economic contribution of TIF to home values contradicts the widespread opinion about TIF that municipalities often inappropriately use TIF in areas expected to experience rapid appreciation in home values regardless of TIF adoption. Although examples of such misuse of TIF do exist, the findings of this study suggest that this is not the case in Minneapolis.

This study only examines TIF impact on homes at one point in time. This arrangement is restrictive for property assessors attempting to value homes in close proximity to TIF. Future studies of the present model could be altered to carry out a fuller exploration of the inter-temporal relationship between homes values and TIF districts in Minneapolis. More analysis of the contributory power of TIF on different housing characteristics across time could help inform a better understanding of the “ideal” location to place TIF districts to ensure optimal results in the removal of blight.

## References

Anderson, John E. "Tax Increment Financing: Municipal Adoption and Growth." National Tax Journal. 43.2 (1990): 155-63.

Anderson, Soren T. "The Effect of Open Space on Single Family, Residential Home Property Values." Macalester Journal of Economics. (2000).

Brueckner, Jan K. "Tax Increment Financing: A Theoretical Inquiry." Journal of Public Economics. 81.2 (2001): 321-43.

Byrne, Paul F. "Determinants of Property Value Growth for Tax Increment Financing Districts." Economic Development Quarterly. 20.4 (2006): 317-29.

Carroll, Deborah. A., and Robert J. Eger. "Brownfields, Crime, and Tax Increment Financing." American Review of Public Administration. 36.4 (2006): 455-77.

Carroll, Deborah. A. "Tax Increment Financing and Property Value: An Examination of Business Property using Panel Data." Urban Affairs Review. 43.4 (2008): 520-52.

Donaghy, Kieran P., Elson, Andrea K., Knaap, Gerrit J. " Optimal investment in a tax increment financing district." Annals of Regional Science. 33 (1998): 1-22.

Dye, Richard F., and D. F. Merriman. "The Effects of Tax Increment Financing on Economic Development." Journal of Urban Economics. 47 (2000): 306-28.

Gibson, Diane. "Neighborhood Characteristics and the Targeting of Tax Increment Financing in Chicago." Journal of Urban Economics. 54.2 (2003): 309-27.

Glaeser Edward L., Joseph Gyourko, Albert Saiz. "Housing supply and housing bubbles." Journal of Urban Economics. 37.2 (2008): 198-217.

Hong, H., Scheinkman, J., Xiong, W., "Asset float and speculative bubbles." Journal of Finance. 61.3 (2006): 1073–1117.

Man, Joyce Y., and Mark S. Rosentraub. Tax Increment Financing: Municipal Adoption and Effects on Property Value Growth. (Includes Appendix). 26 (1998).

Man, Joyce Y. "Fiscal pressure, tax competition and the adoption of tax increment financing. " Urban Studies 36 (1999): 1151-116

Rosen, Sherwin. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." The Journal of Political Economy. 82 (1974) (1): 34 – 55.

Scholderer, Joachim and Klaus G. Grunert. "Consumers, food and convenience: The long way from resource constraints to actual consumption patterns." Journal of Economic Psychology. 26.1 (2005): 105-128.

Straszheim, Mahlon. "The theory of urban residential location." In: Mills, E.S. (Ed.), Handbook of Regional and Urban Economics. North-Holland, Amsterdam (1987): 717 – 757.

Weber, Rachel, Saurav Dev Bhatta, and David Merriman. "Spillovers from Tax Increment Financing Districts: Implications for Housing Price Appreciation." Regional Science and Urban Economics. 37.2 (2007): 259-81.

Weber, Rachel, Saurav Dev Bhatta, and David Merriman. "Does Tax Increment Financing Raise Urban Industrial Property Values?" Urban Studies Journal. 40.10 (2003): 2001-21.