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THE EFFECT OF TAX INCREMENT FINANCING ON SPILLOVERS AND SCHOOL DISTRICT REVENUE

by

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A DISSERTATION

Presented to the Faculty of

The Graduate College at the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Doctor of Philosophy

Major: Economics

Under the Supervision of Professor John E. Anderson

Lincoln, Nebraska

July, 2011

THE EFFECT OF TAX INCREMENT FINANCING ON SPILLOVERS AND SCHOOL DISTRICT REVENUE

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University of Nebraska, 2011

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Over the years the urban development financing tool known as Tax Increment Finance (TIF) has been a controversial topic as it relates to fiscal impacts on school districts. This study addresses an important question related to this issue. Does TIF affect non-TIF district property value within the school district? The question is explored by developing a theoretical model that describes the relationship between TIF and school finance and estimating an empirical model that tests the hypotheses stemming from the theoretical model. Although the results are mixed, there is some evidence that TIF does affect non-TIF district property value in the school district.

The theoretical model describes the spillover effect of TIF on non-TIF district property values, permitting non-linear spillover effects on the growth rate of non-TIF district property values. Testable hypotheses that flow from this model indicate that at lower levels of TIF intensity the spillover effect is positive, but at higher levels the spillover effect is negative. This theoretical result leads to exploration of the optimal TIF intensity that maximizes the positive spillover effect.

Using data from Minnesota school districts for the years 1992 through 2007, I estimate the relationship between non-TIF district property value growth for school districts and a measure of TIF intensity. Five regressions have statistically significant results supporting the theoretical model's testable hypotheses. Using the coefficient

estimates from estimated equations, the optimal TIF intensity was 21 percent in 1993, 15 percent in 1996, 10 percent in 2000, eight percent in 2002, and six percent in 2003. These results indicate that over time the optimal TIF intensity decreased. Consequently, TIF positive spillover effects appear to have dissipated over time. The actual average TIF intensity of the school districts over these years was generally well below the estimated optimal values and has been decreasing over time. Based on average TIF intensities, it appears that during these years most school districts in Minnesota have benefited from positive spillover effects on non-TIF district property value.

DEDICATION

I would like to dedicate this paper to my husband, Ben, and my sons, Josiah, Jacob, and Eli. I love you guys. Thank you for loving me.

ACKNOWLEDGMENTS

First, I would like to thank God for giving me strength to persevere over the years to complete this paper. I would also like to thank my family and friends for your support and encouragement throughout the years. Thank you especially to my mom, dad, and brother for bearing with me when my answer to your questions about my progress was, “I don’t want to talk about it.” Thank you to Dr. Anderson and Dr. Schmidt for your patience and always being willing to help me progress over the years. I would also like to thank my contacts from the Minnesota Department of Education, the Minnesota Property Tax Division, and the Tax Increment Financing Division of the Office of the State Auditor for assisting me in my data collection and answering my questions.

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Chapter 1

Introduction

Economic development is essential for local communities to thrive and in some cases survive. Local government benefits from development through a higher property tax base which generates more tax revenue. State government can encourage economic development through legislation that provides an economic development financing tool. One financing tool that most states have passed into law is Tax Increment Finance (TIF). TIF allows cities to improve infrastructure in blighted areas without raising tax rates or taking tax revenue from other municipal expenditures. The infrastructure improvement is intended to attract economic development that would not have occurred otherwise.

As its name implies, TIF is financed by tax increments. Prior to improvement, property value within the TIF district is recorded and referred to as fixed, or frozen, property value. As property value increases due to the improvement, the TIF authority captures tax revenue generated from the difference between the frozen value and the new, higher property value. The increase in property value is referred to as the capture and the tax revenue generated from the capture is referred to as the tax increment. The tax increment is used to pay for TIF.

Typically, the city issues bonds to raise the initial revenue to pay for TIF. The revenue raised from these bonds is used to pay for the costs associated with the infrastructure improvement. Each year, the tax increment is used to retire a portion of the bonds. The TIF district is active until all of the bonds are retired. Through this process, the infrastructure improvement is self-financing (see Dye and Sundberg 1998 p 91; Dye and Merriman 2000 p 309; and Weber 2003 p 622 for additional descriptions of this process).

Overlapping jurisdictions, such as counties and school districts, collect tax revenue from the frozen value during the life of the TIF district, which can range from a few years to a few decades. When the TIF district expires, overlapping jurisdictions are no longer restricted to collecting tax revenue from the frozen property value and they once again have access to the total property value.

The effect of TIF on the school district is of particular interest because the school district typically receives the largest share of property tax revenue (McGuire and Papke 2008 p 357). Opponents of TIF argue that city officials have abused TIF and used it in areas that would have developed without TIF, capturing revenue that would have gone to the school district (Dye and Sundberg 1998). Proponents of TIF argue that TIF does not take revenue away from the school district because the revenue would not have been available without the infrastructure improvement (Lawrence and Stephenson 1995 p 106). Most states' TIF legislation require a TIF district to be established in a blighted area that would not be developed "but for" TIF. Proponents add that the school district has access to a higher property tax base when the TIF district expires.

Even if TIF does not take revenue away from the school district, the school district could still be adversely affected if economic development attracts more students. As the number of students increases, the school district may need to hire more teachers and expand facilities (Weber 2003 p 625). To pay for these additional costs, the school district would have to raise its tax rate and collect more tax revenue from property outside of the TIF district. This would impose an additional financial burden on taxpayers within the school district but outside the TIF district (Lehnen and Johnson 2001 p 151). If the number of students and expenditures both increase, and the school district raises the tax rate, expenditures per pupil could remain the same. Otherwise, if the school district is not willing to raise the tax rate, expenditures per pupil would decrease. Either way, the school district is faced with a difficult financial decision.

It is also possible for TIF to positively or negatively affect non-TIF district property value (Skidmore, Merriman, and Kashian 2009). If the infrastructure improvement attracts additional economic development outside the TIF district, total property value would increase and more tax revenue would be available for the school district. This would allow the school district to either increase expenditures per pupil or decrease the tax rate. Conversely, TIF could take economic development away from other areas of the school district, decreasing the school district's tax base. This would decrease the school district's tax revenue during the life of the TIF district. This would force the school district to either decrease expenditures per pupil or increase the tax rate.

Two important questions arise from the preceding scenarios. First, does TIF affect non-TIF district property value within the school district? If it does, then TIF alters the school district's tax revenue during the life of the TIF district. Second, does TIF affect expenditures per pupil? If more TIF causes expenditures per pupil to decline, then the educational output of the school district declines during the life of the TIF district. However, if more TIF causes expenditures per pupil to increase, then the educational output of the school district increases during the life of the TIF district. Answering these questions will provide much needed insight into the effect of TIF on school districts. This paper explores these questions by developing a theoretical model that describes the relationship between TIF and school finance and an empirical model that tests the hypotheses from the theoretical model. Before developing the model, it is important to learn about how school finance and TIF work and review the research on this relationship.

Chapter 2 provides a background of school finance and TIF in the United States. It describes the establishment and evolution of school finance, equity issues in school finance, and state school finance programs. It includes a history of TIF and an overview of the current state of TIF from data I collected from each state. The data show the extent that it is used and reveal that Midwestern states use TIF more than any other region. For example, in 2006 there were currently over 2,000 TIF districts in Minnesota. Because of the rich data available in Minnesota, I use it for empirical estimation.

Chapter 3 includes summaries of previous studies from the School Finance literature and TIF literature. Some studies look at the relationship between TIF and property values but few look at the relationship between TIF and school finance. Of the theoretical models, little focus is given specifically to TIF's effect on school finance. Only recently have researchers empirically examined this relationship. These studies look at the effect of TIF on property tax revenue, state revenue, and the school district's tax rate. However, these empirical models are not motivated by theoretical models.

In Chapter 4, I develop a theoretical model that describes the spillover effect of TIF on the growth rate of non-TIF district property values. This model is an extension of theoretical models in two previous studies (Brueckner 2001 and Skidmore, Merriman, and Kashian 2009). The TIF variable is defined as TIF intensity, which is similar to the TIF intensity variables used in two previous empirical studies (Weber 2003 and Weber, Hendrick, and Thompson 2008). The testable hypotheses that flow from this model are based on the assumption that TIF intensity creates a non-linear spillover effect on the growth rate of non-TIF district property values. First, at lower levels of TIF intensity, the spillover effect is positive, and second, while at higher levels of TIF intensity, the spillover effect is negative.

In Chapter 5, I use data from Minnesota to empirically test the hypotheses of the theoretical model. These hypotheses are tested by estimating the parameters of an empirical model using data from school districts in Minnesota. I estimate the relationship between non-TIF district property value growth for school districts and TIF intensity for the years 1992 through 2007. The estimation provides statistically significant results that support these hypotheses.

Chapter 6 contains policy implications for Minnesota as well as other states. Policymakers should be aware of the potential non-linear effect of TIF on overall property value growth within the school district. This is especially important in trying to determine the effect of TIF on school finance.

Chapter 2

Background of School Finance and Tax Increment Finance

In the United States, school finance dates back several centuries while TIF dates back only several decades. For most of its history, school finance has been a local responsibility. This has changed in recent years as equity concerns have risen due to large disparities across school districts. TIF has also been scrutinized recently due to its uncertain effect on school districts. As TIF becomes more popular across the United States, interest in this relationship is sure to continue.

The Establishment and Evolution of School Finance

The relationship between property values and school finance in the United States can be traced back to President Thomas Jefferson in late eighteenth century. Jefferson proposed government funding for primary education and private funding for secondary education (Lindert 2004). In 1779, he introduced a bill, "calling for a statewide system of free public elementary schools to be paid for by local taxpayers" (Lindert 2004 p 11). Each of the three times the bill was introduced, it was defeated by property owners who were concerned about the tax implications of a public education system. Eventually, landowners realized that a high-quality public education system could increase the value of their land, and they became less resistant to public education. By the 1850s, policymakers developed a system for financing education that included a combination of local and state funding (Springer, Houck, and Guthrie 2008 p 7), with property taxes being the main source of local funding. For the next century, local revenue was the main revenue source for public education and school districts were primarily autonomous.

In the twentieth century, education finance began to change. From 1900 through 1930 the local share of total funding for education was over 80 percent but in the 1950s it was less than 60 percent (Springer, Houck, and Guthrie 2008 p 7). It gradually fell during the last half of the twentieth century and in 2000 the local share was down to 40 percent (McGuire and Papke 2008 p 360). In the 1950s the property tax was 46 percent of total revenue and by 2000 it decreased to 28 percent (McGuire and Papke 2008 p 360).

While the local government's share began to decrease in the 1930s, the state and federal governments' shares both increased. The federal government's share of school finance increased from under one percent in the early 1900s to nine percent in 1980 and fell to seven percent in 2000 (Gordon 2008 p 297). The state's share of education was 20 percent at the beginning of the twentieth century and by the end of the century it accounted for approximately half (Springer, Houck, and Guthrie 2008 p 7). It remains to be seen if state revenue will continue to replace local revenue.

Equity Issues of School Finance

When school districts were collecting most of their revenue from local sources, they were restricted to the tax capacity of their property tax base. Because tax revenue was highly correlated with district wealth, poorer school districts could not provide the same quality of education as wealthy school districts. This caused variations in expenditures per pupil across school districts. States felt pressure to "equalize differences in the property tax-raising capacity of their school districts" and "provide local property tax relief" (Picus, Goertz, and Odden 2008). During the latter part of the twentieth century, the legality of a decentralized system was challenged in several states.[1]

[1] For an extensive list of cases, see Yinger 2004 p 387.

Since then, states began to adopt a more centralized method of school finance where school districts provide revenue but the state "must carry the fiscal burden of such provision if local governments cannot" (Lukemeyer, 2004 p 72). This helps to explain the shift from local to state funding during the later part of the twentieth century.

State School Finance Programs

States generally use one of two methods to finance education, foundation aid and guaranteed tax base (also known as the power-equalizing aid program).[2] Under foundation aid, states determine the amount of revenue each school district needs to provide what it deems an adequate level of education and subtracts the amount of revenue the school district can generate from its property value. The state provides the difference in aid. With the guaranteed tax base, state aid equals the difference between a state-determined property tax revenue and the school district's actual property tax revenue multiplied by the school district's tax rate (Yinger 2004 p 12).

Under both methods, state aid is a function of the local government's ability to pay. The lower the school district's property tax base, the higher the state aid. If concern about property-based finance persists, states may change these formulas to exclude property value.

The History of Tax Increment Finance

Originally referred to as tax "allocation" funding, TIF was first implemented in California in 1952 (Huddleston 1984 p 11). TIF appealed to state governments because it allowed them to address economic development needs in blighted areas that cities may

[2] Forty-one states use foundation aid (Yinger 2004 p 16). Thirty use it alone and eleven supplement it with other aid (Yinger 2004 p 337).

have ignored due to “incentives inherent in the existing property tax system” (Huddleston 1981 p 373). Some cities would forgo development because they could not bear the entire development cost. TIF provided a way for overlapping jurisdictions to shoulder the financial burden of development. Some examples of early TIF projects include “the purchasing and clearing of land, improving streets, providing infrastructure, servicing debt, and so forth” (Huddleston 1984 p 12).

As funding for local economic development from federal and state government decreased (Dye and Sundberg 1998), TIF became a popular method of funding. By 1982, twenty-eight states employed TIF (Cohen 1982) and by 1993, TIF was legal in at least forty-four states (Forgey 1993). As of 2007, forty-nine states had TIF legislation (Petersen 2007).

Though most states have approved some form of TIF, each state administers it differently. For example, some require a state agency to be involved in the adoption process while others give local government complete control. In some states, local government is responsible for funding infrastructure improvements while others require businesses to initially finance it and are later reimbursed by the city. Regardless of procedural differences, TIF is intended to promote economic development within the state.

Initially, the TIF adoption decision was made by the municipality, even though it impacted overlapping jurisdictions. Sometimes these jurisdictions were included in the TIF adoption discussion but they were excluded from making the TIF adoption decision. Over time, states let overlapping jurisdictions have a louder voice in the process, and some states have even allowed school districts to participate in the TIF adopting decision.

In a few states, school districts can decline to let their revenue be part of the tax increment. For example, in Michigan, the tax increment is only permitted to include school district revenue for environmental cleanup projects (Lehnen and Johnson 2001 p 140).

The Current State of Tax Increment Finance

Although TIF has been used for over half a century in the United States, it is difficult to determine the current state of TIF. Records are kept locally and most states do not require local governments to report information to the state. Also, it can be difficult to identify a state agency that is familiar with TIF activity within the state.

Unavailable data may explain why previous overviews of TIF are limited. A few studies have indicated which states had TIF legislation (Cohen 1982, Forgey 1993) and a few have summarized legislation by state (Johnson and Kriz 2001, Council of Development Finance Authorities 2008), but no previous study identifies the extent that TIF is used by each state. In order to fill this gap and determine the current state of TIF in the United States, I collected data from each state regarding TIF use, when TIF legislation was passed, and if a state agency oversees TIF.

Data were primarily collected by contacting local and state government agencies involved with TIF in each state. A state contact or agency was identified in 30 states but the level of involvement by each agency varies by state. For example, some states have established separate entities that oversee and collect data on each TIF district while others include TIF administration within an existing government entity. Table 2.1 provides a national overview of TIF by reporting the year a state adopted TIF legislation, an estimate of the current number of TIF districts within the state, and a contact or reference for TIF in each state.

Table 2.1
National Overview of TIF by State

State	Year TIF was Passed into Legislation	Estimated Number of TIF Districts	State Contact or Reference
AK	1988	0	
AL	1987	< 10	
AR	2000	10 - 20	Department of Economic Development
AZ	na	na	
CA	1952	771 [a]	State Controller's Office
CO	1974	42 [b]	Department of Local Affairs, State Auditor's Office
CT	1994	<5	Connecticut Development Authority
DE	2003	0	
FL	1977	173	Department of Revenue, Department of Community Affairs
GA	1985	< 15	
HI	1985	0	
IA	1969	949 [c]	Department of Management
ID	1988	50	
IL	1977	1000	Department of Commerce and Economic Opportunity, Office of Comptroller
IN	1975	126	Department of Local Government Finance
KS	1976	4	
KY	2000	7	Cabinet for Economics Development
LA	1988	5 - 10	
MA	2003	2	Office of Budget Management, Economic Assistance Coordinating Council
MD	1980	> 18	
ME	1977	> 200	Department of Economic and Community Development
MI	1980	88 [b]	State Tax Commission, Department of Treasury, Economic Development Corporation
MN	1979	2184	Department of Revenue and Office of the State Auditor
MO	1984	263 [a]	Department of Economic Development
MS	1986	150	Development Authority
MT	1978	20 - 22	Department of Revenue
NC	2004	0	Local Government Commission
ND	1989	10	
NE	1978	398 [a]	State Property Tax Administrator
NH	1979	6 - 7	
NJ	2002	0	Local Finance Board
NM	1978	2 - 3	
NV	1987	> 50	Local Government Finance, Department of Taxation
NY	1984	2	State Comptroller
OH	1987	747	Office of Tax Incentives, Department of Development
OK	1992	25	
OR	1960	75 [e]	Department of Revenue, State Treasury
PA	1990	> 100	
RI	1984	2	
SC	1984	100	
SD	1978	74	Department of Revenue
TN	2004	20 - 30 [d]	Comptroller of the Treasury
TX	1987	82 [f]	State Comptroller
UT	1968	51	
VA	1988	3	

Table 2.1 (Continued)
National Overview of TIF by State

State	Year TIF was Passed into Legislation	Estimated Number of TIF Districts	State Contact or Reference
VT	1985	< 6	Department of Taxes
WA	2001	3	Department of Revenue
WI	1975	818	Department of Revenue
WV	2002	11	West Virginia Development Office
WY	1983	5 - 10	
If the state does not have TIF districts, the numbers are estimates of the following: a: projects, b: authorities, c: areas, d: projects and districts, e: plan areas, f: zones			

The first variable listed in Table 2.1 is the year that each state passed TIF enabling legislation. These data were obtained from the date on the state statute, the state contact or agency, or from a secondary source (e.g. existing literature). The next variable in Table 2.1 is the estimated number of TIF districts within the state. [3] In most cases a state contact or agency provided data on the number of TIF districts. In other cases, if a state contact or agency could not be identified, estimates were obtained from persons familiar with TIF in the state, such as an attorney or a local government official. Because most states do not track each TIF district and therefore do not know exactly how many TIF districts are in the state, this number is not necessarily the exact number of districts currently in the state. Rather, this number is intended as an approximate reflection of the general use of TIF within each state. Lastly, Table 2.1 also provides information for the state contact or agency where available.

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[3] Not all states call TIF locations, “districts;” alternate identities are indicated at the bottom of Table 1. In addition, although most states only allow property taxes, some states allow alternate sources of funding such as a sales tax; no distinction for alternate sources of funding is made in this study.

Although TIF was initially used in the 1950s, it took several decades before it became widely accepted. Table 2.1[4] shows that prior to 1960 only one state had codified TIF and during the 1960s only three states passed TIF legislation. In the 1970s and 1980s, TIF legislation was adopted by 13 and 20 states respectively. During the 1990s three states adopted TIF legislation and since 2000 nine of the remaining 10 states have adopted TIF legislation. Today, 49 states have TIF legislation. This is likely due to the decrease in federal and state funding for local economic development (Huddleston 1986; Dye and Sundberg 1998).

Table 2.1 also includes the estimated number of TIF districts in each state, which ranges from zero to 2,184.[5] Five states have TIF enabling legislation but have not used it or are not currently using it. Fifteen states have between one and 10 TIF districts and nine states have between 11 and 50. Seven states have between 51 and 100 TIF districts and 13 states have between 101 and 2,184 TIF districts. This variation in TIF utilization is due to several factors. First, legislation, which differs by state, can be confusing and cumbersome, deterring local governments from using TIF. Also, some states have different alternatives available for funding infrastructure improvements and some state agencies promote TIF more than others. Finally, fear of lawsuits has discouraged some local governments from pursuing TIF.

[4] In some cases the year in Table 1 may not corroborate the results of previous studies. This is most likely due to ambiguity in the way TIF is defined and from changes in legislation over time. Links to all TIF statutes can be found at www.cdfa.net.

[5] For states with a range for the estimated number of TIF districts, I used the average of the range and states with less than or greater than a number, I used the number listed in the calculations. The correlation coefficient between age and number of districts is -.36.

Of the 12 states with the most TIF districts, all have state contacts. This is not surprising because those states would want more oversight and need to provide assistance to local governments, or want to collect data to determine the impact of TIF on the state. Even though the extent to which TIF is used varies greatly across states, there are similarities within geographic regions.

Table 2.2 gives summary statistics for the four geographic regions of the United States as defined by the US Census.[6] It shows that all nine states in the Midwest employ TIF. The average number of TIF districts in those states is 555 and one state has over 2000 TIF districts. In the other three regions, at least one state in each region has no TIF districts. In the West, although one state has 771 TIF districts, the average is 89. States in the Northeast and the South have had much lower TIF employment; the average in the Northeast is 36 and the average is the South is 39.

One explanation for the variation in TIF utilization is the age of TIF legislation. As seen in Table 2.2, states in the Midwest and the West have had TIF legislation much longer, on average. In addition, states may become familiar with the economic development tools used in neighboring states and feel pressure to adopt similar incentives to attract business.

[6] Census regions are defined as follows: Northeast includes CT, ME, MA, NH, RI, VT, NJ, NY, PA; Midwest includes IN, IL, MI, OH, WI, IA, KS, MN, MO, NE, ND, SD; South includes DE, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LO, OK, TX; and the West includes AZ, CO, ID, NM, MT, UT, NV, WY, AK, CA, HA, OR, WA

Table 2.2
Regional Overview of TIF

Region	Estimated Number of TIF Districts by Region					Year TIF was Passed into Legislation
	Average	Standard Deviation	Median	Minimum	Maximum	Average
Midwest	555	637	331	4	2184	1979
Northeast	36	69	5	0	200	1989
South	39	56	13	0	173	1992
West	89	216	31	0	771	1979

Source: Petersen (2007)

As more information becomes available, Tables 2.1 and 2.2 can be expanded to better evaluate TIF. For example, although knowing the number of TIF districts in each state provides some information about the extent to which TIF is used, it does not reflect the financial magnitude of the infrastructure improvements. Further work is needed to find a more descriptive measure of TIF utilization such as the size measured in land area or the size of the capture relative to the tax base.

School Finance and TIF

This chapter has described a major change in school finance during the last several decades. In response to challenges to the school finance system, most states have shifted to a centralized method of finance. Despite its decline, the property tax still represents a significant component of school finance at more than a quarter of total revenue. During this time, most states have also adopted TIF legislation to encourage local economic development. TIF became especially popular in the Midwest. The next chapter summarizes previous studies of the relationship between TIF and school finance.

Chapter 2 Appendix TIF by State

During 2006 data were primarily collected by contacting local and state government agencies involved with TIF.

Alaska

Although TIF legislation was passed in 1988, it has not been employed and there is no state agency that oversees it.

Legislation: Improvement Area Projects; Title 29, Chapter 47, Section 460 (Debt for Improvement Area Projects)

Alabama

Codified in 1987, TIF is used sparingly in Alabama. There is no state agency that oversees TIF and therefore no data is available. Although there is no count of the number of TIF districts in Alabama, it is estimated that there are less than ten.

Legislation: Tax Increment Districts; Title 11, Subtitle 3, Chapter 99

Arkansas

TIF was passed into legislation in 2000 and amended in 2005. The new legislation requires Redevelopment Districts to file with the Department of Economic Development. The number of estimated districts is between ten and twenty.

Legislation: Community Redevelopment; Title 14, Subtitle 10, Chapter 168, Subchapter 3

Arizona

TIF is not legal in Arizona.

California

California was the first state to codify TIF in 1952. Between 2001 and 2005 there were 771 projects areas. The California State Controllers Office collects and publishes select data annually.

Legislation: Community Redevelopment Law; Chapter 1, Article 1, 33000

Colorado

TIF was first enacted in 1974 and has since been divided into two categories, Urban Renewal Authorities and Downtown Authorities. There are 42 TIF districts. Although districts are required to report annually to the Department of Local Affairs and the State Auditor’s Office, data is not available.

Legislation: Urban Renewal Law; Title 31, Article 25, Part 1

Connecticut

TIF was passed into legislation in 1994. The Connecticut Development Authority is minimally involved but does not keep record of TIF districts. Legislation states that, "no commitments for new projects shall be approved by the authority under this section on or after July 1, 2005."

Legislation: Tax Increment Financing Program; Title 32, Chapter 588n

Delaware

TIF was codified in 2003 but there are no districts yet. There is no state government agency that oversees TIF.

Legislation: Municipal Tax Increment Financing Act; Title 22, Chapter 17

Florida

TIF was codified in 1977. There are 173 districts but there is no overseeing government agency.

Legislation: Community Redevelopment Act; Title 11, Chapter 163, Part III

Georgia

TIF was passed into legislation in 1985 but there is no overseeing government agency. It is estimated that there are less than 15 TIF districts in the state.

Legislation: Redevelopment Power Law; Title 36, Chapter 44

Hawaii

TIF was passed into legislation in 1985. It is unclear how many TIF districts there are or if there is an overseeing state agency.

Legislation: Tax Increment Financing Act; Division 1, Title 6, Subtitle 1, Chapter 46, Part IV

Iowa

TIF was legalized in 1969 and there are 949 TIF areas. Every other year TIF areas are required to report their outstanding indebtedness to the Department of Management.

Legislation: Urban Renewal Law; Title IX, Subtitle 4, Chapter 403

Idaho

TIF was codified in 1988. There is no government agency that oversees TIF so data is not available. There are an estimated 35 TIF districts in Idaho. TIF is growing in popularity so this number is expected to increase in the near future.

Legislation: Local Economic Development Act; Title 50, Chapter 29

Illinois

TIF was codified in 1977 and reformed in 1999. In 2006 there were 1,000 TIF districts. The Department of Commerce and Economic Opportunity is the state agency that collects data on TIF districts annually. The Illinois Tax Increment Association also has information on TIF in Illinois.

Legislation: Tax Increment Allocation Redevelopment Act; Chapter 65, Article 11, Division 74.4

Indiana

TIF was passed into legislation in 1975. The Department of Local Government Finance has minimal oversight. There are approximately 126 districts within the state.

Legislation: Redevelopment Commissions; 36-7-Chapter 14

Kansas

Enacted in 1977, TIF has not been widely used in Kansas. It involves a lengthy process and is usually only used in large-scale projects in cities with a large tax base. TIF districts are divided into several sub-categories; some districts use property taxes while others use sales taxes. There is no state agency that oversees TIF. Four TIF districts are estimated to be active in Kansas in 2006.

Legislation: Development & Redevelopment of Areas In & Around Cities; Chapter 12, Article 17

Kentucky

TIF legislation was passed in 2000 and has been amended several times since. There are three government agencies that oversee TIF including the Office of State Budget Director, the Finance Administration Cabinet, and the Revenue Cabinet. The Cabinet for Economic Development also has information about TIF. There are roughly six TIF districts but TIF is gaining in popularity because of changes in legislation. Currently, districts are not required to report to the state, but they will be required in the future.

Legislation: Increment Financing Act; Title IX, Chapter 65

Louisiana

TIF was passed into legislation in 1988. There is no state government agency that oversees TIF and it is not clear how many TIF districts are located in the state.

Legislation: Tax Increment Development Act; Title 47, Subtitle 9, Chapter 1

Massachusetts

District Improvement Financing (DIF) was passed in 2003 and is just beginning to be utilized. The Massachusetts Economic Assistant Coordinating Council must approve the projects. There are only 2 DIF projects thus far.

Legislation: District Improvement Financing; Part 1, Title VII, Chapter 40Q

Maryland

TIF was passed in 1980 but there is no government agency that oversees it so no information is available on the districts.

Legislation: Tax Increment Financing Act; Article 41, Title 14, Subtitle 2

Maine

Department of Economic and Community Development oversees TIF and collects some data on TIF districts.

Legislation: Tax Increment Financing; Title 30-A

Michigan

The first TIF Act was passed in 1980 but was replaced in 1984 with the Downtown Authority Act and in 1987 the Local Development Finance Authority was created to limit the scope of TIF. The Department of Treasury collects and audits data on the TIF districts. There are 88 TIF authorities in Michigan, which is the closest approximation of the number of TIF districts in the state.

Legislation: Tax Increment Financing Authority Act; Chapter 125

Minnesota

TIF was passed into legislation in 1979 and since then it has been used extensively. In the 2003-04 fiscal year there were 2,184 TIF districts. TIF districts are required to submit data to the Department of Revenue annually and the TIF Division of the Office of the State Auditor was established in 2001 to oversee and audit TIF districts.

Legislation: Tax Increment Financing; Chapter 469

Missouri

TIF was codified in 1984 but didn't gain in popularity until the 1990s when legislation was amended. Recently TIF districts have been required to report to the Department of Economic Development. According to the 2005 Annual Report, there are 263 TIF districts.

Legislation: Real Property Tax Increment Allocation Redevelopment Act; Title 7, Chapter 99

Mississippi

TIF was codified in 1986. The Mississippi Development Authority Board approves TIF districts but does not follow them over time so no data is available on individual districts and a cumulative number is not available.

Legislation: Tax Increment Financing; Title 21, Chapter 45

Montana

TIF was codified in 1978. TIF districts are not required to report to a state agency but the Department of Revenue corresponds with the TIF districts annually about the property values in the district. The estimated number of TIF districts is between 20 and 22.

Legislation: Urban Renewal Law; Title 7, Chapter 15, Part 42

North Carolina

TIF was passed into legislation in 2004 but there are no TIF districts yet. The Local Government Commission approves the TIF districts and collects data annually from each district.

Legislation: Project Development Financing Act; Chapter 159, Article 6

North Dakota

TIF was passed into legislation in 1989 but there is no overseeing government agency. There are 10 TIF districts in the state.

Legislation: Urban Renewal Law; Title 40, Chapter 40-58

Nebraska

TIF was passed into legislation in 1978. Each city the uses TIF must file a report annually with the State Property Tax Administrator. In 2005, there were 398 TIF projects and data for each project is available in the annual Report to the Legislature.

Legislation: Community Development Law; Chapter 18, Article 21

New Hampshire

TIF was codified in 1979. There are approximately 6 or 7 TIF districts. TIF districts are not required to report to any state agency so no data is available.

Legislation: Municipal Economic Development and Revitalization Districts; Title XII, Chapter 162-K

New Jersey

TIF was passed into legislation via the Redevelopment Allocation District Financing Act in 2002. The State's Finance Board oversees TIF but there are no TIF districts.

Legislation: Revenue Allocation District Financing Act; Title 52, Subtitle 3, Chapter 27D, Article 9

New Mexico

TIF was passed into legislation in 1978. It has only been used to create approximately 2 or 3 TIF districts. Legislation passed in 2006 is intended to encourage TIF districts in the future. There is currently no state agency that oversees TIF in New Mexico.

Legislation: Urban Development Law; Chapter 3, Article 46

Nevada

Community Redevelopment Law was passed in 1959 but the redevelopment districts were not defined until 1987. TIF districts, referred to as redevelopment districts, are overseen by the Local Government Finance Section of the Department of Taxation. There are over 50 redevelopment districts in Nevada.

Legislation: Community Redevelopment Law; Title 22, Chapter 279

New York

TIF was codified in 1984 and as of 2002 there were only two TIF districts. There is no state agency that oversees TIF and no data is available.

Legislation: Municipal Redevelopment Law; Article 18-C

Ohio

It is estimated that TIF was passed into legislation in 1987 and that there are approximately 747 districts. There are two types of districts: Parcel TIFs and Incentive District TIFs. They report annually to the Department of Economic Development.

Legislation: Municipal Tax Increment Financing; Title 57, Chapter 5709

Oklahoma

TIF was adopted in 1992 but there is no government agency that oversees it and there is no data available on the individual districts. An estimate of the number of districts was not available. An Incentive Review Committee is being set up to look into these issues.

Legislation: Local Development Act; Title 62, Chapter 9

Oregon

TIF was passed into legislation in 1960. TIF districts are referred to as 'Urban Renewal Plan Areas.' Each plan area reports to the Department of Revenue and there were 75 plan areas in 2004.

Legislation: Urban Renewal Law; Chapter 457

Pennsylvania

TIF was passed into legislation in 1990. The only state involvement comes from the Department of Community and Economic Development from the TIF Guarantee Program that helps local governments fund the TIF districts. Data is not available on individual TIF districts and the number of TIF districts is estimated to be greater than 100.

Legislation: Tax Increment Financing Act; Title 53, Part I, Chapter 24D

Rhode Island

TIF legislation was passed in 1984. There is no state agency that oversees it so data is not available. TIF has only been used a few times; it is estimated to be only 2 TIF districts.

Legislation: Tax Increment Financing Act; Title 45, Chapter 33.2

South Carolina

TIF law was passed in 1984. The Municipal Association of South Carolina corresponds with local government about TIF but there is no government agency that oversees TIF. There are approximately 100 TIF districts in the state.

Legislation: Tax Increment Financing Law; Title 31, Chapter 6

South Dakota

TIF legislation was enacted in 1978. The Department of Revenue corresponds with the counties about the property values in the TIF district. In 2005 there were 74 TIF districts.

Legislation: Tax Incremental Districts; Title 11, Chapter 11-9

Tennessee

General TIF has been in the Tennessee legislation since 1945 but it was not until 2004 that legislation was amended to specifically promote TIF. There are several TIF projects, but there are no TIF districts yet. There is no state agency that oversees TIF.

Legislation: Redevelopment; Title 13, Chapter 20, Part 2

Texas

TIF was codified in 1987. TIF districts are referred to as Tax Increment Reinvestment Zones. The State Comptroller publishes a Biennial Report that contains data on each zone which is available online. For the 2003-04 fiscal year, there were 82 zones.

Legislation: Tax Increment Financing Act; Title 3, Subtitle B, Chapter 311

Utah

It is estimated that the first Redevelopment Area was in 1968 an approximation of when TIF was passed into legislation. It appears that there has not been a single state agency that oversaw TIF in the past. In 2005, the Governor's Office of Economic Development began establishing Economic Development Zones. The best estimate of the number of TIF districts is 51, which is the number of projects adopted since 1993.

Legislation: Redevelopment Agencies; Title 17B, Chapter 4, Part 1

Virginia

TIF became legal in 1988 but there are currently only about three TIF districts. There is no state agency that oversees TIF.

Legislation: Tax Increment Financing; Title 58.1, Subtitle III, Chapter 32 Article 4.1

Vermont

TIF legislation was passed in 1985. There are probably no more than six TIF districts in the state. TIF districts must be approved by the local and state government. The Vermont Economic Progress Council is the state agency that oversees TIF. The legislature is currently reviewing TIF legislation to expand its use in Vermont.

Legislation: Tax Increment Financing; Title 24, Part 2, Chapter 53, Subchapter 5

Washington

TIF was recently passed into legislation in 2001 and is currently being amended to expand its use and make previous legislation more clear. There are only about three TIF districts. Minimal oversight is provided by the Department of Revenue.

Legislation: Community Revitalization Financing; Title 39, Chapter 39.89

Wisconsin

TIF was codified in 1975. The Department of Revenue assists in creating TIF districts, referred to as Tax Increment Districts, and collects data from each district annually, which is available online. In 2005, 818 districts were active.

Legislation: Tax Increment Law; Chapter 66

West Virginia

TIF was passed in 2002. The West Virginia Development Office approves all TIF projects and districts. As of 2006, there were 11 total TIF districts.

Legislation: West Virginia Tax Increment Financing Law; Appendix A, Article 11B

Wyoming

TIF was codified in 1983. There is no state agency that oversees TIF and it is estimated that there are no more than 5 or 10 TIF districts in the state.

Legislation: Urban Renewal Code; Title 15, Chapter 9, Article 1; West Virginia Tax Increment Financing Law, Appendix A, Article 11B

Chapter 3

Previous Studies

This chapter reviews literature related to TIF and school finance. Despite widespread interest in this relationship, few studies have addressed it explicitly. Perhaps the main reason for this is the lack of accessible TIF data noted in the previous chapter. Several papers examine expenditures per pupil and acknowledge the link between TIF and school finance, but only recently has there been empirical evidence showing TIF's effect on school finance. These studies just begin to describe this relationship. They establish the foundation which this paper builds upon.

Empirical Papers

Researchers of school finance study different effects on expenditures per pupil including age demographics (Poterba 1997, Berkman and Plutzer 2004) and income (Hoxby 1998). Poterba (1997) finds that school districts with a larger elderly population have lower expenditures per pupil, an effect that is magnified when the racial composition of the elderly differs from that of the school-aged children. Berkman and Plutzer (2004) decompose the elderly population in two groups, longlasting elderly and migrant elderly. The authors find that school districts with more longstanding residents lead to higher expenditures per pupil but school districts with a larger migrant elderly population have lower expenditures per pupil. Hoxby (1998) finds that per capita income and per-pupil valuation are important positive contributors to expenditures per pupil.

Other studies explore the effect of legislative changes on school finance, such as the introduction of a state lottery (Campbell 2003) and centralizing school finance (Anderson 1994, Zimmer and Jones 2005, Maher and Skidmore 2008). Campbell (2003) finds a positive relationship between lottery spending and education spending. Anderson (1994) finds that after reform in Nebraska, school districts with higher tax rates receive larger increases in state aid and school districts with higher spending receive smaller increases in state aid, results that are consistent with the goals of centralization. Zimmer and Jones (2005) find that after reform in Michigan, school districts with higher spending issue more bonds as a way to maintain higher spending, a result that is inconsistent with the goals of centralization; Maher and Skidmore (2008) support this finding with data from Wisconsin. Despite the vast school finance literature, little attention is given to the effect of TIF on school districts.

School districts first entered the TIF literature to determine the extent that overlapping jurisdictions subsidize TIF (Huddleston 1981, 1984). Huddleston (1981) defines the effective subsidy rate to measure the incidence of the subsidy by calculating the portion of the tax increment paid by taxpayers residing outside the city that has TIF but within the overlapping jurisdiction. Huddleston (1984) finds that cities with higher population growth rates have higher effective subsidy rates. This relationship peaked interest in the relationship between TIF and city population growth.

Anderson (1990) finds evidence supporting the relationship between TIF use and property value growth, but cautions against concluding that TIF causes growth. He suggests that TIF authorities may be capturing growth that would have occurred otherwise. Man and Rosentraub's (1998) finding supports the positive relationship between TIF adoption and property value growth but Dye and Merriman (2000) find evidence of a negative relationship. These conflicting results indicate that the effects of TIF may be different for different areas within the city, or across cities.

Researchers separate the total effect of TIF on property value into two effects, one on property value in the TIF district and one on property value in the rest of the city. Dye and Merriman (2000) suggest that the cost of higher growth in the TIF district is lower growth elsewhere in the city. Skidmore, Merriman, and Kashian (2009) confirm this, finding that TIF decreases growth in non-TIF property value of the city but increases growth in total property value of the city. They also find that within TIF districts, commercial and manufacturing property value increases but residential property value is not affected.

It can be asserted that different types of TIF districts produce different spillover effects. Weber, Bhatta, and Merriman (2007) find evidence of negative spillovers from commercial or industrial TIF districts and positive spillovers from mixed-use TIF districts that contain both commercial and residential property. These spillover effects have important implications for school finance. Since non-TIF property value is not frozen, increases or decreases due to spillovers from TIF increase or decrease the school district's tax base.

Theoretical Papers

The effect of TIF on overlapping jurisdictions and surrounding areas is modeled in several theoretical papers. Lawrence and Stephenson (1995) model the incidence of the tax increment on overlapping jurisdictions. They look at one city with TIF and find that during the early years of TIF, taxpayers in the metro area subsidize TIF but in the later years they benefit from lower tax rates and pay less property tax. Dye and Sundberg (1998) model the net present value of tax revenue for the city and school district to describe the efficiency, viability, and equity of TIF. They show that it is possible for TIF to be viable but not efficient and caution policymakers against using TIF in these situations.

Brueckner (2001) models the effects of TIF on the city's provision of public goods. He shows that when a public good is underprovided, TIF is not likely to be viable and when TIF is viable, it may yield an inefficient amount of public good. Fernandez (2004) extends Brueckner's (2001) model to include the school district's provision of public goods. He finds that the school district may also produce an inefficient amount of education as a result of TIF by either under- or over-providing its public good. Skidmore, Merriman, and Kashian (2009) model spillovers and TIF viability. Each of these models incorporates school districts to some extent in their analysis, but individually they do not illustrate the effect of TIF of school finance.

Only one theoretical model explicitly looks at the effect of TIF on school finance. Byrne (2005) models the net effect of a change in utility for residents resulting from TIF's effect on expenditures per pupil for both the city and school district. The net effect of TIF on expenditures per pupil equals the loss in revenue per pupil the city would have received in the absence of TIF. This simple model assumes no change in the growth rate of property value in the TIF district after TIF adoption and no revenue source other than from property value. Byrne's (2005) model sheds light on TIF's effect on school finance, but leaves many questions still unanswered.

Empirical Papers on TIF and School Finance

The area of school finance that has been discussed the most in empirical research is TIF's relationship to state aid. Some researchers control for whether or not the overlapping school district is in or out of formula. Neither Anderson (1990) nor Dye and

Merriman (2000) find evidence that this affects the TIF adoption decision. Some consider how state aid to school districts is affected by TIF. Huddleston (1981) says that if the state aid formula includes the capture when calculating state aid, it ignores the fact that the school district does not receive that portion of the tax increment. Hence, the school district receives less state aid.

Lehnen and Johnson (2001) use data from several Midwestern states to look at TIFs effect on school districts. Their data is descriptive and limited to a few variables. First, they calculate the percent of school districts that have TIF for Indiana, Iowa, Minnesota, and Wisconsin. The percentages range from 23 in Indiana to 99 in Wisconsin. Then, they explain how state aid has changed in response to TIF over the years. Michigan and Wisconsin increased state aid to offset the 'loss' in local revenue. In the past, Minnesota has penalized school districts with more TIF by decreasing state aid because TIF makes less revenue available to the state. In addition, prior to 1988, "all levies in Minnesota were not equalized, and TIF had created a need for higher local tax rates" (p 142). Using data from Illinois, they calculate the variable 'TIF as a percent of total assessed valuation', which ranges from zero to 32 percent. They conclude that local taxpayers subsidize TIF through higher tax rates in 67 school districts and all taxpayers subsidize TIF through higher income and sales taxes. Other important factors affect the school district's tax rate that Lehnen and Johnson (2001) do not control for when drawing this conclusion.

Weber (2003) controls for other factors when examining TIF's effect on local and state funding. Using school districts in Cook County, Illinois from 1989 to 1999, she finds that school districts with more TIF intensity have smaller growth in revenue from property taxes but larger growth in state aid, suggesting that the state increases funding to compensate for less local revenue. She also finds a negative relationship between TIF and the school district's tax rate. This counterintuitive result could mean that state aid more than offsets the decrease in local revenue or it could be due to changes in property tax limitation legislation passed during the time period. Weber (2003) concludes by questioning the state's willingness to compensate school district's with higher TIF intensity with more state aid.

A similar study looks at the effect of TIF intensity on school district tax rates and property values for school districts in the entire state. Weber, Hendrick, and Thompson (2008) use data in Illinois to determine the effect of TIF on school district tax rates in 2001 and the change in property tax revenues between 1990 and 2000. The impact of having at least one TIF district on changes in property tax revenue is positive in rural school districts and negative for school districts in MSAs outside of the five-county metro area. There is no impact in Cook county, the five-county metro area, or for the overall sample. More TIF intensity leads to a larger increase in property tax revenue in the five-county metro area and in other MSAs in the state. They find a small positive effect of TIF on tax rates, with the largest effect in rural school districts. Although their research is important in advancing the field, neither Weber (2003) nor Weber, Hendrick, and Thompson (2008) use a theoretical model to motivate their empirical work.

Measures of TIF Used in the Literature

A quantitative measure of TIF is necessary to conduct empirical analysis. In the past, most researchers use a dummy variable. They use '1' if the city has at least one TIF district and '0' if none (Man and Rosentraub 1998, Dye and Merriman 2000). This measure is limited because it treats all TIF districts the same despite differences in age, type, and capture. One measure used to reflect age is a dummy variable for the number of years since TIF was adopted (Dye and Merriman 2000, Weber 2003). This is useful when the observation contains only one TIF district, but cannot be used with multiple TIF districts. Even though these measures are limited, they may have been the only measure available at the time.

As better data have become available, researchers have used measures of the magnitude of TIF. The most common measure is TIF intensity, which is defined as the capture from TIF as a portion of the total assessed valuation in the school district (Lehnen and Johnson 2001, Weber 2003, and Weber, Hendrick, and Thompson 2008). This variable provides a more accurate description of the magnitude of TIF relative to an overlapping jurisdiction, such as the municipality or school district. This is a good measure because it should be positively correlated with the number of TIF districts, the age of the TIF districts, and the magnitude of the TIF projects. It allows the unit of observation to include several TIF districts. This is useful when studying the effect of TIF on school finance because a school district may contain several TIF districts.

Gap in the Literature

Each of these papers contributes to our understanding of TIF. However, because most of the articles do not focus on school districts, it is difficult to determine the effect of TIF on school finance. The few papers that do focus on school finance represent a small body of literature that needs to be expanded. Unfortunately, the theoretical models thus far have not been empirically tested and the empirical papers are not based on a theoretical model. This paper fills this gap by developing a theoretical model that is empirically tested.

The remainder of this paper includes the theoretical model, empirical analysis, and policy implications. In Chapter 4 I develop a theoretical model of TIFs effect on school finance through spillover effects on non-TIF property value growth rates. In Chapter 5 I empirically test the hypotheses of the theoretical model on data from Minnesota, a state that has a long history of TIF and where rich data are available at the school district level. Policy implications and conclusions are drawn in the conclusion of Chapter 6.

Chapter 4

Theoretical Models

This chapter includes two theoretical models. The first is an illustration of how TIF affects property within the TIF district and in the school district property. This simple model ignores spillover effects, focusing only on property value over time within the TIF district. It shows the short-run and long-run effects of TIF on the school district. The second model begins with the choice of public goods from a budget constraint and community preferences. Then the school district's budget constraint is used to explore spillover effects of TIF on non-TIF property value growth. The second model is used to develop hypotheses that are tested in Chapter 5.

A Model of Property Value over Time

This model illustrates the impact of TIF on school district tax revenue for three different scenarios of pre-TIF property value growth. Each scenario includes discussion of whether or not the school district is expected to support the municipality's use of TIF. In the model, I first describe the case where all property is either blighted or non-blighted and all of the blighted property is eligible for and uses TIF. Then, I consider the case where not all of the blighted property is eligible for TIF and of the blighted property that is eligible, not all use TIF. In each case, I describe the short-run and long-run implications of TIF on a school district's local tax revenue. Finally, I comment on some of the assumptions about the growth rates in the model.

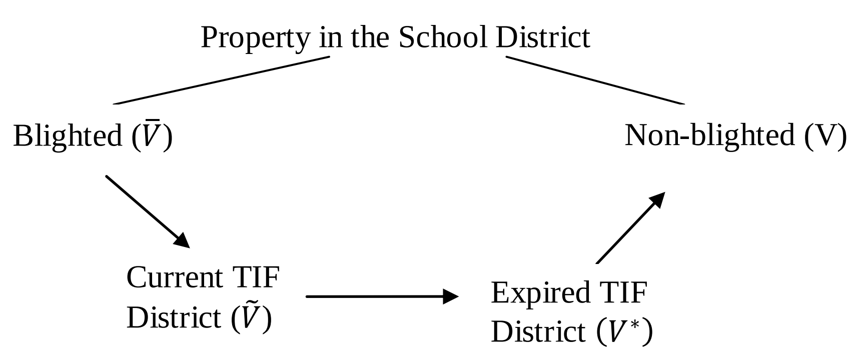
The model appeals to the work of Ladd and Stephenson (1995) and Dye and Sundberg (1998). Dye and Sundberg (1998) define an equation that describes a school district's local tax revenue collection from two towns, one of which is partially blighted.

I expand upon this concept to by defining subcategories of blighted areas. I also appeal to Lawrence and Stephenson's (1995) theoretical model which decomposes the tax increment into four components, one of which is the tax revenue that would have occurred in the absence of TIF. This component is used to determine if the school district subsidizes the TIF district and if so, by how much. If the school district subsidizes the TIF district then there are negative consequences for school finance while the TIF district is active. Ladd and Stephenson (1995) also include a time dimension to determine how the shares of the four components change over time, which I consider when developing the short-run and long-run aspects of my model.

All Blighted Property is Eligible for TIF and Uses TIF

Consider a school district with two types of property, blighted and non-blighted, and assume that all of the blighted property is eligible for TIF and uses TIF. Before the TIF district expires, property in the TIF district will no longer be blighted. As a result, all of the property within the school district will be non-blighted, as illustrated in Figure 4.1. When the TIF district expires, the property generates more tax revenue for the school district than it would have without TIF.

Figure 4.1: Flow of Property within the School District



Property value is a function of the initial property value at the time of TIF adoption and the growth rate. I will assume that the growth rate of the blighted property increases after TIF adoption and the growth rate of the non-blighted property remains the same. Non-blighted property value in year t is $V_t = V(1+g)^t$, which is based on the initial value, V, and a constant growth rate, g. Similarly, blighted property value in year t is $\bar{V}_t = \bar{V}(1+\bar{g})^t$, which is based on the initial value, $\bar{V}$, and a constant growth rate, $\bar{g}$. Prior to TIF adoption, tax revenue for the school district in year t is the product of the school district's tax rate, t_l and property value within the school district, given by

$$TR_t = t_l[\bar{V}(1+\bar{g})^t + V(1+g)^t] \text{ for } t < \tilde{t}, \tag{4.1}$$

where $\tilde{t}$ is the year of TIF adoption.

After the infrastructure improvement, property value in the TIF district increases to $\tilde{V}_{\tilde{t}}$ and grows at a higher rate of $\tilde{g}$. In year t, property value in the TIF district is $\tilde{V}_{\tilde{t}}(1+\tilde{g})^{t-\tilde{t}}$. The tax increment is generated from the difference between the current property value, $\tilde{V}_{\tilde{t}}(1+\tilde{g})^{t-\tilde{t}}$, and frozen property value, $\bar{V}_{\tilde{t}}$. While TIF is active, the property value available to the school district is the frozen property value, $\bar{V}_{\tilde{t}} = \bar{V}(1+\bar{g})^{\tilde{t}}$. The school district's tax revenue in year t is the difference between the tax revenue collected on all of the property in the school district and the tax increment,

$$TR_t = t_l\left[\tilde{V}_{\tilde{t}}(1+\tilde{g})^{t-\tilde{t}} + V(1+g)^t\right] - t_l\left[\tilde{V}_{\tilde{t}}(1+\tilde{g})^{t-\tilde{t}} - \bar{V}_{\tilde{t}}\right], \tag{4.2}$$

$$\text{for } t^* > t > \tilde{t},$$

where t^* is the year the TIF district expires.

Once the TIF district expires, none of the property in the school district is blighted. The property value in the expired TIF district is $V^*_{t^*} = \tilde{V}_{\tilde{t}}(1+\tilde{g})^{t^*-\tilde{t}}$. After the

TIF district expires, the growth rate is g^* and the school district once again receives tax revenue from all of the property in the school district,

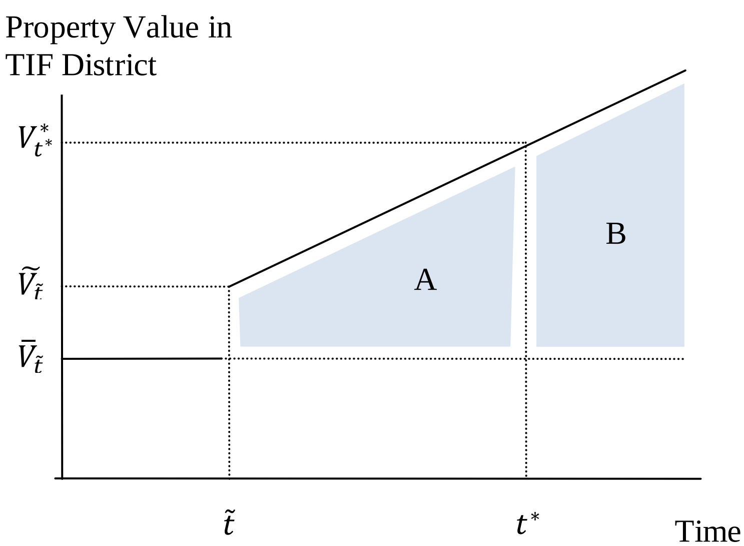
$$TR_t = t_l\left[V_{t^*}^*(1+g^*)^{t-t^*} + V(1+g)^t\right], \text{ for } t > t^*. \tag{4.3}$$

This model has described the school district's tax revenue prior to TIF, while the TIF is active, and after the TIF district expires. The next step is to determine when the school district benefits from TIF. This occurs when net benefits for the school district become positive. Benefits are defined as increased tax revenue or the absence of a loss in tax revenue. Costs are defined as lost tax revenue. These calculations are made in both the short-run and long-run, where the time period while the TIF district is active is referred to as the short-run and the time period after the TIF district expires is referred to as the long-run. In the short-run the school district can incur either costs or benefits, depending on the growth rate of the property prior to TIF, but in the long-run the school district strictly benefits.

The long-run benefits include the total tax revenue generated after the TIF district expires from the formerly blighted property beyond what it would have been without TIF. Calculating the short-run impact is more complicated because it involves the counterfactual growth rate. If the blighted property value was increasing prior to TIF, then a portion of the tax increment is not entirely due to the infrastructure improvement, and the school district loses this tax revenue. Alternatively, if the blighted property value was not increasing prior to TIF, then all of the tax increment is due to TIF. The short-run cost or benefit depends on $\bar{g}$, the growth rate prior to TIF. Three possible outcomes from the three different growth rates are illustrated and described below.

Figure 4.2 illustrates the short-run and long-run effects of TIF on property values within the TIF district if the pre-TIF growth rate is zero. The frozen property value is $\bar{V}_{\tilde{t}}$ and the initial increase in the property value due to TIF-financed infrastructure improvements is $\tilde{V}_{\tilde{t}} - \bar{V}_{\tilde{t}}$. In this case the entire tax increment is due to TIF. Although the school district relinquishes the increment to the TIF authority, it is not actually losing any tax revenue because the property value would not have increased without TIF. Area A represents the total property value that the municipality collects the tax increment on. In this case, the school district neither benefits nor loses from the presence of TIF in the short-run. In the long-run, the school district benefits by receiving more tax revenue from the higher property values as seen by the shaded area B, which occurs after the TIF district expires. The school district loses nothing in the short-run and gains B in the long-run, resulting in a net gain.

Figure 4.2 Pre-TIF Growth Rate is Zero ($\bar{g} = 0$)



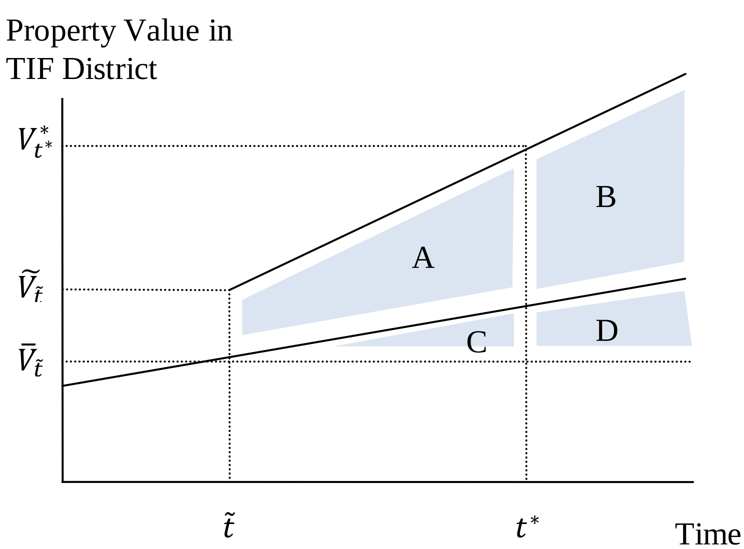
Equation 4.4 describes net benefits illustrated in Figure 4.2, which equals the tax revenue generated from applying the school district's tax rate to the property value in the TIF district each year after the TIF district expires,

$$NB_t = \sum_{t=t^*}^{\infty} t_l\left[V_{t^*}^*(1+g^*)^{t-t^*} - \bar{V}_{\tilde{t}}\right]. \tag{4.4}$$

Net benefits are positive starting when the TIF district expires. When property values are constant prior to TIF adoption, the school district should be indifferent to TIF in the short-run and support it in the long-run.

If the growth rate prior to TIF is positive, part of the increased property value would have been available to the school district but with TIF it is captured by the municipality. This property value is the shaded portion of Figure 4.3 between $\tilde{t}$ and t^* labeled C.

Figure 4.3 Pre-TIF Growth Rate is Positive ($\bar{g} > 0$)



Area A represents neither a gain nor a loss to the school district because that property value would never have increased without TIF. In the long-run, the school district is able to tax property value D, which it also would have in the absence of TIF, so it is neither a loss nor a gain to the school district. The school district benefits from the increase in property due to TIF after the TIF district expires, which is area B. Overall, this is the worst case for the school district because it implies that the school district is subsidizing the tax increment.

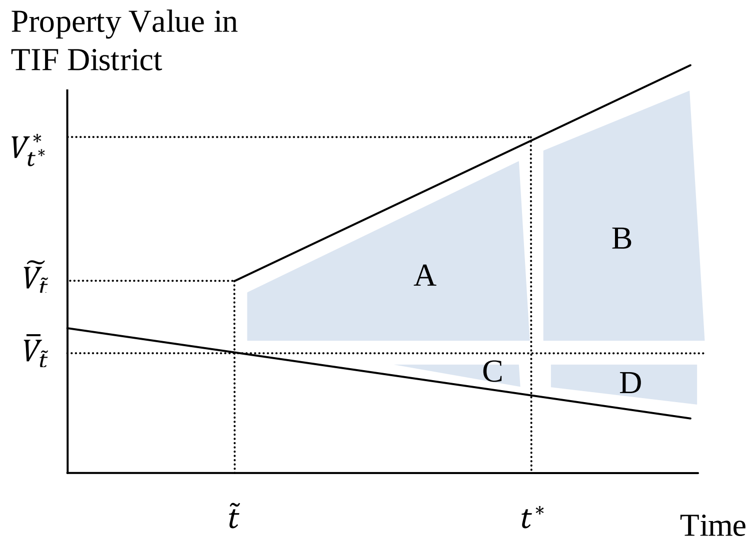
In this case, the school district incurs a loss in the short-run but benefits in the long-run. Net benefits are,

$$NB_t = \sum_{t=t^*}^{\infty} t_l\left[V_{t^*}^*(1+g^*)^{t-t^*} - \bar{V}_{\tilde{t}}(1+\bar{g})^t\right] - \sum_{t=\tilde{t}}^{t^*} t_l\left[\left[\left(\frac{\tilde{V}(1+\tilde{g})}{1+r}\right)^{t-\tilde{t}} - \bar{V}_{\tilde{t}}\right]\right], \tag{4.5}$$

where the first summation represents the long-run benefits, which is equal to the tax revenue generated by applying the school district's tax rate to area B in Figure 4.3. The second summation represents the short-run costs, which is equal to the tax revenue generated by applying the school district's tax rate to area C in Figure 4.3. A discount rate, r, is included to reflect the opportunity cost of the school district not being able to use these funds while the TIF district is active. When property value in the TIF district increases prior to TIF adoption, we expect the school district to oppose the TIF district if it only considers the short-run but support TIF if it considers the long-run.

The last scenario is when the property value in the blighted area is decreasing prior to TIF. In this case, the property value in the absence of TIF would actually be less than the frozen value. The school district benefits in the short-run from having TIF because it does not lose tax revenue that it otherwise would have, as seen by the shaded area C in Figure 4.4 between $\tilde{t}$ and t^*.

Figure 4.4 Pre-TIF Growth Rate is Negative ($\bar{g} < 0$)



Area A represents neither a gain nor a loss to the school district. In the long-run, the school district benefits by receiving more tax revenue from the higher property value as seen by the shaded areas B and D after time t^*. Area D represents the decrease in property value that would have occurred in the absence of TIF. With TIF, the frozen property value available to the school district is higher than this.

In this case, the school district benefits in the short-run and long-run. Net benefits for the school district are,

$$NB_t = \sum_{t=t^*}^{\infty} t_l\left[V^*_{t^*}(1+g^*)^{t-t^*} - \bar{V}_{\tilde{t}} + 2\bar{V}(1+\bar{g})^t\right] + \sum_{t=\tilde{t}}^{t^*} t_l[\bar{V}_{\tilde{t}} - \bar{V}(1+\bar{g})^t]. \tag{4.6}$$

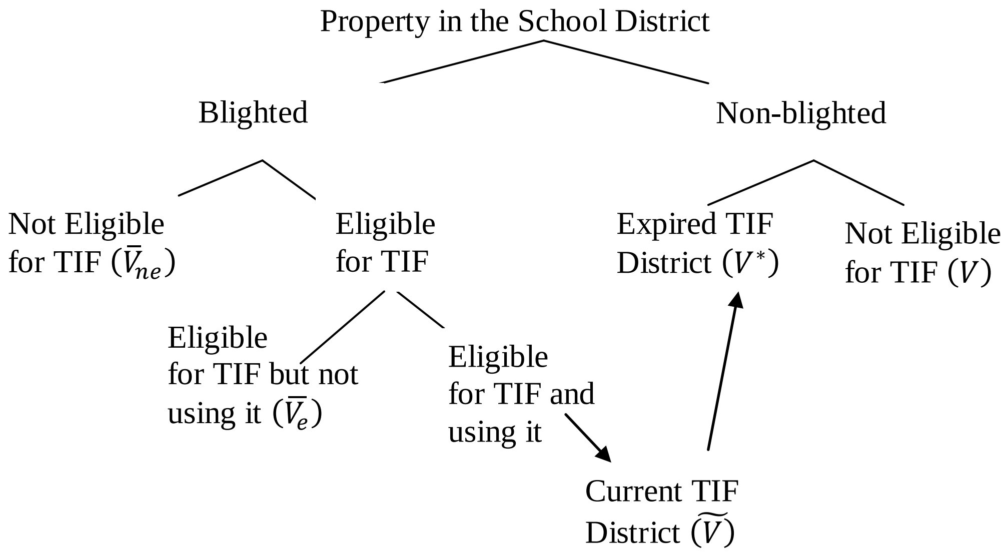
The first summation reflects the long-run benefit, which is tax revenue generated from the area B in Figure 4.4 and twice the value of area D. Tax revenue from area D is included twice because without TIF, tax revenue from this property would have decreased but with TIF, not only is tax revenue gained but tax revenue is not lost. The second summation reflects the short-run benefit of the school district generated by applying the tax rate to area C in Figure 4.4. This is the tax revenue that the school district would have lost in the absence of TIF, but with TIF it does not. As a result, the school district does not lose tax revenue in the short-run. In the long-run, the school district not only does not lose revenue, but it actually gains revenue. This is the best case for the school district.

For each of the scenarios outlined above, the year that net benefits becomes positive is the year when the school district begins to benefit from the municipality's use of TIF. This depends on the growth rates in the TIF district, the discount rate, and the duration of the TIF district. According to this model, school districts should always support the municipality's decision to use TIF when growth rate in the TIF district prior to TIF adoption is negative or zero. This results in no cost to the school district in terms of lost local property tax revenue. Also, as seen in Figure 4.4 and Equation 4.6, it may actually generate more revenue in the short-run than it would in the absence of TIF. The only time a school district should oppose TIF is when the growth rate of property in the TIF district is positive. However, because TIF is specifically designed for use in blighted areas, it is unlikely to be adopted when the growth rate is positive. Therefore, school districts are likely to support TIF in both the short-run and the long-run.

Not All Blighted Property is Eligible for TIF and Not All of the Blighted Property that is Eligible for TIF Use It

This section extends the model by designating additional categories of property. First, not all blighted property is eligible for TIF and there may be blighted property that is eligible for TIF but the municipality chooses not to use TIF. Figure 4.5 builds upon Figure 4.1, illustrating the classification of property values according to blight and TIF usage.

Figure 4.5: Expanded Flow of Property within the School District



Prior to TIF, tax revenue is generated according to Equation 4.7 by applying the school district's tax rate to all property in the school district.

$$TR_t = t_l[\bar{V}_{ne}(1+\bar{g}\,)^t + \bar{V}_e(1+\bar{g}\,)^t + V(1+g)^t], \text{ for } t < \tilde{t}. \qquad (4.7)$$

While the TIF district is active, tax revenue is generated according to Equation 4.8, where the tax increment is subtracted from the total tax revenue,

$$TR_t = t_l\left[\tilde{V}(1+\tilde{g})^{t-\tilde{t}} + (\bar{V}_{ne}+\bar{V}_e)(1+\bar{g}\,)^t + V(1+g)^t\right] - t_l\left[\tilde{V}(1+\tilde{g})^{t-\tilde{t}} - \bar{V}_{\tilde{t}}\right],$$

$$\text{for } t^* > t > \tilde{t}. \qquad (4.8)$$

When the TIF district expires, the school district collects tax revenue generated for the property value within the TIF district,

$$TR_t = t_l\left[V^*_{t^*}(1+g^*)^{t-t^*} + \bar{V}_{ne}(1+\bar{g}\,)^t + \bar{V}_e(1+\bar{g}\,)^t + V(1+g)^t\right], \text{ for } t > t^*. \qquad (4.9)$$

It is apparent from the preceding equations that in the long-run and possibly also in the short-run, it is in the school district's best interest to use TIF in all of the blighted property that is eligible for it. As the share of blighted property to total property decreases, the school district has access to a higher tax base, increasing tax revenue.

Thus far, a few simplifying assumptions about growth rates have been made in the model. First, all growth rates have been assumed constant, creating a linear trajectory of property values in each classification. This assumption may be valid for property that does not use TIF. However, it is possible that after infrastructure improvements are made in the TIF district, the growth rate is non-linear, higher initially and then diminishing over time. Also, growth rates are assumed the same across TIF districts and independent of the magnitude of infrastructure improvement. It is possible that the post-TIF growth rate depends on the magnitude and type of infrastructure improvement. With some additional work, this model can be extended to relax the growth rate assumptions that are currently imposed.

A Model of Property Value with TIF and Spillover Effects

The next theoretical model extends the current literature by showing the impact of TIF on school finance through spillover effects. The first part of the model shows the school district's expenditures per pupil derived from the school district's budget constraint. The second part of the model shows how the non-TIF district property value growth rate is affected by the TIF intensity in the school district.

A Summary of Previous Theoretical Models

There are only a few theoretical models of TIF and only one of them explicitly includes TIF's effect on school finance. Brueckner (2001) models public good provision in a city. Fernandez (2004) extends Brueckner's (2001) model to include public good provision in a school district. Skidmore, Merriman, and Kashian (2009) extend

Brueckner's (2001) model to include spillover effects within a city. Byrne (2005) models TIF's effect on expenditures per pupil but the simplicity of the model does not fully explain the relationship. Each of these models is described in more detail below.

Brueckner's (2001) theoretical model determines TIF's viability and, once adopted, if the public good is likely to be over-, under-, or optimally provided. He solves the city's budget constraint for its tax rate and differentiates with respect to a change in public good due to TIF and finds that if the public good is 'seriously underprovided' and TIF is used, then the city's tax rate will decrease because the increase in property values will otherwise create a budget surplus. However, if the public good is 'moderately underprovided' or 'overprovided', the city's tax rate must increase to cover the increased cost of providing the public good; this happens because the marginal benefit is either slightly greater than or less than the marginal cost (p 300). Brueckner (2001) also looks at the effect of the school district's tax rate on "TIF's range of relevance," finding that an increase in the school district's tax rate widens the range of relevance because "the public improvement leads to a larger increase in combined city and school revenue under TIF" (p 339). Although important in explaining TIF's effect on the city, Brueckner's (2001) theoretical model does not explain the effects of TIF on the school district.

Fernandez (2004) extends Brueckner's (2001) model by including two overlapping jurisdictions, a city and a school district. He uses an inter-temporal budget constraint, allowing the city and school district to make decisions today based on future cost and revenue streams, including when the TIF district expires. He looks at the effect of TIF on school district behavior and finds that when the city's decision of public good provision is exogenous of the school district's decision of public good provision, the school district underprovides its public good because less revenue is generated (p 160). When the city's decision of public good provision is endogenous, the school district over-, under-, or optimally provides its public good, depending on if the city under-, over-, or optimally provides its public good respectively (p 162). This follows from the assumption that the school district chooses its level of public good in order to maximize property values. Although Fernandez's (2004) model includes school districts, the main focus is on public good provision under TIF, not TIF's effect on school finance.

Skidmore, Merriman, and Kashian (2009) also extend Brueckner's (2001) model to study the impact of TIF on property values in an entire city that contains a TIF district, where property value in the neighborhood without TIF is affected by the level of public goods in the neighborhood with TIF. They hypothesize that even though property value within the TIF district increases, non-TIF district property value of the city decreases due to negative spillovers. Using panel data from Wisconsin municipalities, Skidmore, Merriman, and Kashian (2009) conduct an empirical analysis using Two-Stage Least Squares. They find evidence supporting their hypothesis of negative spillovers from TIF. The authors support this conclusion by stating that development would likely have occurred in other areas of the city had TIF not been used (p 22). Although their unit of observation is the city, the model can be extended to the school district to illustrate the spillover effects within a school district. One drawback to their study is their measurement of TIF, which is the number of TIF districts created over a certain time period.

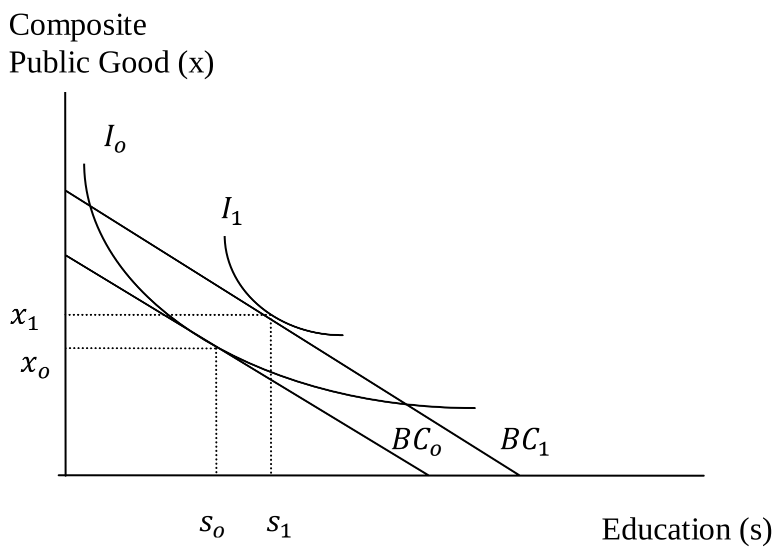
One model that looks explicitly at the relationship between TIF and expenditures per pupil is that of Byrne (2005). Because his model of this relationship is not the primary model developed in the paper, it is included in the appendix. The partial derivative of a school district budget constraint shows that an increase in TIF ultimately decreases expenditures per pupil by the amount of tax revenue that the school district would have received from that property value increase. However, this ignores the "but for" clause, which assumes that the school district would not have the tax revenue without TIF. He also uses growth rates in his model which assumes that growth prior to TIF is the same as growth after TIF. This seems unlikely given that TIF is adopted in blighted areas and spurs growth, implying lower growth prior to adoption. Although this model shows TIF's effect on school finance, its simplicity does not fully illustrate the relationship between TIF and school finance.

Although each of the aforementioned models incorporates aspects of TIF and/or school finance, none adequately models both to determine the impact of TIF on school finance. The theoretical model developed in this paper shows the effect of TIF on expenditures per pupil via spillovers. It includes the school district's budget constraint introduced by Brueckner (2001), including local, state, and federal revenue. It incorporates the spillover effects of Skidmore, Merriman, and Kashian (2009), extending the effects to the entire school district. This model differs from Byrne (2005) because it does not consider the tax revenue from the tax increment as a necessary loss to the school district.

School District Expenditures per Pupil without TIF

Every community must decide how much of each public good to provide. This can be determined by comparing preferences of the taxpayers with a budget constraint. Suppose there are two public goods, education (s) and a composite public good including all other public goods (x). The budget constraint includes all tax revenue and the prices of each good. Figure 4.6 illustrates this scenario. The line BC_o represents an initial budget constraint. The preferences of the community are reflected by indifference curve labeled I_o. In this case, the optimal choice of public goods is x_o and s_o.

Figure 4.6
The Choice of Educational Spending



An increase in the budget constraint allows the community to choose more of x, s, or both. This would happen if the price of the composite public good decreases, the price of education decreases, or if more tax revenue is collected. For the purposes of this paper, I will focus on a parallel shift of the budget constraint resulting from additional tax revenue. This is illustrated in Figure 4.6 by budget constraint BC_1. With the parallel shift of the budget constraint, it is possible have more of both the composite public good and education, x_1 and s_1. It is also possible to have more of the composite public good and the same amount of education and vice versa. Ultimately, the choice depends of the preferences of the community, illustrated by indifference curves.

An increase in the school district's revenue would result in a similar shift as described above. However, because school district revenue is restricted for use solely on education, the new budget line would be kinked, extending back to the y-axis at the previous budget line. This could still yield the same increase in both the composite public good and education to x_1 and s_1 as before or lead to a choice near the kink. The choice would depend on the preferences of the community for these two goods. The theoretical model developed in this chapter uses the school district's budget constraint to illustrate how this shift can occur.

The school district's budget constraint is an identity that reflects the equality of a school district's total revenue and total expenditure. Brueckner (2001) presents the school district's budget constraint where total expenditure equals total revenue raised from applying a tax rate to school district property value. His equation does not include state or federal revenue. I extend his equation to reflect all revenue sources for the school district. The school district's budget constraint is

$$K(s) = F_l + F_s + F_f, \tag{4.10}$$

where total expenditures, $K(s)$, equals revenue from local sources F_l, state sources, F_s, and federal sources, F_f.

Local revenue is determined by applying a local tax rate, t_l, to all property in the school district,

$$F_l = t_l V. \tag{4.11}$$

In some states, state funding is also a function of local property value. The subsequent analysis is based on foundation aid,[7] which "provides aid based on the foundational level of expenditures chosen by policymakers at the higher level of government" (Anderson 2003, p 556). Foundation aid is $F_{s,f} - t_s V$, where $F_{s,f}$ is the foundational level of total expenditures and t_s is the foundation aid tax rate that is applied to local property values.[8] State aid equals the foundation level minus the tax revenue that the school district could raise locally if it applied the foundation aid tax rate to its property value. Policymakers define the values of $F_{s,f}$ and t_s, which are the same for every school district. If $t_s V$ exceeds the foundation level of total expenditures, then the school district is out of formula and the state does not provide foundation aid to that school district. Total state revenue includes state aid and other revenue from grants, special education, and other state sources, denoted by $F_{s,o}$,

$$F_s = F_{s,f} - t_s V + F_{s,o}. \tag{4.12}$$

Federal revenue, F_f, is for child nutrition and other categorical reasons. Increases in federal funds for education, such as the American Recovery and Reinvestment Act of 2009, would result in an increase in the school district's total revenue and withdraw of these funds would decrease to school district revenue. In either case, revenue derived from property value will not be affected unless these funds are a function of local property value.

Including local, state, and federal revenue, the school district's budget constraint can be written in terms of property value,

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[7] I chose foundation aid because my empirical analysis uses data from Minnesota, which uses foundation aid.

[8] This formula is taken from Anderson (2003). The notation is changed to be consistent with the notation of this model.

$$K(s) = (t_l - t_s)V + F_{s,f} + F_{s,o} + F_f. \tag{4.13}$$

Equation (4.13) shows that expenditures equal the tax revenue generated from property value, state aid, other state revenue, and federal revenue. Dividing both sides by the number of pupils, this equation can be written as expenditures per pupil and revenue per pupil,

$$\frac{K(s)}{P} = (t_l - t_s)\frac{V}{P} + \frac{F_{s,f}}{P} + \frac{F_{s,o}}{P} + \frac{F_f}{P} \tag{4.14}$$

Because expenditures per pupil is a common measure of school finance, it will be used in the remainder of the model.

School District Expenditures per Pupil with TIF

For school districts that have one or more TIF districts, the school district does not collect tax revenue from the total property value of the TIF districts. Instead, it collects tax revenue only from the frozen, pre-TIF property value. To illustrate this, suppose there are two neighborhoods, a and b, within a school district. Neighborhood a includes all TIF district property within the school district and neighborhood b includes all non-TIF district property within the school district. In neighborhood a, property value increases over the frozen value; this increase is the capture. The school district does not collect revenue from the capture, only from the frozen property value, V_a°. Therefore, with TIF, expenditures per pupil is,

$$\frac{K(s)}{P} = (t_l - t_s)\frac{V_a^{\circ} + V_b}{P} + \frac{F_{s,f}}{P} + \frac{F_{s,o}}{P} + \frac{F_f}{P}, \tag{4.15}$$

where V_a° is the frozen property value from the TIF district and V_b is the remaining non-TIF district property value.

School District Expenditures per Pupil with TIF Spillovers

Now suppose that TIF creates externalities in neighborhood b, as suggested by Skidmore, Merriman, and Kashian (2009). Then, property value in neighborhood b is a function of TIF used in neighborhood a, where TIF denotes the property value increase in neighborhood a due to TIF,

$$V_b = V_b(TIF). \tag{4.16}$$

Making this substitution, the school district's budget constraint is,

$$\frac{K(s)}{P} = (t_l - t_s)\frac{\mathring{V_a}+V_b(TIF)}{P} + \frac{F_{s,f}}{P} + \frac{F_{s,o}}{P} + \frac{F_f}{P}. \tag{4.17}$$

Differentiating expenditures per pupil (4.17) with respect to (TIF) provides the effect of TIF on expenditures per pupil,

$$\frac{\partial\frac{K(s)}{P}}{\partial(TIF)} = \left(\frac{t_l - t_s}{P}\right)\frac{\partial V_b(TIF)}{\partial TIF}. \tag{4.18}$$

The sign of the first term depends on the relationship between the school district's tax rate and the foundation aid tax rate. The sign of the second term depends on the spillover effect, $\frac{\partial V_b(TIF)}{\partial(TIF)}$.

If the school district's tax rate exceeds the foundation aid tax rate, as it often does, the first term on the right is positive and the sign of the overall effect depends on the spillover effect. If neighboring properties benefit from TIF, $\frac{\partial V_b(TIF)}{\partial(TIF)} > 0$, then expenditures per pupil increase due to increases in property values that are not excluded from school district taxation. The magnitude of the increase equals the increase in property value multiplied by the difference between the school district tax rate and the foundation aid tax rate, weighted by the number of pupils. Some of the revenue generated from the increase in property values in local revenue is offset by a decrease in state aid.

If the school district's tax rate exceeds the foundation aid tax rate and neighboring property values suffer from TIF, $\frac{\partial V_b(TIF)}{\partial(TIF)} < 0$, then expenditures per pupil decrease. In this case, part of the decrease is offset by an increase in state aid.

If there are no spillovers, then $\frac{\partial V_b(TIF)}{\partial(TIF)} = 0$, and TIF has no effect on expenditures per pupil because the property tax base is not affected. If the school district's tax rate equals the foundation aid tax rate, any change in local property tax revenue is equally offset by a change in state aid. If the school district's tax rate is lower than the foundation aid tax rate, then the first term is negative. Although this is possible, it is not likely. Most school districts raise more revenue than what the state deems adequate. However, if a school district has a high enough tax base, it may be sufficient to impose a tax rate lower than the foundation aid tax rate. In this case, if there are positive spillovers, the effect of TIF on expenditures per pupil is negative because the decrease in state aid exceeds the increase in revenue raised at the local level. Alternately, negative spillovers increase expenditures per pupil and no spillover results in no change in expenditures per pupil.

Table 4.1 summarizes the effects of TIF on expenditures per pupil under positive spillovers, negative spillovers, and no spillovers and on the relationship between the school district's tax rate and the state aid foundation aid tax rate.

Table 4.1
The Effects of TIF on School Finance in the Presence of Spillovers

	$\frac{\partial \frac{K(s)}{P}}{\partial (TIF)}$		
	$t_l > t_s$	$t_l < t_s$	$t_l = t_s$
Positive Spillover	> 0	< 0	0
Negative Spillover	< 0	> 0	0
No Spillover	0	0	0

In summary, under the likely scenario that the school district's tax rate exceeds the foundation rate, we have the following results. With positive spillovers, an increase in TIF increases expenditures per pupil, *ceteris paribus*. This is the ideal outcome for the school district because the school district can have higher expenditures per pupil, without an increase in the tax rate. With negative spillovers, an increase in TIF decreases expenditures per pupil, *ceteris paribus*. This is the worst outcome for the school district because they will have to decrease expenditures per pupil. If an increase in TIF has no spillovers, expenditures per pupil is not affected.

School District Expenditures per Pupil with TIF Intensity

The nature of the spillover effect depends on TIF intensity, which is the capture as a percent of the total property value within the school district, $INT = \frac{capture}{V_a+V_b}$. First, non-TIF district property value is written as a function of TIF intensity. The equation is assumed to be quadratic to account for a non-linear effect. This will provide a way to test if the nature of the spillover effect changes with respect to TIF intensity. The growth rate of the non-TIF district property value is given by the following equation,

$$\frac{V_b - V_{b-1}}{V_{b-1}} = \alpha_o + \alpha_1 INT + \alpha_2 INT^2 + e, \qquad (4.19)$$

where e represents a normally distributed error term.

Taking the derivative of the growth rate with respect to TIF intensity yields,

$$\frac{d\left(\frac{V_b - V_{b-1}}{V_{b-1}}\right)}{dINT} = \alpha_1 + 2\alpha_2 INT. \tag{4.20}$$

Setting this equation equal to zero indicates the level of TIF intensity that maximizes property value growth. That value is

$$INT = \frac{-\alpha_1}{2\alpha_2}. \tag{4.21}$$

TIF intensity can then be incorporated into the school district's budget constraint to determine its effect on expenditure per pupil. Solving the growth rate (4.19) for the non-TIF district property value yields,

$$V_b = (1 + \alpha_o)V_{b-1} + \alpha_1 INT * V_{b-1} + \alpha_2 INT^2 * V_{b-1} + u, \tag{4.19}$$

where $u = e(V_{b-1})$. Substituting this into the school district's budget constraint (4.15), yields,

$$\frac{K(s)}{P} = (t_l - t_s)\left[\frac{\mathring{V_a}}{P} + (1 + \alpha_o + \alpha_1 INT + \alpha_2 INT^2 + u)\frac{V_{b-1}}{P}\right] + \frac{F_{s,f}}{P} + \frac{F_{s,o}}{P} + \frac{F_f}{P}. \tag{4.20}$$

Differentiating with respect to TIF intensity yields,

$$\frac{\partial \frac{K(s)}{P}}{\partial INT} = (t_l - t_s)(\alpha_1 + 2\alpha_2 INT)\frac{V_{b-1}}{P}. \tag{4.21}$$

If the school district tax rate exceeds the foundation aid tax rate, then $(t_l - t_s) > 0$. Property values and pupils are both positive. Therefore, the sign depends on the parameters α_1 and α_2. If $\alpha_1 + 2\alpha_2 INT > 0$, then higher TIF intensity leads to higher expenditures per pupil. If $\alpha_1 + 2\alpha_2 INT < 0$, then higher TIF intensity leads to lower expenditures per pupil. As before, setting this equation equal to zero provides the TIF intensity that maximizes the impact of TIF intensity on expenditures per pupil. As before, this occurs when, $INT = \frac{-\alpha_1}{2\alpha_2}$.

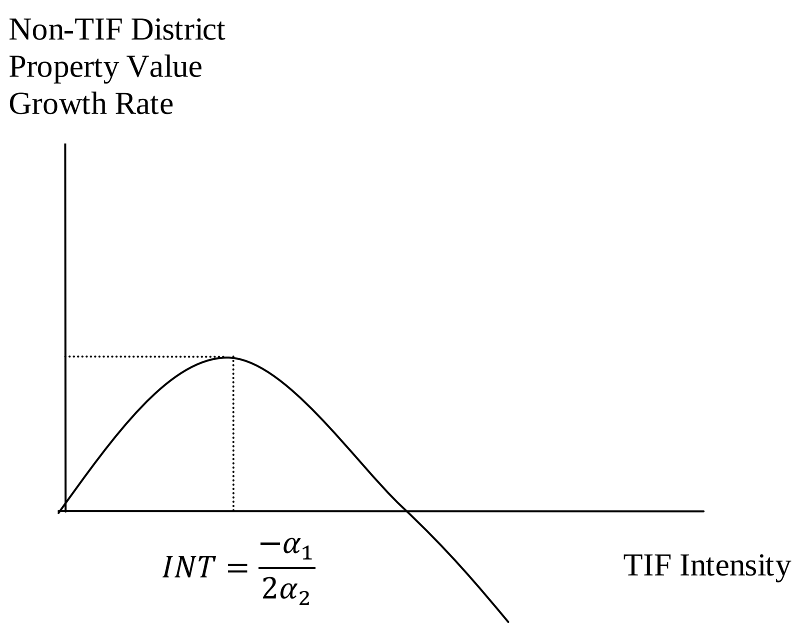
Testable Hypotheses

This model includes two parameters, α_1 and α_2. If $\alpha_1 > 0$, then there are positive spillovers from TIF on non-TIF district property value. If $\alpha_1 < 0$, then there are negative spillovers. If the effect of TIF on non-TIF district property value growth is linear, α_2 will be zero. However, if there is a non-linear effect, α_2 will be non-zero. In addition, if $\alpha_1 \neq 0$ and $\alpha_2 \neq 0$, then the sign of α_2 indicates whether spillovers increase or decrease over time. It is also possible that there is no spillover effect. In that case, both α_1 and α_2 will be zero. While the theoretical model is perfectly general, permitting the possibility of (1) no spillovers, (2) positive spillovers, or (3) negative spillovers, depending on the parameters as indicated above, it remains for the empirical evidence to provide support for these testable hypotheses.

Although Skidmore, Merriman, and Kashian (2009) find evidence of negative spillovers, they do not allow for a non-linear effect. I hypothesize that there may be positive spillovers with low levels of TIF intensity but negative spillovers with high levels of TIF intensity. TIF may be used sparingly or for small projects in areas of blight that would otherwise deter neighboring development. In these cases, TIF could be the impetus that attracts development and spurs property value growth in neighboring, non-TIF district property. Although TIF may initially stimulate non-TIF property value growth, after a certain point the spillover effect may be negative. If TIF is used excessively, it may attract development that would have occurred elsewhere in the school district in the absence of TIF. If businesses think they are likely to get approval for TIF, they may wait on non-TIF developments. If these hypotheses are true, then estimations of the values of α_1 and α_2 should be positive and negative respectively.

The TIF intensity that maximizes non-TIF district property growth is $INT = \frac{-\alpha_1}{2\alpha_2}$ from equation (4.21). If evidence supports this relationship, estimates of α_1 and α_2 can be used to estimate this TIF intensity. In addition, we can determine what levels of TIF intensity actually lead to a decline in non-TIF district property growth. Figure 4.7 illustrates this.

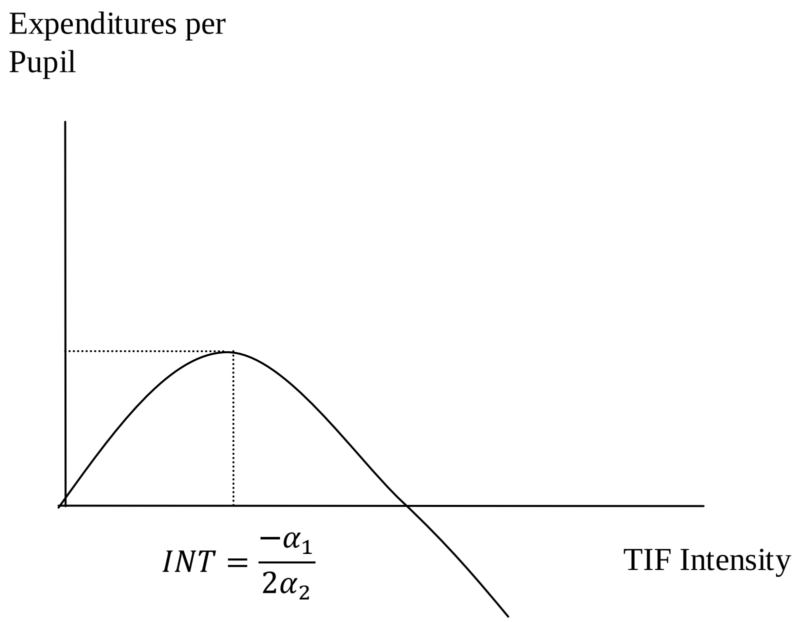
Figure 4.7
Non-TIF District Property Value Growth Rate



As seen in equation (4.21), the same TIF intensity that maximizes non-TIF district property growth also maximizes expenditures per pupil. Figure 4.8 illustrates this.

Figure 4.8

Expenditures per Pupil



The theoretical model developed in this chapter shows the effect of TIF on school finance through expenditures per pupil. It fills the gap in the literature by focusing solely on the school district's perspective. Unlike related previous studies, it incorporates property value spillovers resulting from TIF. As state and local governments experience increasing financial pressures, local economic development incentives such as TIF may become more popular among local governments. It is important to study this issue and learn how it impacts education.

This model can be extended to account for changes in state aid. For example, if the foundation aid tax rate increases, foundation aid will decrease with positive spillovers and increase with negative spillovers. As states feel pressure to provide more equity across school districts, they may take on more of the financial responsibility for primary and secondary education. If states shift the tax burden from the local level to the state level, they will decrease their reliance on local revenue for education finance. In this case, the effect of TIF on school finance will decrease. The next chapter uses data from Minnesota to empirically test the hypotheses from this model.

Chapter 5

Evidence from Minnesota

In this chapter, I empirically test hypotheses derived from the theoretical model developed in Chapter 4. I use data from Minnesota to determine the nature of the spillover effect of TIF on school finance. I also compare the results of the empirical estimation with the averages of the school districts to determine the spillover effects they have been experiencing in the 1990s and 2000s.

TIF in Minnesota

The TIF Act was created in 1979 to govern "the creation and administration of TIF districts" (Tax Increment Financing Legislative Report, 2005, p 4). Since 1979, TIF legislation has changed frequently and become more cumbersome. As a result, the 1995 Omnibus Tax Act established the Tax Increment Financing Division of the Office of the State Auditor (p 2), which enforces TIF legislation, collects data, and submits an annual report on TIF to the Legislature (p 5). TIF districts report to the TIF Division annually.

In Minnesota TIF is used primarily to "promote economic development, redevelopment, and housing in areas where it would not otherwise occur," (Tax Increment Financing Legislative Report, 2010, p 1). In 1996 there were 1,830 TIF districts and by 2003 there were 2,184 (Tax Increment Financing Legislative Report, 2005, p 26). Since 2004, the number of TIF districts has steadily declined (Tax Increment Financing Legislative Report, 2010, p 27). This was most likely spurred by changes in property tax laws in 2001 reduced the amount of revenue available for tax increments, decreasing the financial viability of new TIF districts. The average tax increment revenue per district decreased by 32 percent from 2001 to 2002 from $150,253 to $102,227 (Tax Increment Finance Legislative Report: 2005, p 26). As a result, the number of new TIF districts declined dramatically from nearly 150 in 2001 to less than 100 in 2002 and has been slowly declining since (Tax Increment Finance Legislative Report: 2005, p 27).

School Finance in Minnesota

Prior to 2001, school districts received funding from a combination of property taxes and state aid. Minnesota's foundation aid was 'equalized', where the local levy was calculated by "comparing a district's adjusted net tax capacity per pupil unit to the equalizing factor" which was "determined by dividing the basic formula allowance by the tax capacity rate" (Financing Education in Minnesota, 1997-1998, p 3). The state paid the difference between the formula allowance and the local levy.

In 2001, the state began to fully fund the general education levy in an attempt to reduce inequities that resulted from differences in local wealth across school districts. The general education levy was completely replaced with state education aid beginning in fiscal year 2003 (Minnesota School Finance History). School districts can still raise revenue from property taxes for specific expenditures but this must be approved by voters and is limited by state statute.

TIF and School Finance in Minnesota

The tax increment of a TIF district is the product of the original tax rate and the captured tax capacity of the TIF district (Minnesota House of Representatives 2006). The original local tax rate is the sum of the city, county, and school district tax rates in the year the TIF district is created. This applies to districts created after 1988; districts created prior to 1988 use the current local tax rate to determine the increment. Because the 2001 tax law change eliminated the general levy, education state aid is no longer a function of local property values and therefore not affected by TIF.

Data

Data for the empirical analysis come from the Minnesota Department of Revenue, the Department of Education, and the Office of the State Auditor. Data were provided for each year from 1992 through 2007. Data for TIF districts are from the Office of the State Auditor. These variables include the original net tax capacity, the current net tax capacity, and the change in net tax capacity for every TIF district in the state. The change in net tax capacity is the difference between the current and original net tax capacities and represents the property value that the school district cannot tax. The values for these variables are aggregated for all TIF districts within a school district to get the totals for each school district. The change in net tax capacity will be used to generate the TIF intensity of the school district and the current net tax capacity will be used to generate the non-TIF district property value. Total Real and Personal Net Tax Capacity for each school district was provided by the Department of Revenue. This is used to calculate the TIF intensity for each school district.

In addition, I include data on three other variables to provide a context for the size and location of the school districts. First, I include the average number of students in each school district, provided by the Department of Education. Next, I identify the school districts that are located in the Seven County Metropolitan Area. I use this to control for differences between metro and non-metro school districts related to economic development and property values. I also identify the school districts that are in the seven Iron Range counties. Due to mining in these counties, the taconite production tax is, "a major source of revenue to the counties, municipalities and school districts with the taconite assistance area," (Mining Tax Guide, 2010, p 1). It is important to control for this in empirical estimation because of its effect on school finance in the school districts in these counties. Table 5.1 includes the description and source of each variable.

Descriptive Statistics

Table 5.2 shows the averages of the variables that are used in estimation. The averages of these variables are also calculated separately for school districts with TIF and for school districts without TIF, represented in Tables 5.3 and 5.4 respectively. From 1992 to 2007, the number of school districts declined by 21 percent from 421 to 334. Most of the decline occurred in the early 1990s. During that time, the number of school districts with TIF increased from 248 to 266. In 1992, only 59 percent of all school districts had at least one TIF district. In 2007, that number increased to 80 percent.

As school districts consolidated over time, the average number of pupils per school district increased from 1823 in 1992 to 2411 in 2007. The average number of students in school districts with TIF was significantly higher than the average number of students in school districts without TIF. For the school districts with TIF, the average number of pupils fluctuated over the fifteen years, ranging from 2782 to 3136. School districts without TIF had between 449 and 602 students on average. This number also fluctuated over the fifteen years.

The next three variables in Table 5.3 represent information on TIF within the school district. The average net tax capacity change for school districts with TIF increased from $912,426 in 1992 to $1,118,733 in 2007. The increase was steady from 1992 to 2001 but in 2002, it declined dramatically.

Table 5.1
Variable Description and Sources

Variable	Description
Pupils[a]	Total resident ADM of all district residents, pre-kindergarten through grade 12
Original Net Tax Capacity[b]	The original net tax capacity of the TIF district. The original value is the base year value plus any adjustments for applicable classification changes, class rate changes, growth adjustment for economic development districts where applicable, etc.
Current Net Tax Capacity[b]	The current net tax capacity of all payable taxable property located within the TIF district that is payable in that year.
Net Tax Capacity Change[b]	The net tax capacity change equals the current net tax capacity minus the original net tax capacity. The net tax capacity change is set equal to zero when the calculated amount is negative.
Total Real and Personal Net Tax Capacity[c]	The total fully taxable real and personal taxable market value within the school district.
TIF Intensity	Net Tax Capacity Change divided by the Total Real and Personal Net Tax Capacity
Non-TIF Property Value Growth Rate	The growth rate of the difference between The Total Real and Personal Net Tax Capacity and the Current Net Tax Capacity.
Metro[b]	A dummy variable indicating whether the school district is located in the Seven County Metro Area. These include: Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington counties.
Iron Range[e]	A dummy variable indicating whether the school district is located in the Iron Range. These include: Aitkin, Cook, Crow Wing, Itaska, Lake, and St. Louis counties.

Source:

a. Minnesota Department of Education

b. Definitions from Minnesota Department of Revenue, Data from Minnesota Office of the State Auditor, Tax Increment Financing Division

c. Minnesota Department of Revenue, Property Tax Division

e. Minnesota Department of Revenue, Mining Tax Guide

Table 5.2
Averages for All School Districts

Year	n	Pupils	Original Net Tax Capacity	Current Net Tax Capacity	Net Tax Capacity Change	Total Real and Personal Net Tax Capacity	TIF Intensity	Non-TIF Property Value Growth	Metro	Iron Range
2007	334	2411	$134,957	$1,025,241	$890,967	$17,456,217	0.02	na	0.14	0.07
2006	337	2394	$134,631	$915,869	$783,217	$15,460,126	0.02	0.13	0.14	0.07
2005	338	2397	$129,195	$854,899	$726,975	$13,754,876	0.02	0.13	0.14	0.07
2004	337	2425	$129,289	$834,143	$705,604	$12,260,911	0.02	0.13	0.14	0.07
2003	337	2444	$127,204	$789,389	$662,835	$11,103,575	0.02	0.11	0.14	0.07
2002	338	2457	$127,764	$734,154	$607,295	$10,086,419	0.02	0.09	0.14	0.07
2001	339	2463	$207,080	$1,065,518	$860,638	$12,555,785	0.03	-0.13	0.14	0.07
2000	340	2465	$203,135	$945,957	$744,924	$11,261,615	0.03	0.08	0.14	0.07
1999	341	2467	$202,595	$894,552	$693,288	$10,523,626	0.03	0.06	0.14	0.07
1998	343	2444	$278,821	$925,568	$700,798	$10,468,455	0.03	0.00	0.14	0.07
1997	349	2390	$304,399	$980,637	$709,501	$10,678,978	0.03	-0.02	0.14	0.07
1996	356	2314	$271,691	$904,170	$642,477	$9,775,628	0.03	0.06	0.13	0.07
1995	376	2162	$235,839	$812,642	$582,353	$8,735,437	0.03	0.07	0.13	0.06
1994	390	2054	$218,982	$778,591	$563,397	$8,100,049	0.02	0.05	0.12	0.06
1993	408	1923	$217,766	$792,376	$577,318	$7,822,255	0.02	-0.02	0.12	0.07
1992	421	1823	$216,402	$751,618	$537,486	$7,649,876	0.02	0.03	0.11	0.06

Table 5.3
Averages for All School Districts with TIF

Year	n	Pupils	Original Net Tax Capacity	Current Net Tax Capacity	Net Tax Capacity Change	Total Real and Personal Net Tax Capacity	TIF Intensity	Non-TIF Property Value Growth	Metro	Iron Range
2007	266	2909	$169,458	$1,287,332	$1,118,733	$21,174,644	0.02	na	0.18	0.07
2006	267	2902	$169,927	$1,155,985	$988,554	$18,855,379	0.02	0.13	0.18	0.07
2005	270	2882	$161,733	$1,070,207	$910,065	$16,659,596	0.03	0.13	0.17	0.08
2004	268	2900	$162,576	$1,048,904	$887,271	$14,744,296	0.03	0.13	0.17	0.08
2003	268	2932	$159,955	$992,627	$833,490	$13,381,494	0.03	0.11	0.17	0.08
2002	268	2960	$161,135	$925,911	$765,916	$12,197,786	0.03	0.10	0.17	0.08
2001	267	2985	$262,921	$1,352,849	$1,092,721	$15,303,863	0.03	-0.13	0.17	0.08
2000	264	3002	$261,614	$1,218,279	$959,372	$13,830,235	0.03	0.09	0.17	0.08
1999	263	3045	$262,680	$1,159,857	$898,901	$13,170,196	0.03	0.06	0.17	0.08
1998	258	3076	$370,680	$1,230,504	$931,680	$13,384,726	0.04	0.00	0.18	0.08
1997	249	3136	$426,648	$1,374,468	$994,441	$14,273,464	0.04	-0.01	0.18	0.08
1996	247	3106	$391,587	$1,303,176	$926,000	$13,396,508	0.04	0.07	0.19	0.09
1995	247	3033	$359,010	$1,237,058	$886,497	$12,539,432	0.04	0.07	0.19	0.07
1994	242	3020	$352,904	$1,254,754	$907,954	$12,250,418	0.04	0.05	0.19	0.07
1993	244	2909	$364,133	$1,324,957	$965,351	$12,197,222	0.04	0.00	0.18	0.07
1992	248	2782	$367,360	$1,275,933	$912,426	$12,140,753	0.04	0.02	0.18	0.06

Table 5.4

Averages for All School Districts without TIF

Year	n	Pupils	Original Net Tax Capacity	Current Net Tax Capacity	Net Tax Capacity Change	Total Real and Personal Net Tax Capacity	TIF Intensity	Non-TIF Property Value Growth	Metro	Iron Range
2007	68	462	$0	$0	$0	$2,910,609	0.00	na	0.01	0.06
2006	70	456	$0	$0	$0	$2,509,658	0.00	0.13	0.01	0.06
2005	68	471	$0	$0	$0	$2,221,429	0.00	0.13	0.01	0.04
2004	69	577	$0	$0	$0	$2,615,299	0.00	0.12	0.03	0.03
2003	69	548	$0	$0	$0	$2,256,005	0.00	0.09	0.03	0.03
2002	70	532	$0	$0	$0	$2,002,898	0.00	0.07	0.03	0.03
2001	72	527	$0	$0	$0	$2,364,997	0.00	-0.13	0.03	0.04
2000	76	602	$0	$0	$0	$2,339,040	0.00	0.05	0.04	0.04
1999	78	519	$0	$0	$0	$1,599,934	0.00	0.05	0.03	0.04
1998	85	528	$0	$0	$0	$1,616,715	0.00	-0.02	0.02	0.04
1997	100	533	$0	$0	$0	$1,728,709	0.00	-0.03	0.02	0.03
1996	109	520	$0	$0	$0	$1,570,514	0.00	0.05	0.02	0.03
1995	129	493	$0	$0	$0	$1,451,819	0.00	0.06	0.02	0.05
1994	148	473	$0	$0	$0	$1,313,635	0.00	0.04	0.02	0.04
1993	164	457	$0	$0	$0	$1,313,157	0.00	-0.05	0.02	0.06
1992	173	449	$0	$0	$0	$1,212,087	0.00	0.04	0.02	0.06

Average original net tax capacity and average current net tax capacity also declined in 2002. This was most likely due to the "elimination of the local education levy subject to capture by TIF authorities" and "the decertification of large, pre-1979 districts," (Tax Increment Finance Legislative Report 2005, p 26). After 2002, the net tax capacities continued to increase once again.

As with the number of pupils, total real and personal net tax capacity is higher in school districts with TIF than school districts without TIF. In 1992 total real and personal net tax capacity in school districts without TIF was just over a million dollars, just 10 percent of the 12 million dollar total real and personal net tax capacity in the school districts with TIF. In 2007, total real and personal net tax capacity in school districts without TIF was under three million dollars and over 21 million dollar in the school districts with TIF.

!n 1992, TIF intensity for school districts with TIF was four percent. This means that the TIF capture, as measured by the net tax capacity change, was four percent of the total real and personal net tax capacity of the school district. This figure steadily declined to half that value to two percent in 2007. Even though change in net tax capacity due to TIF has increased over time, the increase in total tax capacity increased to a greater extent.

During this time period, the non-TIF property value growth rate for all school districts fluctuated from negative thirteen percent to positive 13 percent. The negative 13 percent growth rate between 2001 and 2002 was most likely due to changes in the tax law in 2001 referred to above. Since then, non-TIF district growth has been higher than the past years at slightly above ten percent. Similar figures are seen for the non-TIF property value growth rates in school district with TIF as seen in Table 5.4.

The metro variable indicates if the school district is located in the Seven County Metropolitan region. For this variable, the average represents the proportion. Since 1997, between 11 and 14 percent of all school districts are located in this region. Between 17 and 19 percent of the school districts with TIF are located in the metro region while only one to four percent of the school districts without TIF are located in the metro region. This may explain why the school districts with TIF have a larger number of pupils and higher total real and personal net tax capacity.

For all school districts, the proportion of school districts in the Iron Range is six and six percent over the 15 years. For school districts with TIF, the proportion is between seven percent and nine percent over the 15 years. For the school districts without TIF, the proportion is six percent in 1992, decreases to three percent and then increases to six percent in 2007.

Empirical Estimation

Using the data described above, I estimate two equations. First, I estimate equation (4.19) from Chapter 4, $\frac{V_b - V_{b-1}}{V_{b-1}} = \alpha_o + \alpha_1 INT + \alpha_2 INT^2 + e$. Next, I estimate the same equation with the inclusion of three additional variables, school districts in the Seven County Metropolitan Area ($METRO$), school districts in the Iron Range ($IRON$), and school districts that were consolidated between the two years of the growth rate ($CONSOL$),

$$\frac{V_b - V_{b-1}}{V_{b-1}} = \alpha_o + \alpha_1 INT + \alpha_2 INT^2 + METRO + IRON + CONSOL + e. \quad (5.1)$$

The non-TIF property value growth rate ($\frac{V_b - V_{b-1}}{V_{b-1}}$) is calculated by taking the growth rate of the difference in real and personal net tax capacity and the current net tax capacity of the school district. The difference between the real and personal net tax capacity and the current net tax capacity represents the non-TIF property value of the school district. TIF intensity (INT) is calculated by dividing the change in net tax capacity of the school district by the real and personal net tax capacity of the entire school district. In other words, this is the capture as a portion of the total property value in the school district.

The model is estimated by ordinary least squares using data from each of 15 time periods. Because of possible heteroskedasticity, White's heteroskedasticity-consistent covariance matrix estimator is used to obtain coefficient standard errors.

Results

Results for the model without the controls for $METRO$, $IRON$, and $CONSOL$ are shown in Table 5.5 and 5.6. The coefficient estimates for INT and INT^2 are reported for each time period from 1992-93 (listed as 1992) in Table 5.5 through 2006-07 (listed as 2006) in Table 5.6. The explanatory power of the regressions ranges from less than one percent to almost ten percent as measured by the R^2. Seven of the 15 years have statistically significant results, as measured by having both statistically significant coefficients and passing the F-test of overall significance. Of the seven years with significant results, five have both a positive coefficient for INT and a negative coefficient for INT^2 (1993, 1996, 2000, 2002, and 2003). These results support the hypothesis that TIF intensity initially stimulates growth in non-TIF district property value but eventually causes it to fall.

Table 5.5
Regression Results for TIF Intensity, 1992-1999

	1992	1993	1994	1995	1996	1997	1998	1999
INT	-.5854 ***	.7193 ***	.1832	-.0634	.3858 ***	.0817	.2626 *	.2899
	(.1346)	(.1286)	(.1179)	(.1705)	(.1005)	(.1233)	(.1601)	(.2062)
INT^2	1.8857 **	-1.6907 ***	-.5439	.5561	-1.1406 **	-.1808	-1.3756	-1.6409 *
	(.7389)	(.5993)	(.7641)	(.9642)	(.4869)	(.8851)	(1.3920)	(.8884)
R^2	.0436	.0982	.0118	.0022	.0439	.0030	.0112	.0048
n	408	390	376	356	349	343	340	339
F-test[a]	9.235 ***	21.081 ***	2.225	.386	7.934 ***	.519	1.911	.814

* 10 percent level of significance
** 5 percent level of significance
*** 1 percent level of significance
a. Test of the joint hypothesis that all coefficients, except the intercept, equal zero.
Coefficient standard errors are shown in parentheses.

Table 5.6
Regression Results for TIF Intensity, 2000-2006

	2000	2001	2002	2003	2004	2005	2006
INT	.8409 ***	-.5090 ***	.4983 ***	.5042 ***	.1345	-.1172	-.2752 **
	(.1408)	(.1970)	(.1693)	(.1805)	(.1470)	(.1041)	(.1253)
INT^2	-3.1791 ***	.2896	-2.2648 **	-3.0893 ***	-.9893	-.2575	.3502
	(0.7362)	(.8645)	(1.0410)	(1.0630)	(.7030)	(.4736)	(.5653)
R^2	.0978	.0510	.0255	.0214	.0027	.0174	.0095
n	339	338	337	337	337	337	334
F-test[a]	18.207 ***	8.993 ***	4.364 **	3.644 **	0.456	2.964 *	1.596

* 10 percent level of significance
** 5 percent level of significance
*** 1 percent level of significance
a. Test of the joint hypothesis that all coefficients, except the intercept, equal zero.
Coefficient standard errors are shown in parentheses.

However, six of the 15 years have statistically insignificant coefficient estimates for both α_1 and α_2, one year supports a positive linear relationship, one year supports a negative linear relationship.

The general patterns in the above results are supported by estimation of the model while controlling for $METRO$, $IRON$, and $CONSOL$. Those results are reported in Tables 5.7 and 5.8. Including the control variables increases the explanatory power of the regressions. The R^2 ranges from less than one percent to almost 20 percent. A test of joint significance for the control variables indicates that at least one of the control variables is significant in all years except 1995, 1998, 2005, and 2006. Of the remaining equations, five have a positive coefficient for INT and a negative coefficient for INT^2 (1993, 1996, 2000, 2002, and 2003). These results also provide evidence of an initial positive spillover effect followed by a negative spillover effect. For the remaining years, the results remain mixed.

In order to determine the TIF intensity that maximizes the property value growth, we can use the estimates of α_1 and a_2 to calculate $INT = \frac{-\alpha_1}{2\alpha_2}$. Using the coefficient estimates from Table 5.7, the optimal TIF intensity in 1993 was 21 percent.[9] This means that below 21 percent, more TIF intensity is associated with a higher non-TIF district property value growth rate but above 21 percent, a higher TIF intensity is associated with positive but lower non-TIF district property value growth rate. Using the coefficient estimates from Tables 5.7 and 5.8, the optimal value was 15 percent in 1996, 10 percent in 2000, eight percent in 2002, and six percent in 2003. According to the model, over

[9] -.6012/(2*-1.4629) = .2055 = 20.55%

this time period the optimal TIF intensity decreased, decreasing the length of the positive spillover effect.

The actual average TIF intensity of the school districts for these years was well below the estimated optimal values and has been decreasing over time. Average TIF intensity was four percent in 1993 and 1996; and three percent in 2000, 2002 and 2003. However, some school districts have had more than the optimal TIF intensity. The highest TIF intensity for an individual school district was 35 percent in 1992. Intensity decreased to 30 percent in 1997 and hovered around 25 percent from 1998 through 2007. Those school districts may have been experiencing negative spillover effects from such high TIF intensity, causing strain on their revenue generating capacity.

The above results provide evidence that school districts may or may not benefit from TIF within the school district, depending on the amount of TIF intensity. Based on the average TIF intensity, it appears that most school districts have benefited from positive spillover effects on non-TIF district property value. Although these results are supported by five of the fifteen years of data, the mixed results of the remaining ten years indicate that additional research is necessary to confirm the conclusion of these results.

Table 5.7
Regression Results for TIF Intensity and Controls, 1992-1996

	1992		1993		1994		1995		1996		1997		1998		1999	
INT	-.3010	**	.6012	***	.1505		-.1133		.2692	***	-.0067		.1754		.1323	
	(.1257)		(.1341)		(.1167)		(.1643)		(.1045)		(.1201)		(.1614)		(.1995)	
INT^2	1.3568	**	-1.4629	**	-.4782		.6525		-.9118	**	-.0306		-1.3133		-1.5891	*
	(.5808)		(.6171)		(.7492)		(.9417)		(.4551)		(.8223)		(1.4110)		(.8715)	
METRO	-.0480	***	.0184	**	.0063		.0088		.0213	***	.0171	***	.0157	***	.0322	***
	(.0081)		(.0082)		(.0071)		(.0095)		(.0069)		(.0065)		(.0056)		(.0060)	
IRON	-.0114		.0698	***	.0231	***	.0010		-.0089		-.0092		.0064		-.0048	
	(.0111)		(.0092)		(.0073)		(.0080)		(.0081)		(.0093)		(.0071)		(.0066)	
CONSOL	-.0012		-.0405	**	.0044		-.0001		-.0121		-.0383	***	-.0078		-.0672	
	(.0130)		(.0186)		(.0070)		(.0233)		(.0151)		(.0107)		(.0120)		(.0468)	
R^2	.0923		.1969		.0339		.0053		.0751		.0385		.0243		.0283	
n	408		390		376		356		349		343		340		339	
F-test[a]	8.172	***	18.828	***	2.594	**	.371		5.567	***	2.701	**	1.665		1.936	*
F-test[b]	11.879	***	20.484	***	3.556	**	.284		4.273	***	7.671	***	2.869	**	11.761	***

* 10 percent level of significance

** 5 percent level of significance

*** 1 percent level of significance

a. Test of the joint hypothesis that all coefficients, except the intercept, equal zero.

b. Test of joint hypothesis that the coefficients on METRO, IRON, and CONSOL equal zero

Coefficient standard errors are shown in parentheses.

Table 5.8

Regression Results for TIF Intensity and Controls, 2000-2006

	2000		2001		2002		2003		2004		2005		2006	
INT	.6045	***	-.0878		.3384	*	.3563	*	.0333		-.1387		-.2744	**
	(.1343)		(.1926)		(.1766)		(.1820)		(.1509)		(.1124)		(.1289)	
INT^2	-3.0225	***	-.2033		-2.2054	**	-3.0318	***	-.9472		-.2382		.3498	
	(.7369)		(.7725)		(1.0830)		(1.1070)		(.7349)		(.4814)		(.5671)	
METRO	.0447	***	-.0664	***	.0291	***	.0291	***	.0190	***	.0035		-.0006	
	(.0061)		(.0097)		(.0074)		(.0081)		(.0067)		(.0050)		(.0060)	
IRON	-.0131		-.0287	**	.0097		.0339	***	.0189	**	.0028		-.0058	
	(.0085)		(.0128)		(.0084)		(.0091)		(.0096)		(.0096)		(.0116)	
CONSOL[a]	-.1849	***	-.0508	***									-.0140	***
	(.0040)		(.0054)										(.0052)	
R^2	.1996		.1396		.0563		.0663		.0305		.0188		.0102	
n	339		338		337		337		337		337		334	
F-test[b]	16.613	***	10.772	***	4.956	***	5.897	***	2.610	**	1.590		.677	
F-test[c]	889.369	***	43.816	***	7.927	***	11.898	***	5.369	***	.269		3.890	***

* 10 percent level of significance

** 5 percent level of significance

*** 1 percent level of significance

a. There were no school district consolidations from 2001-02, 2002-03, 2003-04, and 2004-05.

b. Test of the joint hypothesis that all coefficients, except the intercept, equal zero.

c. Tests of joint hypothesis that the coefficients on METRO, IRON, and CONSOL equal zero.

Coefficient standard errors are shown in parentheses.

Chapter 6

Conclusion

This paper finds some evidence in support of spillovers from TIF on non-TIF property value growth within school districts but the overall finding is mixed. These spillovers are positive with low levels of TIF intensity but negative with high levels of TIF intensity. If a school district is experiencing positive spillovers, the school district benefits from higher revenue. If a school district is experiencing negative spillovers, the school district suffers from lower revenue. Evidence from Minnesota suggests that most school districts are benefiting from TIF through positive spillovers. However, some school districts have more than the optimal amount of TIF intensity. In these situations, school districts would be better off with less TIF and should be cautious about proposals for additional TIF districts.

The significant contributions of this paper are the use of school districts as units of observations, the inclusion of non-linear spillovers, and the measure of TIF intensity that uses property values. By focusing on school districts, I am able to begin to understand how TIF affects school finance. Including non-linear effects allows for the possibility of both positive and negative spillovers, depending on the magnitude of TIF within the school district. Measuring TIF with property values provides a richer measure of the size of TIF districts relative to all property value. This is a richer measure than a simple count of TIF districts. All of these contributions jointly shed light on the answers to the questions originally posed in the Introduction. First, it appears that TIF does affect non-TIF district property value within the school district in some cases. The non-linear effect is initially positive for low proportions of TIF but negative for high levels of TIF. However, more research should be undertaken to support this conclusion. As for the second question, this paper only answers that theoretically. Theoretically, TIF does affect expenditures per pupil. A natural extension of this paper would be to empirically support this answer by including data on educational expenditures in the estimation.

Another way to extend this research would be to take into consideration the type of TIF districts that are within the school district. Weber, Bhatta, and Merriman (2007) found both positive and negative spillovers in their research, depending on the type of TIF district. This may be difficult in school districts with many TIF districts, but could be controlled for in estimation through a variable that identifies the proportion of all TIF district property that is of a certain type of TIF district.

In addition, it is important to test for robustness of these results. One could collect data on other states that are similar to Minnesota during this time period. It would interesting to contrast these results with data from states that have less TIF use to see if evidence supports the non-linear effect of TIF on property value growth. Unfortunately, this may be difficult to do given the dearth of data available on TIF in most states, especially by school district.

It is also important to recognize the limitations of this paper. In particular, the results from this paper may not apply to Minnesota today. Data for this paper were from the years 1992 through 2007. Since then there have been changes in the school finance. As mentioned in Chapter 5, state funding now represents the majority share of the school district's revenue. Property value does not affect Minnesota's school finance as much as it once did. Even so, the results can be useful in states that have not moved in this direction. The results can also be useful in assessing and learning from the past.

Over the years, TIF has been a controversial topic as it relates to school districts. Many opponents of TIF argue that it takes revenue away from school districts. However, evidence from this paper does not support that claim. If anything, evidence from this paper suggests that TIF may actually help school districts raise more revenue, up to a point. Policymakers in Minnesota and other states should be aware of the non-linear effect and be open to the idea that TIF may be neither a friend nor a foe, but rather both, depending on the magnitude of its presence.

References

"A Minnesota Tax Increment Financing Glossary." Minnesota House of Representatives. 2006. http://www.house.leg.state.mn.us/hrd/issinfo/tifgloss.htm

Anderson, J. E. (1990). Tax Increment Financing: Municipal Adoption and Growth. *National Tax Journal*, 43(2), 155-163.

Anderson, J. E. (1994). Reducing Reliance on the Property Tax in School Finance. In J. Anderson (Ed.) *Fiscal Equalization for State and Local Government Finance* (pp.127-149). Westport, CT: National Tax Association.

Anderson, J. E. (2003). *Public Finance*. Boston, MA: Houghton Mifflin.

Berkman, M., & Plutzer, E. (2004). Gray Peril or Loyal Support? The Effects of the Elderly on Educational Expenditures. *Social Science Quarterly*. 85(5),1178-1192.

Brueckner, J. K. (2001). Tax Increment Financing: A Theoretical Inquiry. *Journal of Public Economics*. 81, 321-343.

Byrne, P. F. (2005). Strategic Interaction and the Adoption of Tax Increment Financing. *Regional Science & Urban Economics*. 35, 279-303.

Campbell, N. (2003). Do Lottery Funds Increase Educational Expenditures? Evidence from Georgia's Lottery for Education. *Journal of Education Finance.* 28 (Winter), 383-402.

Cohen, N. (1982). Community Assistance: The States' Challenge. *Intergovernmental Perspective*. 8(3), 14-21.

Council of Development Finance Authorities. (2008). *2008 TIF State-by-State Report*. Available at http://www.cdfa.net/cdfa/cdfaweb.nsf/fbaad5956b2928b086256efa005c5f78/6f8fca63dc04444b8625752700572be3/$FILE/CDFA-2008-TIF-State-By-State-Report.pdf

Dye, R. F. & Merriman, D. F. (2000). The Effects of Tax Increment Financing on Economic Development. *Journal of Urban Economics*. 47, 306-328.

Dye, R. F. & Sundberg, J. O. (1998). A Model of Tax Increment Financing Adoption Incentives. *Growth and Change.* 29, 90-110.

Fernandez, G. E. (2004). Tax Increment Financing: Interaction Between Two Overlapping Jurisdictions. *Journal of Urban Economics*. 55, 151-164.

"Financing Education in Minnesota 1997-1998." Minnesota House of Representatives Fiscal Analysis Department. http://www.house.leg.state.mn.us/fiscal/files/97fined.pdf

Forgey, F. (1993). Tax Increment Financing: Equity, Effectiveness, and Efficiency. In *The Municipal Yearbook*. (pp. 25-33). Washington, DC: International City Management Association.

Gordon, N. (2008). The Changing Federal Role in Education Finance Governance. (Ed.) In H. Ladd and E. Fiske. *Handbook of Research in Education Finance and Policy*. 295-313.

Hoxby, C. (1998). How Much Does School Spending Depend on Family Income? The Historical Origins of the Current School Finance Dilemma. *American Economic Review*. 88(2), 309-314.

Huddleston, J. R. (1981). Variations in Development Subsidies Under Tax Increment Financing. *Land Economics*. 57(3), 373-384.

Huddleston, J. R. (1984). Tax Increment Financing as a State Development Policy. *Growth and Change*. (April), 11-17.

Huddleston. J. R. (1986). Distribution of Development Costs Under Tax Increment Financing. *Journal of the American Planning Association*. 52, 194-98.

Johnson, C. & Kriz, K. (2001). A Review of State Tax Increment Financing Laws. In C. L. Johnson & J. Y. Man, (Ed.), *Tax Increment Financing and Economic Development: Uses, Structures, and Impact.* State University of New York Press, Albany. 31-56.

Lawrence, D. & Stephenson, S. (1995). The Economics and Politics of Tax Increment Financing. *Growth and Change*. 26(1), 105-37.

Lehnen, R. G. & Johnson C. E. (2001). The Impact of Tax Increment Financing on School Districts: An Indiana Case Study." C. L. Johnson & Joyce Y. Man, (Ed.), *Tax Increment Financing and Economic Development: Uses, Structures, and Impact.* (pp. 137-54). State University of New York Press, Albany.

Lindert, P. H. (2004). *Growing Public: Social Spending and Economic Growth Since the Eighteenth Century.* Cambridge University Press. United Kingdom.

Lukemeyer, A. (2004). Financing a Constitutional Education: Views from the Bench. (Ed.) John Yinger. *Helping Children Left Behind*. The MIT Press. Cambridge MA. 59-85.

Maher C. & Skidmore, M. (2008). Changing Education Finance Policy, School Referenda Activity, and School Rates. *Public Finance Review*. 36(4), 431-455.

Man, J. Y. & Rosentraub, M. S. (1998). Tax Increment Financing: Municipal Adoption and Effects on Property Value Growth. *Public Finance Review*. 26(6), 523-547.

McGuire, T. & Papke, L. (2008). Local Funding of Schools: The Property Tax and Its Alternatives. (Ed.) Helen Ladd and Edward Fiske. In *Handbook of Research in Education Finance and Policy*. 357-372.

"Mining Tax Guide." Minnesota Revenue. November 2010. http://taxes.state.mn.us/special/mineral/documents/2010_mining_guide.pdf

"Minnesota School Finance History: 1849-2005." http://education.state.mn.us/mdeprod/groups/Finance/documents/Publication/004107.pdf

Petersen, J. (2007). The State of Tax Increment Financing in the United States. *State Tax Notes*. 45(9), 601-604.

Picus, L., Goertz, M, & Odden, A. (2008). Intergovernmental Aid Formulas and Case Studies. (Ed.) Helen Ladd and Edward Fiske. In *Handbook of Research in Education Finance and Policy*. 257-275.

Poterba, J. (1997). Demographic Structure and the Political Economy of Public Education. *Journal of Policy Analysis and Management*. 16(1), 48-66.

Skidmore, M., Merriman, D., & Kashian, R. (2009). The Relationship Between Tax Increment Finance and Municipal Land Annexation. *Land Economics*. 85(4), 598-613.

Springer, M. G., Houck, E. A., & Guthrie, J. W. 2008. "History and Scholarship Regarding United States Education Finance Policy." (Ed.) Helen Ladd and Edward Fiske. In *Handbook of Research in Education Finance and Policy*. 3-22.

"Tax Increment Financing Legislative Report." State of Minnesota Office of the State Auditor. 2010 http://www.osa.state.mn.us/reports/tif/2008/tifLegislative/tifLegislative_08_report.pdf

"Tax Increment Financing Legislative Report." State of Minnesota Office of the State Auditor. 2005. http://www.osa.state.mn.us/reports/tif/2003/tifLegislative_03_report.pdf

Weber, R. (2003). Equity and Entrepreneurialism: The Impact of Tax Increment Financing on School Finance. *Urban Affairs Review*. 38(5), 619-644.

Weber, R., Bhatta S. D, & Merriman D. (2007). Spillovers From Tax Increment Financing Districts: Implications for Housing Price Appreciation." Regional Science and Urban Economics. 37, 259-281.

Weber. R., Hendrick R., & Thompson, J. (2008). The Effect of Tax Increment Financing on School District Revenues: Regional Variation and Interjurisdictional Competition. *State and Local Government Review.* 40(1), 27-41.

Yinger, J. (2004). State Aid and the Pursuit of Educational Equity: An Overview. (Ed.) John Yinger. *Helping Children Left Behind*. The MIT Press. Cambridge MA. 3-58.

Zimmer, R., & Jones J. T. (2005). Unintended Consequence of Centralized Public School Funding in Michigan Education. *Southern Economic Journal*. 71(3), 534-544.