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Case Study — Practicing Planner — Spring 2013

Fiscal Impact Analysis Using GIS in Anoka, Minnesota

by Linda Tomaselli

Editor's note: In the last issue of Practicing Planner (Vol. 10, No. 4, December 2012), the author described the inadequacies of simple fiscal impact analyses and then described how a GIS could be used to vastly improve such analyses (Tomaselli 2012). This case describes an application of the GIS method in Anoka, Minnesota.

Local government finance is very complex, and simple, quick methods of fiscal impact analysis do not foster adequate understanding given those complexities. This case demonstrates that planners do not have to rely on those rather simplistic methods currently being used. There is an alternative, one that I call the planning and enterprise approach to fiscal impact analysis, which relies on GIS. An enterprise GIS approach involves efforts by all departments to collect and share vital information that can be used across the organization.

The objective of fiscal impact analysis is to determine how fiscal impacts (revenues minus expenditures) vary on the basis of different types of land uses. Ideally, local governments would have "transaction processing" systems with which they could record the origin of every dollar of revenue that comes in and the destination of every dollar of expenditure that goes out. In such an instance, the fiscal impact of every land parcel (and every major land-use type) could be specifically measured. Local governments typically do not record information on where revenues come from, in terms of the specific address of the person or entity making the payment, or the cost of responding to an individual police call to an address. Surrogate factors are used to replicate information that a transaction system might provide.

The method described in this article was first described in the early 1980s. Back then cities did not have the GIS tools or data to apply it.¹ It is not a "model" per se; it is an approach or method based on the premise that all local government revenues and expenditures are spatial in nature, and that the best way to measure fiscal impact is to model the flows of those elements of local government finance by using GIS tools.

OVERVIEW OF REVENUES AND EXPENDITURES

Anoka is a city of about 18,000 located in the Twin Cities metropolitan area. It is the Anoka County seat and a once-freestanding small city that now has been engulfed by suburbia. Figures 1 through 4 show operating revenue, operating expenditures, capital revenues, and capital expenditures, respectively, for Anoka in 2009. Property taxes are the largest source of operating revenue (56 percent) in Anoka, with charges for services accounting for 16 percent of operating revenue (Figure 1). The largest operating expense category in Anoka is for public safety, at 45 percent (Figure 2). The majority (50 percent) of Anoka's capital revenues are from tax increment financing districts (described further below), as indicated in Figure 3. Most (64 percent) capital expenditures are for street renewal, as shown in Figure 4. All data used in this case are for 2009.²

City of Anoka, MN, 2009 Operating Revenue (\$)

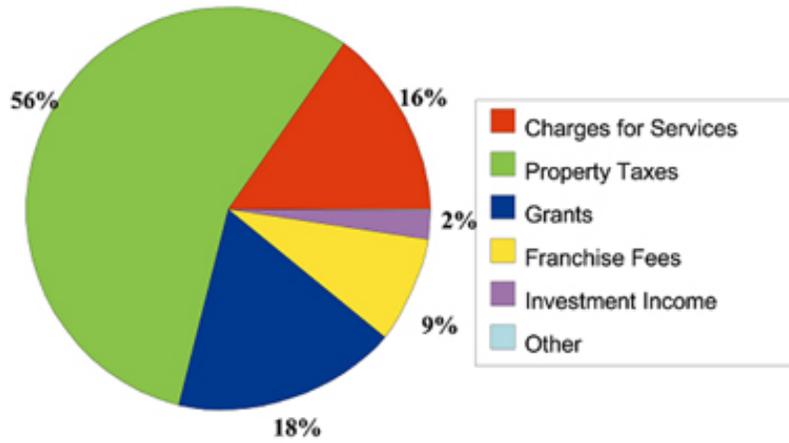


Figure 1

City of Anoka, MN, 2009 Operating Expense (\$)

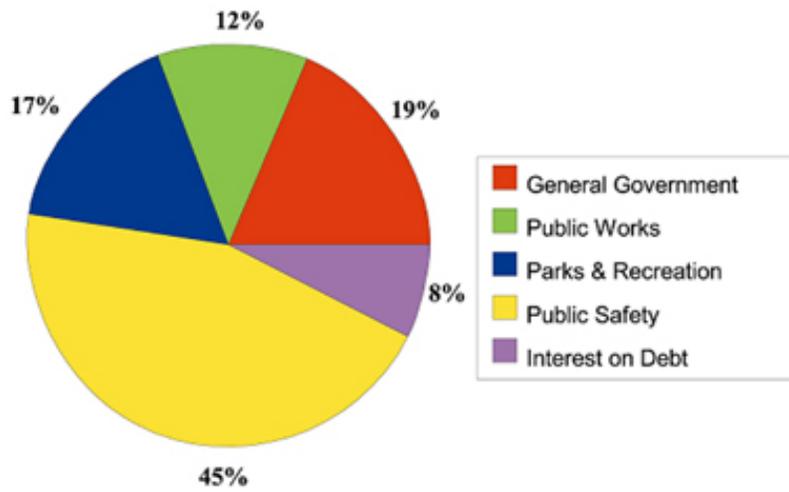


Figure 2

City of Anoka, MN, 2009 Capital Revenue (\$)

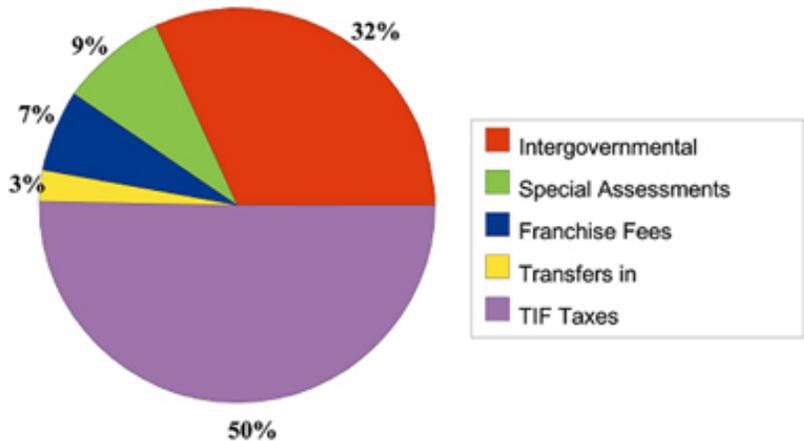


Figure 3

City of Anoka, MN, 2009 Capital Expenditures (\$)

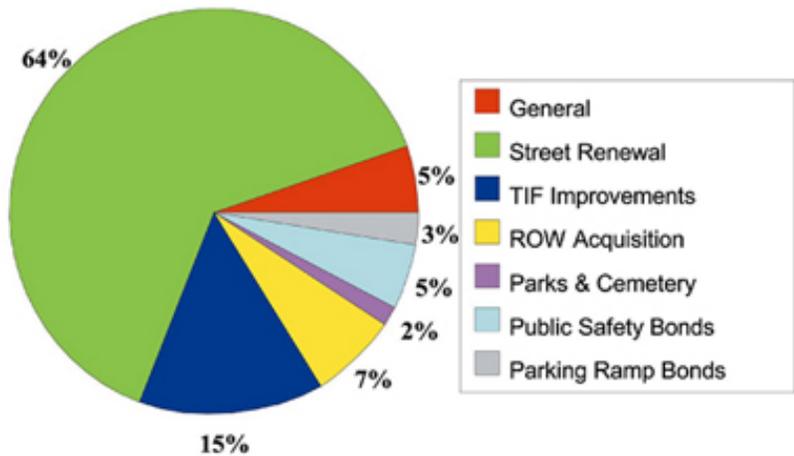


Figure 4

The Minnesota Fiscal Disparities Law and Tax Increment Financing (TIF) in Anoka have a big impact on how property taxes are collected, deserving of further explanation below.

Twin Cities Fiscal Disparities Revenue Distribution

Anoka has a unique context with regard to revenues. One factor that affects revenue in the Twin Cities region of Minnesota is the fiscal disparities revenue distribution law. Since 1971, that law has resulted in the collection of 40 percent of the growth in commercial and industrial development into a regional pool. The value, and resulting tax revenue, is distributed back to cities based on the inverse of market value per capita. The result is that cities in the region that have a lower market value than the regional average receive more revenue, and those with a higher value receive less revenue. This is a complicating factor that requires adjustments in the revenue methods used for fiscal impact analysis. In Anoka's case, the city contributes a large amount of revenue to the regional pool but receives more

revenue back than it contributes due to its population and market value as a low- to moderate-income city.

Capital Revenues from Tax Increment Financing

TIF revenues also pose another unique challenge with regard to revenue allocation for the fiscal impact analysis method. In Minnesota, cities may establish specific TIF districts and make improvements to the land in those districts. The incremental tax revenue that is collected (or "captured") from new development in the district is dedicated to pay for the improvements. The city of Anoka has five tax increment financing (TIF) districts, which bring in \$2.5 million, accounting for about 50 percent of the city's capital revenue. About \$1.1 million is captured local (city) revenue, and \$1.4 million is captured from the schools and county.

IMPLEMENTING THE METHOD

Parcel Level Database

The basic input component for the method is the parcel level database (see Table 1). A parcel level database is needed because the parcel is almost always the lowest common denominator for land use. Therefore, the first key step of the GIS method of fiscal impact analysis is to develop a database at the parcel level. Typically, local governments have already developed a parcel-level database that is used by tax assessors. In the case of Anoka, attributes already in the database included: parcel identification number, owner name, parcel address, land-use type, structure type, year built, homestead status, market value, and taxes, among others. A very generalized land-use map is shown in Figure 1. In actuality there were more than 70 detailed categories.

Table 1. Major Components of Anoka's GIS Database

County Tax Parcel Database (Existing)	Attributes Added for Fiscal Impact Analysis
Parcel identification number (PIN)	Population (estimated)
Parcel address	Type of housing unit
Owner name	Employment by employer address
Taxable use	Police calls
Structure type	Fire calls
Year built	Road frontage by jurisdiction
Market value	Sidewalk frontage
Building value	Electrical and water billing
Taxes and tax capacity	Others
Homestead and exemption status	
Special assessments	
Tax district (e.g., tax increment financing)	

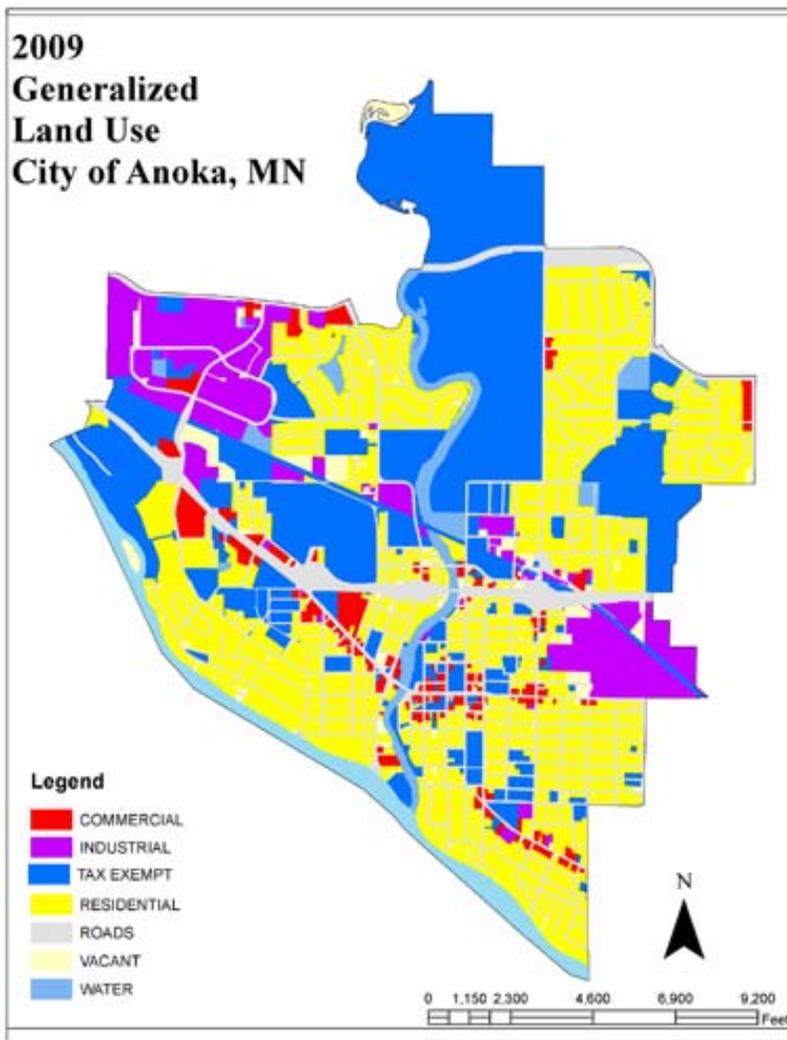


Figure 5

Generalized land use 2009

Parcel Database Embellishment

Measurable items useful in fiscal impact analysis can be obtained or estimated at the parcel level for additions to the basic parcel database. Additional data need to be added that indicate or approximate revenue and expenditure streams of the local government. We worked with the city's finance director to separate operating expenditure items (i.e., those recurring every year from capital items, which may vary significantly from one year to the next.) Operating items represented two-thirds of Anoka's budget and capital represented approximately one-third. Based on input from members of the police department, public works, parks and recreation, planning, community development, and the city manager, surrogate factors that best indicated the revenue and expenditure categories were identified.

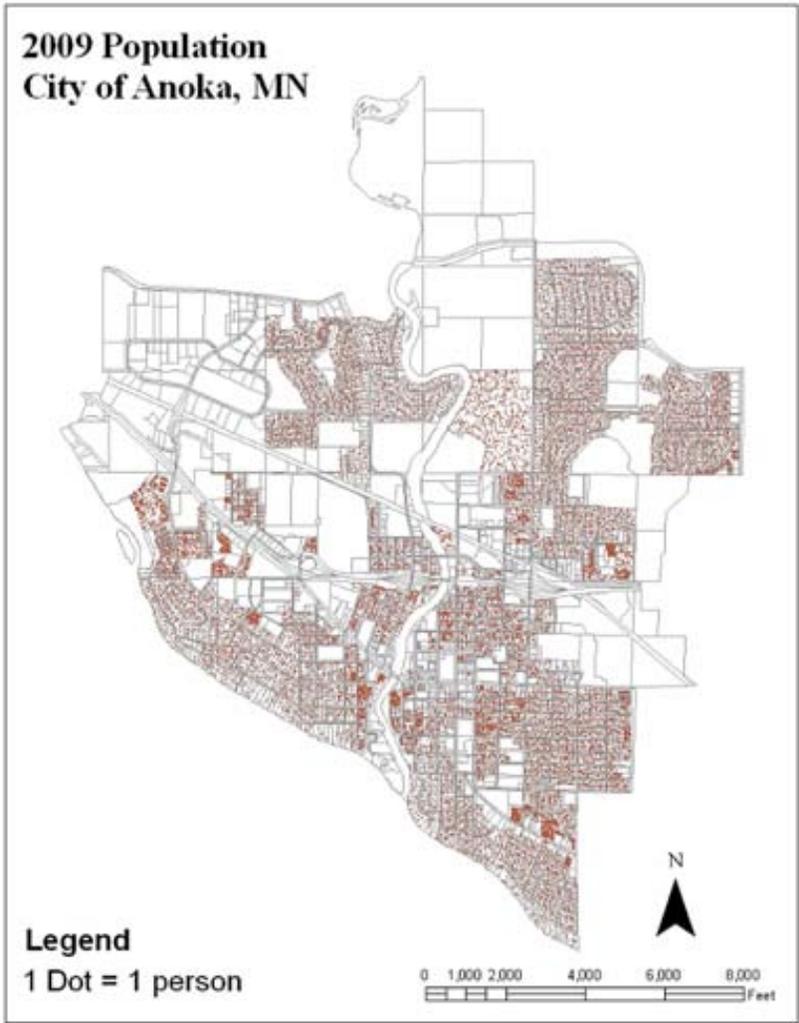
For some factors, data could be directly assigned, such as property taxes. For others, data have to be allocated. Weights were assigned to each of the factors, depending on the best judgment of city staff as to how the factors contribute to each budget item. Surrogate indicators of local government revenues and expenditures added to the Anoka GIS method (Table 1) included: population, type of housing unit (if residential), employment (if nonresidential), police calls, fire calls, road frontage, sidewalk frontage, and electrical billing. Grant revenues were allocated using the same formula used by the granting agency, and

electrical franchise fees (revenues) were distributed based on electrical billing. Electrical billing was also a very important database that was address-matched, since it represented more than \$1 million in surplus revenue from the enterprise fund, out of a \$10 million operating budget in Anoka.

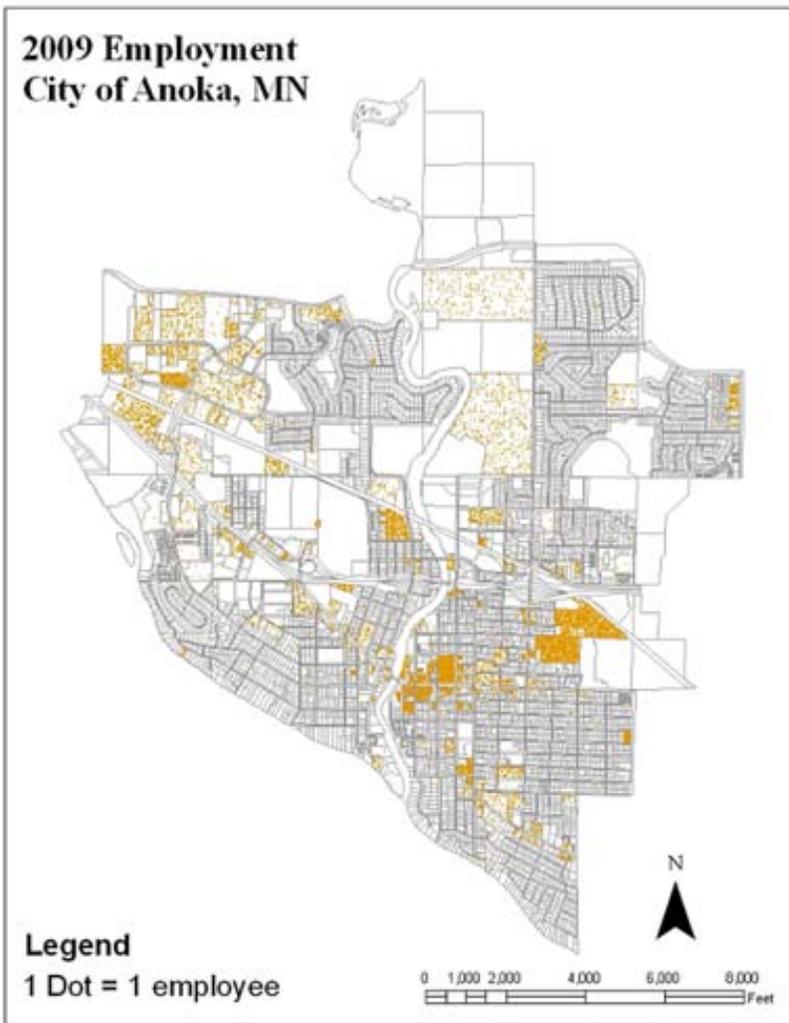
Fiscal impact methods rarely, if ever, include the study of tax-exempt properties. Anoka has many tax-exempt land uses such as churches and charitable institutions. Including roads, nearly half of the land area of the city is tax-exempt. Consideration of tax exemptions was a unique feature of the Anoka fiscal impact analysis project.

Population and Employment

Population, shown on Figure 6, was estimated by using the known counts of housing units by type and using per unit multipliers supplied by Excensus, a demographic statistics company. Our unit counts were based on the tax parcel list and an inventory of apartment units from the city, which licenses all multi-family rental units. Employment numbers, shown on Figure 7, came from a city survey of all businesses, including home-based businesses. This data had already been collected as part of the city's economic development activity.



▣ Figure 6
Anoka's Population Distribution

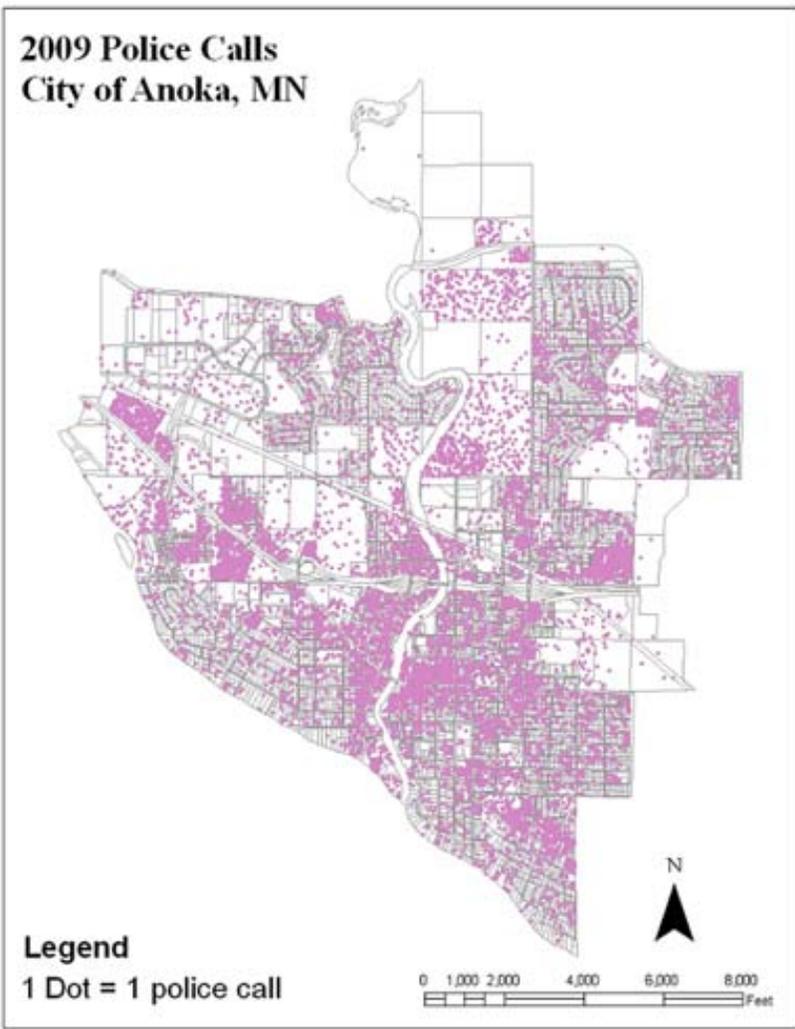


▣ *Figure 7*

Anoka's Employment Distribution

Police

The distribution of police calls is shown on Figure 8. I created a database of all of the police calls for one year from a portable document file (pdf) generated from the police dispatch system. The database was address-matched to the parcel addresses to determine this distribution. Expenditures for many police calls can be directly allocated to specific parcels. In the case of calls to intersections or to blocks, they were matched to an intersection database and then were spatially allocated to parcels within the vicinity of the call (this same matching was done for fire calls as well).



▣ *Figure 8*

Police Calls in Anoka

To distribute public safety costs, it was estimated that 50 percent of the regular police expenses were attributable to police calls, and the remaining 50 percent was based on the overall need for a police presence in the city, including routine patrolling to protect both people and property. Public safety expenses (50 percent) that could not be directly attributed in those ways were allocated based on population (20 percent), employment (10 percent), and property market value (20 percent).

It should be noted that the weights for the surrogate factors, such as population or market value, needed for all revenue and expenditure items, not just police, were provided by city staff, using their expert opinions.

The police department contracts out for services to specific parcels, so there is revenue for those services that can be allocated directly to the parcels involved. Revenues produced by the police department include police call fees, fines, and liquor license fees for commercial restaurants, which can be directly allocated.

Roads

Most (64 percent) of Anoka's capital expenditures are for street renewal. The city is systematically renewing streets, neighborhood by neighborhood, with new base, pavements,

and curbs and gutters. These capital expenditures are paid for with special assessments, grants, and excess Tax Increment Financing (TIF) revenue.

We also developed "right-of-way parcels" including the attributes of road name, road type, and jurisdiction to allocate certain revenues and expenditures. Jurisdiction is important because the county and state maintain some of the streets, while other local streets generate revenue by means of Minnesota Street Aid (MSA). Using a centerline file to split rights of way down the middle and closing them off at intersections, right of way polygons or parcels were created. Where appropriate, right of way polygons and parcels were intersected using GIS with abutting parcels to facilitate fiscal impact analysis.

Table 2 summarizes road and sidewalk frontage by residential type in Anoka. Note the large difference between apartments and single-family detached.

Table 2. Road Frontage per Unit by Jurisdiction and Residential Land-Use Type in Anoka, 2009

Land Use	Total Housing Units	Road Frontage per Housing Unit (feet)						Sidewalk Frontage (feet)
		Local	MSA	County	State	US Highway	Total Frontage	
Apartment	2,710	6.38	2.08	1.37	0.58	0.19	10.55	3.92
Condominium	33	0.00	18.45	0.00	0.00	0.00	18.45	6.16
Duplex	315	50.70	11.87	4.94	1.88	2.67	72.06	21.32
Quad Homes	84	25.33	0.00	4.46	0.00	0.00	29.80	0.00
Twin Homes	22	60.32	15.00	6.14	0.00	0.00	81.45	15.77
Single-Family Attached	712	50.37	9.17	5.23	2.71	0.75	68.23	18.44
Single-Family Detached	3,526	94.00	12.52	4.64	2.53	0.53	114.23	24.57
Totals	7,402	54.59	8.24	3.50	1.76	0.51	68.57	15.90

Parking

When the direct source of parking revenues could be determined, those parking revenues were allocated directly to the parking lot parcel. In more ambiguous cases, such as general government charges for services, the following surrogate expenditure factors and allocation weights were used: population (40 percent), employment (10 percent), and market value (50 percent).

Other Facilities and Services

Fire expense was allocated separately by fire call locations. For parks and recreation, the expense was distributed based primarily on population, but to a lesser extent on employment. Public works expenditure was distributed based on the amount of locally maintained streets and sidewalks. General government was less obvious; we used population, market value, and employment to allocate expenditures.

Revenue Adjustments

Property taxes are directly tied to land parcels, but there are adjustments that have to be

made before determining the amount of property tax and other revenues that are derived from each parcel.³ The GIS method in Anoka deducted the Fiscal Disparities contribution from the affected commercial / industrial parcels, and allocated the distribution back to the residential parcels based on the inverse of market value per capita. Without the Fiscal Disparities law, the city would not contribute 40 percent of its commercial / industrial growth (\$791,134 in equivalent property taxes), but then again it would not receive the distribution from the regional tax base pool (\$1,260,285 in taxes), resulting in a net revenue loss of \$469,151. TIF revenues also had to be allocated to the TIF district parcels as identified in the parcel file. Without the electrical utility data included in this method, the city would not have \$1,363,989 in revenue, 54 percent of which comes from commercial and industrial land uses. Lastly, without TIF, the city would not capture \$1,387,040 from the other taxing jurisdictions, such as the school district and county. Most of that revenue comes from commercial and industrial development, although some of the revenue comes from apartments and single-family attached residences. All told, without these sources, a more typical city would have \$3,220,180 less revenue.

Understanding the impact of these revenue adjustments is difficult. But since they are based on measurable factors that can be traced back to parcels, these impacts can be mapped and measured, as shown in Figure 9.

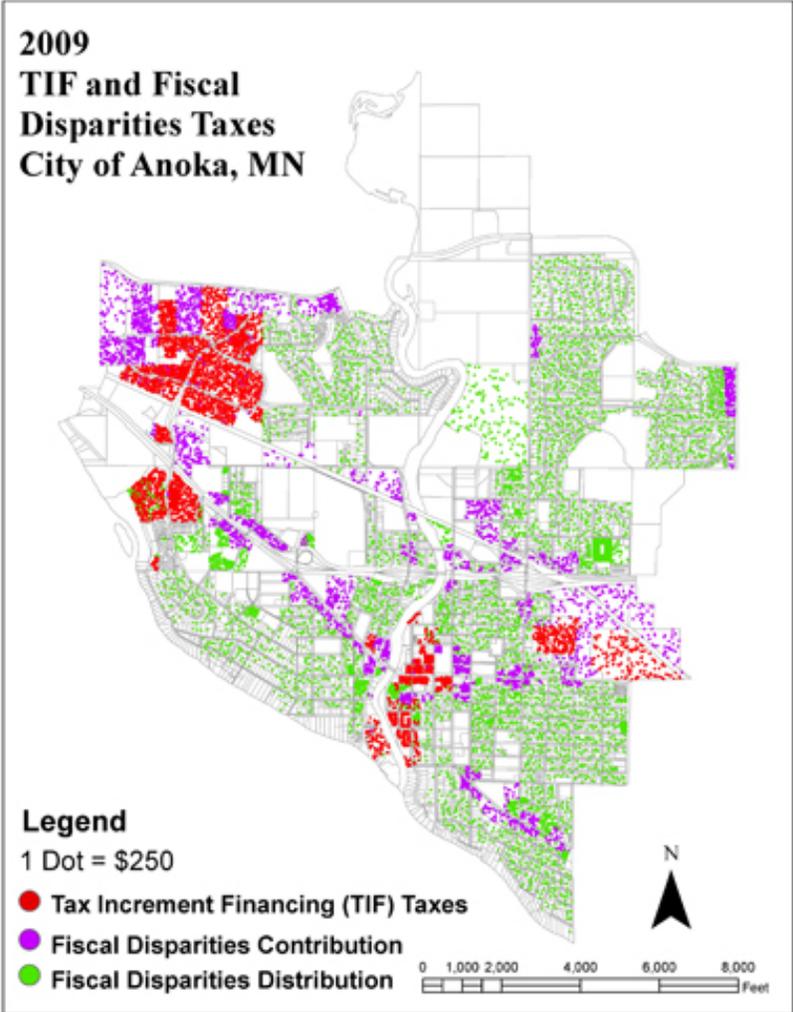


Figure 9

TIF and Fiscal Disparities Taxes

OUTCOMES

The fiscal impact of the combined operating and capital budget of Anoka is shown on Figure 10.

The colors shown as shades of red indicate a deficit (expenditures exceed revenues); the green shaded colors show surpluses (revenues exceed expenditures). Because of the parcel level database, each revenue or expenditure item could be individually mapped, as well as just the operating or capital fiscal impact.

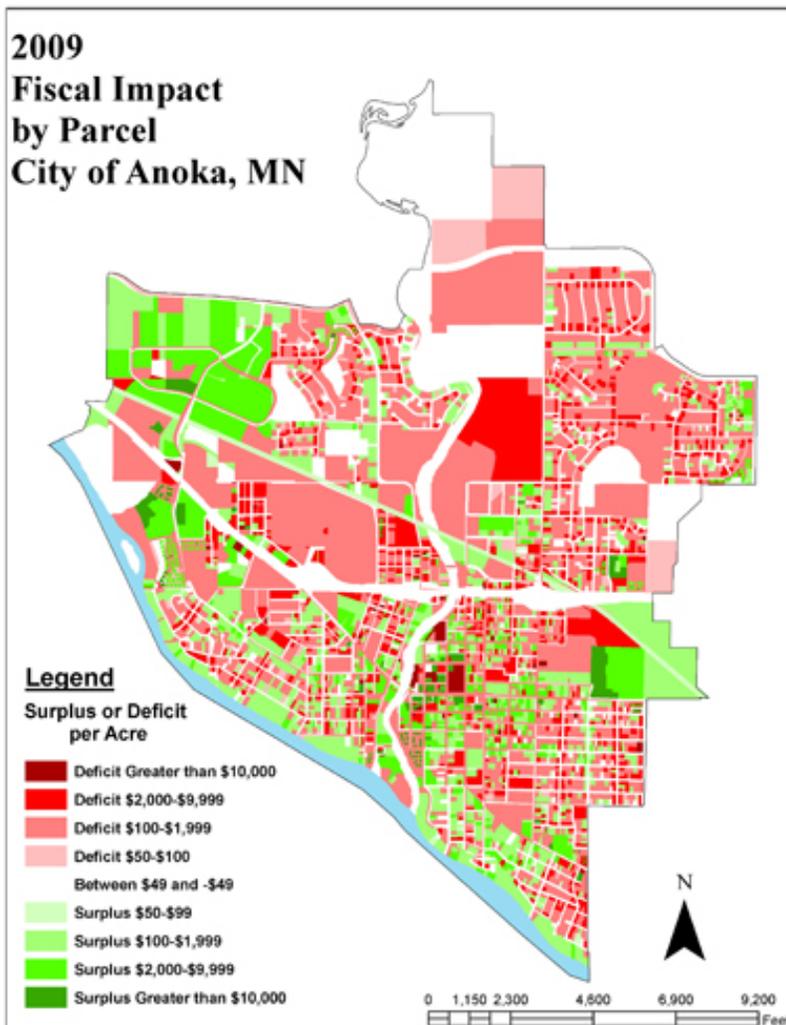


Figure 10

Fiscal Impact by Parcel

Commercial and Industrial

Commercial and industrial uses have differing fiscal impacts, as shown in Figure 11. In terms of per acre results, fiscal impacts of commercial land use are somewhat exaggerated because they tend to be more compact in land area than industrial. Overall, industrial land uses provide Anoka with a total surplus of \$943,199, while all of the commercial uses provide a surplus of \$531,071.

Residential Fiscal Impact
With and Without TIF, Fiscal Disparities and Electrical Revenue

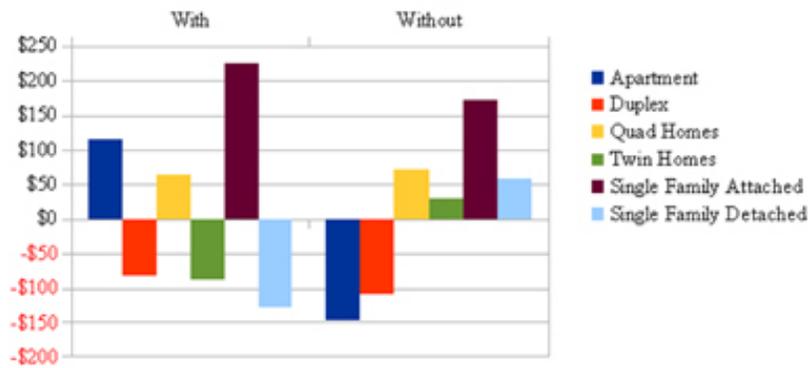


Figure 11

Commercial/Industrial Total Surpluses per Acre

In Anoka, these surpluses are higher than what might normally be anticipated because many of these uses are in TIF districts, resulting in extra, non-local revenue captured from the school district and county. These uses also generate a significant amount of revenue from the electrical utility, which is unique to Anoka. However, at the same time, the surpluses are reduced by the city's contribution to the Twin Cities Fiscal Disparities tax base sharing pool.

It is important to recognize that these results are unique to Anoka. Without these revenue adjustments for TIF, the electrical utility, and the Fiscal Disparities law, commercial and industrial land use would still provide surpluses over expenditures to Anoka, but the surplus would be significantly reduced by more than \$1 million.

Residential

Anoka has several different residential land-use categories, with more than 2,500 apartments, 3,500 single-family detached units, nearly 300 duplexes, and close to 700 single-family attached residences. The results (Figure 12) are skewed somewhat because some of the apartments and single-family detached are in TIF districts and bring in captured non-local revenue. The city also has some condominiums, but they were just in the final stages of completion and occupancy, and did not provide reliable results at that point in time. Note again that these results are unique to Anoka. Without the revenue adjustments of TIF, the electrical utility and Fiscal Disparities, apartments would go from a surplus to a deficit and single-family detached would go from a deficit to a surplus.

Anoka Commercial/Industrial Total Surpluses per Acre

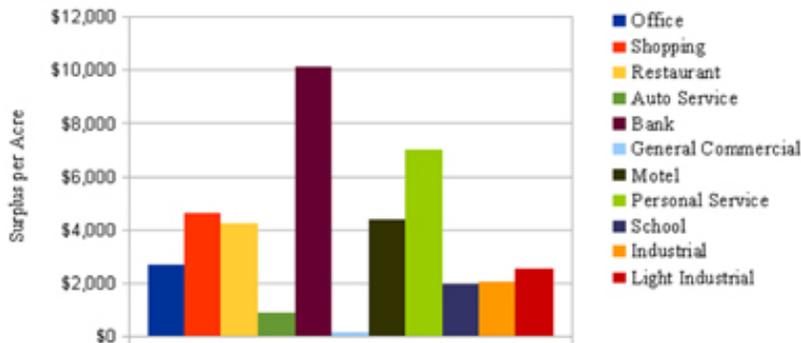


Figure 12

Residential Fiscal Impact

Another one of the many important findings from using this GIS method showed that housing built before 1987 has deficits (expenditures exceed revenues), and the deficits are greater for non-owner occupied (non-homestead) units. Housing built since 1986 results in a surplus (revenues exceed expenditures), but the surplus is smaller for non-homesteaded units.

Apartments are often looked upon negatively due to the typical observation that they have more police calls than detached units. However, in Anoka, I found that newer apartments (i.e., built since 1986) have a substantially lower average number of calls per unit (1.09) than those built earlier (2.00). This is very comparable to the average rate of police calls per units for single-family detached housing types (1.02) (see Table 3).

Table 3. Police Calls to Apartments by Year Built

Year Built	Occupied Apartment Units	Police Calls	Police Calls per Unit
Before 1987	1,667	3,331	2.00
1987-2009	881	957	1.09
Total	2,548	4,289	1.69

The above are only a few examples of the wealth of information derived from using the GIS method.

Costs of the Enterprise GIS System

Developing the database consumed about half of the time (420 hours) required to complete and apply the system. Without the items unique to Anoka, the work for an average city of 18,000 people would be about 280 hours. Using an hourly rate of \$75, development of the database cost \$31,500.

The cost of developing a system of the sort used in Anoka largely depends on what the city already has available. Anoka had detailed data from an employment survey, which provided employment numbers at the parcel level. The county provided most of the parcel data in a single file, but other items had to be added, such as homestead status and TIF parcels. Larger cities would require more time, particularly when it comes to standardizing addresses for matching police calls and digitizing road frontage parcels. The cost of analyzing the city's financial reports will also vary with the complexity. Interaction with city staff will vary by jurisdiction, depending on what the city leadership wants, and what the final product deliverables will be.

LESSONS LEARNED

Overcoming the lack of data about geographically specific municipal expenditures requires the use of surrogates. Most cities do not organize information in a manner where it can be allocated to specific places or users within the community. In short, cities do not usually "geocode" their expenditures. Fiscal impact analysts will have to accept the fact that the "ideal" transaction processing system alluded to in this case is not possible or at least highly unlikely. Yet, analysts can use surrogates, which in the opinion of city staff, best reflect the costs, for lack of a better way. Although cities typically don't go this far in their analyses, this case urges that, by using reasonable surrogates, cities could attribute costs of facilities to different users to better understand the geographical implications of those distributions of costs, and therefore, the effects that different land uses have on municipal expenditures.

The method can measure more than just fiscal impacts. In addition to measuring differences among land uses, results from the enterprise GIS method can be cross tabulated by homeowner status, age of structure, neighborhood, building square footage, and so many other characteristics. Because the GIS method is based on a parcel level database, it is possible to look at only the fiscal impacts of recent development, which are probably better indicators of future new development than looking at all existing development. City leaders who want to better understand the complexity of local government revenues and expenditures by land-use type should support development of a comprehensive parcel-level planning database including several financial indicators. Leaders should view the development of the database as an investment because it can be used for daily planning decisions beyond just fiscal impact. Recently, the city of Bloomington, Minnesota, asked the legislature to consider a change to Fiscal Disparities because of the service costs for the Mall of America. If they had a system like Anoka's, they could have shown the impact to make their case.

The method can be incorporated into or used to improve other assessment tools. Over the last few years there have been discussions and efforts about incorporating fiscal impact assessment into tools that attempt to measure community impacts and benefits of various land-use patterns, such as CommunityViz, Envision Tomorrow, Index, Urban Foot Print, and others. The fiscal impact method described here holds potential for advancing the reliability of these other assessment tools.

Recognize obstacles; acknowledge why the enterprise GIS method has not seen widespread application. Why don't more cities use GIS to measure fiscal impact? I can conjecture some of the answers to this question, ranging from practical to cynical: cost, time, lack of staff expertise, lack of GIS resources, complexity, lack of curiosity, preconceived ideas, and even developer influence. To be sure, the development of the database will require resources, whether it is for in-house staff or the hiring of a consultant to help the staff. In Anoka, the city does not yet have the staff capability to do ongoing maintenance of data such as police calls or electrical billing allocated to parcels. And the city's finance department does not have its reporting system set up to quickly separate operating from capital items. These are indicative of some of the challenges to implementing the ideal method proposed in this article.

Guard against inappropriate use of this tool. Some of the fiscal impact analyses being done today are undertaken to promote some public or private action, and the results are reported in a positive context. Such efforts are easily discounted because they either report only the good points and not the bad, or because they fail to embrace the complexity of urban economics. The method described here is devoid of such extraneous purposes — there is no agenda here.

Recognize unique local fiscal circumstances and use data from other jurisdictions with caution. Most fiscal impact assessment methods do not adequately account for Tax Increment Financing districts, or revenue redistribution programs such as the Minnesota Fiscal Disparities law for the Twin Cities region. Anoka has several unique revenues that required extra work if they were to be accurately incorporated into the fiscal impact analysis method. Such unique revenue adjustments would not necessarily be needed for the typical city of comparable size. Yet, all cities should consider their unique financing sources, such as surpluses from enterprise funds.

Linda Tomaselli earned a BA, MA, and PhD in geography from the University of Minnesota. She worked as a planner for the Twin Cities Metropolitan Council. While at the council, she provided local planning assistance to cities and townships, particularly in developing financial analyses and capital programs. In 1988 the National Science Foundation (NSF) awarded

Tomaselli a grant to produce a case study of fiscal impact methods for the City of Anoka, Minnesota. That project became the basis for her PhD dissertation, and the Urban and Regional Information Systems Association (URISA) awarded her its highest honor, the Horwood Critique Prize. Since then, she has worked as a consultant to county and city governments at her company, GIS Research and Development Consultants (GISRDC).

Notes

1. I got started on fiscal impact analysis back in the early 1980s after I was assigned the task of helping communities develop capital improvement programs as part of their comprehensive plans. I found not only that their capital improvement plans were rarely related to their comprehensive plans, but also that cities lacked the ability to assess what the fiscal impact would be of their land-use plans and resulting capital improvements. I looked at the "state of the art" in fiscal impact methods and found them also lacking. The methodology was conceived as early as 1982, and had been applied in several cities up to 1989. I developed this approach and was awarded a \$50,000 grant from the National Science Foundation. I wrote my PhD dissertation on the subject. In 2007 I approached the City of Anoka to do a reprise of it now that the cities had greater GIS capabilities. To view the complete report on the Anoka Fiscal Impact Project, go to www.GISFiscalImpact.com, or e-mail ltomaselli@earthlink.net.

2. The year 2009 was selected because it was the most recent year for which complete data were available. Anoka's Comprehensive Annual Financial Report (the source of some data) was finalized in June 2010, and the parcel data for 2009 were not available until 2010. The project was started in July 2010 and completed in 2011.

3. Fiscal impact analysts must grapple with difficult issues and decide how to handle them. An illustrative example of the complexities involved follows: A given house generates revenue from property tax (independent of the number of people in the house). The need for the house may have been generated because some business had a job, it employed someone and thus that employee needed a place to reside. Should the credit for the tax revenue therefore go to the business or to the house? Often, people work outside a given city. Or, a given house may have been in that city for decades. People (owners or renters) come and go, but the house remains. In the subject case, the house gets credit for the property tax revenue. People living in the house also spend money for food and clothes, which generates sales tax (which is related to the number of people and their education, income level, and culture). But the sales tax is collected at a store and was originally generated by where someone works. So what land use gets credit for this income: the house, the store, or where they work? The store gets credit for the sales tax, if a city had a sales tax (which in this case, Anoka does not). Without the store, there would be no sales tax collected.