Ranking CTA Infill Stations by Fiscal Efficiency
Using Alternative Local Financing Methods

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Introduction

In the past, many transit planning and financing decisions were very simple: they were made by the developer of a piece of land. Oftentimes, private "transit companies" were themselves either strongly tied to or the same company as a land developer. This strong connection was reinforced by the principle these developers had that greater accessibility creates greater value, and that by providing this accessibility through transit they could, in the end, charge more for their product.

The fact that home buyers value access to transit is well documented. A number of studies (Yeates 1965, McDonald & Osuji 1995, Gruen Gruen 1997, Ryan 1999, Parsons Brickerhoff 2001) detail the connection between transit accessibility and the land value of a given property. While many of the same studies also note that immediate adjacency to a transit corridor itself can be detrimental to property values due to noise, air, and other pollution, this decline in value is often offset if the property is near a station as well. Given these studies, it is clear that, all other things equal, transit is either directly contributing to an increase in values where it is located or helping create the kind of neighborhood that people value whether or not they actually use the transit resource.

Transit & Land Value

The connection between the availability of transit and a price-premium in land values has long been recognized and studied (Smith 2006). While residential areas seem to benefit more in these studies, commercial properties can also benefit from the proximity to transit, especially if located in a focus point of the transit system. A review of some of the relevant studies follows.

Multiple studies have shown a strong connection between proximity to transit, both existing and newly constructed, and an increase in land value in Chicago specifically (Yeates 1965, McDonald 1995). In addition, these results have been confirmed in areas such as San Francisco, Philadelphia, and Atlanta. An important distinction to make, however, is that when taken as a whole, land value effects of transit are more prevalent in areas with an established and mature rail system, as newer, smaller systems do not have the coverage and range of destinations necessary to allow property owners to command a price premium.

In the most recent academic study completed in Chicago (McDonald 1995), the authors studied the values on the southwest side of the city before and after the planning and construction of the Chicago Transit Authority's Orange Line. They found that properties within 1.5 miles of planned stations rose in value by an average of 17%, just in anticipation of construction of the line. Today, a ride on the line as it passes through areas of new and rehabilitated properties continues to reflect the long-term implications of this rise in value.

Value Capture Theory

The research into the effect on land values by the presence of transit has led to the study of another concept: value capture. The private sector is, for the most part, no longer involved in the construction or operation of transit systems and public transportation has come to be regarded as a public good. As such, it is provided by local or regional government agencies that rely on large taxpayer subsidies. By implementing a value capture scheme, however, transit providers can decrease the general public subsidy by gaining a return on at least a portion of the benefits provided by their service (Batt 2001, Ohland).

Value capture was defined in 1976 by the Administration and Management Research Association as

> the recapture for public use of the transit-induced values that otherwise accrue to owners of property adjacent to transit improvements. The public share may then be applied to financing either part of the transit system itself or to transit related improvements.

Using this definition, and expanding to include other kinds of public investment, the authors of a 1978 UMTA Report (Gladstone 1978) noted that value capture has been present in other countries, notably England, since the 1400s and even in the United States (or precursor colonies) since the 1600s. These value capture schemes usually took the form of special assessments or "betterment levies," or special taxes levied in direct relation to the benefit a private owner received based on government determination.

While always of theoretical interest to economists and public administrators, relatively few agencies have actually attempted to put a system in place to specifically recoup their investment in modern times. One implementation of note, however, is the original construction of the New York City subway system in the early 1900s, and implementation that, in fact, failed

when it proved to drive the costs of land up far beyond what they were actually worth, which ended up discouraging development for some time after construction.

With interest tempered by the failure in New York, value capture fell of the radar for most public agencies until the 1970s. At this point, academic studies began to re-invigorate the idea. Smith (2006) offers a comprehensive summary of studies to date that have made a significant contribution to this field. In doing so, he notes that while some cities system's, such as Hong Kong's, are nearly completely funded by joint development schemes or from contributions from developers seeking extensions, nearly all case studies to date in the United States take a theoretical, often retrospective look at projects. An example of this view is Batt's (2001) analysis of the incremental value increases after a highway extension was completed.

Smith (2006) also provides some lessons from location in developing countries where value capture is legal, but its implementation is thwarted. For example, Cervero (1999) found that while values increased near freeway offramps in Jakarta, implementing a value capture system would be difficult due to lack of recorded assessments and corrupt tax collectors. Problems such as these would be negligible in the US, where the property tax is well established, assessments are conducted frequently, and it is much rarer for one to simply "buy off" a taxing body.

While methods, theoretical and implemented, domestic and international, for implementing value capture vary widely, there are a number that fall with in the current legal framework of the United States. It is important to stay within this framework since not only are wholesale changes in the tax system unlikely in the short-term, but implementing these changes may also be more costly than the revenue they seek to generate. More modest shifts, however, have high potential for generating revenue in relation to transit improvements, albeit not as much as a complete implementation when disregarding the costs of a transition (Gladstone 1978). A number of these methods are detailed in the next section.

Taxes, Assessments, and Charges

Note: The information in this section is synthesized from Chapter 6 of Gladstone 1978.

Property Tax

The property tax has a wide variety of applications in transit, and the experience in the real world is just as varied. As the primary means of municipal taxation in the United States,

most governments are familiar with the administration and collection of this tax. For transit specific applications, the scope of the tax varies depending on the types of financing goals to be accomplished.

On one hand is the dedicated regional tax. Implemented in places such as San Francisco, Denver, and Minneapolis, these taxes have financed the construction and operation (usually through leveraging of the revenue stream) of region-wide systems that may often run through a number of different jurisdictions. On the other hand, and more appropriate for consideration as a localized technique, are the implementations of overlay zones in an effort to created a dedicated revenue stream from one specific area.

There are some important considerations, however, when considering a smaller area for implementing a dedicated tax. The increment of the total property tax over adjacent areas can not be significantly more than that of similar surrounding areas, or the tax will act as a detriment to development in the area it covers. This will amount to less than expected revenues for both the transit agency and all other taxing bodies that rely on the property tax. Because of this consideration, it is important to note that revenue generated on a local scale is likely to be minor, and not enough to cover significant capital expenditures.

Special Benefit Assessment

Special benefit assessments, or specific assessments on designated property owners that are identified to benefit directly from a public investment, were used historically in the US to pay for infrastructure improvements. There are a number of obstacles, however, that prevent this type of assessment from being applied directly to transit improvements. Specifically, most special benefit assessment legislation and theory necessitates that the tax or assessment levied be proportional to the benefit received. This is difficult to determine on a property-by-property basis with transit, as benefits are often regional.

Transit is a different type of investment than those traditionally financed through special benefit assessments. Capital projects such as sewer connections, sidewalk installation, and street lighting have clear benefits to each property owner. The zone of influence for the benefits of transit, if there are any, varies with each specific situation and even over time in the same situation. These facts make implementation to directly fund transit both logistically and politically difficult. Additionally, the extremely limited base of the special assessment, relative

to other financing options, may create large assessments that act as a disincentive to development in an area, thus negating any proposed benefits.

Service Charges

Service charges operate under the assumption that properties adjacent (or connecting to) transit stations do, in fact, accrue benefits from their location and are charged a fee for that access. Experience in these kinds of charges is limited abroad, and mostly non-existent in the US. Notable exceptions include Toronto's transit system and Rockefeller Center in New York, where private developers pay for connections to the system and then operated and maintain the public areas and any concessions involved.

This technique, however, appears to be limited to the denser, downtown areas of cities where direct connection of commercial buildings to the transit system is seen as an amenity. With this limited base, the financing potential is likely limited, often to just a one time payment that may only cover the cost of station or connection construction. While external gains in areas such as ridership and public image may accrue for the transit agency, financial windfalls are unlikely through this method.

Tax Increment Financing

In public finance today, one of the most common methods for recouping the costs of a significant capital investment with localized benefits is the Tax Increment Financing district. TIF districts return the increased value properties in the district benefit from to a special fund, which is then used to either service bonds issued to pay for the original investment or invest in improvements under a pay-as-you-go scheme. With this type of financing becoming extremely popular in the US and Illinois specifically, it has been identified as the method with highest potential for success in funding transit, and is explored in detail below.

Tax Increment Financing

Background

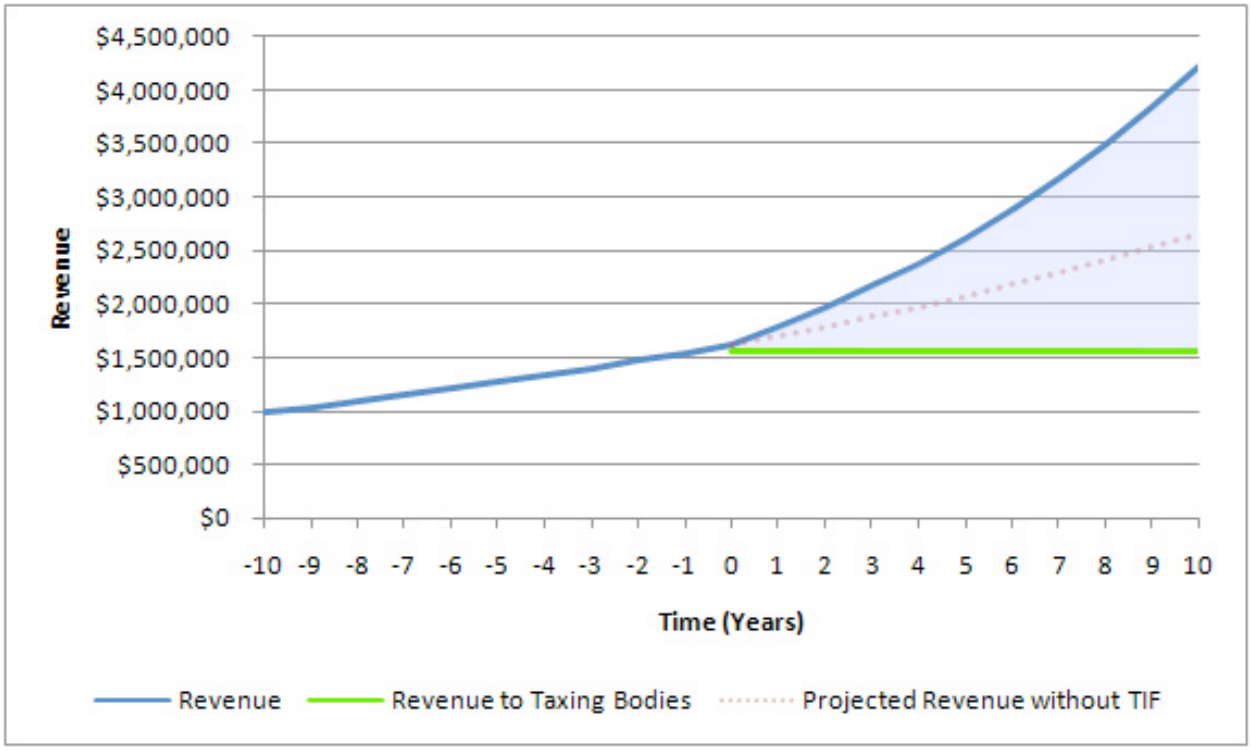
A tax increment financing district, or TIF, is a local financing mechanism used to create capital for improving an area by borrowing against future revenues that are expected to result from these improvements. Pioneered in California and Illinois, TIFs are now legal in 49 states

and the District of Columbia, Arizona being the only exception. Beginning as a tool of last resort for blighted communities, from the 1980s onward use of TIF districts exploded, leading many critics to point out that they are no longer being used to regenerate depressed areas, but more as a tool to attract developments by giving government incentives to large corporations.

Functionality

The creation of a TIF district, in most jurisdictions, has prerequisites. First, a study must be undertaken that proves "blight" or "obsolescence" in the area. This can be shown in a number of ways: decline sales revenue, high vacancy rates, etc. The district must then pass through a review board and approval process, where other taxing bodies such as schools, park districts, and sanitary districts can voice their concerns or objections to the TIF. Passing this step, the district is created for a set period of time (23 years in Illinois), often with an option for extension. TIF districts obtain their revenue by freezing property taxes at their value at the time of the inception of the district. Any increase in revenue above that point is paid to the TIF – the theory being that values will increase much more quickly as the improvements paid for by bonds backed by future revenue take hold. This is illustrated in Graph 1 below:

Graph 1: TIF Functionality



The shaded area indicates the amount of money that will be paid to the TIF to pay down debt and fund future projects.

Results

TIF districts are popular for many reasons, one of these of course being their success. No TIF district has ever not met its bond obligations for lack of revenue. More qualitatively, many planners see the revitalization of the districts encompassed by the TIF as evidence alone. While studies have shown that the increase in business such as retail sales in the district often comes at the price of other local businesses, the rewards for the district itself are still positive.

TIF districts are also popular in that they produce a source of locally controllable money that cannot be spent outside the district. This gives local officials a tap into property tax monies that were previously controlled and spent by often regional districts in areas other than the one that is now in the TIF. Local control of the money makes it appealing for politicians to push for the creation of the district, knowing that they will obtain control of the funds in addition to immediately be able to produce positive improvements such as upgraded streetscapes and other public facilities in the area.

TIF & Transit

Given that the presence of rail transit has been shown to have a positive effect on neighboring property values, it is a short leap to propose that some of these benefits be transferred back to their source. Tax Increment Financing districts offer the best way, without a radical reformation of the tax system in the United States (see Metalitz 2004), to capture the increase in value of properties. It appears to be the most applicable to the problem of finding a way to transfer the monetary benefits, at least in part, back to the transit investment that predicated them.

While these sorts of setups may be commonplace in day to day operations and planning, both of transit systems themselves and the land use jurisdictions around them, very few mentions of real examples from the United States have made their way into academic literature. In this country, joint agreements with developers is the most common method used to retain some of the revenues developers receive by developing on excess property the transit provider may own. One exception may be Los Angeles, which during the construction of the Metro system created a special assessment district wherein properties within 1/3 mile of a station were assessed an extra payment based on the square footage of the property (Covarrubias 2001).

Implementing a TIF district, however, may overall be more palatable to the constituency, as discussed above. This is likely since it amounts to no actual increase in the tax *rate* that a property owner sees on their bill. The increased dollar amount is only attributable to an increased valuation in the property, which property owners are likely to want to realize.

Further study is needed, both in the form of identifying and analyzing current cases and performing predictive analysis, on the viability of using TIF districts to fund transit expansions. A brief analysis was conducted as part of the 1978 UMTA document (Gladstone 1978), but the calculations and method may need to be updated fro the present time. While it may be clear that the financial case has solid grounding, the details may also be in the politics and policies. Since TIF money is locally controlled, application across a region to fund transit may be difficult to implement.

Overall, however, Tax Increment Financing district's characteristics coupled with the proven propensity of established rail transit make it an especially appealing tool in cities such as Chicago. As an alternative source of funding, it would allow ever-shrinking revenue from other sources to be freed up from future construction and placed into day-to-day operations of the

facility, further increasing transit's appeal and likelihood to raise values. If implemented properly, TIFs appear to be a successful combination of local and regional resources to fund a public good.

Example Analysis

As a preliminary example of the applicability of the use of TIF funds to finance transit expansion in Chicago, a hypothetical data set was developed based on potential infill stations along CTA rapid transit lines. Using this dataset, the stations were ranked based on the available and deduced data using a type of Data Envelopment Analysis (DEA) known as the Fixed Proportions Measure (FPM). Unlike standard DEA, which assumes substitutability in inputs (costs) and outputs (benefits), FPM assumes no substitutability but rather that inputs and outputs are related and must be consumed (or are produced) in proportion with one another (see Barnum 2008 for a detailed explanation and mathematical model). As, for example, a decrease in TIF district value cannot be offset by an increase in station maintenance expenditures, this type of analysis is appropriate for the task at hand.

Data Considered

The list of stations considered in this analysis is shown in Table 1 below. However, due to availability of data and feasibility constraints (e.g., the a number of stations along the Forest Park Branch of the Blue Line that appear on the list were closed due to very low ridership shortly after opening and would likely be poor candidates for reactivation as infill stations), the original list of 18 stations was trimmed to 11. This final list, as well as the variables used in the analysis, is shown in Table 2.

Table 1: Potential Infill Stations

NAME	LINE
Ridge	YELLOW
Dodge	YELLOW
Crawford	YELLOW
Oakton	YELLOW
Morgan	GREEN
Damen	GREEN
Western	GREEN
California	BLUE
Madison	PINK
Medical Center (Pink/Blue Transfer)	PINK/BLUE
Roosevelt	PINK
Kostner	BLUE
Central	BLUE
22nd/Cermak	GREEN
Chinatown	ORANGE
27th	GREEN
58th	GREEN
Racine/63rd	GREEN

Table 2: Final Station List & Variables

Station	CapCst {I}	MaintCst {I}	TIF Value {O}	TIFGrowth% {O}	PtenRidr {O}	PopEmpChg {O}
22nd/Cermak	165	50	118.3561	9	6478	10480.35
27th	165	50	294.0538	29	5022	2933.64
58th	165	50	0	0	4380	4666.33
Chinatown	165	50	522.4408	13	4466	5755.15
Damen	165	50	1669.9605	41	4034	3097.61
Madison	165	50	1669.9605	41	4143	9740.99
Medical Center (Pink/Blue Transfer)	165	50	0	0	8461	7265.72
Morgan	165	50	1789.9563	18	1230	8917.34
Racine/63rd	165	50	392.9854	30	3545	2673.74
Roosevelt	165	50	454.3539	21	5646	15597.45
Western	165	50	1669.9605	41	3785	6094.39

In Table 2, the variables used are as follows:

- CapCst: Capital Cost, an input representing the up-front cost to the CTA of building and opening the station (data from CTA).
- MaintCst: Maintenance Cost, an input representing the ongoing yearly cost of maintaining and staffing a station (data from CTA)

- TIF Value: TIF Value, an output representing the value of funds in the account of the TIF district in which the potential station lies (a zero value indicates no TIF present at that location. Data from Cook County Assessor)
- TIFGrowth%: An output representing the average yearly change in the assessed value of all properties within the TIF district. Included as an indicator for the health and success of a given TIF (data from Cook County Assessor)
- PtenRidr: Potential Ridership, an output representing the potential ridership in 2030 of the new station, assuming mode splits of the census tract remain constant and based on Northeastern Illinois Planning Commission (NIPC) projections.
- PopEmpChg: Population and Employment Change, an output representing the magnitude of growth in both population and employment within ½ mile of the proposed station between 2000 and 2030 (data from NIPC).

Results

After applying the Fixed Proportion Analysis to the data in Table 2, the results shown in Table 3 were produced. It is important to note that DEA and FPM measures, by nature, are relative scores of efficiency, with each decision making unit (in this case, station) measured against one another. Thus, Madison (Pink), with a score of 1.0, is the most efficient use of resources amongst those considered, and those with lesser scores represent a percentage of efficiency relative to Madison.

Table 3: Results of FPM Analysis

Station	FPM
Madison (Pink)	1.000
Western (Green)	0.909
Damen (Green)	0.856
Roosevelt (Pink)	0.799
Morgan (Green)	0.708
22nd/Cermak (Green)	0.566
27th (Green)	0.543
Racine/63rd (Green)	0.506
Chinatown (Orange)	0.494
Medical Center (Pink/Blue Transfer)	0.481
58th (Green)	0.268

Interpretation of Results

The results shown in Table 3 are generally expected, given both the input data and knowledge of the areas in which each of the stations are located. For example, the top five stations (Madison, Western, Damen, Roosevelt, and Morgan), all with scores above .7, all lie in the fast-growing West and South Loop areas. Additionally, each of these stations has the potential to tap funds from a healthy TIF district. On the other end of the spectrum, however, 58th not only does not have a source for TIF funds currently in place, but is in a neighborhood unlikely to see the level of growth found in the areas around the top stations in the next 30 years.

An interesting, and reassuring from a validity perspective, result is the placement of the Medical Center station second from the bottom. While this station may have value systemwide as a significant transfer station, its relative lack of local impact and lack of an existing TIF district make it a poor choice in a situation such as this, where the investment will need to generate returns focused towards the local community, not in a regionwide scale or scope. Given different parameters, Medical Center may very well be found at the top of a different list.

Conclusions

By and large, it is important to note that the rankings deduced by DEA measures such as this serve less to highlight the clear top choice but more as a tool to identify the lowest performers in a group given a set of criteria. Because of its quick and flexible nature, DEA and FPM type measures are best suited to decide which projects from a list should *not* receive further consideration as they blatantly fail to meet the performance levels of their peers. Those projects remaining, however, will likely still need further and deeper consideration and analysis to determine which, if any, should move forward to completion.

While this paper focused on data available for a quick and illustrative example, it and other applications would stand to be enhanced by more rigorous differentiation of each DMU. One must be cautious, however, to not spend so much time gathering data that the value of the analysis in performing a quick first cut is lost. As in this analysis, a happy medium is likely found in utilizing data that is available or easily obtained, but accurate (or defendable) and that provides different information about each DMU.

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