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Prospects for transportation utility fees

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Abstract: Transportation utility fees are a transportation financing mechanism in which the network is treated as a utility and properties are charged fees in proportion to their network use, rather than according to their monetary value as in property taxation. This mechanism connects the costs of maintaining the infrastructure more directly to the benefits received from mobility and access to the system. The fees are based on the number of trips generated and vary with land use. This paper evaluates transportation utility fees as an alternative funding source in terms of efficiency, equity, revenue adequacy and political and administrative feasibility. The experiences of cities currently using utility fees for transportation are discussed. Calculations are included to determine the fee levels necessary for transportation maintenance budget needs in three sample cities and a county in the Minneapolis-St. Paul (USA) metropolitan area. Proposed fees for each property type are compared to current property tax contributions toward transportation. The regressive effects of the fees and the effect of adjusting for the length of trips generated are also quantified.

Keywords: Value capture; Transportation utility fees; Transportation financing; Land use; Minnesota

1 Introduction

Recent economic conditions have called into question the sustainability of current transportation funding sources for local governments. Contributions from state funds generated by taxes on vehicle sales and fuel consumption can be expected to decrease as vehicles become more fuel efficient and last longer. Declining property values reduce the revenue available from property taxes, and rate increases remain unpopular. In light of these trends, transportation utility fees have generated increased interest as an alternative funding mechanism. The distribution of property taxes is based on property value, which is not always a good indication of the burden a property places on the transportation system. Because vehicle fuel economy varies widely, the correlation between fuel consumption and road use is also not direct. Transportation utility fees are assessed to properties based on the number of trips they generate, providing a more direct connection between demand for transportation facilities and the costs of constructing and maintaining them.

This paper discusses the development of transportation utility fees and evaluates their viability as an alternative funding source. The transportation utility fee concept and its underlying rationale are explained, and the experiences of several locations in the United States where transportaion utility fees have been implemented are discussed. Criteria for evaluation follow, including the potential and observed effects of the fees on economic efficiency, equity, revenue adequacy and sustainability, and political and administrative feasibility issues the fees present. An analysis was conducted to determine the necessary fee level to fund budgeted transportation needs in three sample cities and a county in the Minneapolis-St. Paul (USA) Metropolitan Area (the "Twin Cities"). A description of the data and methodology used and a discussion of the results are presented.

2 Concept and rationale

The reasoning behind transportation utility fees holds that the transportation system functions as a public utility comparable to municipal water and sewer systems. Those utilities are funded by charging users based on how much they use the systems, and transportation funding can be approached in a similar way. Properties that cause more traffic by the nature of their use are responsible for a greater portion of the wear and tear on transportation infrastructure, and might reasonably be expected to make larger contributions toward maintenance expenses. The fees can be used to finance construction

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or maintenance projects for any transportation mode, but are most commonly applied to roads and used to fund preventive maintenance of existing facilities rather than capital projects.

In many instances, the establishment of a transportation utility fee is motivated by a revenue shortfall and a backlog of road maintenance projects. Because they are not taxes, fees may be adopted without a public referendum in many cases, though this depends on the city and state in question. The visible connection between the fee and its purpose can also make it more acceptable to the public and easier to levy than a new tax. However, to be considered a fee and not a tax, a firm relationship between costs and benefits must be established. The Supreme Judicial Court of Massachusetts established three standards that distinguish fees from taxes: 1. they are assessed in exchange for a particular benefit; 2. they are avoidable by opting not to use the service; and 3. they exist not to raise revenue but to compensate the government for the costs of providing the service (Emerson College v. City of Boston 1984). A similar common standard known as the "rational nexus test" includes the following criteria: 1. the service needs must be directly attributable to those bearing the cost; 2. the costs must be allocated proportionally to benefits; 3. the facilities funded must be part of a comprehensive plan; the fee must account for taxes paid toward transportation so property owners are not double-billed; and 4. the fee revenues must be used for their intended purpose in a timely manner (Altshuler *et al.* 1993). Variation in these standards among states has led to a checkered history for the fees in the courts, and whether to uphold them as payments for services rendered or strike them down as illegal taxes can become a semantic argument.

3 Extent of use

Transportation utility fees have been used in several states since the mechanism was first created by ordinance in Fort Collins, Colorado in 1984. They have become most popular in Oregon, where the city of La Grande was the first to adopt them in 1985. The extent of adoption depends on the legality of the fees, which varies by state and by the wording of the particular fee in question. The Fort Collins fee was challenged by residents and discontinued by the city. The fee in Pocatello, Idaho met a similar fate in 1986, but litigation continued in both cases until reaching the state supreme courts. The Idaho Supreme Court ruled the Pocatello fee unconstitutional (Brewster v. City of Pocatello 1988), while the Colorado Supreme Court ruled the Fort Collins fee to be valid with the removal of a clause directing excess collections into the general fund (Bloom v. City of Fort Collins 1990). The first such fee in Oregon was never challenged, encouraging more city governments in that state to consider transportation utility fees a viable option. The concept then spread to Texas, where Beaumont introduced a fee that has gone unchallenged, and to Florida, where the Port Orange fee drew opposition and was overturned (State of Florida v. The City of Port Orange, Florida 1994). These and other locations using the fees are displayed in Table 1.

The most common basis for a transportation utility fee is an estimated number of trip ends attributable to each property type using the procedures found in the *Trip Generation* manual published by the Institute of Transportation Engineers (2003). Residential trip rates are given per unit and commercial rates per gross floor area and per employee. Jurisdictions may instead use flat or per-unit fees that vary only by property type, or fees based on land area, floor area or frontage. Because all of these are estimates, rather than measurements of exact usage for individual properties as with water or sewer service, the connection between cost and service is less solid than for other utilities. The methods presented in *Trip Generation* are more likely to withstand legal scrutiny than estimates based on lot size, but as Shoup (2003) discusses, they are hardly ideal. They are meant to apply nationally, but some of the rates given are based on very small sample sizes and show little correlation. If they are used as the basis for utility fees, the accuracy of the estimated rates might be improved by adjusting based on local traffic counts.

4 Evaluation

The proposed fees should be evaluated in themselves and also against the existing transportation funding source in the jurisdiction, which is usually the property tax. A framework of several criteria is used here, similar to that developed by Mikesell (2003). *Economic efficiency* considers the effect on resource allocation in the community. *Equity* includes evaluation of fairness based on benefits received and ability to pay. *Revenue adequacy and sustainability* concerns the stability of the base and the revenue potential at a socially acceptable fee level. *Political and administrative feasibility* includes public acceptance and complexity of the collection effort. All criteria are important, but revenue levels and administration issues might be given more weight if fee collection and expenditure for transportation is to be completely separated from general revenue.

4.1 Economic efficiency

Funding transportation infrastructure based on user benefits would redistribute costs. With the property tax *status quo*,

Table 1: Selected U.S. cities using transportation utility fees.

State	City	Year Adopted	Outcome	Basis
CO	Fort Collins	1984	Discontinued 1987	Front footage
			Validated 1990	Trip generation
CO	Loveland	2001	In use	Flat fee per unit per acre
FL	Port Orange	1992	Invalidated 1994	Flat fee
ID	Pocatello	1986	Discontinued 1986	Trip generation
			Invalidated 1999	
OR	Ashland	1989	In use	Flat fee per unit
OR	Bay City	2003	In use	Determined by council
OR	Corvallis	2005	In use	Trip generation
OR	Eagle Point	1990	In use	Flat fee per unit
				Gross floor area
OR	Grants Pass	2001	In use	Flat fee per unit
				Trip generation
				Gross floor area
OR	Hillsboro	2008	Effective 2009	Flat fee per unit
				Trip generation
OR	Hubbard	2001	In use	Flat fee per unit
				Trip generation
OR	La Grande	1985	In use	Flat fee
OR	Lake Oswego	2003	In use	Flat fee
				Trip generation
				Gross floor area
OR	Medford	1991	In use	Trip generation
OR	Milwaukie	2006	In use	Trip generation
OR	North Plains	2003	In use	Trip generation
OR	Oregon City	2008	In use	Trip generation
OR	Philomath	2003	In use	Trip generation
				Gross floor area
OR	Phoenix	1994	In use	Flat fee per unit
				Trip generation
OR	Talent	2000	In use	Trip generation
OR	Tigard	2003	In use	Flat fee per unit
				per parking space
OR	Tualatin	1990	In use	Trip generation
OR	Wilsonville	1997	In use	Flat fee per unit
				Trip generation
				Gross floor area
TX	Austin	1990	In use	Trip generation
WA	Soap Lake	1992	Invalidated 1995	Flat fee
WI	Oconomowoc	2005	Abandoned 2005	Flat fee per unit
				Trip generation
				Gross floor area

Source: Carlson *et al.* (2007), League of Oregon Cities (2008), Hillsboro and Oregon City municipal codes.

most residential properties pay more of the costs of transportation infrastructure than their share of trips justifies, and most commercial properties pay less. Additionally, many significant trip generators such as churches, stadiums and public offices are tax-exempt and contribute nothing toward transportation facility upkeep. With a transportation utility fee, the contributions of each type of property directly reflect use of the system, and new money would accrue from institutions and the offices of other levels of government.

Whom to charge can be difficult to determine for non-owner-occupied properties. If owners are charged rather than tenants, any price signal will not directly reach those who would act on it. Though the property tax contributions of absentee landlords would be lost, charging the fee to the operator of a business would create a closer connection to trip generation than charging the landowner. However, this could complicate administration if tenant information is less complete and current than ownership information. A larger portion of the cost of transportation might be paid by nonresidents with a utility fee than with a tax, as the commercial share would increase and would likely be passed on to customers.

A fee based on metered usage, as applied to other utilities, might influence user behavior; however, this is less likely when the fee is based on predicted rather than actual use and when billing is not immediate. In this respect, transportation utility fees could be called non-distortionary, since residents cannot decrease the amount of their fees by making fewer trips. This characteristic has the potential to create legal issues in states where the definition of a fee requires that it be avoidable by non-users.

4.2 Equity

A utility fee based on trip generation would adhere to the benefit principle of taxation very well if accurate trip generation calculations were possible. Even using estimates, the costs of road maintenance billed as a utility fee coincide much more closely with road use than does the property tax. The connection can be improved if trip length and the weights of the vehicles used are reflected in the fee schedule. However, the correlation between the size of the transportation utility fee charged to a property and the ability of the property owner to pay will be weaker than in the case of the property tax. The number of trips generated by residences is the same in areas with low and high average incomes, and the financial condition of a business may not be reflected in the number of customers or deliveries it attracts. The ability-to-pay criterion is less applicable to a fee than to a tax, because fees recover the cost of services used by a particular property rather than by the community. Because the purpose of a fee is to recover specific costs rather than to raise general revenue, the benefit principle should be given greater weight.

The fairness of a specific fee is also affected by its basis. For example, a fee based solely on land area would place an undue burden on parks and other large parcels that are not used intensively. A fee based on frontage would do likewise, to a lesser extent. The inclusion of parcels exempt from property taxation would cause residential properties to contribute a smaller proportion of the total expense. An equity issue that arises from the procedures described in *Trip Generation* is that the number of units in a multi-family residential development is not the best proxy for the number of residents or, by extension, the number of trips. A solution proposed for Milwaukee by Carlson *et al.* (2007) is to apportion the residential share by number of bedrooms rather than by number of units. Courts have held that exact calculations are not required as long as the fee schedule is not arbitrary (Ewing 1993). Because trip generation figures are estimates rather than observations, the same methodology should be used for all types of property to achieve a uniform level of accuracy.

Several other measures have been taken in various cities to make transportation utility fees more acceptable to owners of certain types of property. One common consideration is to count "pass-by" trips with lesser weight for businesses such as gas stations and convenience stores that attract traffic already making trips between two other destinations. With no adjustment, such trips cause an unfairly high charge since they were not really generated by the business. Some cities have addressed this by setting a maximum number of trips that can be charged to a property. A similar adjustment can be made for mixed-use developments that internalize some trips. The ordinance in Port Orange, Florida included both adjustments, and Austin, Texas waives the fee for property owners who do not own a car (Ewing 1993). Another option is to assess truck trips at a higher rate than car trips, since heavier vehicles cause more damage to roads. Hillsboro, Oregon considered this but opted against it, concluding that most heavy vehicle traffic within the city uses arterials rather than local streets (Angelo Planning Group 2008). Neighboring Wilsonville, however, does account for vehicle weight because of a greater presence of warehouses and distribution centers in that city. Some examples of discounts allowed in jurisdictions with existing fees are given in Table 2. Several cities also exempt vacant parcels, city-owned land and public open spaces.

Table 2: Examples of utility fee discounts.

State	City	Conditions for Discount
CO	Fort Collins	Low-income and all elderly residents
OR	Ashland	Low-income elderly residents
OR	Grants Pass	Vacant properties unoccupied for 30 days 50% discount for residences with no vehicles
OR	Hubbard	Low-income elderly residents
OR	North Plains	50% discount for residences with no vehicles
OR	Phoenix	Low-income elderly residents Residences with no vehicles discounted to senior housing rates
TX	Austin	Measured traffic below assigned level
TX	Beaumont	Elderly residents

Source: Angelo Planning Group (2008).

4.3 Revenue adequacy and sustainability

Travel patterns, although they may be more dynamic than property values, do not change drastically, so revenue sources based on trip generation would be fairly stable. An adequate level of revenue could be determined by calculation based on the cost of necessary maintenance or on the existing share of property tax devoted to transportation uses. Since utility fees are best suited for funding continued maintenance of existing facilities, another funding source would be necessary for capital projects. It may be deemed politically necessary to limit the fee to funding only a portion of maintenance expenses, as was the case in Clackamas County, Oregon (Springer and Ghilarducci 2004). Additional financing to cover the remaining costs would then be needed from other sources. Costs derived from through traffic would also not be covered by the fees, but this issue may be moot, as most through traffic uses arterials that are funded by higher levels of government. Establishing a transportation utility fee would provide cities with additional diversity in revenue sources, serving as a hedge against fluctuating levels generated by other taxes and fees.

4.4 Political and administrative feasibility

As with any adjustment to existing local government finance mechanisms, the adoption of a transportation utility fee would create winners and losers. This effect has the potential to increase opposition to transportation utility fees because the increased bills would fall on commercial interests, which are generally fewer in number but more prominent politically than homeowners. Since the first application of transportation utility fees in most states has been contested, local officials enacting a utility fee for transportation should be prepared to defend it against a legal challenge. The most important characteristic a fee must possess to be upheld is a direct and apparent connection between the costs and benefits associated with each affected property.

The administrative workload would be increased compared to the status quo because the fee would not replace existing property tax, which would still be needed to fund other city expenses. Local officials would need to become familiar with methods of calculating trip generation estimates and ensure that land use classifications are updated frequently. If the necessary data are not readily available, compilation could become work-intensive. Assessing a fee monthly may also increase administrative complexity compared to an annual tax.

Increasing the number of property categories in order to address concerns about the equity of estimation procedures would also require more administrative effort. Carlson *et al.* (2007) suggest some clauses that may be politically necessary but would increase complication of administration. These include an appeals process, a reduction procedure for properties such as convenience stores that derive business from "pass-by" rather than "generated" trips, and a ceiling on the fee for isolated cases that could incur very large bills.

Compliance may be more difficult to enforce than with conventional funding mechanisms, since road access cannot be shut off in the same way that electricity and water service can. If the fee is collected monthly, one option is to tie the service to other utilities on the same bill and itemize and prioritize them (Ewing 1993). The bill might stipulate that the transportation portion of the total bill be paid before the water bill, so that water service would be the first to become delinquent due to chronic underpayment of the total amount. However, since water and road services are not directly linked by their nature, this too may create grounds for legal challenges.

5 Analysis

Introducing a transportation utility fee to fund projects that would otherwise be paid for out of the general fund through property taxes would change the proportional contribution of each land use. This analysis determines fees for each type of property based on trip generation using the cities of Minneapolis, Richfield and Bloomington, Minnesota to represent a central city, an inner suburb and an outer suburb, respectively. Fees are also calculated for Hennepin County, where

the test cities are located. As each of these cities comprises a different mix of development types, the effect of varying the proportions of each type can be observed. The transportation funding needs also vary by city, and this is the largest single factor determining a sufficient fee level. The fee levels resulting from the analysis are compared with the shares of the transportation cost borne under the existing property tax regime.

5.1 Data

Several sets of data from various sources were used to determine the distribution of each type of property in each city. Parcel data from 2008 and general land use data from 2005 were obtained from MetroGIS. Business information—including type of business, total sales and number of employees—was taken from files generated by a previous project that combined 2005 business listings purchased from Dun & Bradstreet with MetroGIS parcel data (Horning *et al.* 2008). The total numbers of jobs and households in each city in 2007 were available from the Quarterly Census of Employment and Wages (QCEW) published by the United States Bureau of Labor Statistics. The QCEW data also included categorized employments, but did not report data that would disclose information about a specific employer because of a low number of businesses in a category. For this reason the categorization from the Dun & Bradstreet data was used.

Trip generation rates were obtained from the Seventh Edition of *Trip Generation* (Institute of Transportation Engineers 2003). The independent variable for the rates varies. Rates by unit were used for residential properties, and rates by employee were used for commercial, industrial and institutional properties. Another option for nonresidential properties, seen more commonly in ordinances and used in a previous analysis of Minnesota cities (Shands and Transportation Policy Institute 2004), is to calculate trips based on developed floor area, reported in *Trip Generation* as trips per thousand square feet. Neither independent variable provides rates that are conclusively more accurate than the other. The number of employees was chosen as the basis for nonresidential trips in this analysis only because developed floor area data are not available for Hennepin County.

The transportation expenditures to be covered by the fee in each city were obtained from the most recent available municipal budgets. Minneapolis and Richfield 2009 budgets were used, and the most recent budget available for Bloomington was from 2008. The line items differ somewhat in each city's budget, but all three included figures for engineering and for street maintenance and repair. The amount listed by Bloomington for maintenance administration was also included, as was the seven percent portion of the Minneapolis budget item for traffic and parking services that is paid out of the general fund.

For Hennepin County, the fee was estimated using the amount budgeted in 2009 for the transportation department. Line items included were administration, planning, design, construction, traffic and operations. Capital expenditures for new construction projects are budgeted separately and were not included. If the county were to adopt a utility fee in addition to the city fees, the utility fee would replace the portion of county property tax revenues directed toward transportation, and properties in the sample cities would be assessed both fees.

5.2 Methodology

The number of trips generated on a weekday by each single-family parcel, each unit in a multi-family complex, each business or institution and each acre of parkland were computed for each city and for the county. The total transportation expenditure from each municipal budget was then allocated by trip. The results display the fee charged to each property type that would be sufficient to cover the reported transportation expenses.

The number of single-family residential properties in each municipality was calculated by counting the number of parcels in single-family areas using a Geographic Information System (GIS). The result was subtracted from the total number of households in the municipality given by the QCEW data, and the difference was assumed to represent the number of units in multi-family developments. The generalized land use file from MetroGIS distinguishes single-family attached construction from single-family detached houses. This analysis assumes that typical household behavior is similar in both types of development, and this takes precedence over the type of physical construction. Therefore, both types of development were classed as single-family developments for the purpose of assigning trips. The trip generation rate applied to multi-family units was the average of the reported rates for apartments and condominiums.

Distributing trips among the various commercial uses involved a more complicated process. The files created by Horning *et al.* (2008) included three levels of categorization based on the North American Industry Classification System (NAICS). At the finest granularity, NAICS codes are six-digit identifiers of the specific nature of businesses. The data for the seven-county metropolitan area included 1027 six-digit categories. The businesses were reclassified into 67 specific destination codes, and then into 17 more general categories. In *Trip Generation*, business and institutional properties are

grouped into 98 categories, several of which do not correlate closely with either the destination codes or the general categories used in this research. For this analysis, the 17 most general categories of nonresidential properties from Horning *et al.* (2008) were used, and trip generation rates per employee were determined from the reported information for the most similar category or categories in *Trip Generation*.

The property categories and trip generation rates used in the analysis are presented in Table 3. The "Other" category consists mostly of manufacturing and construction jobs, but also includes agriculture and mining. Some categories, such as food and entertainment, encompassed uses with widely varying trip generation rates. In the case of a land use for which several of the rates in *Trip Generation* could be considered representative, an average rate was calculated. The level of aggregation chosen meant that additional considerations, such as a fee reduction for pass-by trips, could not be applied reliably, since some categories included both convenience businesses that would merit such a reduction and destination businesses that would not. For instance, grocery stores might merit a reduction while sit-down restaurants would not, but both are included in the "Food" category. Each unit of each use was counted in mixed-use development areas, but no reduction was made to account for internalized trips.

Properties dedicated to educational, institutional, civic and religious uses were included in the Dun & Bradstreet data. Parks, however, were not included and were accounted for separately, though they generate only a small proportion of total trips. The acreage of parkland in each city was calculated from the land use data, and the trip generation rate per acre for city parks was applied. If parks are owned by the municipality, the cost derived from the trips they generate could be apportioned among other land uses or transferred from funds collected for the parks budget from other sources.

The proportion of trips in each city generated by each use was then calculated. This proportion of the total transportation cost was allocated to each land use type, and then divided by the number of units to calculate the residential fee and by the number of employees in each category to determine the nonresidential fee. Fees were calculated under two scenarios. *Fee 1* was determined by assuming a complete reallocation of transportation funding obligation based on trips generated. To create a less drastic shift for comparison, *Fee 2* retained the general land use breakdown of the property tax, but reallocated the bills of each category of residential and commercial development. A combination of the two would be possible as well, in which the general proportions are set so that the share of transportation costs paid by commercial properties is higher than under the current property tax regime, but not as high as under Fee 1. All calculations were performed using annual data, but since a utility fee would likely be charged monthly, a monthly fee level is reported as well.

Table 3: Trip generation rates by land use category.

Category	Trips Generated	Basis
Residential:		
Single-family	9.57	Unit
Multi-family*	6.29	
Nonresidential:		
Shopping	28.84	Employee
Food	87.82	
Fitness	45.71	
Entertainment*	65.74	
Health care	7.75	
Post office	28.32	
Bank/Insurance	72.79	
Education	15.71	
Services	14.34	
Transportation	6.99	
Wholesale	8.21	
Information	48.85	
Real estate	22.36	
Professional	3.32	
Administrative	3.32	
Other*	2.13	
Recreational:		
Parks	1.59	Acre

Note: * = derived from author's calculations.
Source: Institute of Transportation Engineers (2003).

The total property tax bill for each parcel was included in the parcel data set. The metadata file provided does not explain which jurisdictions' taxes are included, and it is likely that taxes levied by other bodies such as the county and the school districts are included in the reported tax. This does not affect the proportional contributions calculated for each property type because all jurisdictions tax the same value, and only the relative tax share paid by each category of property was of interest for this analysis. This was used to determine an annual share of property tax per employee or per unit allocated to transportation for comparison.

5.3 Results

The results of the calculations are presented in the charts below. The comparison between the fees calculated by both methods and the share of transportation cost paid via prop-

erty tax is displayed in Figure 1 for Minneapolis, Figure 2 for Richfield, Figure 3 for Bloomington and Figure 4 for Hennepin County. If Fee 1 were enacted, completely redistributing transportation costs, most commercial properties would pay more and all residential properties would pay less. Enacting Fee 2, redistributing costs among the categories within each land use type, would produce similar effects to a lesser degree. The multi-family contribution would increase relative to the single-family share, and offices would pay less compared to retail establishments. The difference in scale between the three cities is determined by the total transportation funding need, in proportion to total property value in the city for the property tax and to the total number of trips generated in the city for the utility fees.

The monthly utility fees proposed under each scenario for residential properties are presented in Table 4 for each city. As a point of comparison, the residential fees calculated for the cities studied by Shands and Transportation Policy Institute (2004) ranged from $0.92 to $2.33 for single-family homes and from $0.55 to $1.40 for apartments. The difference in fee levels from city to city can be attributed to variation in the amount and distribution of development and in the amount of funding needed. No data were available for comparison to per-employee rates, as most jurisdictions using the fees have based them on developed floor area for nonresidential properties.

Adherence to the user-pays principle often comes at a cost of increased regressivity. Calculations were made in an attempt to quantify the effects of the fees on residential property by value. Single-family residential properties were divided into four groups by estimated total value, and the average annual payment toward transportation by a household in each group was determined for each of the three cities using current property taxes. This amount was compared to the fee per unit, which varies only by city irrespective of property value. Multi-family housing units were not included because the transportation cost per unit is less certain. This is partly because of data limitations and partly because the incidence of tax on rental property is not clear.

The results are shown in Table 5. The magnitude of the regressive effect of the fees can be seen, as the owners of lower-valued properties see their bills increase and the owners of more valuable properties contribute less. Under Fee 1, all residential properties pay less, with the burden being shifted onto commercial properties. Higher property values mean higher bills currently, so these households see a larger decrease with the fee. The regressive effect is more apparent with Fee 2 because changes in all residential bills must sum to zero, though the overall shift is less drastic. Both scenarios give less weight to property owners' ability to pay than the property tax, in exchange for stronger correlation with the amount of transportation network use. However, even property value is not a great indicator of the ability of an owner to pay, since possession of valuable land does not necessarily correlate with high liquid wealth.

The connection between the demand placed on transportation facilities by a property and the share of the facility maintenance costs charged to that property can be strengthened further by accounting for the length of the trips each type of property generates. In the Minneapolis-St. Paul metropolitan area, the Metropolitan Council (the regional planning organization) conducted a travel behavior inventory that included information about the average distances traveled for different types of trips (Metropolitan Council 2003). The categories used in the inventory were more general than those used in this analysis, and included separate average lengths for trips related to work, shopping, school and other purposes. The nonresidential trip generation figures were then weighted by length to calculate adjusted fee levels. The results are shown as a comparison of shares of nonresidential trip ends in Table 6.

This calculation was based on the reported lengths of home-based trips. Lengths of non-home-based trips were included in the inventory, but were only divided into work and non-work trips, categories not specific enough to be of use in the present analysis. Because the data were aggregated at multiple levels, the estimate of the trip length adjustment is less certain than the other results of the analysis. Assumptions must be made in order to assign the land use categories to work, shopping or other trip purposes. If a municipality were to include such a length adjustment in its fee ordinance, more exact figures on the proportion of trips attributable to customers versus employees would likely be needed.

The cities considered in the present analysis do include some properties that generate particularly high proportions of heavy vehicle traffic. Businesses such as warehouses, trucking companies and construction firms may be assessed less than their fair share under either fee scenario. A further equity improvement could be made if the weight of the vehicles comprising the traffic generated were taken into account. Local traffic data that would permit the proportion of truck trips for each business to be determined were not available, and land use categorization is an issue here as well. Transportation-related and wholesale businesses could be assessed a weight-based surcharge, as could some (but not all) of the businesses in the "Other" category. A gray area would arise in regard to retail businesses, especially smaller establishments that receive

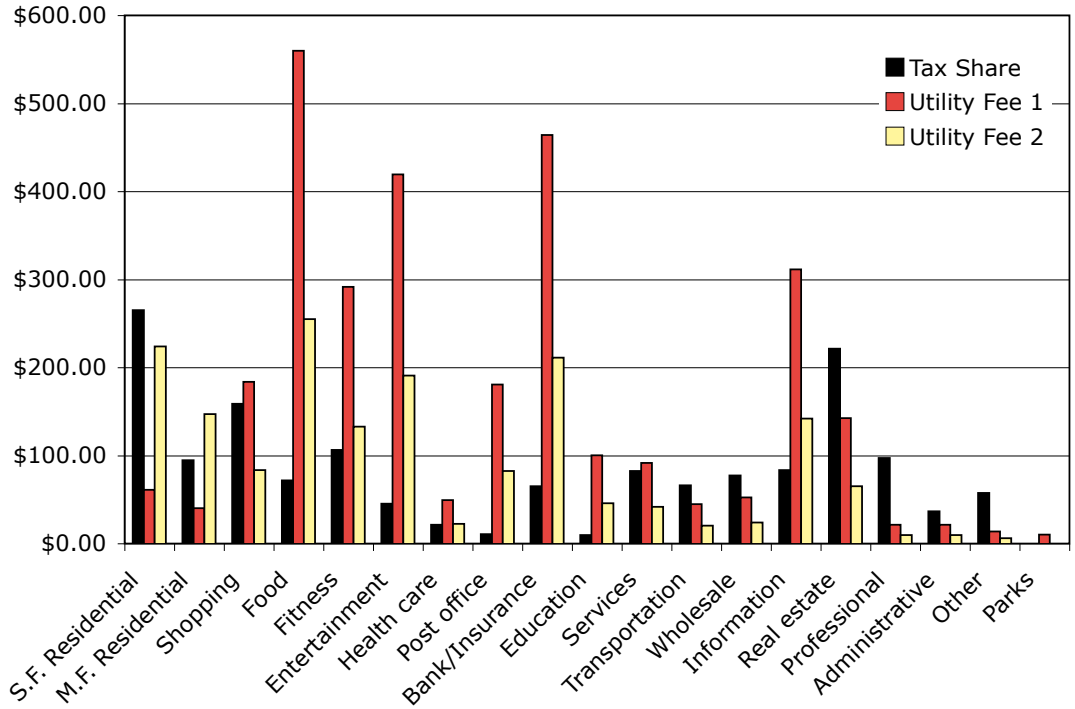

Figure 1: Comparison of utility fees with transportation share of property tax in Minneapolis, displayed as annual cost per residential unit or per employee.

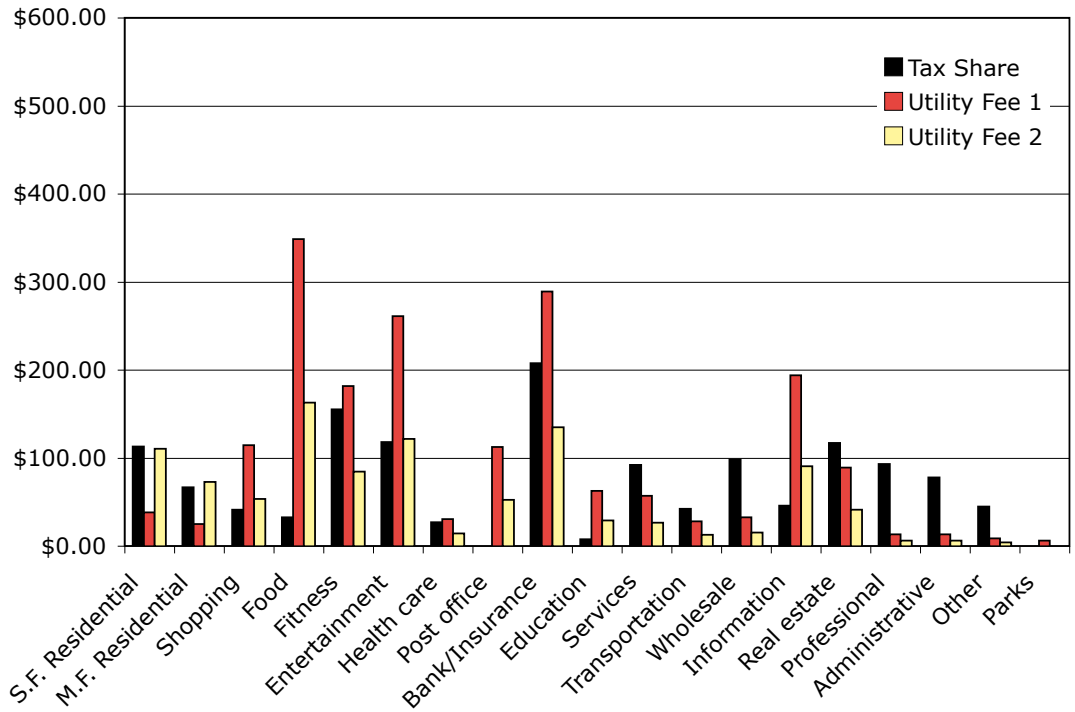

Figure 2: Comparison of utility fees with transportation share of property tax in Richfield, displayed as annual cost per residential unit or per employee.

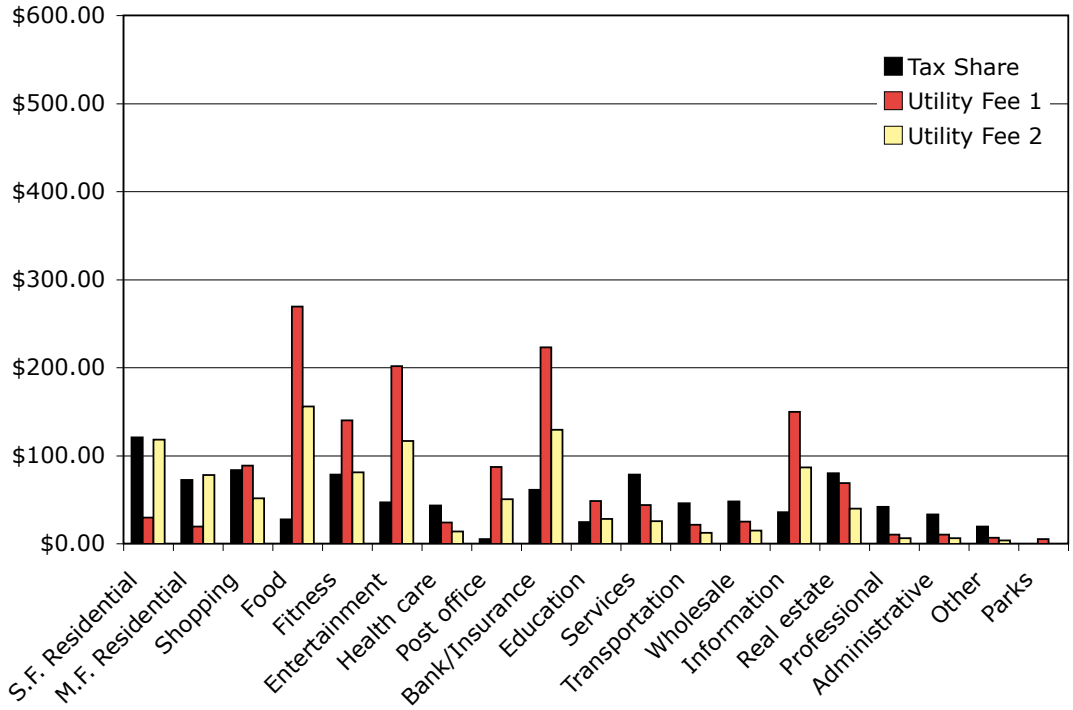

Figure 3: Comparison of utility fees with property tax share in Bloomington, displayed as annual cost per residential unit or per employee.

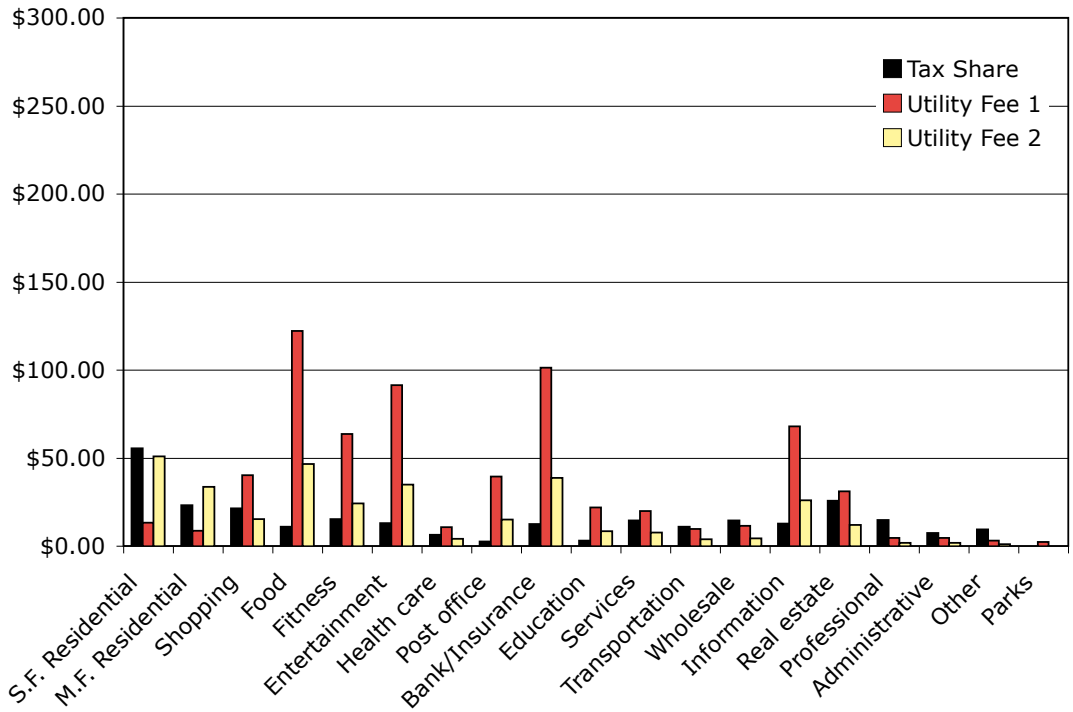

Figure 4: Comparison of utility fees with property tax share in Hennepin County, displayed as annual cost per residential unit or per employee. Note the vertical scale has been reduced by half.

Table 4: Residential monthly utility fees per unit.

	Total Annual	Single-family			Multi-family		
City	Funding Need	Units	Fee 1	Fee 2	Units	Fee 1	Fee 2
Minneapolis	$51 207 828	93 747	$5.08	$18.67	73 620	$3.34	$12.27
Richfield	$2 333 080	10 450	$3.17	$9.21	4524	$2.08	$6.05
Bloomington	$7 950 995	26 301	$2.44	$9.86	10 490	$1.61	$6.48
Hennepin Co.	$32 120 312	340 503	$1.11	$4.25	141 762	$0.73	$2.79

Note: Fee 1 is determined by a total reallocation of cost based on trips. Fee 2 is determined by a partial reallocation.
Source: Author's calculations.

deliveries by truck only infrequently. Properties located along bus routes present another complication: businesses whose trucks use the routes might protest that buses would continue to cause pavement wear if the trucks were removed, and that the buses would run even if the businesses' customers were to arrive by other modes. Because considering vehicle weight makes the determination of fees much more complex, it was not attempted here; governments considering weight-based surcharges would need to perform an evaluation based on local conditions.

6 Conclusion

Transportation utility fees connect the share of infrastructure maintenance costs paid by property owners to the benefit they derive from access to the transportation system. On the beneficiary-pays principle, this provides an equity improvement over the property tax, which also reflects value due to characteristics other than accessibility. However, the legality of transportation utility fees varies from state to state, and there is a risk that a fee will be invalidated as an unauthorized tax. Fee ordinances that have been upheld have limited the use of the proceeds to transportation purposes, and have tended to favor maintenance applications over new construction, so funding from other sources would still be necessary for capital projects. This could be addressed by pairing the utility fee with another value capture strategy that applies predominantly to new construction, such as an impact fee.

Compared to conventional property tax funding, transportation utility fees change the proportion of transportation costs borne by owners of various types of property. Residential property owners generally pay less, and commercial property owners generally pay more. Lower-valued residential properties see larger increases than more valuable property. Reducing the difference between the fee level assessed and the portion of property tax currently paid toward transportation may render public acceptance of the fee system more likely. One way to accomplish this would be to leave the general distribution of costs unchanged, and reallocate based on trip generation only among specific categories of property within the same land use. Further adjustment based on trip length or vehicle weight may also help to address equity concerns.

Changing the structure of local transportation funding by charging a fee based on land use rather than a tax on value may affect future land use patterns in the city. Businesses that attract large traffic volumes may choose to locate in a city without a utility fee, especially in suburban areas where nearby options are likely to be similar in other respects. Conversely, construction in a city with a utility fee might increase in value if there is a corresponding property tax reduction. This is a question that could be investigated empirically in cities where utility fees have been in place for a sufficient length of time.

When a utility fee is designed, a balance must be found between efficiency, equity and administrative concerns. The fairest system, in terms of billing based on use, would require the installation of traffic counters at each property to obtain accurate trip generation rates. Even if this were not prohibitively expensive, the potential for evasion would remain. Establishing more land use categories would enable rate estimates to be adjusted at a finer level, improving equity while avoiding the cost of metering traffic. An optimal level of aggregation would weigh the need to produce accurate trip estimates and to minimize the potential for legal challenges against the additional administrative effort that a more detailed procedure would require.

Table 5: Single-family residential cost changes by property value.

City	Value Quartile	Property Tax Avg. Cost ($)	Utility Fee 1			Utility Fee 2		
			Avg. Cost ($)	Change ($)	Change (%)	Avg. Cost ($)	Change ($)	Change (%)
Minneapolis	1	143.34	61.01	−82.33	−57.4	224.09	+80.75	+56.3
	2	192.75	61.01	−131.74	−68.4	224.09	+31.34	+16.3
	3	247.71	61.01	−186.70	−75.4	224.09	−23.62	−9.5
	4	487.64	61.01	−426.63	−87.5	224.09	−263.55	−54.1
Richfield	1	86.59	38.01	−48.58	−56.1	110.55	+23.96	+27.7
	2	101.28	38.01	−63.27	−62.5	110.55	+9.27	+9.2
	3	111.38	38.01	−73.37	−65.9	110.55	−0.83	−0.7
	4	138.26	38.01	−100.25	−72.5	110.55	−27.71	−20.0
Bloomington	1	67.12	29.33	−37.79	−56.3	118.26	+51.14	+76.2
	2	89.53	29.33	−60.20	−67.2	118.26	+28.73	+32.1
	3	105.82	29.33	−76.49	−72.3	118.26	+12.44	+11.8
	4	173.68	29.33	−144.35	−83.1	118.26	−55.42	−31.9
Hennepin Co.	1	28.67	13.31	−15.36	−53.6	51.00	+22.33	+77.9
	2	38.85	13.31	−25.54	−65.7	51.00	+12.15	+31.3
	3	49.69	13.31	−36.38	−73.2	51.00	+1.31	+2.6
	4	108.39	13.31	−95.08	−87.7	51.00	−57.39	−53.0

Note: Fee 1 is determined by a total reallocation of cost based on trips. Fee 2 is determined by a partial reallocation.
Source: Author's calculations.

Table 6: Nonresidential trip shares adjusted by average trip length.

	Minneapolis			Richfield			Bloomington			Hennepin Co.		
	Share (trips)	Share (miles)	Change (%)	Share (trips)	Share (miles)	Change (%)	Share (trips)	Share (miles)	Change (%)	Share (trips)	Share (miles)	Change (%)
Shopping	0.062	0.041	−33.5	0.373	0.326	−12.7	0.143	0.104	−27.4	0.111	0.075	−32.5
Food	0.339	0.226	−33.5	0.380	0.331	−12.7	0.419	0.304	−27.4	0.319	0.216	−32.5
Fitness	0.007	0.004	−33.5	0.010	0.009	−12.7	0.009	0.007	−27.4	0.014	0.009	−32.5
Entertainment	0.030	0.024	−18.5	0.009	0.010	+6.9	0.026	0.023	−11.0	0.025	0.020	−17.3
Health care	0.042	0.034	−18.5	0.033	0.035	+6.9	0.011	0.010	−11.0	0.035	0.029	−17.3
Post office	0.002	0.001	−18.5	0.006	0.006	+6.9	0.002	0.002	−11.0	0.001	0.001	−17.3
Bank/Insurance	0.232	0.321	+38.7	0.040	0.073	+82.1	0.200	0.303	+51.5	0.243	0.342	+40.9
Education	0.057	0.060	+4.8	0.054	0.074	+37.6	0.012	0.013	+14.4	0.040	0.042	+6.4
Services	0.042	0.034	−18.5	0.045	0.048	+6.9	0.037	0.033	−11.0	0.039	0.032	−17.3
Transportation	0.005	0.006	+38.7	0.001	0.002	+82.1	0.005	0.007	+51.5	0.005	0.006	+40.9
Wholesale	0.013	0.018	+38.7	0.010	0.019	+82.1	0.022	0.033	+51.5	0.021	0.030	+40.9
Information	0.100	0.139	+38.7	0.005	0.010	+82.1	0.045	0.068	+51.5	0.069	0.097	+40.9
Real estate	0.022	0.030	+38.7	0.018	0.033	+82.1	0.025	0.038	+51.5	0.029	0.041	+40.9
Professional	0.019	0.027	+38.7	0.004	0.008	+82.1	0.014	0.021	+51.5	0.016	0.023	+40.9
Administrative	0.016	0.022	+38.7	0.006	0.010	+82.1	0.010	0.015	+51.5	0.013	0.019	+40.9
Other	0.013	0.011	−18.5	0.005	0.005	+6.9	0.020	0.018	−11.0	0.019	0.015	−17.3
Total	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	

Note: The effect of weighting for length varies with the distribution of land uses in each city but is the same for Fee 1 and Fee 2.
Source: Author's calculations.

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