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Understanding Smart Growth Savings

What We Know About Public Infrastructure and Service Cost Savings,
And How They are Misrepresented By Critics

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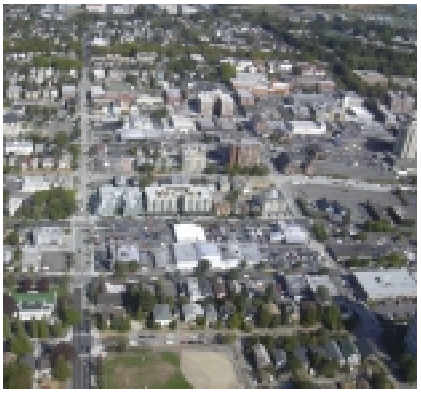



Abstract

Land use patterns affect the costs of providing public infrastructure and services such as roads, water, sewage, garbage collection, school transport and mail delivery. Various studies show that these costs tend to increase with sprawl (dispersed development outside existing urban boundaries), and can be reduced with Smart Growth (compact, planned development within existing urban boundaries). Smart Growth can save hundreds of dollars annually per capita compared with providing comparable public services to sprawled destinations. Most current development charges, utility fees and taxes fail to accurately reflect these location-related cost differences, representing a subsidy of sprawl. More accurate pricing can result in significantly more efficient land use development patterns, providing overall benefits to consumers. This paper summarizes estimates of Smart Growth savings, and critiques a study by Cox and Utt which claims that such savings are insignificant. That study misrepresents Smart Growth and contains several critical errors.

Introduction

Our local newspaper charges higher subscription fees for delivery to suburban locations. Similarly, many urban stores and restaurants offer free or inexpensive delivery, but suburban stores either lack delivery service or charge a significant fee.

Most activities that involve distribution (products being delivered to a destination) or interaction (numerous people and materials being brought together) are more efficient with compact land use patterns, because less travel is required to reach destinations. Although costs per mile tends to increase in denser areas, due to congestion and friction, unit costs tends to decline because each mile serves more destinations. These efficiencies are why people and businesses tend to cluster into cities, towns and business districts.

Table 1 **Types of Cost Savings**

Distribution (One-To-Many)	Interaction (Many-To-Many)
Newspaper, mail, and courier delivery	Schools, colleges and universities
Water supply, sewage and stormwater management	Retail centers
Road and sidewalk networks	Businesses
Electricity, telephone and cable lines	Recreational and cultural activities
Garbage collection	Emergency services
Government services, such as policing	
School busing	

Many activities are more efficient when destinations are located closer together.

Over the last few decades many studies have shown that more compact land use patterns, called *Smart Growth*, can significantly reduce various public infrastructure and service costs compared with more dispersed land use patterns, called *sprawl*. These studies have influenced development policies in various ways, in many cases leading to policies that encourage Smart Growth and discourage sprawl.

Although the basic concepts are well accepted by most experts, these relationships are complex and so can be difficult to quantity. Some critics claim that there is no real evidence that Smart Growth provides savings. A recent example is a study by Cox and Utt (2004) which analyzed the effects of land use density, growth rates and age on certain public expenditures in numerous municipalities. They conclude that Smart Growth savings are trivial. Their analysis contains several critical errors which reflects either inadequate understanding of the concept of Smart Growth, or intent to misrepresent the issue. This paper reviews the evidence on Smart Growth cost savings and evaluates the Cox and Utt study.

Defining Smart Growth

Smart Growth is a general term for policies that result in more compact, accessible development within existing urban areas. Smart Growth is an alternative to dispersed, automobile dependent development outside existing urban areas, often called sprawl. Table 2 compared these land use patterns.

Table 2 **Comparing Smart Growth and Sprawl** ("Smart Growth," VTPI, 2004)

	Smart Growth	**Sprawl**
Density	Higher-density, clustered activities.	Lower-density, dispersed activities.
Growth pattern	Infill (brownfield) development.	Urban periphery (greenfield) development.
Land use mix	Mixed land use.	Homogeneous (single-use, segregated) land uses.
Scale	Human scale. Smaller buildings, blocks and roads. Designed for pedestrians.	Large scale. Larger buildings, blocks, wide roads. Less detail, since people experience the landscape at a distance, as motorists.
Services (shops, schools, parks)	Local, distributed, smaller. Accommodates walking access.	Regional, consolidated, larger. Requires automobile access.
Transport	Multi-modal transportation and land use patterns that support walking, cycling and public transit.	Automobile-oriented transportation and land use patterns, poorly suited for walking, cycling and transit.
Connectivity	Highly connected roads, sidewalks and paths.	Hierarchical road network with numerous loops and dead-end streets, and unconnected sidewalks and paths.
Street design	Streets designed to accommodate a variety of activities. Traffic calming.	Streets designed to maximize motor vehicle traffic volume and speed.
Planning process	Planned and coordinated between jurisdictions and stakeholders.	Unplanned, with little coordination between jurisdictions and stakeholders.
Public space	Emphasis on the public realm (streetscapes, pedestrian environment, public parks, public facilities).	Emphasis on the private realm (yards, shopping malls, gated communities, private clubs).

This table compares Smart Growth and sprawl land use patterns.

Smart Growth can be applied in a variety of conditions, including rural, suburban and urban. For example, in rural areas it means clustering more development into villages, and in suburban areas it means creating complete, mixed-use, walkable neighborhoods. It is concerned with how people are distributed within a community, not with the total size of the community or the average density over a large area.

Smart Growth can provide a variety of economic, social and environmental benefits, as summarized in Table 3. These benefits result from various features of Smart Growth, including reduced per capita land consumption, less dispersed development, and more diverse transportation systems. Of course, the benefits of a particular Smart Growth program depend on its specific features and the conditions in which it is implemented. The existence of these benefits has been demonstrated in numerous studies and is widely accepted by a diverse range of professions and interest groups, including the American Planning Association, the Institute of Transportation Engineers, the International City/County Management Association, the National Governors Association, the National Trust for Historic Preservation, and various farming and environmental organizations.

Table 3 **Smart Growth Benefits** (Burchell, et al, 1998; ICCMA, 1998; Litman, 2002; USEPA, 2004)

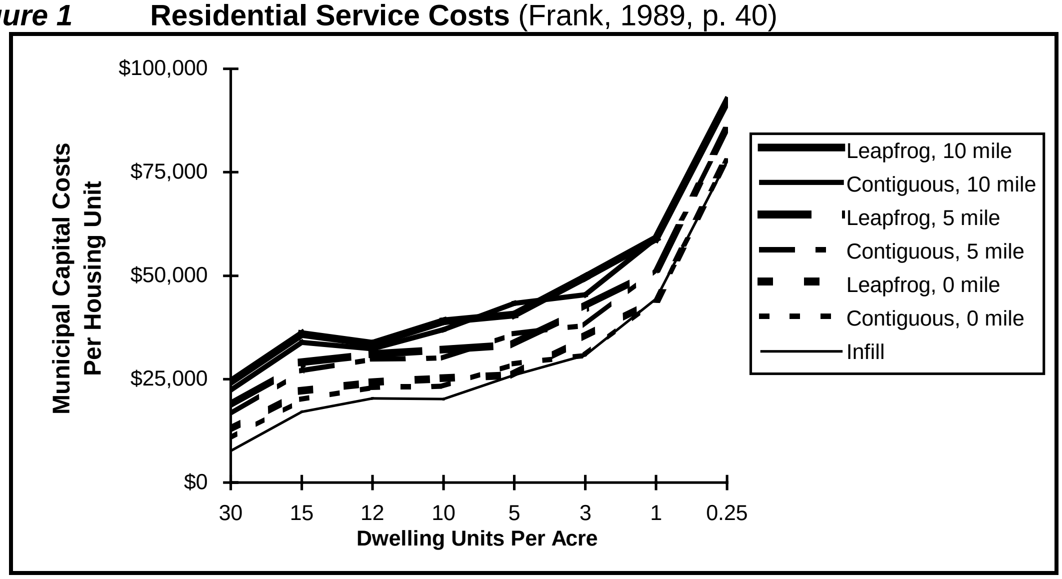
Economic	Social	Environmental
Reduced development costs. Reduced public service costs. Reduced transportation costs. Economies of agglomeration. More efficient transportation. Supports industries that depend on high quality environments (tourism, farming, etc.).	Improved transport options and mobility, particularly for non-drivers. Improved housing options. Community cohesion. Preserves unique cultural resources (historic sites, traditional neighborhoods, etc.) Increased physical exercise and health.	Greenspace & habitat preservation. Reduced air pollution. Increased energy efficiency. Reduced water pollution. Reduced "heat island" effect.

Smart Growth can provide various economic, social and environmental benefits.

Evidence of Smart Growth Savings

One of the many Smart Growth benefits is its ability to reduce public infrastructure and service delivery costs. Many studies conclude that Smart Growth can provide significant public cost savings (Burchell, et al, 1998; Muro and Puentes, 2004). Frank (1989) identified various factors that affect these costs, including density and distance from the existing urban center (town or city), as illustrated in Figure 1.

Figure 1 **Residential Service Costs** (Frank, 1989, p. 40)



Capital costs increase for lower density, non-contiguous development. Higher density, clustered, infill development can provide hundreds of dollars in annual savings compared with sprawl.

Burchell and Mukherji (2003) found that sprawl increases local road lane-miles 10%, annual public service costs about 10%, and housing costs about 8%, adding about $13,000 per dwelling unit. Table 4 shows how school, road and utility costs per residential unit vary depending on development density. Rural Sprawl costs are about 60% more than denser urban development.

Table 4 **Annualized Municipal Costs for Different Densities** (Smythe, 1986)

Costs	Higher Density	Medium Density	Rural Cluster	Rural Sprawl
Units/Acre	4.5	2.67	1	0.2
Schools	$3,204	$3,252	$4,478	$4,526
Roads	$36	$53	$77	$154
Utilities	$336	$364	$497	$992
Totals	*$3,576*	*$3,669*	*$5,052*	*$5,672*
Incremental Cost	*NA*	*3%*	*41%*	*59%*

Per household annual municipal service costs increase with sprawl, based on a prototypical community of 1,000 units housing 3,260 people, 1,200 students. Compared with Higher Density, Rural Cluster increases costs 41%, and Rural Sprawl 59%.

Table 5 summarizes public costs (utilities, government services and transportation infrastructure) for three possible development patterns in the Toronto region, showing significant potential savings for the more clustered option. In addition to these costs, the "Nodal" and "Central" options provide additional savings by reducing per capita annual vehicle mileage, and therefore costs such as traffic congestion and pollution.

Table 5 **Public Costs of Three Development Options** (Blais, 1995)

	Central	Nodal	Spread
Residents per Ha	152	98	66
Capital Costs (billion C$1995)	39.1	45.1	54.8
O&M Costs (billion C$1995)	10.1	11.8	14.3
Total Costs	*49.2*	*56.9*	*69.1*
Percent Savings over "Spread" option	*40%*	*16%*	*NA*

This table compares the estimated 25-year public costs of three land use development options, in millions of dollars. More spread development substantially increases costs.

Table 6 compares the public infrastructure costs of a low-density "Sprawl" and high-density "Smart Growth" scenarios in the Twin City region. Costs per household are more than double under the sprawl development patterns. The sprawl development option incremental costs have an annualized value of $565 per unit. This does not include ongoing public service costs that increase with sprawl, such as utility maintenance, emergency response and school busing.

Table 6 **Twin City Development Patterns Compared** (CEE, 1999, p. 23)

	Sprawl (2.1 units/acre)	Smart Growth (5.5 units/acre)
Miles of local roads	3,396	1,201
Costs of local roads per unit	$7,420	$2,607
Other infrastructure costs per unit	$10,954	$5,206
Total	*$18,374*	*$7,813*

This table shows infrastructure cost savings from "Smart Growth" development that increases residential development from low to medium density.

The city of Lancaster, California development impact fees that reflect the infrastructure costs of a particular location (New Rules, 2002). These fees are calculated by a civil engineering firm based on local development costs. The fees for a typical house located near the city edge are $5,500, but increase to $10,800 if located a mile away, reflecting the additional costs of providing more dispersed infrastructure. Since this price structure was implemented, virtually all new development has been located close to the city.

School travel costs are another example of potential smart growth savings. School busing costs average about $640 per student-year, represent 5-10% of typical school budgets, and even more in rural areas (STN, 2004). Some students must be bused regardless of their home location, due to physical disability or to attend special schools, but for most students, the need to bus and therefore school bus services costs depends on the distance between their home and local schools. Below is the typical distance used by school districts above which students must be provided bus services:

- Grades K - 5: Student lives 1.0 mile or more from school.
- Grades 6 - 8: Student lives 1.5 miles or more from school.
- Grades 9 - 12: Student lives 2.0 miles or more from school.

If half of a community's land area is devoted to residential development, and there are an average of 0.2 elementary students per household, and an elementary school requires at least 300 students, then residential densities of approximately 1.5 housing units per acre can support an elementary school without requiring busing. As densities decline, an increasing portion of students must be bused.

In addition, busing is sometimes provided for students who live much closer than these distances if a busy roadway creates a barrier to walking and cycling. As a result, as densities decline and vehicle traffic increases, schools must bear increased school busing costs, or households must bear increased financial and time costs chauffeuring children to and from school, and schools and local governments must devote more money to expand road and parking capacity to accommodate these vehicle trips. Note that, except for additional roadway capacity expansion costs, none of these costs are reflected in municipal budgets. Rather, they consist of increased school district expenditures or cuts in other school services, higher household transportation expenditures, and time costs imposed on parents.

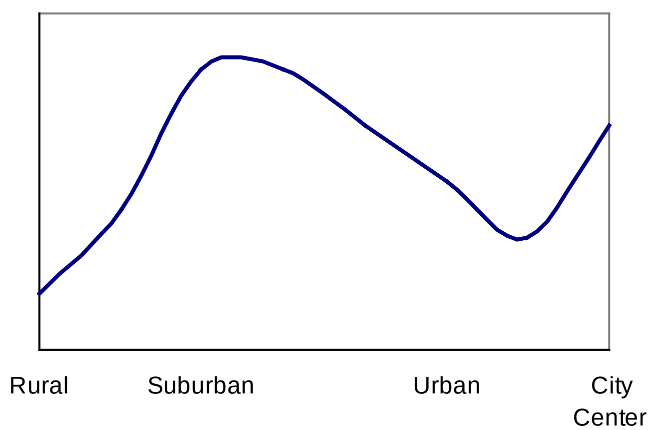
Smart growth includes development of more carefully planned communities, with schools located close to residential neighborhoods, improved walkability, traffic calming and other strategies to control vehicle traffic, and improved public transit bus services. It also includes efforts to redevelop existing urban communities and improve public services (including public school quality in such areas). Each of these features can help reduce school busing and chauffeuring requirements, providing savings to school districts, families and municipal governments.

The relationships between density and public costs are, of course, complex. Actual costs depend on the specific location and types of services provided. There are also incremental costs associated with increased density, including increased congestion and friction between activities, special costs for infill development, and often higher design standards. Ewing (1997) concludes that this relationship can be graphed as a tilde (~):

- Costs are low in rural areas where households provide their own services.
- Costs increase in suburban areas where services are provided to dispersed development
- Costs decline with clustering, and as densities increase from low to moderate.
- Costs are lowest for infill redevelopment in areas with adequate infrastructure capacity. Costs tend to increase at very high densities due to congestion and high land costs.

Figure 2 illustrates this pattern. Note that much of the public savings in rural areas are actually costs shifted from public to private budgets or reductions in service quality. For example, rural residents tend to provide their own water, sewage and garbage collection. They actually spend more in total on these services (SC, 1999), although the costs do not show up in public utility budgets (and so are ignored in Cox and Utt's analysis). On the other hand, the cost reductions associated with increased density are true resource cost savings, reflecting reductions in total costs per unit.

Figure 2 **Land Use Impacts on Public Infrastructure and Service Costs**



Public costs tend to be low in rural areas, where most residents provide their own water and sewage, and service standards are relatively low. They increase in suburban areas as more services are publicly supplied to dispersed destinations, decline with increased clustering due to efficiencies, then increase at very high densities due to increased congestion.

Other factors also affect public service costs. Single-use development results in inefficient use of infrastructure, increasing per capita costs:

> "Because the home and the workplace are entirely separated from each other, often by a long auto trip, suburban living has grown to mean a complete, well-serviced, self-contained residential or bedroom community and a complete, well-serviced place of work such as an office park. In a sense we are building two communities where we used to have one, known as a town or city. Two communities cost more than one; there is not only the duplication of infrastructure but also of services, institutions and retail, not to mention parking and garaging large numbers of cars in both places." (Kelbaugh, 1992, p. 17)

Rural residents traditionally accepted lower levels of public services such as roads (often unpaved), emergency response (often voluntary), and limited library and recreation services. Sprawl encourages residents accustomed to urban quality services to move to exurban areas, pressuring governments to provide more services to low-density locations, despite their high costs.

None of the studies described here considers *all* public infrastructure and service costs affected by land use patterns, so total savings of Smart Growth are greater than they indicate. Most only consider a limited set of infrastructure costs borne directly by one level of government. Some ignore costs borne by private utilities, by other levels of government, (such as the post office or school districts), by businesses, and indirectly by consumers. On-going costs are often overlooked. For example, many studies consider the incremental costs of building longer water and sewage lines, but not the incremental costs of maintaining and operating them. Similarly, some studies consider the incremental costs of building more roads, but not the costs of maintaining them, or of providing additional parking at destinations due to more automobile-dependent land use patterns.

Overall, the various studies described above indicate that Smart Growth (medium- to high-density, mixed-use development within existing urban areas) can provide direct savings in publicly-borne development costs (roadways and utility lines) ranging from $5,000 to as much as $75,000 per unit, compared with the same quality of infrastructure provided to dispersed, automobile-dependent development one or more miles beyond the urban boundary. Annualized, these savings range from $270 to $4,000 per unit (assuming 7% interest over 20 years). In addition, incremental operations, maintenance and service costs (maintaining longer roads and utility lines, increased pumping costs, higher delivery costs for public services, etc.) are probably at least as large, indicating that Smart Growth can provide public cost savings ranging from $500 to nearly $10,000 annually per unit.

Some communities use impact fees to internalize a portion of these costs, but in practice these seldom reflect full costs. Low-density homes generally do not pay sufficient incremental taxes to cover their higher costs for public services such as school busing, road maintenance, or water and sewer line (Sorensen and Esseks, 1998). As a result, households in older urban neighborhoods tend to overpay for public services, while those in newer, lower-density suburban locations tend to underpay (Guhathakurta, 1998).

Cox and Utt's Analysis

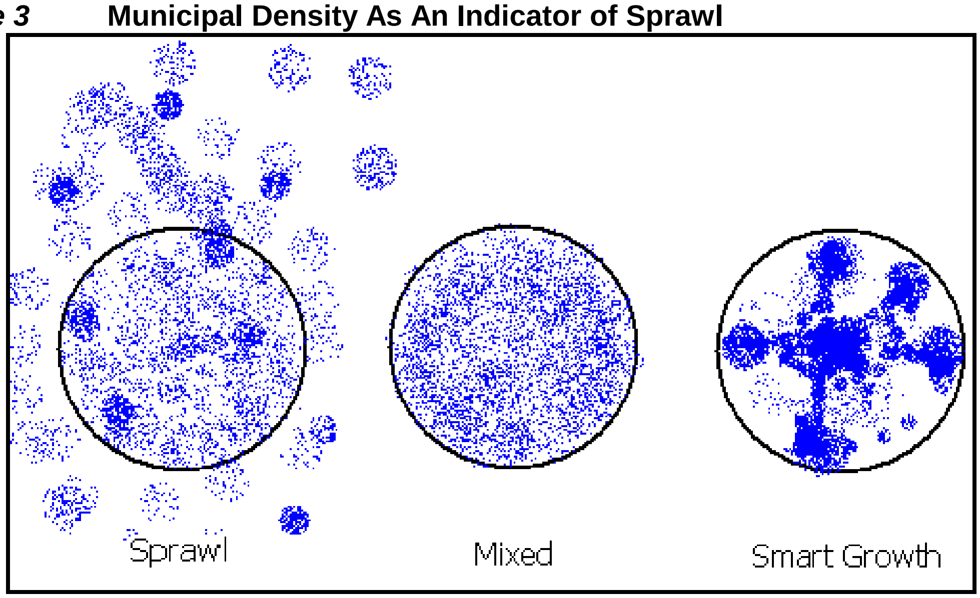
Cox and Utt analyzed various government expenditure by more than 700 municipalities in 2000. Based on the analysis results they conclude that density and growth rates do not significantly affect per capita local government expenditures, so Smart Growth provides no significant development or service cost savings. Their analysis contains several critical errors, as discussed below.

Definitions of Smart Growth

Cox and Utt base their analysis on the assumption that Smart Growth consists primarily of increased population density, and that these impacts can be measured effectively at the municipal scale. Both of these assumptions are wrong.

As indicated in Table 2 and related literature, population density is just one of many Smart Growth features, and density changes must be evaluated at a fine-grained geographic scale. For example, in their seminal analysis of land use patterns, Ewing, Pendall and Chen (2002) created an Sprawl Index with four primary factors: residential density, neighborhood mix, strength of activity centers and street network design, measured mostly at a fine grain (such as census tract) scale. Municipal-scale density represents less than a quarter of total Smart Growth factors. Simply increasing city-wide density by itself would do little to achieve Smart Growth objectives. A given level of city-wide density can provide very different results, depending on whether or not there is also clustering, mix and connectivity. To illustrate this distinction, Los Angeles has the highest gross density of any U.S. city, but ranks 45th out of 83 metropolitan areas on the Sprawl Index, because other cities rank higher in terms of other attributes such as land use mix, activity center strength and roadway connectivity.

Figure 3 **Municipal Density As An Indicator of Sprawl**



All three cities may have the same measured population density, although one reflects sprawl and the other Smart Growth. Sprawl consists of dispersed development outside existing urban boundaries. Smart Growth consists of clustered, mixed-use development within urban boundaries.

Studies described earlier indicate that the most costly type of sprawl consists of dispersed development *outside* existing urban areas. Cox and Utt's only consider development *within* existing municipal boundaries and so ignore these savings. Smart Growth policies that direct development into existing urbanized areas can provide far more savings than Cox and Utt found. Low-density housing built a few miles outside the urban fringe can cost hundreds of dollars more in annual public costs to provide a given level of public services than the same size housing build in clusters of mixed-use, urban neighborhoods.

Smart Growth does not always reduces public service costs. As described earlier, some costs may increase at high densities due to increased congestion and friction (although high-density areas such as central business districts provide other benefits, such as land cost savings, reduced transportation costs, and increased economic productivity that offset these higher development costs). This is exactly the pattern Cox and Utt found.

Measuring Costs

Cox and Utt base their analysis on the assumption that municipal expenditures reflect the costs of providing public services, so lower expenditures reflect greater efficiency and higher expenditures reflect reduced efficiency. This is wrong for several reasons.

First, in lower-density areas a greater portion of service costs are borne directly by property owners, but Cox and Utt ignore private costs. They incorrectly assume that costs are avoided if residents maintain their own wells and septic systems, and deliver their own garbage to the dump. In fact, rural residents actually spend more on basic services than urban residents (SC, 1999).

Second, rural residents tend to have lower levels of public services than can be provided in urban areas. Smaller towns tend to rely on volunteer fire and police departments, have lower grade roadways (many roads are unpaved), lack facilities such as sidewalks, often lack public transit services, and may have minimal parks and recreational services. Cox and Utt do not account for such differences when comparing per capita costs.

Put another way, as more efficient land use patterns make municipal services more cost effective to provide, some of these savings can be reinvested as additional public services. As a result, residents gain from improved service quality rather than lower taxes. These additional public services often provide financial savings to consumers and businesses. For example, residents in Smart Growth community spend less on automobile transportation because their communities have better travel options (McCann, 2000), and better parks and recreation facilities may avoid the need to join a private club.

In addition, larger cities bear special costs associated with concentrated poverty. In 1990, large U.S. cities comprised 12% of the nation's population but 17% of its poor, and as a result spent an average of $364 per capita on health, hospitals, and public welfare, 30% of local tax revenues, while smaller cities and suburbs spent only $40 per capita on those poverty-related categories, just 9% of local taxes (Gyourko and Summers, 1997). This partly results from suburban zoning and automobile-dependency that excludes residents who require affordable housing or cannot drive, offloading public costs onto cities.

Other Cost Savings

Cox and Utt assume that the three cost categories they measure (municipal expenditures, water supply and sewage) reflect total potential Smart Growth savings, but there are many more potential savings, as indicated in Table 7. Total cost savings are therefore much larger than those measured by Cox and Utt.

Table 7 **Types of Cost Savings Considered by Cox and Utt**

Costs Considered	Costs Ignored
Water and sewage services Road and sidewalk networks Government services, such as policing Parks services Emergency services (some)	Newspaper, mail, and courier delivery Business costs Consumer vehicle ownership and use Emergency services (some) Electricity, telephone and cable lines Garbage collection School busing Parking cost savings

Cox and Utt's analysis only considered a portion of total savings associated with Smart Growth.

Municipal Employee Wages

Cox and Utt argue that increased density reduces public service efficiency by increasing municipal employee wages and work regulations, due to "special-interest capture." Their analysis overlooks critical issues. Residents of larger cities with denser land use patterns tend to earn higher wages, due to the greater productivity resulting from agglomeration economies. This drives up the cost of living in these cities. In addition, public services in large cities are often more sophisticated and productive. For example, larger cities often use larger transit buses and more automated traffic control systems, which require better trained operators. It is only logical that municipal employees in such areas should earn more than employees in lower-wage communities. To prove their point Cox and Utt would need to show that municipal employees in denser and older cities receive significantly higher wages compared with overall local wages, without any increase in municipal employee productivity.

Cox and Utt confuse costs and economic transfers. Smart Growth provides true resource savings: per capita costs to provide infrastructure and services are reduced. Wage differentials, if they exist, are economic transfers not costs: higher costs to employers and higher benefits to employees. Whether such differences are good or bad is subjective. Cox and Utt assume that higher municipal wages are harmful, but it would be equally appropriate to say that lower-age employees in lower-density, newer communities are underpaid. Although there is no doubt that society benefits from Smart Growth resource cost savings, it is wrong to assume that society benefits from lower wages.

Ignorance or Intentional Misrepresentation?

When writing a research paper it is standard practice to provide a balanced overview of the issue, including discussion of previous analysis on the subject, describe the new research, and discuss the strengths and weaknesses of the results (Litman, 2004). Cox and Utt fail to do this. They provide no discussion of the various definitions of sprawl or different ways to measure it. They reference only one previous study on the costs of sprawl (Burchell, et al, 2002). They claim incorrectly that Smart Growth consists simply of increased population density which can be measured effectively at the municipal level. They ignore extensive recent developments on techniques for evaluating the benefits and costs of sprawl and Smart Growth (Ewing, Pendall and Chen, 2002). They cite Ladd (1992), but ignore cautions contained in that study against using that analysis to evaluating sprawl costs, and other critiques of that analysis (Litman, 2003).[1] They do not discuss whether municipal expenditures reflect all sprawl-related incremental costs, or whether differences in service quality and area wage rates can be ignored. Either Cox and Utt are careless researchers, or they intentionally ignore alternative evidence and misrepresent these issues.

Unintended Praise

A bible story tells how the king of Moab once hired the soothsayer Balaam to curse the Israelites when the tribe camped by his land. Reluctantly (he had been warned against performing the deed), Balaam traveled to Mount Phogor, above the Israeli encampment to pronounce the curse. Seven bullocks and seven rams were sacrificed as prescribed. But instead of a curse, out of Balaam's mouth came unexpected praise, a blessing that has since become part of the Jewish liturgy ("How beautiful are thy tabernacles, O Jacob, and thy tents, O Israel!").

Similarly, despite their efforts to the contrary, Cox and Utt's research shows that Smart Growth actually does reduce public service costs. Per capita municipal expenditures are found to decline with density, except in the densest cities, just as previous research indicates. Cox and Utt argue that these cost differences are trivial, and so do not justify Smart Growth policies. However, as described earlier, their analysis greatly understates total potential Smart Growth savings because it only considers costs that show up in municipal government annual accounts. Total savings to utilities, school districts, state governments, businesses and consumers from more compact, mixed-use development are probably an order of magnitude higher than the $53 Cox and Utt found. This indicates that Smart Growth typically provides hundreds of dollars in annual per capita savings compared with sprawled, unplanned development patterns.

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[1] In 2003 I debated Wendell Cox at the *Urban Streets Symposium*, sponsored by the Transportation Research Board and the Federal Highway Administration, during which I shared my criticisms of his misrepresentations of Ladd's analysis (Litman, 2003). He therefore cannot legitimately claim that he was unaware of these issues.

Conclusions

Smart Growth consists of various development features that create more efficient land use patterns. Numerous studies indicate that Smart Growth can reduce public infrastructure and service costs, providing savings on roads, water, sewage, garbage collection, utilities, school transportation, delivery services, and parking facilities.

Cox and Utt attempts to discredit these studies by showing that increased residential density provides relatively small municipal cost savings. Their analysis contains several critical errors.

- It incorrectly defines Smart Growth as simply increased density or slower growth.
- It measures density at a municipal scale, which is too large to reflect Smart Growth.
- It only compares differences between municipalities, ignoring differences between development within and outside of municipal boundaries, and between conventional and clustered development within municipal boundaries.
- It only considered a small portion of total costs affected by land use patterns (municipal, water and sewage expenditures), ignoring other savings resulting from more accessible land use patterns.
- It ignored costs of services provided directly by households in lower-density areas, such as well water, septic systems and garbage disposal.
- It ignores differences in service quality.
- It treats higher municipal employee wage in higher-density cities as a cost and an inefficiency, ignoring differences in average overall wages in such areas.

Cox and Utt's analysis greatly understates total potential Smart Growth savings. They calculate that a 25% increase in municipal population density provides $53 annual per capita in direct savings in municipal, water supply and wastewater management costs. This suggests that a comprehensive Smart Growth program that shifts dispersed, urban fringe development into more compact, mix-use, multi-modal urban villages could provide public infrastructure and service savings that total several hundred dollars annually per capita, or more than a thousand dollars annually per household. This is consistent with previous research.

Smart Growth critics such as Cox and Utt claim that sprawl reflects consumer preferences, and that Smart Growth harms consumers. But this assumes that current markets are efficient. Efficient markets require that prices (what individuals pay) reflect marginal costs. Currently, many incremental costs resulting from sprawl are dispersed throughout the economy, rather than charged directly to individual consumers. Even where home-buyers pay development fees, such fees seldom reflect the full incremental cost of serving sprawl development. User fees and taxes do not generally reflect additional costs of maintaining and operating more dispersed infrastructure, of providing school busing services, or to deliver mail to dispersed locations. Described more positively, people who choose Smart Growth locations should be rewarded for the cost savings they provide to their community. This would allow individual consumers to make tradeoffs between cost and location.

This type of underpricing is just market distortion that stimulates sprawl. Table 8 summarizes others.

Table 8 **Market Distortions That Favor Sprawl** ("Market Principles," VTPI, 2003)

Market Distortion	Description
Underpricing Location-Related Costs	Although public service costs tend to be higher for sprawl development, development charges, utility fees and local taxes do not generally reflect these location-related costs.
Excessive Parking and Roadway Requirements	Most zoning codes and development standards require generous road and parking capacity. This encourages lower-density, urban fringe development where land is cheaper, and underprices vehicle travel.
Roadway Right-of-Way	By convention, land use for public roads and parking facilities is exempt from rent and taxes. Economic neutrality implies that land used for roads should be priced and taxed at the same rate for competing uses.
Planning and investments that favor suburbs	Many current planning and public investment practices favor new, lower-density, automobile-dependent development over urban infill.
Undervaluing Nonmotorized Modes and Transit	Transportation planning practices tend to undervalue nonmotorized transport modes and transit services, and so underinvest in them.
Residential Lending Practices	Mortgage lenders usually treat car ownership as a financial asset. As a result, lower-income households are encouraged to purchase homes in automobile-dependent suburban areas rather than in multi-modal urban locations.
Underpricing Automobile Travel	Automobile travel is underpriced through underpricing of road use, free parking, fixed insurance and registration fees, and various external costs.

This table describes market distortions that encourage sprawl and automobile dependency.

Consumer surveys indicate that many households would willingly shift from lower-density, dispersed locations to Smart Growth infill locations if offered financial incentives of this magnitude (see discussion in Litman, 2003). Experience with location-based development fees in Lancaster, California indicates that when consumers are charged efficient prices they will usually choose Smart Growth over sprawl.

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