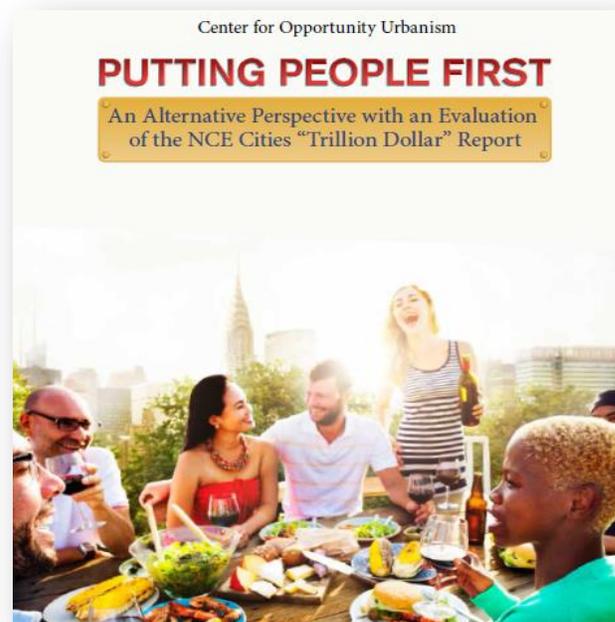
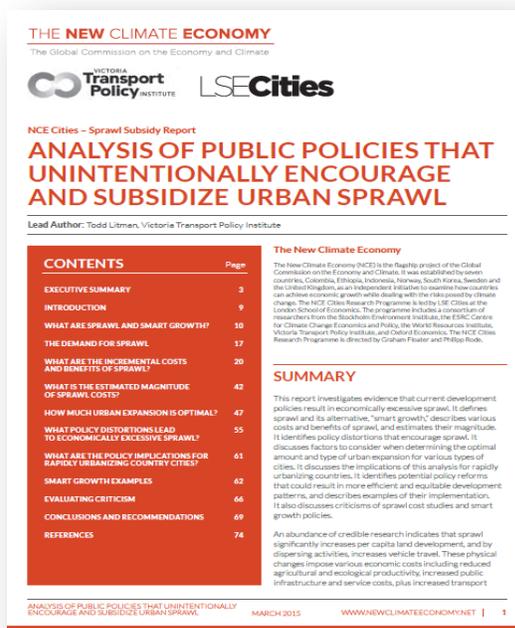


## Response to *Putting People First: An Alternative Perspective with an Evaluation of the NCE Cities “Trillion Dollar” Report*

4 December 2015

By Todd Litman  
Victoria Transport Policy Institute



### Abstract

My 2014 report, *Analysis of Public Policies That Unintentionally Encourage and Subsidize Urban Sprawl*, evaluated costs of sprawl and benefits of Smart Growth, and identified various policy distortions that result in economically excessive sprawl (more than people would choose with more efficient policies). Wendell Cox responded with, *Putting People First: An Alternative Perspective with an Evaluation of the NCE Cities “Trillion Dollar” Report*, which argues that my study exaggerated sprawl costs by overstating vehicle travel reductions, and increases housing costs caused by urban containment regulations. This document examines and responds to these criticisms. Cox uses biased analysis to reach his conclusions; they cannot withstand scrutiny. He incorrectly defines issues, uses incomplete data and unjustified assumptions, and misrepresents key evidence. Much of the research he claims justifies sprawl actually supports Smart Growth. In fact, my \$1.2 trillion annual estimate reflects a lower-bound value, the total costs of sprawl and benefits of Smart Growth are probably much higher.

## Executive Summary

My report, [Analysis of Public Policies That Unintentionally Encourage and Subsidize Urban Sprawl](#), describes various policy distortions which result in economically-excessive sprawl, estimates incremental costs that result, and identifies Smart Growth policies that can correct these distortions. Wendell Cox responded with, [Putting People First: An Alternative Perspective with an Evaluation of the NCE Cities “Trillion Dollar” Report](#), which argues that my report exaggerates sprawl costs and Smart Growth benefits by overstating vehicle travel reductions and the tendency of urban containment regulations to increase housing costs. Although there is a kernel of truth to some of Cox’s arguments, he “tortures the data,” he uses selective and incomplete data, and unjustified assumptions, to reach his desired conclusions. His arguments cannot stand scrutiny. They reflect these errors:

- Much of Cox’s criticism is based on the incorrect assumption that Smart Growth consists only of urban containment regulations. Such regulations are actually a minor portion of Smart Growth policies. For every jurisdiction with strongly-enforced urban containment regulations there are dozens with strict regulations that limit urban infill and mandate automobile parking.
- Cox misrepresents economic productivity and opportunity impacts. Good research indicates that more compact development tends to increase employment, business activity, wages, tax revenue and economic mobility (the chance children born in low-income households become economically successful as adults). He claims, incorrectly, that Hsieh and Moretti (2015) and Saks (2008) criticize urban containment regulations when they actually criticize sprawl-inducing regulations that limit compact infill in economically-successful cities, and they recommend Smart Growth policies that reduce such restrictions and expand high-quality public transit. He erroneously claims that Hsieh and Moretti’s \$2 trillion lost productivity estimate should be *subtracted* from my \$1.1 trillion sprawl cost estimate, on the contrary, it should be *added* to my estimate, implying that total sprawl costs are more than double my estimate.
- Cox’s affordability analysis is incomplete, biased and unrealistic. He ignores the many ways that Smart Growth reduces costs. By only considering single-family house prices, he exaggerates housing costs in cities where more compact housing types are common. He argues that cities such as New York, San Francisco and Seattle would have affordable housing if they simply reduced urban containment regulations, although they are geographically constrained and have little undeveloped land available within affordable commute distances.

**Table ES1 Smart Growth Affordability Impacts**

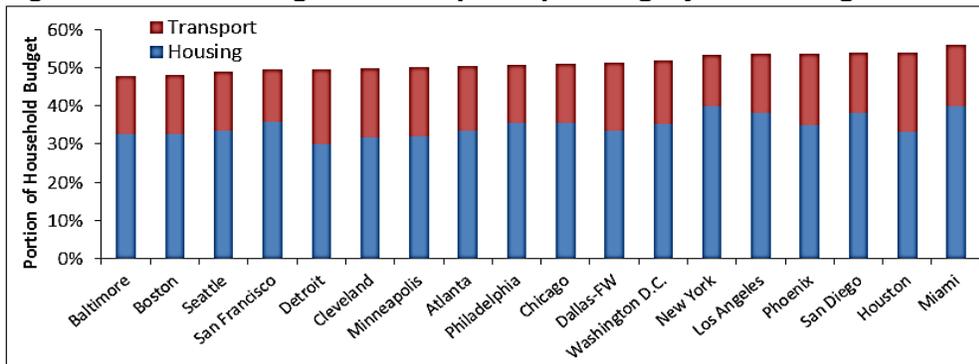
Reduces Affordability	Increases Affordability
<ul style="list-style-type: none"> <li>• Urban containment regulations increase land unit prices (per square meter).</li> <li>• Denser, infill development increases some infrastructure requirements (curbs, sidewalks, sound barriers, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Allows higher densities which reduce land use per housing unit</li> <li>• Increases affordable (adjacent and multi-family housing options).</li> <li>• Reduces parking requirements and associated costs.</li> <li>• More affordable transport options (walking, cycling and transit).</li> <li>• Lower infrastructure and utility costs.</li> </ul>

*Cox argues that Smart Growth reduces affordability, ignoring the many ways it increases affordability.*

- Cox claims that my analysis exaggerates sprawl costs. He estimates that sprawl only increases motor vehicle travel 37-42%, although many credible studies find much larger impacts. My sprawl cost estimate is actually a lower bound value; had I used international and sub-regional vehicle travel data, and monetized the values of lost open space, inadequate transport options for non-drivers, and reduced economic productivity, the estimate would be much larger. For example, adding Hsieh and Moretti’s \$2 trillion estimate of lost productivity due to regulations that limit infill development in economically-successful cities would nearly triple my estimate.
- Cox uses incomplete and inappropriate analysis. For example, he finds positive associations between regional density and outcomes such as housing costs, traffic congestion, property taxes and social inequity, but ignores important demographic, geographic and economic factors that affect these relationships. This is bad research and the results are worthless. Credible studies that accounts for these factors reach very different conclusions, they indicate that, all else being equal, more compact and multimodal development increases overall (housing and transport costs) affordability, reduces per capita congestion delays, increases infrastructure cost efficiency, and improves economic productivity and opportunity.
- Cox ignores the primary issue examined in my study: the degree that current policy distortions result in economically excessive sprawl and automobile travel, and the potential benefits of correcting these distortions. Many Smart Growth policies reflect economic principles including *consumer sovereignty* (they respond to consumer demands), *cost-based pricing* (users pay directly for the infrastructure and services they use), and *neutral planning* (planning reflects comprehensive analysis and unbiased policies), and so tend to increase efficiency and equity.
- Cox claims that sprawl and automobile dependency reflect consumer preferences, but ignores evidence of changing consumer demands, and the impacts of current housing and transport distortions that reduce compact housing options and affordable transport modes.
- Cox’s analysis violates basic research principles: it fails to present all perspectives, is unclear and poorly documented, and lacks independent peer review.

Cox’s analysis focuses on one issue: housing affordability. Although important, this is just one of many economic, social and environmental policy objectives. Cox is wrong to claim that my analysis “dismisses the housing affordability consequences of urban containment policies,” in fact, I devote several pages to this issue, but put it in perspective: I point out that Smart Growth affordability impacts are mixed, some policies increase but others reduce housing costs, and it provides other savings and benefits, including transport saving and higher incomes.

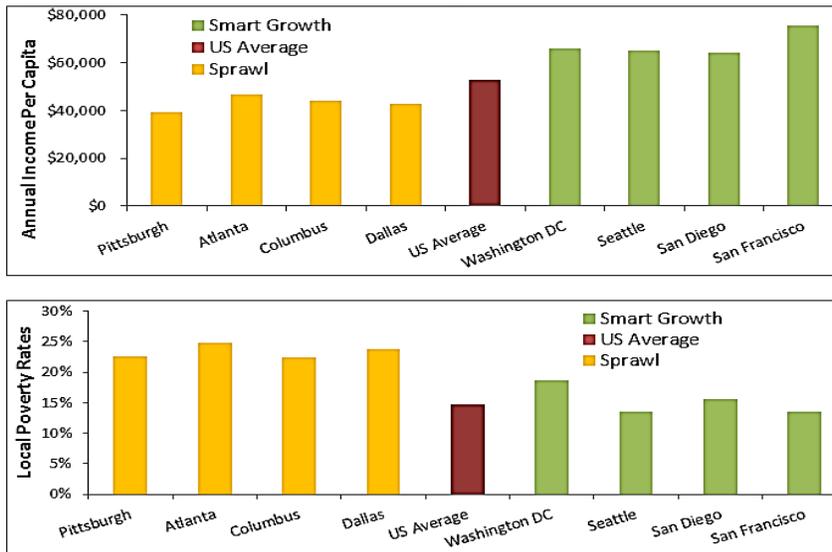
**Figure ES1 Housing and Transport Spending By Urban Region**



*The compact regions that Cox criticizes as unaffordable, such as Boston, Seattle and San Francisco, have **lower** total housing and transport expenses than the sprawled regions he advocates, such as Phoenix, Houston and Miami, because their higher housing costs are more than offset by cheaper transport.*

Contrary to Cox's claims, sprawl reduces economic productivity and opportunity: the sprawled regions he cites as successful have significantly lower average incomes, higher poverty rates, lower education attainment, higher housing foreclosure rates, and less economic mobility than the compact regions he criticizes. Sprawl reduces household wealth by increasing expenditures on vehicles (which depreciate in value) and reducing investments in housing (which appreciate). Fiscal impact studies indicate that, due to higher infrastructure costs and lower per-acre property tax revenue, dispersed development often costs local governments more than its incremental tax revenue, forcing households in compact areas to cross-subsidize those in sprawled locations. This is economically inefficient and unfair.

**Figure ES1 Income and Poverty Rates Compared**



*The sprawled urban regions that Cox advocates have far **lower average incomes and higher poverty rates** than the U.S. average and the cities he criticizes for their Smart Growth policies. Of course, many other factors besides local development policies may help explain these undesirable outcomes, but this contradicts claims that low-density, automobile-dependent development increases economic productivity and opportunity.*

Cox is correct that my analysis failed to account for additional public transit costs often required for Smart Growth, which averages \$300-500 annually per capita. This may seem large, but is less than 10% of average expenditures per automobile and so is offset if high quality transit reduces per capita vehicle ownership rates by at least that amount. In fact, households in transit-oriented developments typically own about half as many vehicles as they would in sprawled, automobile-dependent areas, and they enjoy other savings and benefits, so these transit investments are generally cost effective overall.

Cities around the world face critical decisions concerning how best to balance economic, social and environmental goals. Cities have had a century of social engineering that promotes sprawl, such as restrictions on infill density and multi-family housing, minimum parking requirements, and automobile-oriented transport planning. There are good reasons to change. My research provides guidance by identifying policy distortions that can lead to economically excessive sprawl, estimates the resulting costs, and therefore the benefits of Smart Growth policies that correct such distortions. Wendell Cox is a Smart Growth critic and so, unsurprisingly, attempts to criticize my study. His arguments, cannot withstand scrutiny. They are based on inaccurate definitions, incomplete and biased analysis, and misrepresentations of key research.

## Introduction

My 2014 report, [\*Analysis of Public Policies That Unintentionally Encourage and Subsidize Urban Sprawl\*](#), evaluated the degree that sprawl (dispersed, automobile-dependent development) results from policy distortions, and estimated the incremental costs that result. Smart Growth critic Wendell Cox responded with, [\*Putting People First: An Alternative Perspective with an Evaluation of the NCE Cities "Trillion Dollar" Report\*](#), which argues that my report exaggerates sprawl costs. This document examines Cox's criticisms.

Cox and I agree on some issues, particularly the importance of providing opportunities to disadvantaged people, and the risks of excessive regulations. He identified some errors in my report for which I am thankful: The spreadsheet link on page 44 was incorrectly spelled [www.vtpi.org/Sprawl\\_Cost.xls](http://www.vtpi.org/Sprawl_Cost.xls) rather than [www.vtpi.org/Sprawl\\_Costs.xls](http://www.vtpi.org/Sprawl_Costs.xls) (missing the second "s"), so the data was inaccessible, I overlooked the incremental public transit costs of Smart Growth, and my analysis relied on U.S. urban regions categorized by density, which is simplistic and fails to accurately reflect many Smart Growth impacts. We will do better in the future.

However, overall Cox's analysis is incomplete and biased, and he misrepresents key research. His criticisms are based on the inaccurate assumptions that Smart Growth consists only of urban containment regulations, which reduce economic productivity and opportunity. As this document explains, there is a kernel of truth in those assumptions, but they are overall wrong. Smart Growth actually consists of several integrated policies that create more compact and multimodal, and therefore more resource-efficient, communities. Many of these policies improve affordable housing and transport options, and help achieve other policy goals including infrastructure savings, improved mobility for non-drivers, public health and safety, local economic development and environmental protection.

Cox lacks a comprehensive vision for more efficient and equitable cities. He prescribes only one policy, reducing restrictions on urban expansion, but fails to show how this could solve urban problems such as traffic and parking congestion, accident and pollution problems, and inadequate mobility for non-drivers. Cox is out of synch with changing consumer demands and professional practices which emphasize more comprehensive analysis and integrated planning.

Cox should actually find my analysis reassuring. Contrary to his implications, Smart Growth does not require all residents to live in crowded high-rises and forego automobile travel. My research indicates that most cities can achieve substantial benefits – open space preservation, efficient infrastructure, affordability, efficient transport for drivers and non-drivers, public safety and health, increased economic productivity and opportunity, energy conservation and emission reductions – with moderate-density neighborhoods and moderate levels of automobile travel. The key to success is to provide diverse options and incentives to use the most efficient option necessary, such as walking and cycling for local errands, public transit when travelling on major urban corridors, and automobile travel only when it is truly cost effective overall. The resulting efficiencies can provide direct benefits to users and indirect benefits to other residents. In these ways, Smart Growth policies truly put people first.

## What Are Sprawl and Smart Growth?

*Sprawl* refers to dispersed, segregated (single-use), automobile-oriented, urban-fringe development. The alternative, called *Smart Growth* in this report, involves more compact, mixed, multi-modal development. Table 1 compares these two development patterns.

**Table 1 Sprawl and Smart Growth (SGN 2009)**

	Sprawl	Smart Growth
<b>Density</b>	Lower-density, dispersed activities.	Higher-density, clustered activities.
<b>Land use mix</b>	Single use, segregated.	Mixed.
<b>Growth pattern</b>	Urban periphery (greenfield) development.	Infill (brownfield) development.
<b>Scale</b>	Large scale. Larger blocks and wide roads. Less detail, since people experience the landscape at a distance, as motorists.	Human scale. Smaller blocks and roads. Attention to detail, since people experience the landscape up close.
<b>Services (shops, schools, parks, etc.)</b>	Regional, consolidated, larger. Requires automobile access.	Local, distributed, smaller. Accommodates walking access.
<b>Transport</b>	Automobile-oriented. Poorly suited for walking, cycling and public transit.	Multi-modal. Encourages resource-efficient modes (walking, cycling and public transit).
<b>Connectivity</b>	Poorly connected roadway network.	Highly connected roads, sidewalks and paths, allowing direct travel.
<b>Street design</b>	Streets designed to maximize motor vehicle traffic volume and speed.	Reflects <i>complete streets</i> principles that accommodate diverse modes and activities.
<b>Planning process</b>	Unplanned, with little coordination between jurisdictions and stakeholders.	Planned and coordinated between jurisdictions and stakeholders.
<b>Public space</b>	Emphasis on private realms (yards, shopping malls, gated communities, private clubs).	Emphasis on public realms (shopping streets, parks, and other public facilities).

*This table compares various features of sprawl and Smart Growth.*

Smart Growth is a general set of principles that can be applied in many different ways. In rural areas, it creates compact, walkable villages with a mix of single- and multi-family housing organized around a commercial center. In large cities, Smart Growth creates dense, urban neighborhoods with high-rise buildings organized around major transit stations. Between these is a wide range of neighborhood types that include compact development, diverse housing options, and multi-modal transport systems that favor resource-efficient modes (walking, cycling and public transit). In mature cities, Smart Growth consists primarily of incremental infill in existing neighborhoods, but in growing cities it often includes urban expansion. Smart Growth does not generally require all residents to live in high-rise apartments and forego automobile travel; excepting cities with severe constraints on expansion, a major portion of households can live in single-family or adjacent (townhouses), and a significant portion of trips can be made by automobile.

## Cox's Errors and Misrepresentations

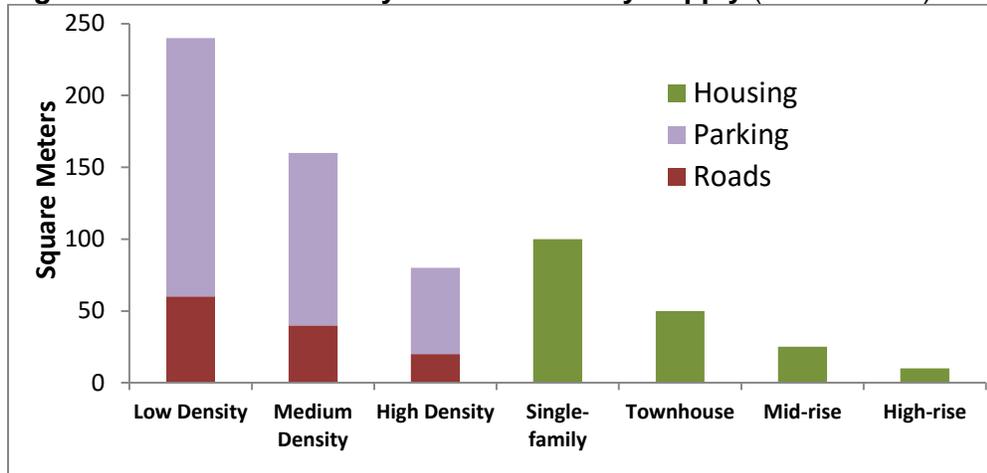
This section identifies various errors and misrepresentations in Cox's analysis.

### 1. Actually, Smart Growth Puts People First

The title of Cox's report, "Putting People First" is unjustified. Smart Growth actually puts people first by helping create communities designed more for people rather than motor vehicles, and by responding more effectively to people's diverse housing demands, including growing demands for affordable housing in accessible, multimodal neighborhoods, and to meet the travel needs of people who cannot, should not, or prefer not to rely on automobile transport.

Cities are, by definition, places where many people and activities occur close together, which means that space is always scarce and valuable. As a result, urban development policies often involve trade-offs between space for people and motor vehicles. For driving and parking to be convenient, sprawled cities must devote approximately 55 square meters to roads plus 180 square meters to parking, which is about three times more than what is required in more compact cities, and more than the land area devoted to an average person's house, as illustrated in Figure 1. Similarly, roads designed to maximize motor vehicle traffic volumes and speeds reduce walking and cycling safety and accessibility. By reducing vehicle ownership rates, reducing traffic volumes and speeds, and supporting efficient road and parking management, Smart Growth frees up land for housing and greenspace, and improves non-drivers' mobility options, creating more people-oriented cities.

**Figure 1 Urban Density Versus Roadway Supply (Litman 2014)**



*In sprawled areas, each vehicle requires about 240 square meters of road and parking space, which is more than the amount of land devoted to a typical urban resident's house. Smart Growth reduces motor vehicle land requirements, leaving more space for housing and urban greenspace.*

Not only is the report's title misleading, so are its illustrations. Pages 1 and 4 show central city skylines, and page 37 shows a mixed, happy and economically successful group enjoying an outdoor dinner in New York City, all examples of economic and social benefits provided by Smart Growth development. It shows no realistic images of open space displaced by low-density housing or highways crowded with single-occupant vehicles that result from the sprawl-oriented development Mr. Cox advocates.

## *2. Smart Growth Involves More than Urban Containment Regulations*

Cox claims that Smart Growth, “seeks to stop the physical expansion of cities” (p. 6). He is wrong; after all, the term refers to *growth*. Smart Growth is concerned with *how* cities grow and how best to balance diverse planning goals.

**Table 2 Smart Growth Policies** (Litman 2014; SGN 2006)

Land Use	Transport
<ul style="list-style-type: none"> <li>• More integrated planning</li> <li>• Support for more compact and mixed development</li> <li>• Support for more compact housing types (adjacent and multi-family housing, secondary suites, etc.)</li> <li>• Reduced and more flexible parking requirements</li> <li>• More consideration to the public realm (public spaces where people naturally interact)</li> </ul>	<ul style="list-style-type: none"> <li>• More connected roadway networks</li> <li>• Improved walking, cycling and public transit</li> <li>• More efficient road and parking pricing (users pay directly for using these resources, with higher rates during congested periods)</li> <li>• Transportation demand management programs where they provide cost-effective solutions</li> </ul>

*Smart Growth consists of various policies and planning practices which are intended to achieve various outcomes.*

Much of Cox’s criticism is based on the assumption that Smart Growth consists primarily of urban containment regulations. He writes, “the principle policy instrument has been stronger land use regulations on the urban peripheries, often including urban containment boundaries” (p. 7). He is wrong. Smart Growth actually includes many policies (Table 2), only two of which increase, and several of which reduce, regulations (Table 3). Which are more common? A recent study, *How Often Do Cities Mandate Smart Growth or Green Building?* (Lewyn and Jackson 2014), found that virtually all cities impose sprawl-inducing regulations that limit density and require abundant parking, but few have Smart Growth regulations. For every urban containment boundary that prohibits urban expansion, dozens of regulations limit compact infill (Gyourko, Summers and Saiz 2008).

**Table 3 Smart Growth Regulations**

Increased Regulations	Reduced Regulations
Urban growth boundaries Maximum parking requirements	Reduced minimum lot size Fewer restrictions on density, building heights, multi-family housing and secondary suites Fewer restrictions on mixed use and conversions to alternative uses (e.g., warehouses into restaurants and housing) Reduced and more flexible parking requirements

*Smart Growth may increase two types of regulations but reduces a much larger number.*

Cox misrepresents key research by Hsieh and Moretti (2015) and Saks (2008) by implying that they identify economic costs from urban containment boundaries, when in fact, their analysis actually identifies costs from sprawl-inducing regulations that limit infill density. Contrary to Cox’s claims, they advocate Smart Growth policies that reduce restrictions on urban infill and increase investments in high quality public transit.

### 3. *Incomplete and Biased Analysis*

My analysis framework divided U.S. metropolitan regions into density quintiles. This was useful for cost calculations but was never intended as a way to evaluate sprawl impacts. Cox bases much of his criticism on analysis of these quintiles, which is inappropriate for these reasons:

- First, Smart Growth involves much more than simply increasing regional density. It is possible to have dense sprawl (high-rises in automobile-dependent, urban fringe locations) and rural Smart Growth (compact, mixed, walkable rural villages). Ewing and Hamidi's Index incorporates 17 indicators of four factors (density, mix, centeredness and connectivity); in future studies I plan to use such an Index, rather than just density.
- Second, many Smart Growth impacts should be evaluated at a sub-regional (neighborhood) rather than a regional geographic scale. Smart Growth infrastructure savings and travel impacts depend on neighborhood location and design, factors that are not reflected in regional comparisons. Much of the research cited in my report uses a finer-grained geographic analysis which is much more appropriate for sprawl costing.
- Third, many confounding factors should be considered when evaluating these impacts. For example, Cox finds positive associations between regional density and various undesirable outcomes such as traffic congestion, property taxes, housing costs (his figures 10-12) and social inequity (Table 3), but his analysis fails to account for other important factors that also tend to increase with urban densities such as city size, geographic constraints on urban expansion, household incomes and business activity. As a result, it is not credible.

Below are examples of resulting distortions in Cox's analysis:

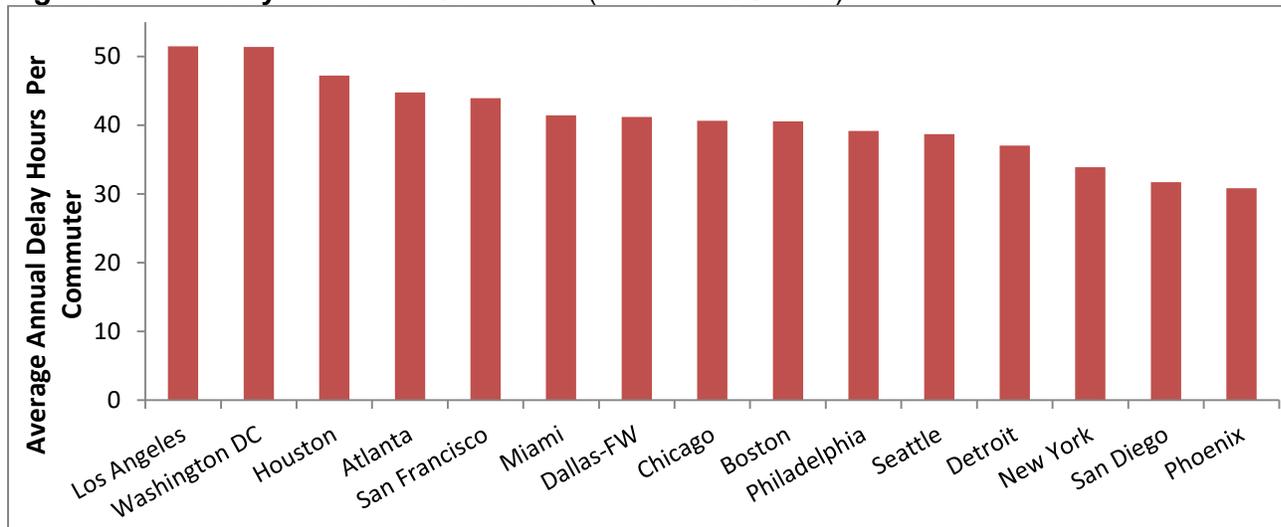
#### **Public Service Costs**

Cox finds that per capita municipal property tax payments are higher in denser urban regions (his Figure 6), but ignores confounding factors: larger, denser cities tend to provide more public services and have more business activity, which can explain why denser cities, which tend to be more livable and economically efficient, tend to spend more per capita. Studies that account for these factors indicate that Smart Growth can provide substantial public savings (Ford 2009; SGA and RCLCO 2015). Recent international studies also find substantial municipal budget savings from more compact development. Analyzing per capita municipal spending on public services in 8,600 municipalities of Brazil, Chile, Ecuador and Mexico, de Duren and Compeán (2015) found that municipal services are most efficient at a relatively dense 90 residents per hectare. Similarly, a detailed analysis of 2,500 Spanish municipal budgets found that the public service cost efficiency declines with sprawl (Rico and Solé-Ollé 2013); in urban areas with less than 25 residents per acre (about 60 residents per hectare), each 1% increase in urban land area per capita increases municipal costs by 0.11%, of which 21% is due to increased basic infrastructure costs, 17% to increased culture and sports program costs, 13% to increased housing and community development costs, 12% to increased community facilities costs, 12% to an increased general administration costs, and 6% due to increased local policing costs.

## Traffic Congestion

Cox calculates that per capita congestion costs are highest in the densest urban regions (his Figure 5), but those cities also tend to be larger, and congestion costs tends to increase with city size. Comparing similar size regions, those that are more multimodal (lower auto mode shares), such as Boston, Philadelphia and New York have less congestion delay per commuter than sprawled cities such as Los Angeles, Houston and Atlanta, as illustrated in Figure 2. Studies using sub-regional analysis also indicate that Smart Growth policies can reduce congestion costs. Kuzmyak (2012) found that residents of more mixed (more nearby services), connected (more connected street networks) and multi-modal (more walking, cycling and public transit) urban neighborhoods drive a third fewer daily miles and experience less congestion delays than similar residents in automobile-dependent, urban fringe neighborhoods.

**Figure 2** Delay Hours Per Commuter (TTI and ACS Data)<sup>1</sup>



Cox argues that congestion delay increases with density, but his analysis fails to account for the tendency of density and congestion to both increase with city size. Comparing large cities, congestion delay per commuter (not just automobile commuters) tends to be higher in sprawled cities such as Houston and Atlanta than in more multi-modal cities such as Boston, Philadelphia and New York.

## Social Inequity

Cox finds (his Table 3) that the most compact urban regions have a high Gini Co-Efficient, but contrary to his claims, this does not really prove that Smart Growth policies cause inequity. Denser cities tend to attract economically successful people and so tend to have more high-income residents; the rich are richer, the poor are not poorer. In fact, Smart Growth cities tend to have higher minimal and median wages, and extensive research indicates that Smart Growth policies which improve non-drivers' accessibility and overall economic productivity increase disadvantaged people's economic opportunities and outcomes (Ewing and Hamidi 2014; Ganong and Shoag 2012), as discussed later in this report.

<sup>1</sup> Calculated using *Urban Mobility Report* (TTI 2012) values for 2011 delay per automobile commuter, multiplied by Auto Drive plus Carpool Passenger mode share data from the 2009 *American Community Survey*.

#### 4. Smart Growth Does Significantly Reduce Vehicle Travel

My report summarized extensive research indicating that increased density and mix, roadway connectivity, walkability, transit accessibility and efficient roadway management significantly reduce motor vehicle travel (CARB 2011-2015; Ewing and Cervero 2010; Outwater, et al. 2014). Although the impacts of individual factors may seem modest, their effects are cumulative and synergistic, so sprawled community residents drive far more annual miles and impose much higher transport costs than they would in Smart Growth areas. Cox argues that my study exaggerated these effects, but his analysis is incomplete and incorrect.

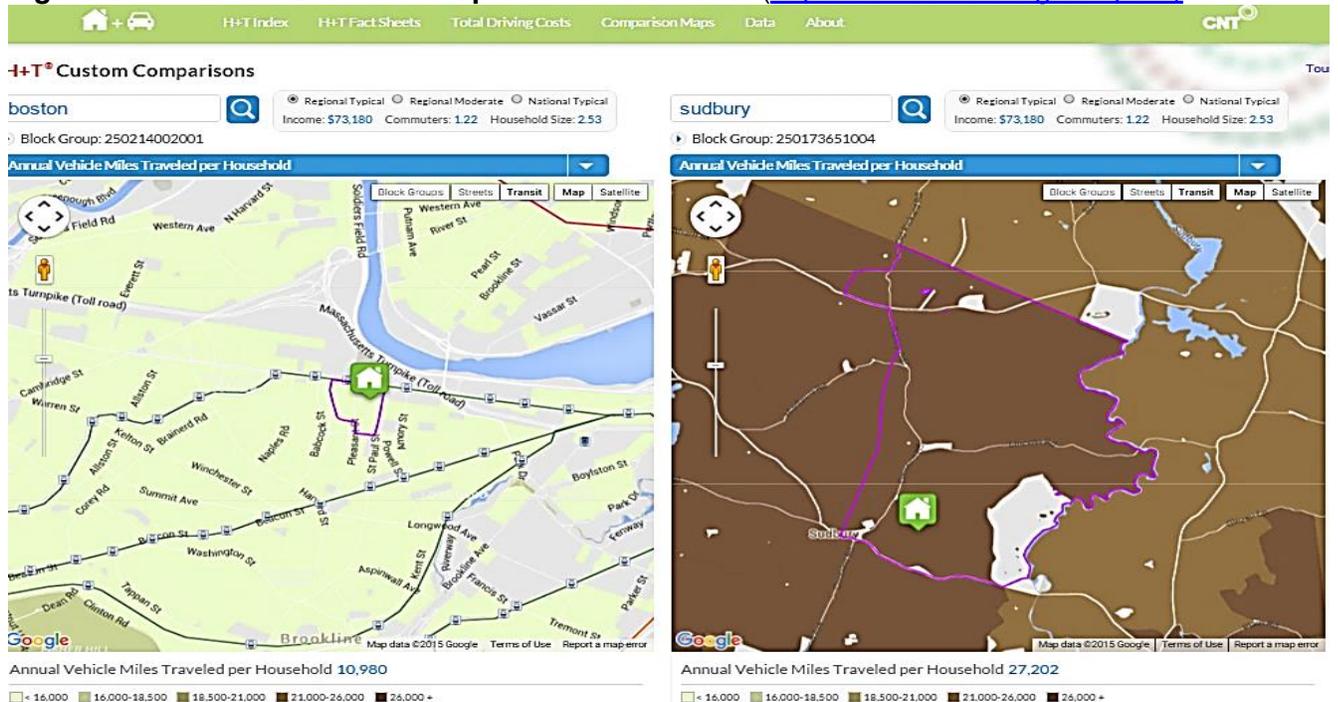
This type of analysis depends on how Smart Growth is defined and measured. My analysis used a simplifying shortcut, it used the densest quintile of U.S. cities reported in *Highway Statistics* Table HM-72, which is functional (since analysis data are already assembled), feasible (since these cities actually exist), but modest (since it reflects regional scale and so fails to account for additional neighborhood scale impacts), and is therefore a lower-bound range of travel reductions. Much larger vehicle travel reductions can be expected from full implementation of all Smart Growth policies:

- Efficient road and parking
- Multi-modal transport planning
- Complete streets, which ensures that walking, cycling and public transit are safe and efficient on all urban streets
- Location-based development fees
- Reduced and more flexible parking requirements
- Reduced restrictions and compact, infill development in urban neighborhoods

Cox estimates that sprawl only increases per capita vehicle travel 37-42%, not the 120% used in my analysis, but he only considers regional scale impacts, which as previously mentioned, fails to account for sub-regional (between neighborhood) variations. He excludes freight truck travel and vehicle travel by residents outside Census but within FHWA urban areas, apparently based on the assumption that Smart Growth causes no freight or urban fringe travel reductions. Cox offers no evidence to support these assumptions and I believe they are wrong. Even if sprawl does not affect intercity freight travel, more dispersed development and less connected road networks increase local distribution and public service (e.g. garbage collection) truck travel. Heavy vehicles impose at least three times as much roadway, congestion, accident and pollution costs per vehicle-mile as automobile travel (Austin 2015), so if sprawl increases truck travel just a third as much as private vehicle travel, my cost estimate is accurate.

See for yourself. Go to the *Housing & Transportation Index* [Custom Comparison Tool](#), click on the arrow button below the "Enter a Location" box, select "Tract," and in the blue bar select "Annual Vehicle Miles Travelled Per Household." Divide household VMT by household size to determine per capita VMT for specific areas. In accessible, multimodal neighborhoods, such as in central Chicago, Philadelphia and New York, you'll find that residents average 2,000 to 5,000 per capita, while in outer neighborhoods in sprawled cities such as Atlanta, Dallas and Knoxville, they average 10,000 to 12,000 per capita, two to five times more, as illustrated in Figure 3.

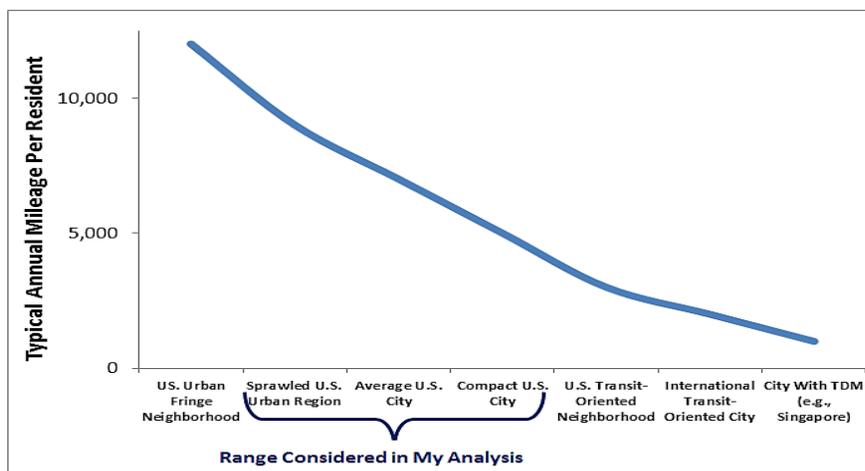
**Figure 3 Smart Growth Vs. Sprawl Vehicle Travel** (<http://htaindex.cnt.org/compare>)



Travel survey data indicate that residents of sprawled Sudbury average 10,751 annual vehicle-miles (27,202/2.53), 148% more than the 4,340 annual vehicle-miles (10,980/2.53) in central Boston neighborhoods 20 miles away.

Even this reflects a relatively narrow range because it only considers U.S. cities. Including international cities with stronger TDM programs, such as London, Singapore and Stockholm, indicates that Smart Growth can have even larger travel impacts (Figure 4). This suggests that the assumption that, compared with comprehensive Smart Growth policies, sprawl increases average vehicle travel by 120% is a lower-bound value; considering a broader range of Smart Growth policies could result in greater mileage impacts and therefore greater sprawl costs.

**Figure 4 Range of Urban Areas Considered**



*When evaluating travel impacts my study only compared U.S. urban regions. Had it considered mileage differences between U.S. neighborhoods or between cities around the world, the differences between the most sprawled and Smartest Growth communities would have been much greater, resulting in larger sprawl cost estimates.*

### 5. Motor Vehicle Travel is Costly – Smart Growth Can Provide Large Savings

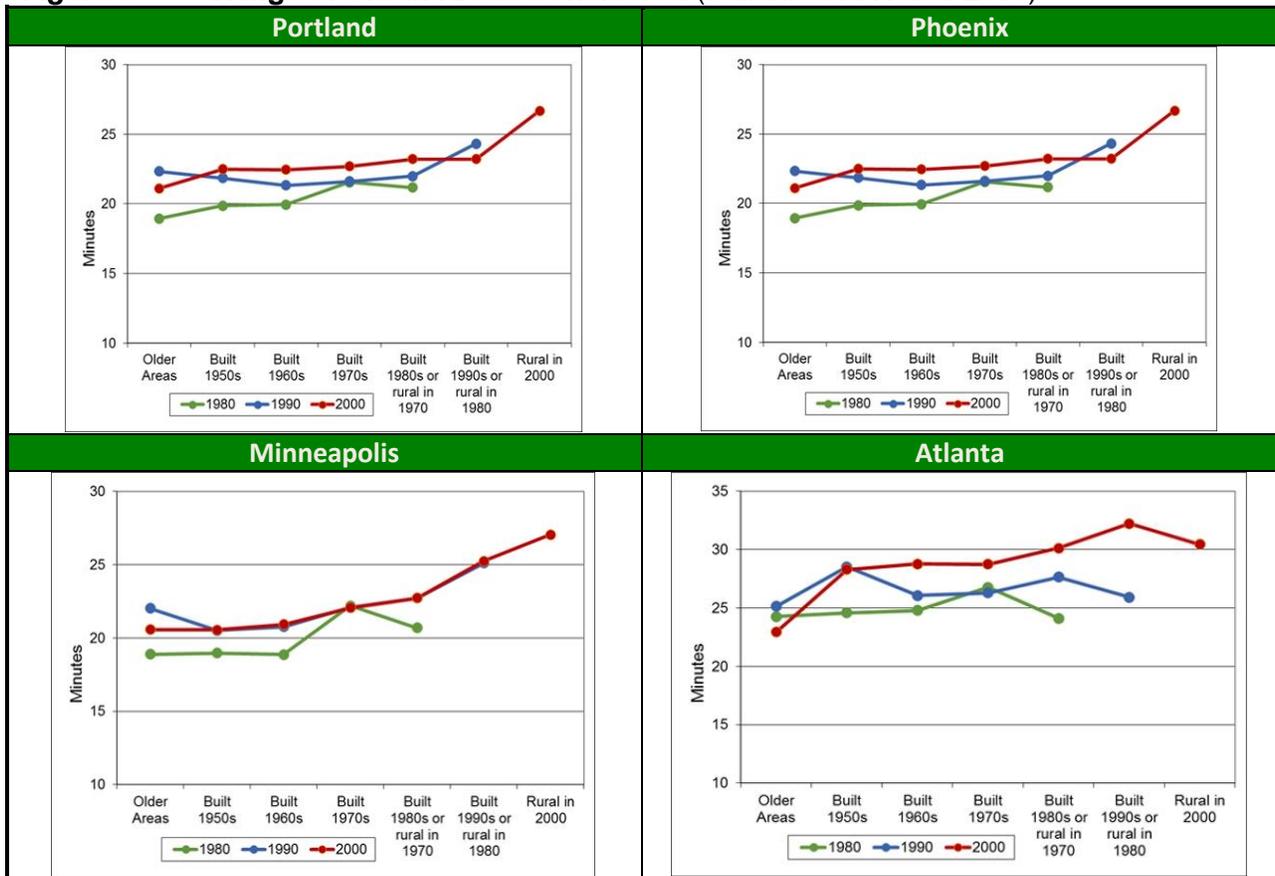
Motor vehicle travel is costly: it requires vehicles, fuel, roads and parking facilities, and imposes traffic congestion, health and safety risks, plus noise and air pollution. Cox misunderstands these costs. He states, "The NCE Cities report does not provide sufficient information to identify the difference between the internal cost estimate and the consumer expenditures as reported by BLS" (p. 14). He apparently failed to examine my Table 10 which specifies the costs included. Cox underestimates sprawl transportation costs in several ways:

- Cox relies extensively on outdated and incomplete analysis by Delucchi (whose name he misspells). Since that research was completed two decades ago, the portion of roadway costs financed by user fees has declined (Henchman 2013); our understanding of parking costs has improved (Shoup 2005); there is more evidence of fuel production external costs (drilling platform, tanker ship and oil train explosions and leaks; military interventions to maintain access to oil supplies), and more knowledge of public health risks of inadequate physical exercise (Surgeon General 2015). As a result, we have greater understanding of the economic and social costs that motor vehicle travel imposes, particularly in urban areas. More recent studies by major professional organizations indicate much higher urban automobile costs than Delucchi and Cox recognize (CE, INFRAS, ISI 2011; Kockelman, et al. 2013; NZTA 2013; Timilsina and Dulal 2011; van Essen, et al. 2007; Zang, et al. 2005).
- Cox misrepresents sprawl transport costs by focusing on commute travel, which only represents a fifth of total personal trips. Sprawl increases motor vehicle travel and associated costs for all types of travel, including errands and social trips, and deprives non-drivers of independent mobility. For example, he argues few jobs are accessible by walking, but with compact, mixed neighborhoods, walking and cycling can serve many errand trips.
- As Cox points out, my analysis applies the same per-mile cost to all urban travel, although some costs vary by location (section 2.21a). He is right that vehicle operating costs per mile tend to be higher in more compact locations, but this effect is minor overall, indicated by the substantial fuel savings in Smart Growth communities (Handy and Boarnet 2014; PIEEE 2015). In addition, Smart Growth communities tend to have much lower traffic casualty rates and require fewer parking spaces. For example, only about a third of the houses on our urban neighborhood street have driveways, the rest share on-street parking spaces. In suburban areas each house has a driveway and a garage with parking for two to four vehicles, resulting in four to eight off-street spaces per vehicle (Davis, et al. 2010). Since crashes and parking are two of the largest costs of vehicle use, accounting for these impacts would probably increase estimated sprawl costs.
- Cox points out (section 2.21c) that, by calculating vehicle costs by mile, my analysis does not account for the savings and benefits that result from reduced automobile *ownership*, including fixed vehicle expenses and residential parking (driveway and garage) costs. Since Smart Growth often reduces vehicle ownership rates by half, it can provide large financial savings that were not fully reflected in my estimate (Arrington and Sloop 2010; Outwater, et al. 2014).
- My study did not monetize (measured in monetary units) some important sprawl costs including farmland and wildlife habitat displacement, higher transport costs for non-drivers (and therefore social inequity), and reduced economic productivity, although these are often large.
- My study does not project into the future, although current demographic and economic trends are increasing Smart Growth benefits (Handy 2008; ULI 2015). For example, as the portion of senior residents increases, so does the value of living in a walkable, multimodal community.

Cox argues (p. 31) that compact, multi-modal cities are inefficient because public transit commuting tends to take longer than driving. This overlooks important points. First, most of this additional time consists of walking and cycling to and from transit stops, which many people consider a benefit rather than a cost because it increases fitness and health, and many people consider it enjoyable (Besser and Dannenberg 2005). Second, many Smart Growth policies help reduce commute travel times by reducing travel distances, increasing roadway connectivity, locating more destinations close to frequent transit services, providing grade-separation (bus, HOV and bike lanes), and more efficiently pricing roads and parking to reduce congestion. These strategies benefit motorists as well as users.

Sub-regional analysis indicates that residents of more central, compact, connected, multi-modal neighborhoods tend to have greater overall accessibility (they can reach more services and activities within a given time and money budget), and experience less traffic congestion delay than residents of sprawled neighborhoods (Kuzmyak 2012). For example, Selima Sultana and Joe Weber (2015) found that in U.S. cities, average commuting times are lower in older neighborhoods (built before 1950) than more recent, urban fringe developments (Figure 5).

**Figure 5 Range of Urban Areas Considered (Sultana and Weber 2015)**



Average commute times are much higher in newer, sprawled areas than in older, central neighborhoods, indicating that policies that allow more compact infill in accessible, multi-modal neighborhoods help reduce travel time.

There is latent demand for non-automobile travel – when walking, cycling and public transit services are improved, use of these modes increases. In a typical community, 20-40% of residents cannot or should not drive because they are too young, have a disability, cannot afford an automobile, are impaired, or their vehicle is temporally unavailable. In addition, many people want to walk and bicycle for health and enjoyment, and many commuters prefer public transit, provided it is convenient and comfortable, because it reduces stress and provides time to rest, read and work while traveling. The effectiveness of traffic safety programs such as graduated licenses, senior drivers' testing and anti-impaired-driving campaigns depends on high-risk travelers (youths, seniors and drinkers) having suitable alternatives to driving. Having affordable alternatives to driving is particularly important for improving economic opportunity for physically and economically disadvantaged people.

Cox offers little practical guidance for serving these demands. His main recommendations (p. 32) are simply more automobile-oriented transport planning, and the suggestion that "Basic access can even be achieved throughout developing world cities with informal small vehicle transit systems, in African cities like Addis Ababa or in Manila that deliver travelers from within walking distance of their origin to locations close enough to complete the trip by walking." He ignores the very poor service quality that such transit systems provide. In contrast, Smart Growth policies that improve walking and cycling conditions, and concentrate development around high quality public transit, can provide a high level of non-auto accessibility.

Of course, high quality public transit is also costly. Cox calculates that compact communities spend \$400 more annually per capita on transit (his Figure 7). This may seem large, but it is only about 10% of the annual costs of owning and operating a typical car, or just 7% including residential parking (driveway and garage) costs, so incremental transit costs are offset if higher quality services reduce vehicle ownership rates by 7-10% (Litman 2010). Smart Growth often achieves much larger vehicle ownership reductions and associated savings (Arrington and Sloop 2010; Outwater, et al. 2014), and so tend to provide large net transport cost savings. As a result, my motor vehicle cost estimates are lower-bound values; more comprehensive analysis that incorporates monetized estimates of all these impacts would result in even larger estimates of sprawl costs and Smart Growth benefits.

### 6. Smart Growth Often Increases Affordability and Living Standards

Cox criticizes Smart Growth for reducing household affordability and living standards. He is wrong. Most of the regulations that increase housing development costs are pro-sprawl restrictions on minimum lot size, maximum density and building height, minimum parking requirements, and other development burdens that fall most heavily on urban infill projects (Gyourko, Summers and Saiz 2008; Ikeda and Washington 2015). By reducing these restrictions and burdens, Smart Growth policies can increase affordability and living standards. His arguments are based on inaccurate definitions, and incomplete and biased analysis. These errors are discussed below.

#### **Inaccurate Definitions and Incomplete Analysis**

Smart Growth includes various policies with diverse affordability impacts, as indicated in Table 4. Two (urban containment and higher infrastructure requirements) can increase development costs, particularly for larger-lot homes, but other strategies tend to increase affordability by improving lower-cost housing and transport options, including more compact housing types with reduced parking, more accessible locations, and improved walking, cycling and public transit. Such housing and transport options are often demanded by physically and economically disadvantaged people, so these policies tend to be overall progressive.

**Table 4 Smart Growth Affordability Impacts**

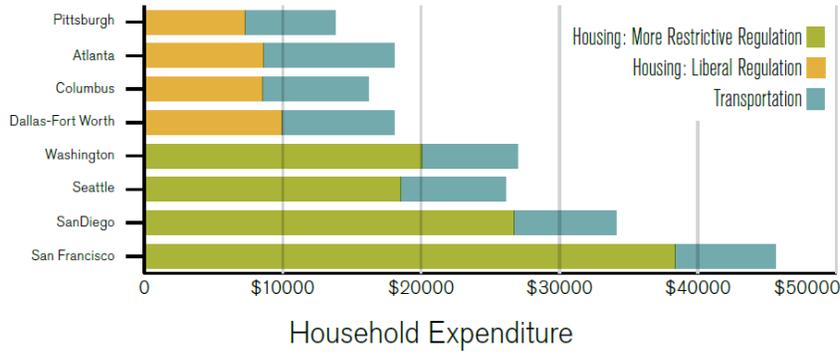
Reduces Affordability	Increases Affordability
<ul style="list-style-type: none"> <li>• Urban containment regulations increase land unit prices (per square meter).</li> <li>• Denser, infill development increases some infrastructure requirements (curbs, sidewalks, sound barriers, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Allows higher densities which reduce land use per housing unit</li> <li>• Increases affordable (adjacent and multi-family housing options).</li> <li>• Reduces parking requirements and associated costs.</li> <li>• More affordable transport options (walking, cycling and transit).</li> <li>• Lower infrastructure and utility costs.</li> </ul>

*Some Smart Growth policies reduce household affordability, others increase it.*

#### **Correlation Does Not Prove Causation**

Cox presents data showing positive correlations between urban density and housing prices (Figure 10 of his report), which he argues demonstrates that Smart Growth reduces affordability, but he fails to account for important confounding factors which also affect housing prices: denser cities tend to be large and geographically constrained, livable and attractive, economically successful, and have lower transportation costs which leaves households with more money to invest in housing. Cox argues (his Figure 17, reproduced below) that higher prices result from more “restrictive” regulations, but he fails to identify which regulations he considers, and ignores other factors that affect housing prices. Because he measures absolute spending rather than budget share, his analysis makes higher income cities look worse, and lower-income cities look more affordable than justified, as discussed later.

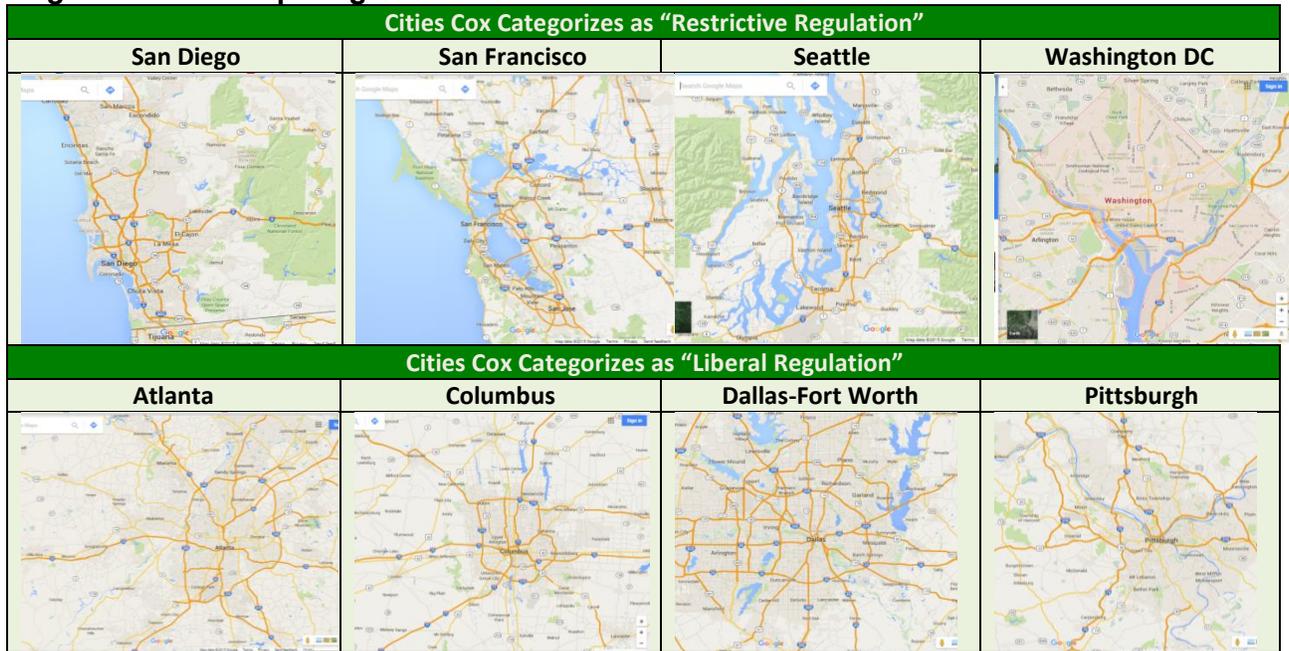
**Figure 6 Cox's Cost Comparison (Cox 2015, Figure 17)**



Cox argues that more "liberal" regulations make Pittsburgh, Atlanta, Columbus and Dallas more affordable than Washington, Seattle, San Diego and San Francisco, but he never explains what regulations he measures, and fails to account for confounding factors that affect housing prices.

The cities Cox criticizes as unaffordable are all economically-successful, attractive, geographically constrained coast cities (Figure 7), with low transport costs, all factors that tend to increase real estate prices. He is wrong to claim that these cities' high housing costs are primarily caused by urban containment regulations, and that reducing such regulations would significantly reduce housing prices. On the contrary, in economically successful, geographically constrained cities, Smart Growth policies that allow more compact infill are the best way to increase affordability and support other policy objectives such as public safety and health, and environmental protection (Murray 2015; Taylor 2015).

**Figure 7 Comparing Cities**



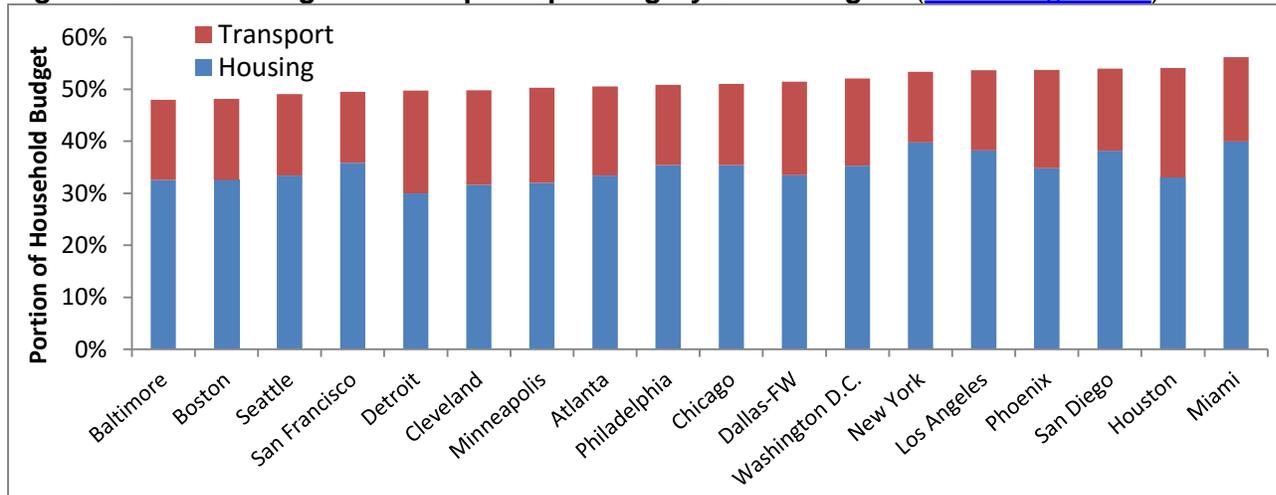
The cities Cox criticizes as unaffordable are all attractive, economically-successful, geographically-constrained coastal cities. The cities Cox classifies as affordable are all less economically successful inland cities with few geographic constraints. Cox is wrong to claim that housing price differences are caused simply by urban containment regulations; other factors are more significant. Allowing more compact infill is the only feasible way to increase affordable housing supply in geographically constrained cities.

### Transportation Costs Also Affect Affordability

Households often make trade-offs between housing and transportation costs. For example, an inexpensive house is not truly affordable if it has high transportation costs, and a more expensive house may be most affordable overall if it is located in an accessible, multi-modal neighborhood with low transportation costs. As a result, most experts now recommend that affordability be calculated based on combined housing and transportation expenses (Newmark and Haas 2015; *Location Affordability Portal*).

Cox's affordability analysis only considers housing costs, ignoring transportation costs. This tends to exaggerate total household cost burdens in more compact locations. Figure 8 compares the average portion of household budgets devoted to housing and transport in various U.S. cities. Although households in compact cities such as Boston, Seattle and San Francisco tend to spend more on housing, they spend much less on transport than in sprawled cities such as Phoenix, Houston and Miami, so their total expenditures are smaller.

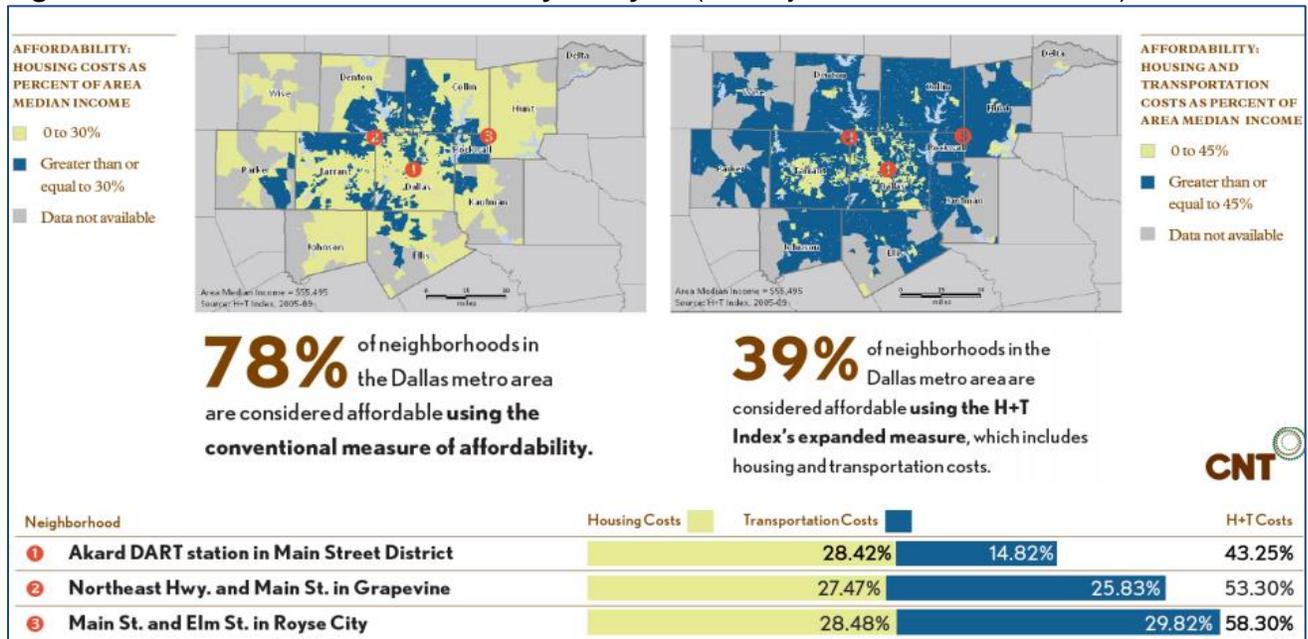
**Figure 8** Housing and Transport Spending By Urban Region ([www.bls.gov/cex](http://www.bls.gov/cex))



Households in the compact regions that Cox criticizes as unaffordable, such as Boston, Seattle and San Francisco, spend less in total on housing and transport than in the sprawled regions he advocates, such as Phoenix, Houston and Miami, because their higher housing costs are more than offset by cheaper transport.

These impacts are even greater at a sub-regional scale: households located in more accessible, multimodal neighborhoods tend to spend the least on housing and transport combined than in more sprawled, automobile-dependent locations. For example, using real housing and transportation cost data, the *Location Efficient Index* indicates that, in Dallas, Texas, a median income household with two commuters can easily spend less than 45% of income on combined housing and transportation if located in a central neighborhood, but must spend more than 50% in most outer suburbs, as illustrated in Figure 9. Central neighborhood households do not give up driving altogether, but better walking, cycling and public transit options, and shorter travel distances allow them to own fewer vehicles and drive less, and save money as a result.

**Figure 9** Dallas Location Efficiency Analysis (Beatley, Shull and Chavez 2012)



This analysis shows that in most Dallas neighborhoods, median-income households can find housing that costs less than 30% of income, but only in central areas can they spend less than 45% of their income on housing and transport combined. This indicates that more accessible and multi-modal neighborhoods tend to be more affordable overall.

### What is a "House"?

Cox's analysis incorporates a subtle bias that tends to exaggerate urban housing costs. Much of his housing affordability analysis only counts single-family houses, ignoring more compact housing types such as townhouses, condominiums and secondary suites. This tends to exaggerate housing prices and housing inaffordability problems in denser cities where a major portion of households live in this type of housing. For example, according to the Demographia *Housing Affordability Survey* (Cox and Pavletich 2015), Vancouver has a 10.6 Median Multiple (median housing prices divided by median incomes), one of the highest in the world. However, this apparently only considers single-family housing prices (despite repeated requests, Cox and Pavletich refuse to share their data for external review). Since townhouses prices are about half, and condominium prices about a third of single-family house prices, and only about 40% regional residential property sales are for single-family houses (Table 5), considering all housing types, regional housing is actually much more affordable than Cox and Pavletich indicate.

**Table 5** Vancouver Region Residential Sales Benchmark Prices

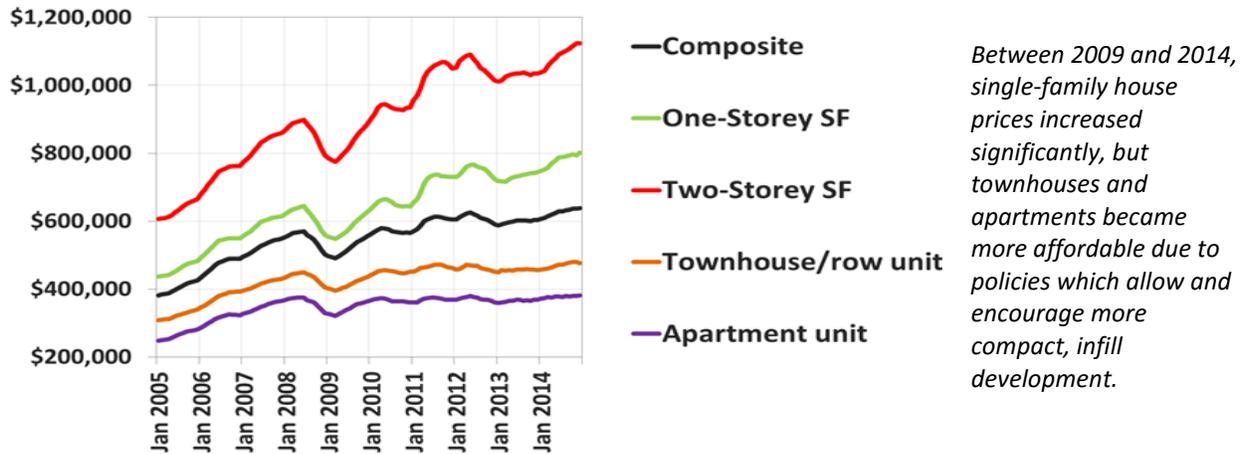
([www.rebgv.org/sites/default/files/REBGV%20Stats%20Package%2C%20December%202014.pdf](http://www.rebgv.org/sites/default/files/REBGV%20Stats%20Package%2C%20December%202014.pdf))

	Number Sales	Portion of Sales	Median
Detached	3,107	40%	\$1,002,200
Townhouses	1,341	18%	\$476,800
Apartments	3,232	42%	\$380,700

Cox and Pavletich claim that Vancouver housing is very unaffordable, but their analysis apparently only considers single-family homes, which represent only 40% of all houses sold in the region.

Figure 10 shows Vancouver housing price trends. Between 2009 and 2014, single-family house prices increased by about half (red and green lines), but during this period, townhouse and apartment prices increased little, so accounting for inflation and wage increases, such housing has become more affordable, probably due to policies which allow and encourage compact, infill development, resulting in more supply.<sup>2</sup>

**Figure 10 Greater Vancouver Housing Price Index**  
([http://creastats.crea.ca/natl/images/natl\\_chartC03\\_hi-res\\_en.png](http://creastats.crea.ca/natl/images/natl_chartC03_hi-res_en.png))



## Examples

According to Cox's narrative, high housing prices in compact cities are caused by their urban containment policies, and allowing more urban expansion is the best way to increase their affordability, but his analysis is incomplete and his recommendations are unrealistic.

### *Vancouver, Canada*

Vancouver is very attractive (*The Economist* magazine rates it one of the world's most livable cities), economically successful (it attracts global business, and has high employment rates and incomes), is growing (it expects to gain a million residents during the next thirty years), has low transport costs (households spend a smaller portion of their income on transport than any other Canadian urban region, leaving households with more money to spend on housing), and is geographically constrained: to the north are mountains and provincial parks, to the west is the ocean, and to the south and east is the Fraser River Valley which contains some of Canada's most productive farmland and wildlife preserves (Figure 11). Only a small amount of urban-fringe land remains for development (brown in the map), and these parcels are dispersed through actively farmed areas, so their development would require costly infrastructure – wider roads, water and sewage lines, fire stations, and school busing – and would disrupt farming. These parcels are 20-50 kilometers from the region's major employment centers, so residents would face long commutes and high transport costs.

<sup>2</sup> For more discussion see my columns, [What is a 'House'? Critiquing the Demographia International Housing Affordability Survey](#) and [How Not To Measure Housing Affordability](#).

**Figure 11 Vancouver Region Farmland Status (Metro Vancouver 2014)**



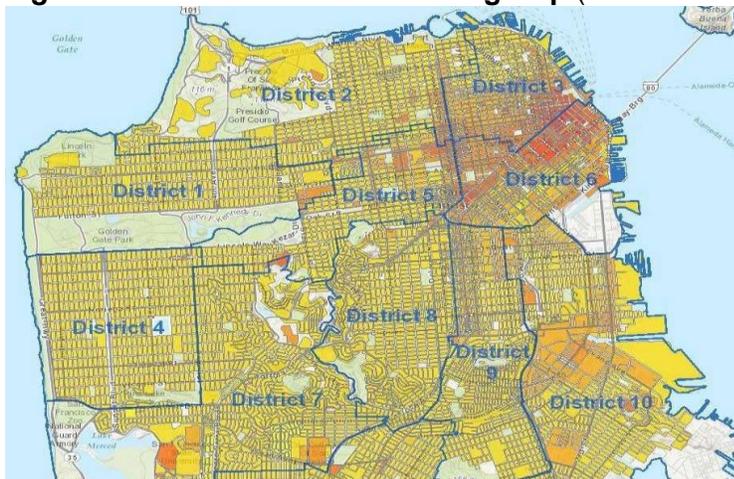
*Most of the Vancouver region is urbanized, protected habitat, or actively used for farming; most unused parcels are scattered and so would be costly to develop and residents would have high transport costs.*

Although Cox argues that Vancouver’s high housing costs result from urban containment regulations, it is more appropriate to blame regulations which limit urban infill. Despite considerable and growing demand for compact housing, Vancouver’s zoning codes severely restrict development density and mix, building height, and multi-family housing, and require significant parking supply in most neighborhoods, reducing affordable housing supply. Smart Growth policies allow more moderate-priced infill development.

#### *San Francisco, USA*

San Francisco is also geographically constrained, attractive and economically successful, with low transportation costs and strict regulations which limit urban infill, all factors that increase housing prices. Despite growing housing demand, current zoning codes limit buildings to four stories in most of the city (Figure 12), discouraging increased housing supply. Smart Growth policies that allow taller buildings, more multi-family housing and reduced parking requirements can increase housing affordability in such conditions.

**Figure 12 San Francisco Zoning Map (Russel 2014)**



*This map shows San Francisco’s zoning. Areas in yellow limit building heights to four stories, and most buildings in these areas are even lower. These regulations discourage development of moderate-priced housing. Smart Growth results in more flexible and responsive regulations, allowing more affordable housing to be developed in accessible, multimodal neighborhoods.*

### 7. Smart Growth Increases Economic Productivity and Opportunity

Cox argues that sprawl development increases economic productivity and opportunity, but most studies find that more compact development tends to increase economic productivity due to agglomeration efficiencies (Donovan and Munro 2013; Hsieh and Moretti 2015; Melo, Graham, and Noland 2009), more productive land use (McKeeman 2012), and more efficient infrastructure (Ford 2009; SGA and RCLCO 2015); and that economically disadvantaged people tend to be economically successful if they live in compact, multi-modal neighborhoods (Ewing and Hamidi 2014; Ganong and Shoag 2012).

Cox misrepresents this research. For example, he states (p. 25), "A recent economic analysis associates an annual loss of nearly \$2 trillion in gross domestic product in the United States with more stringent housing regulation." Cox is correct that Hsieh and Moretti (2015) found that regulations reduce productivity, but they are referring to restrictions on compact infill development, not urban containment. They state:

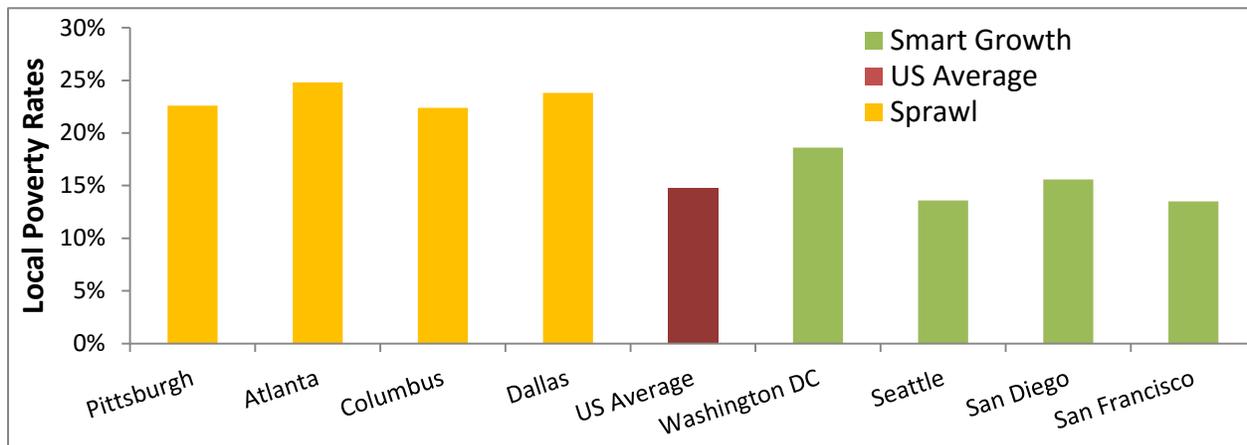
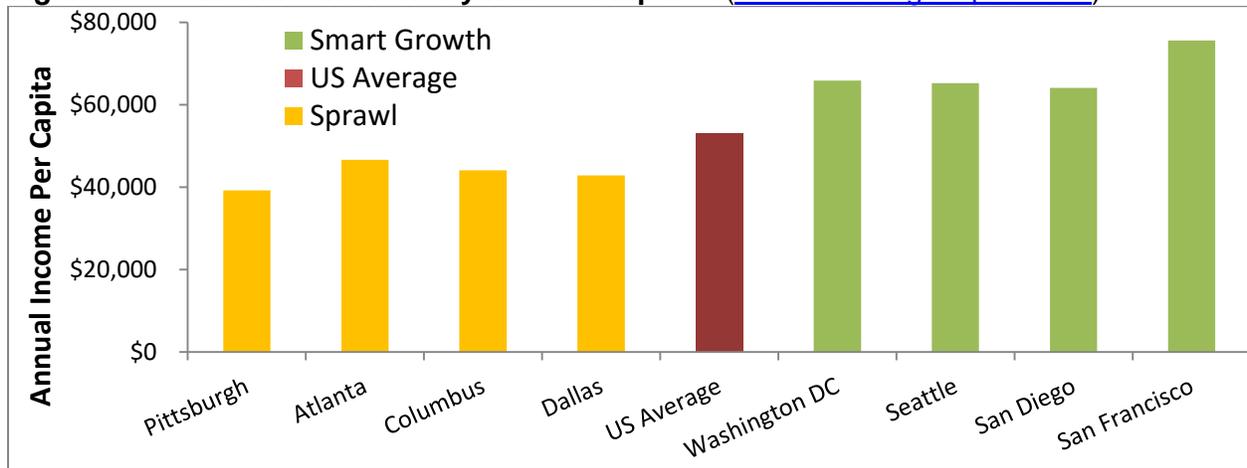
"For example, Silicon Valley – the area between San Francisco and San Jose – has some of the most productive labor in the globe. But, as Glaeser (2014) puts it, 'by global urban standards, the area is remarkably low density' due to land use restrictions. In a region with some of the most expensive real estate in the world, surface parking lots, 1-story buildings and underutilized pieces of land are still remarkably common due to land use restrictions. While the region's natural amenities – its hills, beaches and parks – are part of the attractiveness of the area, there is enough underutilized land within its urban core that housing units could be greatly expanded without any reduction in natural amenities. Our findings indicate that in general equilibrium, this would raise income and welfare of all US workers."

Cox claims (p. 6 and 25) that Hsieh and Moretti's \$2 trillion estimated productivity gain should be considered a *benefit* of sprawl to be subtracted from my sprawl cost estimate; he has the issue backward. As this quote shows, their research actually indicates that sprawl-inducing restrictions on urban infill reduce productivity, so this value should be *added to* my sprawl cost estimate, indicating that the total costs of sprawl are more than twice my estimate.

Cox also states, "There is increasing evidence that urban containment policy is not only irreconcilable with housing affordability and price stability but also with better standards of living and reduced poverty." Good research indicates the opposite: Smart Growth policies tend to increase economic productivity and opportunity. For example, Ganong and Shoag (2012) find that regulations which limit affordable infill in economically successful cities reduce lower-income households' economic opportunities. Similarly, the *Harvard Equity of Opportunity* study (Raj Chetty, et al. 2014, cited in Ewing and Hamidi 2014) indicates that children born in low-income households are more likely to be economically successful if they grow up in Smart Growth rather than sprawled communities. This is understandable: compact, mixed, multimodal neighborhoods offer children greater exposure and access to diverse role models and economic opportunities compared with isolated, automobile-dependent areas.

Cox's colleague Tony Gattis recently made similar inaccurate claims in a report, *Maximizing Opportunity Urbanism With Robin Hood Planning* (Gattis 2015). He argues that Smart Growth policies reduce economic opportunity, and cited Houston as a successful city, but objective data indicate otherwise. As previously illustrated in Figure 8, although Houston households spend a relatively small portion of their budgets on housing (33.1%), they spend the most on transport (21.0%) of the 17 cities surveyed, resulting in the second highest combined housing and transport spending (54.1%). Houston fares badly with regard to other economic outcomes: it has low average incomes, a high poverty rate, low education attainment (29% of adults have college degrees compared with 33% nationwide), and low homeownership rates (45% of households, compared with 64% nationwide) (CCSC 2015; U.S. Census 2015). The sprawled regions that Cox highlights as examples of desirable regulations tend to have lower incomes and higher poverty rates than the compact urban regions that he criticizes (Figure 13).

**Figure 13** Income and Poverty Rates Compared ([www.census.gov/quickfacts](http://www.census.gov/quickfacts))



The sprawled urban regions that Cox cites as examples to be emulated have far lower average incomes and higher poverty rates than the U.S. average, while the cities that he criticizes for their Smart Growth policies are very economically successful. Of course, many other factors besides local development policies may help explain these outcomes, but this certainly contradicts claims that low-density, automobile-dependent development increases productivity and opportunity.

Many economists recommend Smart Growth policies to increase economic productivity and low-income workers' economic opportunities (Ganong and Shoag 2012; Hsieh and Moretti 2015; Saks 2008). The evidence presented here belies Cox's and Gattis' claims that sprawled, automobile-dependent cities increase economic mobility. Of course, other demographic, geographic and economic factors, besides sprawl, may affect education and economic success, but that's the point: Cox's analysis, and the basis of his criticisms of Smart Growth, all fail to account for confounding factors which affect outcomes.

Cox argues that since commuting is difficult without an automobile, Smart Growth harms economically disadvantaged people. This logic is backward. Many disadvantaged people cannot or should not drive, and so benefit from improved travel options. Although some research indicates that disadvantaged workers with cars tend to work more hours and earn more money, on average the additional income only pays the additional vehicle expenses (Smart and Klein 2015), so such workers are better off overall if they can use a less expensive commute mode. Lower-income workers' vehicles are often unreliable, so even those who normally drive need alternatives. As a result, by improving affordable transport options, Smart Growth is particularly beneficial for economically disadvantaged workers.

#### *8. Smart Growth Housing Retains Its Value and Builds Household Wealth*

Cox also claims that "Urban containment policy has also been associated with greater housing market volatility." He is wrong. Recent studies show that houses in more compact, multimodal neighborhoods retain their value better than in sprawled, automobile-dependent locations (Lucy and Herlitz 2009; Pivo 2013; Rauterkus, Thrall and Hangen 2010). One study used detailed analysis of factors that affect mortgage default rates in Chicago, Jacksonville, and San Francisco (NRDC 2010). In all three cities, the study found after controlling for other factors, mortgage foreclosure probably increased with neighborhood vehicle ownership rates. This makes sense because a more accessible and multimodal location provides affordable transport options that help households respond to economic shocks such as fuel price increases, vehicle failures and lost incomes. By shifting household spending from vehicles, which depreciate in value, to housing, which tends to appreciate in value, Smart Growth helps increase household wealth generation, as described in the following box.

##### **Household Wealth Generation**

Households often make trade-offs between housing and transport expenses; they can purchase a cheaper house in a sprawled location (called "drive until you qualify"), or pay more for a house in a more accessible, multimodal neighborhood. The short term costs may appear equal, but because vehicles depreciate and housing tends to appreciate in value, Smart Growth helps build more long-term wealth.

For example, in the short-term, spending \$25,000 annually on a mortgage and \$5,000 on transport has the same total cost as a \$15,000 annual mortgage and \$15,000 on transport, but after a decade the additional \$10,000 mortgage payments accrues about \$200,000 in additional equity (wealth). Shifting spending from vehicle travel to housing also benefits developers and real estate agents, who earn greater profits, and local governments, which earn more property tax revenue per household.

### 9. *There is Significant and Growing Demand for Smart Growth*

Cox (section 4 of his report) attempts to use consumer surveys and domestic migration data to prove that most households prefer sprawl, implying that Smart Growth harms consumers, but the reality is more complex.

- As previously discussed, Smart Growth does not generally eliminate single-family housing. My research indicates that most Smart Growth benefits can be achieved with densities as low as 30 residents per regional hectare (12 residents per acre), which allows most households to occupy single-family houses.
- Household location decisions are influenced by available housing options; to the degree that current market distortions favor lower-density, automobile-dependent development, Smart Growth policies that reduce these distortions would shift some households to more compact, multimodal neighborhoods. Many of the factors that make single-family, suburban housing attractive are social and economic features currently associated with suburbs, such as newer housing stock, lower crime rates, better public services and more prestige, so many people could be satisfied living in Smart Growth neighborhoods that have these attributes.
- Although, given unlimited resources, many people prefer large-lot single-family houses and automobile travel, in fact, given unlimited resources many would probably prefer a giant castle surrounded by a private game reserve, with a fleet of limousines and helicopters, but when forced to consider real-world trade-offs, many will choose more compact housing types if that allows them to live in a more accessible or livable neighborhood, or save money (NAR 2013). For example, a major U.S. survey found that about half of respondents would prefer to live in a community where the houses are larger and farther apart but schools, stores and restaurants are several miles away, and about half would prefer to live where houses are smaller and closer to each other but most services are within walking distance (PEW 2014). Preferences for walkable neighborhoods are particularly high among younger adults and senior women, two growing demographics. Failing to provide these options, for example, by restricting affordable infill housing development, or failing to improve affordable transportation options, ultimately harms households, particularly lower-income households, even if that is not their first choice.
- Cox's evidence is outdated. Recent surveys indicate significant and growing consumer demand for compact housing in multimodal neighborhoods (Handy 2008; Keely, et al. 2012; Nelson 2014; ULI 2015). The key question is, "What housing and transport demands are not being served?" North America has an abundant supply of single-family housing in automobile-dependent neighborhoods, but it is often difficult to find affordable-accessible housing, that is, affordable housing in accessible, multimodal locations. Smart Growth policies help serve these latent demands.

Cox's criticism of compact cities such as New York, Seattle and Vancouver is equivalent to Yogi Berra's comment, "Nobody goes there anymore; it's too crowded." The high housing prices and crowding indicate strong consumer demand; many households want to live there due to these cities' livability and economic opportunity. Smart Growth policies that allow more households to live in such neighborhoods provide direct benefits to occupants as well as broader economic, social and environmental benefits to communities.

**10. Current Development Policies are Inefficient and Inequitable**

Cox argues, “The purpose of public policy in cities is not to focus on a particular urban form, planning philosophy, type of housing, population density, or mode of transport. The purpose is rather to seek better lives for people. The most appropriate form of urban planning policy is that which facilitates better living standards and less poverty.” On this we can agree.

As discussed in my report, many current development policies violate basic economic principles including consumer sovereignty, efficient pricing, and integrated planning. Such policies are social engineering that increases sprawl beyond what consumers would otherwise choose. For example, limits on development density and multi-family housing, and minimum parking requirements, result in less affordable infill than is economically optimal (Glaeser and Gyourko 2008; Hsieh and Moretti 2015). Similarly, only about half of roadway costs and a smaller portion of non-residential parking costs are financed by user fees, and automobile-oriented transport planning reduces travel options, resulting in more automobile travel than economically optimal (Boarnet 2013; DeRobertis, et al. 2014; Henchman 2013). Table 6 summarizes these distortions and reforms. Cox cites an *Economist* magazine article that criticized British urban containment regulations, but ignores other articles by the same magazine that emphasize the costs of sprawl and benefits of Smart Growth reforms (The Economist 2014 and 2015)

**Table 6 Sprawl-Encouraging Market Distortions (Litman 2014, Table 22)**

Distortions	Impacts	Reforms
Restrictions on density, mix, and multi-family housing.	Reduces development densities and increases housing costs.	Allow and encourage more compact, mixed development.
High minimum parking requirements.	Reduces density and discourages infill development. Subsidizes automobile ownership and use.	Eliminate minimum parking requirements, set maxima, require or encourage parking unbundling.
Underpriced public services to sprawled locations.	Encourages sprawl. Increases government costs.	Development and utility fees that reflect the higher costs of serving sprawled areas.
Homeowner tax deductions.	Encourages the purchase of larger homes.	Eliminate or make neutral housing tax policies.
Automobile-oriented transport planning.	Favors automobile travel over other modes. Degrades walking and cycling.	More neutral transport planning and funding.
Road and parking underpricing.	Encourage vehicle ownership and use.	More efficient pricing.
Tax policies that favor automobile commuting.	Encourages automobile travel over other modes.	Eliminate parking tax benefits or provide equal benefits for all modes.

*Many current policies favor sprawl and automobile travel over compact development and multi-modal transport.*

Cox states, “This Evaluation does not favor any particular urban form, planning philosophy, type of housing, population density or mode of transport.” That is untrue. By opposing Smart Growth reforms that increase consumer options, pricing efficiency and planning neutrality, Cox is advocating sprawled development, large-lot housing, low population densities and automobile-dependency. The results are inefficient, unfair and outdated (Boarnet 2013).

**Example**

Judy and Robert, a working class couple, are considering two house purchase options, a \$250,000 single-family home on a quarter-acre lot in a sprawled, automobile-dependent location with a \$1,338 monthly mortgage, or a \$350,000 townhouse on a small lot in an urban neighborhood, with a \$1,919 monthly mortgage payment (assuming 5% interest rate and \$20,000 deposit on each house). According to Cox’s analysis they should choose the cheaper, sprawl-location house because it provides more land per dollar. However, since urban center wages tend to be higher (assume \$14 per hour, compared with \$10 at the fringe), the urban fringe house requires two cars and a 50-mile daily commute, and to accommodate this additional traffic, urban regions must expand highways, which typically costs \$0.50-\$1.50 per additional peak-period vehicle-mile accommodated, plus a \$100 per month workplace parking space for each automobile commuter.

In contrast, the urban neighborhood townhouse allows many workers to commute by cycling and public transit, so they only need one car driven fewer miles. Table 7 compares the housing and transport costs of these options. In this example, the urban townhouse costs less overall. However, with conventional development and transport policies, roadway expansion and commuter parking costs are not charged directly to users, they are financed indirectly through general taxes and higher business rents. As a result, with current, pro-sprawl policies, the urban fringe house option *seems* cheaper. This is economically inefficient and unfair. Smart Growth policy reforms include more efficient road and parking pricing, so urban highway expansions are financed through road tolls and parking is charged directly to users or “cashed out” (employees can choose a cash benefit or transit pass instead of a subsidized parking space).

**Table 7      Sprawl Versus Smart Growth Housing and Transport Costs**

	Urban Fringe Single-family	Urban Townhouse
Mortgage payment	\$1,338	\$1,919
Vehicle ownership (\$250/vehicle)	2 cars = \$500	1 car = \$250
Vehicle operation (25¢/mile)	3,000 miles = \$750	1,000 miles = \$250
Transit Expenses	\$0	\$200
Highway expansion (50¢/mile for 10 miles per commute trip)	\$400	\$0
Employee parking (\$100/month)	\$200	\$0
<b>Totals</b>	<b>\$3,188</b>	<b>\$2,619</b>
<i>Perceived total with subsidized roads and parking</i>	<i>\$2,588</i>	<i>\$2,619</i>

*Although urban fringe housing has lower purchase prices, it has much higher transport costs and so is more costly overall. However, with conventional policies, road and parking facility costs are financed indirectly rather than through user fees, so the suburban location seems cheaper.*

There are other factors to consider when choosing houses. The inexpensive, older cars Judy and Robert own tend to be unreliable so they frequently face vehicle repair and crash risks which can impose large, unexpected costs and stress. Living in an urban neighborhood provides affordable options for when their car is unavailable. Although the urban fringe house has a large backyard for pets and children to play, local roads are busy and lack sidewalks, which

discourages recreational walking and cycling. Urban townhouses have smaller yards, but streets have sidewalks and bikelanes, and there are nearby parks, making walking and cycling convenient. In fifteen years, after they have paid off 40% of their mortgage, the urban house has accrued \$140,000 in equity compared with just \$100,000 for the fringe house, creating more household wealth.

Of course, every situation is unique. Not everybody wants to live in an urban neighborhood or commute by cycling and transit. The point of this example is to illustrate that these factors are often significant. Households and communities should apply comprehensive analysis when evaluating housing and transport options. Cox's analysis ignores these issues and so fails to account for important sprawl costs and Smart Growth benefits.

## Questions

This debate raises several questions that I hope Cox will answer in order to better clarify his arguments and recommendations.

1. Much of Cox's criticisms are based on the assumption that Smart Growth consists primarily of urban containment regulations which increase housing costs. However, Smart Growth includes many other policy reforms, many of which reduce housing and transport costs.  
**Question:** *Does Cox support Smart Growth policy reforms that increase affordability, such as reduced regulations on urban infill density, building height and multi-family housing; reduced minimum parking requirements; plus more support for affordable transport modes (walking, cycling and public transit) in urban areas?*
2. Cox argues that the high housing costs in cities such as New York, San Francisco and Vancouver result from their urban containment regulations, ignoring other factors that increase their housing costs, including geographic constraints, high incomes and restrictions on infill development. In fact, neither New York or San Francisco have urban containment barriers, they are simply highly constrained in their ability to expand due to oceans (they are both coastal cities) and other natural features, valuable parklands, and jurisdictional borders.  
**Questions:** *Is it possible that other factors, besides urban containment regulations, explains the high housing costs in cities such as New York, San Francisco and Vancouver? How might his results change if these factors are considered?*
3. Because households often face trade-offs between housing and transportation expenses (cheaper housing at the urban fringe tends to have higher transport costs than housing in more accessible and multimodal neighborhoods), most experts recommend that household affordability should be measured based on combined housing and transport costs.  
**Question:** *Does Cox agree that affordability should consider both housing and transport costs? If not, why not?*
4. Studies cited in Cox's report, such as Hsieh and Moretti (2015) and Saks (2008) argue that constraints on urban infill in high-income cities reduce economic productivity and opportunity, and so support Smart Growth policy reforms such as allowing higher densities, reduced parking requirements and more urban rail transit investments.

**Question:** *Does Cox support these Smart Growth policies? If not, how can he explain citing this research which advocates these policy reforms?*

5. My report explains that, because the analysis does not monetize some significant costs of sprawl, including open space (farmland and natural habitat) displacement, reduced mobility options for non-drivers, and reduced local economic development, my estimate represents a lower-bound value and the total costs of sprawl are probably higher.

**Question:** *Is it possible that Cox's lower sprawl cost estimate overlooks some important impacts, and the actual costs may be significantly higher than he claims?*

6. A number of demographic and economic trends (aging population, changing consumer preferences, increasing health concerns, etc.) are increasing demand for housing in compact, multimodal neighborhoods, and for alternatives to driving.

**Question:** *Does Cox support policy reforms that respond to these changing demands, such as reducing restrictions on compact housing types (allowing smaller lots, higher buildings and more multifamily housing in urban neighborhoods where it is currently prohibited), reducing parking requirements, and giving more priority to active and public transit improvements?*

## Conclusions

My report, *Analysis of Public Policies That Unintentionally Encourage and Subsidize Urban Sprawl*, describes various policy distortions which result in economically-excessive sprawl; estimates the resulting economic, social and environmental costs; and identifies Smart Growth policies that can correct these distortions. Wendell Cox criticizes my study. He claims that my analysis exaggerates sprawl costs and Smart Growth benefits. There is a kernel of truth to some of his arguments but overall they cannot stand scrutiny. His analysis reflects several errors:

- Much of Cox’s criticism is based on the incorrect assumption that Smart Growth consists only of urban containment regulations. Such regulations are actually a minor share of Smart Growth reforms. For every jurisdiction with strong urban containment regulations there are dozens with strongly-enforced regulations that limit urban infill and subsidize automobile travel. Described differently, constraints on urban expansion – either natural or regulatory – increase housing prices to the degree that a region fails to allow more affordable infill development, so concerns about housing inaffordability in geographically constrained, attractive and economically successful cities such as New York, San Francisco and Vancouver justify *more* rather than *less* Smart Growth policy implementation.
- Cox scours my analysis to find ways that it may overestimate sprawl costs, but ignores a larger number of ways that it underestimates those costs. He claims that sprawl only increases vehicle travel by 37-42%, based on the unjustified assumption that sprawl does not increase freight or urban fringe vehicle travel. Other studies find much larger travel impacts and costs. My analysis actually represents a lower bound value; had I used international and sub-regional (neighborhood-level) data, and monetized the value of degraded open space, basic mobility for non-drivers, and local economic development, my sprawl cost estimate would be much larger. For example, adding Hsieh and Moretti’s \$2 trillion estimate of lost productivity due to regulations that limit infill development in economically-successful cities would nearly triple my sprawl cost estimate.
- My framework, which categorized U.S. urban regions into density quintiles, was intended for calculating costs; it is unsuited to evaluating specific impacts. Cox applies inappropriate analysis to these quintiles; he finds positive associations between regional density and outcomes such as housing costs, traffic congestion, property taxes and social inequity, but he fails to account for confounding factors such as geographic constraints, city size, business activity and household incomes. This is bad research and the results are worthless. Studies that account for these factors reach very different conclusions: credible, peer-reviewed research indicates that, all else being equal, more compact and multimodal development increases household affordability (considering both housing and transport expenses), reduces per capita congestion delay, increases public infrastructure cost efficiency, and improves economic opportunity for disadvantaged residents.
- Cox’s affordability analysis is incomplete and his recommendations are unrealistic. He criticizes Smart Growth for increasing housing costs, ignoring the many ways it increases overall affordability. He argues that housing costs would be much lower in compact cities such as New York, San Francisco and Seattle if they simply reduced urban containment regulations. These cities are geographically constrained and have little undeveloped land available within affordable commute distances, and urban-fringe development imposes high infrastructure and transportation costs on residents and communities. Cox ignores these factors.

- Cox claims that sprawl reflects consumer demand, but his evidence fails to answer key policy questions such as whether households choose sprawled locations and automobile travel because they lack better housing and transport options (such as affordable housing in accessible, multi-modal neighborhoods; and better walking, cycling and public transit services). High housing prices in dense cities such as New York, San Francisco and Vancouver demonstrate that many people prefer such housing. Cox ignores this and other evidence that a significant and growing portion of households prefer Smart Growth attributes, and serving this demand directly benefits occupants and provides broader community-wide benefits.
- Cox ignores the primary issue examined in my study: the degree that current policy distortions result in economically excessive sprawl and automobile travel, and the potential benefits of correcting these distortions. Many Smart Growth policies reflect economic principles including *consumer sovereignty* (they increase housing and transport options that respond to consumer demands), *cost-based pricing* (users pay directly for the public infrastructure and services they consume), and *neutral planning* (planning is based on comprehensive analysis and unbiased policies), and so tend to increase efficiency and equity.
- Cox misrepresents research. For example, he implies, incorrectly, that Hsieh and Moretti (2015) and Saks (2008) support urban expansion policies when they actually endorse Smart Growth policies that encourage compact infill development and multimodal transport planning.
- Cox's analysis violates basic research principles: it does not present all perspectives, poorly documents its methods, fails to make his data available, and lacks independent peer review.

Cox's analysis only considers one planning objective: housing affordability. Housing affordability is certainly an important issue, but not at the expense of all other economic, social and environmental objectives. Cox is wrong to claim that my analysis "dismisses the housing affordability consequences of urban containment policies." In fact, my report devotes several pages to the issue. However, unlike Cox, my analysis puts housing affordability into perspective; it points out that Smart Growth policies have mixed affordability impacts, some policies increase, but others reduce housing and transport costs. Compact infill development can help achieve other economic, social and environmental objectives and so are *win-win* strategies, in contrast to pro-sprawl policies that may increase urban-fringe housing affordability but conflict with other planning objectives.

Cox also ignores the full economics of different development patterns. Even if Smart Growth increases housing costs, this is largely offset by more affordable transport options (walking, cycling and public transit) and resulting transport cost saving, which are particularly important to physically and economically disadvantaged people whose ability to drive is constrained, and so helps achieve social equity objectives.

Contrary to Cox's claims, abundant research indicates that sprawl reduces economic productivity and opportunity: residents of the sprawled regions that Cox cites as examples have significantly lower average incomes, higher poverty rates, lower education attainment rates, and fewer children from impoverished households becoming economically successful later in life than in the compact, multi-modal regions that he criticizes. Lower-income households living

in sprawled areas tend to have higher housing foreclosure rates, apparently because they lack fallback options when facing financial stresses such as fuel price increases, vehicle failures or income losses. Households build less long-term wealth if they purchase cheaper urban-fringe housing, compared with the same total spending on a Smart Growth location house with lower vehicle costs. Sprawl also imposes economic burdens on communities; fiscal impact studies indicate that, due to higher public infrastructure and service costs, and less tax revenue generated per development acre, urban fringe development tends to cost local governments more than the incremental tax revenue generated, forcing more central neighborhood households to cross-subsidize households in sprawled locations. To the degree that is true, sprawl is economically inefficient and unfair.

Cox is correct that my analysis failed to account for additional public transit costs often required for Smart Growth, which averages about \$400 annually per capita. This may seem large, but is less than 10% of average expenditures per automobile and so is offset if high quality transit reduces per capita vehicle ownership rates by at least that amount. Households in transit-oriented developments typically own about half as many vehicles as they would in sprawled areas, and they enjoy other benefits including parking cost savings, improved mobility for non-drivers, reduced chauffeuring burdens, and improved safety and fitness, indicating that transit investments can be cost effective overall.

Cox "tortures the data," meaning that he uses selective, incomplete and biased data, and unjustified assumptions, to reach his desired conclusions. Much of Cox's analysis is unclear and poorly documented, making it difficult to evaluate. For example, his Figure 17 categorizes cities into "Restrictive" and "Liberal" regulations but provides no details as to which regulations he is considering; he implies that it refers to urban containment regulations but since restrictions on compact, infill are more common, Cox's analysis endorses Smart Growth policy reforms which allow and encourage more compact, multimodal development. Similarly, his Figure 13 evaluates "Household Income Upper Limit" without explaining what this means or how it is measured. Cox accuses me of poor documentation, which is true in the case of a typo on page 44 which spoiled the link to my analysis spreadsheet, although the link is correct on page 87, and many of his questions are actually answered in the report. For example, his questions on page 14 of his report concerning which vehicle costs are included in my analysis, are clearly explained in Table 10 of my report. As a result, much of his criticism reflects his own carelessness.

Cities around the world face critical decisions concerning how best to balance economic, social and environmental goals while they grow. My report provides practical guidance by identifying policy distortions that can lead to economically excessive sprawl, and providing order-of-magnitude estimates of the resulting costs, and therefore the potential benefits of Smart Growth policies that correct those distortions. Wendell Cox is a Smart Growth critic and so, unsurprisingly, attempts to criticize my study. His arguments, however, are based on inaccurate definitions, incomplete and biased analysis, and misrepresentations of key research.

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