LAND USE AND MUNICIPAL BUDGETS

the fiscal connection

BY PATRICK LYNCH AND CHRISTOPHER ZIMMERMAN

Sprawling suburban development isn't just bad for the environment, human health, and quality of life; it's also bad for budgeting. Municipalities across the United States are struggling with the fiscal burden of expenditures for infrastructure and services that are higher than necessary because of inefficient planning. Governments can achieve significant savings over time by shifting to more compact development. When the revenue implications of more walkable environments are factored in, the potential gains to the tax base point to sizable net fiscal benefits.

From zoning and building approvals to funding for transportation infrastructure, to taxes on real estate and the location of public facilities, local governments control many of the key tools that shape the pattern of development in their communities — but governments don't typically factor in the fiscal implications of geographic patterns of development when making these decisions. A significant portion of municipal budgets is affected by the geographic pattern of development, including street construction and maintenance, water and sewer infrastructure, fire protection and police services, solid waste removal, and school transportation. Local governments spend more, both for upfront capital costs and ongoing operations, to provide services to their citizens when residences, civic functions, and places of commerce are widely dispersed because of car-only development patterns.

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Analysis by Smart Growth America (SGA) helps quantify the potential magnitude of fiscal benefit that more compact (i.e., less sprawling) development can create.[1] In collaboration with RCLCo, a real estate advisory firm, SGA constructed a fiscal impact model that focuses on the relative effects of sprawl versus compact development. The model can be used in scenario planning to quantify the municipal costs of sprawl and to determine the fiscal dividend that can be earned with smarter growth. It can help planners and local officials better understand the connection between land use policy and local budgets and taxes.[2]

CREATING THE MODEL

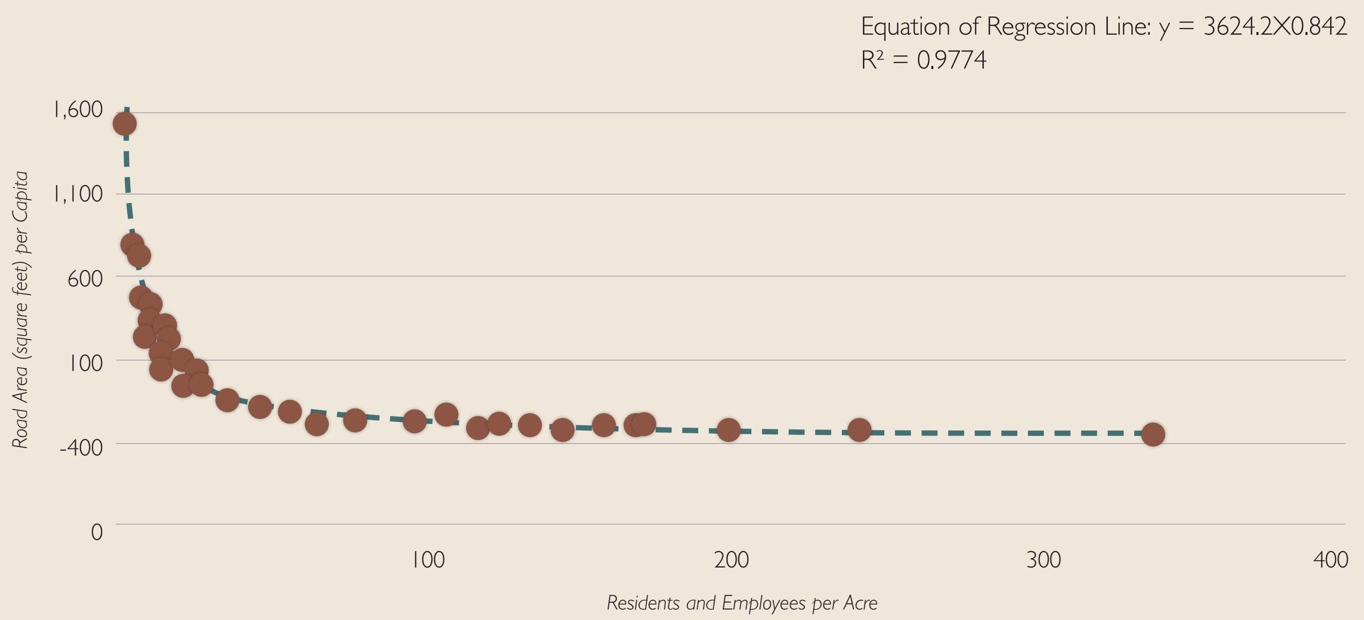
The aim of SGA's study was to develop a fiscal impact methodology that accounts for the increase in cost efficiencies associated with relatively dense development patterns, and that local practitioners can adapt and use in scenario planning. The model focuses on the aspects of municipal budgets most affected by the geographic pattern of development. It also models the revenue side, providing perspective on the net fiscal impact of development pattern choices.

The governmental functions SGA used for modeling were chosen based on the degree to which the cost of providing them (either initially or ongoing) depends on the geographic pattern of development. For example, fire protection is very sensitive to geography because of the need to distribute stations geographically, on the basis of response time. Similarly, the cost of providing school transportation rises sharply when populations are scattered — more of the student population lives beyond a walk zone, and buses must travel greater distances. Other functions, like libraries and human services, tend to be more closely correlated with population levels, regardless of development patterns.[3]

Ultimately, SGA identified five components for potential modeling: street construction and maintenance; water, sewer, and storm water infrastructure; solid waste collection; fire protection; and school transportation.[4]

The inverse relationship between total road pavement area for a community and development densities provides an example of the effect relative geographic dispersion has on these five components. Exhibit 1, an example from Arlington, Virginia (a community that exhibits a wide range of built densities, from large-lot single-family suburban to highly intense transit-oriented development centers with high-rise apartments and office towers), illustrates this relationship. The vertical axis shows road area per capita, and the horizontal shows density, displayed as resident population and employees per acre. Each "dot" on the graph corresponds to a set of specific 40- to 100-acre grid cells with a given density.

Exhibit 1: Road Length and Area Per Capita Decreases as Density Increases (Arlington, Virginia)



Note: This chart shows road area, but SGA also found a similarly strong relationship between road length and population/employment density. Whether road length or area was used in the case studies therefore depended on the availability of data.

Moving up and to the left along the curve, we can see that as density falls, the amount of road area required per capita rises quite sharply at densities below 50 people per acre. Since cost is largely a linear function of the amount of road, this implies a corresponding rise in costs for road construction and maintenance.

But it is not only the cost of roads themselves that are driven by the quantity of roads per capita. Water-related infrastructure — the pipes that bring fresh water to homes and take away waste water — runs beneath the streets. In effect, their cost has a linear relationship to the road network. The more dispersed the development, the more street per capita and the more pipe per capita under the street—and the higher the bill for all of it.

Then there is the cost of what goes on top of the street, which includes local government functions that relate directly to the use of the street network, like garbage trucks, school buses, and fire and EMS vehicles. Again, the more dispersed the development, the more street per capita that has to be traversed by those vehicles, which results in higher operating costs.

> A significant portion of municipal budgets is affected by the geographic pattern of development.

There are some specific considerations for each of these components. The provision of fire and EMS services is driven by response time standards. The standard then governs the distribution of fire stations, which have to be spaced such that vehicles and their personnel can reach any point in the "response shed" within the specified time, regardless of the number of homes or businesses that may be within the service area. The exact standard varies across communities, but as densities drop, more stations will always be necessary to serve fewer properties. Hence, the capital cost of fire station facilities can vary greatly for communities with the same population if they are built at different densities.

In the case of school transportation, all else being equal, costs will decline with higher density for two reasons: 1) School buses have smaller distances to travel, saving on fuel and other operating costs; and 2) more students live within the "walk zone" (close enough that they are not provided school transportation), bringing the cost of their school transportation to zero. More students walking to school means lower operational cost and a potentially significant capital cost reduction because it eliminates the requirements for vehicle purchase, maintenance, and storage.

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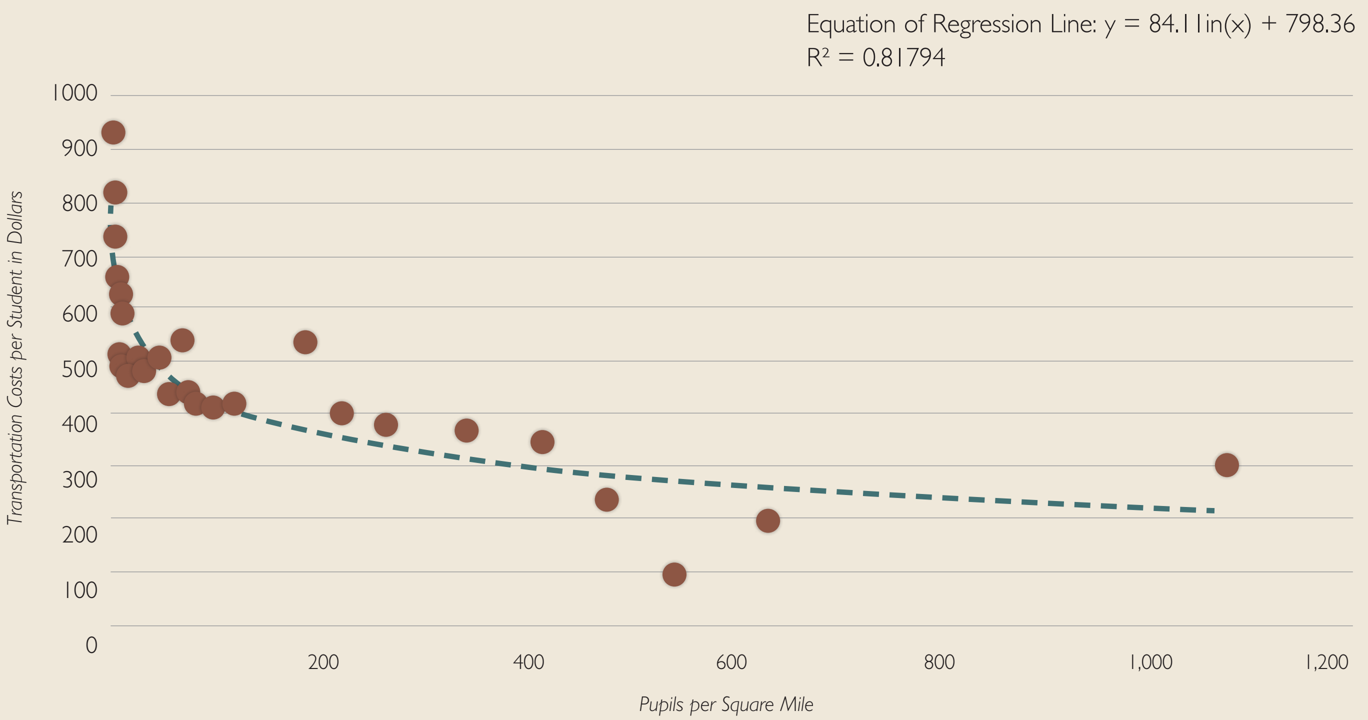
Exhibit 2, which is based on data from the Wisconsin Department of Public Instruction, illustrates the decline of transportation costs per student as density increases.

APPLYING THE MODEL

Methodology. The model's parameters are based on data provided by the municipalities. The general approach is as follows: From the existing street network, SGA derives a formula for estimating the length and area of new local roads that would be generated under the scenario by the development in question. GIS (geographic information system) software is used to overlay a grid of cells (40 to 100 acres) across the entire jurisdiction. For each cell, the number of residents and employees is estimated by allocating data from U.S. Census blocks and the Longitudinal Employer-Household Dynamics (LEHD) "OntheMap" facility.[5]

SGA obtains GIS layers of roads from the jurisdiction. (SGA worked with five communities of disparate sizes and regions to apply the model: Madison, Wisconsin; West Des Moines, Iowa; Doña Ana County, New Mexico; Macon-Bibb County, Georgia; and Indianapolis, Indiana.) The length and area of roads within each grid cell are added. The length (and area) of roads in each grid cell is divided by the total number of

Exhibit 2: School Transportation Costs Decline as Density Increases (by District in Wisconsin)



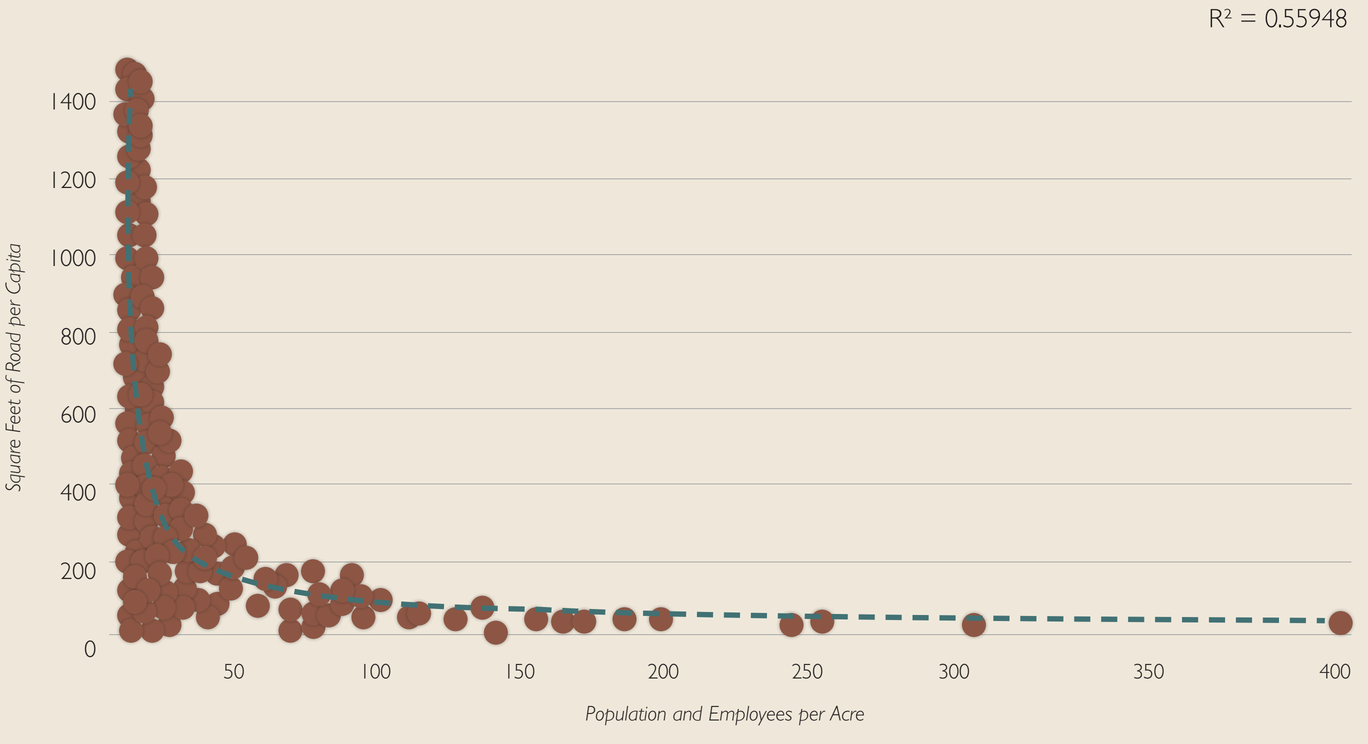
Source: Wisconsin Dept. of Public Instruction residents and employees in each grid cell, and the quantity of roads per capita is plotted against the density of each grid cell, which generates a scatterplot like the one shown in Exhibit 3 (for Madison), where each dot represents a grid cell.

Analyzing Revenue and Development Patterns. To understand the potential impact any given development scenario could be expected to have on local finances, one must compare the net fiscal impact, or the difference between the additional revenue the new development generates, and the added cost of providing infrastructure and services. Doing so requires revenue estimates.

SGA's base analysis included extremely conservative revenue assumptions. The numbers derived from local tax data effectively penalize more compact development because the same size house on a smaller lot is assumed to have a lower market value. This is in part because of the limitations inherent in the data (namely, jurisdictions that as yet have not had much in the way of walkable urban density). Nonetheless, a wide body of research indicates that dense, walkable environments enjoy significant value premiums (of 20 percent and higher) over typical suburban real estate. This means that the assessed value per square foot of development could in fact be higher under compact scenarios than under the base or low-density scenarios. In "base case" scenarios (see below), revenue is calculated without regard for such a premium. Since one can't make accurate comparisons between infill development and typical suburban development without considering the demonstrated potential of walkable communities to generate value premiums, SGA generated an additional variation on the compact scenarios that posits a walkability premium of 20 percent.[6]

Scenarios. Scenarios were determined based on each community's planning needs. Generally, all involve a base case in which future growth is assumed to follow the historical pattern of recent decades, building out at auto-oriented densities and requiring new infrastructure in tandem with growth. Some of these cases result in a very low-density scenario, reflecting development patterns that emerged in the latter stages of sprawl (e.g., the "exurban" commuter town growth patterns of the '80s and '90s). At least one higher-

Exhibit 3: Road Area (per Capita) against Observed Density



density alternative is also modeled — sometimes a transit-oriented development (TOD) scenario, or other times, a potential revitalization of a downtown area. In several cases, a "high-end" scenario is created to account for both a walkability premium on the revenue side and the use of existing infrastructure (through "infill" development) on the cost side.

For example, a scenario generated for Indianapolis involved a high-density TOD occurring in infill locations, adding two factors to the basic model. Applying the walkability premium assumption, property values were assumed to be 20 percent higher, on average, than in the other scenarios. And to approximate conditions in urban infill locations, 75 percent of the road infrastructure was assumed to be place and already maintained by the city.

CASE STUDIES

The communities SGA worked with to apply the model had different conditions and wished to evaluate different scenarios:

- **Madison.** The model was used in Madison to analyze patterns of development for a 1,400-acre greenfield site, built out at higher or lower densities.
- **West Des Moines.** Scenarios that weren't specific to any particular location in the city assumed that the next 20 years of growth would be roughly the same as it had been for the last two decades and used varying densities, including a base reflecting current developed density and incrementally higher and lower alternatives.
- **Doña Ana County.** Similarly, a comprehensive plan review in Doña Ana County included a look at alternative growth patterns for a 25-year horizon, contrasting a base forecast at low densities (consistent with recent historical experience) with higher-density alternatives.
- **Macon-Bibb County.** The purpose of this study was to contrast a future in which growth would be concentrated in a revitalized downtown versus one in which growth continues as additional greenfield development on the outskirts.
- **Indianapolis.** The city wanted to examine the implications of future development occurring in TOD nodes along a planned bus rapid transit (BRT) corridor versus growth scattered around Marion County.

These jurisdictions are not only interested in the effect of density; they are also considering options for growth. Scenarios were therefore developed to reflect each municipality's planning objectives and to cover varying product mixes and densities. As a result, the analyses incorporated different combinations of scenarios to help identify the role of density itself. The data available in each case also varied, so they are not completely comparable. Nonetheless, certain commonalities stand out in the results.

For each jurisdiction, the basic inverse relationship holds between the cost of the identified expenditure areas and development density. The reduction in costs can be significant, especially between very low exurban densities and moderately dense development. For example, the analysis for West Des Moines indicated that moving from very low-density development of one unit per acre to a moderate density of 16 units per acre would reduce municipal costs per capita by 19 percent. In Macon-Bibb County, the cost reduction was 25 percent. For Madison, a shift from two units per acre to 16 would lower costs per capita by 33 percent.[7]

> The capital cost of fire station facilities can vary greatly for communities with the same population if they are built at very different densities.

In every case, the analysis suggested that more compact development scenarios would have a significant positive net fiscal impact. For example, under the compact scenario for the city of Madison, the annual net fiscal impact of new development is 44 percent higher than under the base scenario, and nearly three times the net fiscal impact under the low-density scenario. For West Des Moines, the walkable urban scenario yielded a net fiscal impact 49 percent higher than the low-density case. The forecast outcome of conventional suburban development in both Macon-Bibb County and Indianapolis was for a negative impact on municipal finances — a greater increase in future expenditures than in future revenues — while the higher-density scenarios generated positive outcomes, even under the very conservative revenue assumptions, with no premium for enhanced walkability.

The results are especially striking because they likely understate the potential benefit of more compact development patterns on municipal finances in the long term. This is partly because of the assumptions on revenue, but also because of the limited number of expenditure impacts identified and the difficulty of modeling all of them. (For example, SGA hasn't yet obtained sufficient data to model solid waste collection or fully accounted for the costs of school transportation.) Additionally, the fiscal impact calculations for the more compact development scenarios do not include the value of preserved land. Land that is not used for development retains value, whether it is ultimately developed in the future, used for agricultural purposes, or added to the stock of public open space.

CONCLUSIONS AND POLICY IMPLICATIONS

In summary, four main factors contribute to superior fiscal performance for more compact development patterns: two related to costs and two related to revenue. On the cost side, communities realize savings from the spatial efficiencies created by more compact development (higher densities) and the ability to make use of existing infrastructure when growth follows an "infill" strategy. On the revenue side, more compact development can increase the tax base by permitting more improvements on a given amount of land and via the higher return that can be realized when a walkability premium is generated.

Case Study: Macon-Bibb County

Macon-Bibb County, Georgia, has been working to revitalize its downtown after many years of focusing its development outward on greenfield sites near highways. Leaders wanted to understand what it would mean, in fiscal terms, if future growth occurred mostly through infill in the established

Exhibit 5: Evaluations by Scenario

Low-Density Greenfield

- 300,000 Square Feet of Office
- 200,000 Square Feet of Retail
- 1,000 Single-Family Detached Units
  - Average Value per Unit: $200,000
- Density: 2 per Acre (Net)
- Greenfield development requiring all new infrastructure

High-Density Greenfield

- 300,000 Square Feet of Office
- 200,000 Square Feet of Retail
  - Average Value per Unit: $110,000
- 800 Multifamily Units
  - Average Value: $68,000 per Unit
- Density: 16 per Acre (Net)

Downtown In-Fill

- 300,000 Square Feet of Office
- 200,000 Square Feet of Retail
- 200 Townhouses
  - Average Value per Unit: $111,000
- 800 Multifamily Units
  - Average Value of $68,000 per Unit
- Only marginal additions to existing infrastructure

Downtown In-Fill with Premiums

- 300,000 Square Feet of Office
- 200,000 Square Feet of Retail
- 200 Townhouses
  - Average Value per Unit: $111,000
- 800 Multifamily Units
  - Average Value of $68,000 per Unit
- Only marginal additions to existing infrastructure
- Assumes 20 percent higher assessed value for all property types

downtown area — which has a lot of capacity — as opposed to continued sprawl.

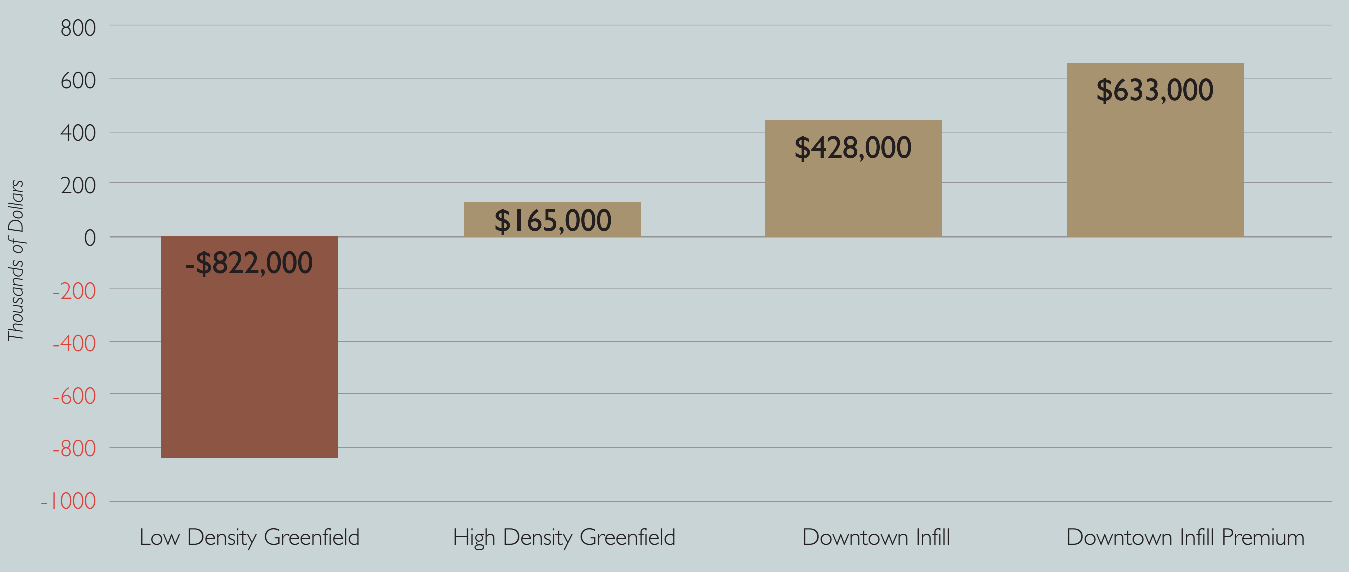
To shed light on this question, Smart Growth America developed four scenarios (two suburban and two downtown — see Exhibit 5) to illustrate the range of possible fiscal effects associated with new development, depending on whether it is more or less compact, and whether it occurs on greenfield sites (needing new infrastructure) or in locations within or proximate to existing development (making use of existing infrastructure).

Each scenario assumed 300,000 square feet of commercial office space, 200,000 square feet of retail, and 1,000 new housing units (although the composition of the housing units varied a bit across the scenarios). The analysis included effects on both the county/city and on the public school system.

The principal contrast is between development in a low-density suburban format (comparable to most of the development that has occurred over the last several decades) and an equivalent volume of development taking place entirely within the downtown area. Under the former scenario, new infrastructure must be put in place and maintained over a larger geographic area, while under the latter, the jurisdiction can take advantage of existing infrastructure. This, along with the variation in density, contributes to the difference in fiscal impact. A third factor is the difference in likely impact on schools, which is a major expenditure item (as it is in most communities), based on the different composition of housing types. (Single-family housing generates far more school-age children than the mix of townhouses and apartments assumed under the downtown scenario.) To isolate the impact of the housing/school factor, the high-density greenfield scenario assumes the same unit mix as the downtown scenario, at downtown densities, but requiring new infrastructure (i.e., it's the downtown program on a greenfield site). Finally, the second downtown scenario introduces the possibility of a "walkability premium" affecting the valuation of the new development, with a concomitant increase in revenue yield.

The resulting differences in annual net fiscal impact can be seen in Exhibit 6. The low-density greenfield ("business as usual") scenario generates more additional cost than revenue, yielding a negative impact. Applying a higher-density approach to greenfield development results in a slightly positive outcome. The downtown infill scenario is significantly more positive, even before any revenue premium is posited.

Exhibit 6: Total Annual Budgetary Impact, Macon-Bibb County and Schools



This suggests a rough spectrum where the least cost-effective pattern — widely dispersed, low-density exurban development on greenfield sites — is on one end. On the other end, we find highly compact, pedestrian-oriented development that is focused on infill locations where the greatest fiscal gain is to be had. (See Exhibit 4.) That said, the above spectrum only applies when the scenarios compared are roughly equivalent. Changes in assumptions such as the local tax and cost structure, assessed values, and the number of residents per unit, for example, can have dramatic effects on the results, as they would in any other fiscal impact analysis.

Exhibit 4: Effect of Developmental Density and Location

		Development Location	
		Greenfield	Infill
Development Density	Low-density	Low or Negative	Moderate
	High-density	Moderate	High Positive

The analysis suggests that policymakers are not sufficiently informed about the impact of their land-use decisions on the long-term health of government finances. Communities can use a model like the one SGA employed to better understand the specific ways smart growth can reduce budgetary pressure on local governments over time. One implication is that municipalities should routinely conduct geographic-based fiscal analysis as part of the process for adopting and renewing comprehensive plans, and for approvals of major development projects. Today, these approvals almost always include traffic modeling, but not fiscal analysis. A systematic approach to the fiscal impact of development patterns may yield more fiscally sustainable policies, ultimately improving the future economic and fiscal health of local governments.

Notes

1. The project was conducted with support from a grant from the U.S. Department of Housing and Urban Development. SGA conducted case studies in five communities around the country to assist them with specific planning objectives and to contribute to the effort to derive generalizable results, which may be useful for communities all across the country.
2. The connection between land use development patterns and the costs of providing public infrastructure and services has been the subject of many studies since the 1970s. A good review of the early literature can be found in "Investing In A Better Future: A Review Of The Fiscal And Competitive Advantages Of Smarter Growth Development Patterns" a discussion paper by Mark Muro and Robert Puentes for the Brookings Institution Center on Urban and Metropolitan Policy, March 2004. More recently, many analyses have been done for specific localities. Smart Growth America's May 2013 Building Better Budgets report summarizes the results of 17 of these studies.
3. These relationships are not absolute; however, the goal is to shed light on how municipal finances will be affected in future years, depending on whether communities grow in more a compact, clustered fashion (as would be in accordance with the guidance of many new regional plans) or whether they continue to sprawl. This leads us to focus on the major drivers of city budgets that are heavily influenced by location and development.
4. In practice, it has not been possible to incorporate each of these components for each case, owing to the limitations of data available from the municipalities.
5. SGA's population density concept is the sum of those who live and those who work in a given area.
6. See Joe Cortright, "Walking the Walk: How Walkability Raises Home Values in U.S. Cities," *CEOs for Cities*, August 2009; Gary Pivo and Jeffrey D. Fisher, "The Walkability Premium in Commercial Real Estate Investments," working paper, Responsible Property Investing Center, University of Arizona and Benecki Center for Real Estate Studies, Indiana University, February 2010; and Christopher B. Leinberger and Mariela Alfonso, "Walk this Way: The Economic Promise of Walkable Places in Metropolitan Washington, D.C.," Brookings Institute, May 2012.
7. Note that these comparisons are for greenfield development. Of course, the cost savings would be substantially more with infill development that takes advantage of existing infrastructure. The greenfield comparison provides a way to see the effect of density by itself.

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