

Review of NAHB Development Impact Model for House Building

October 2012

Overview

The National Association of Home Builders (NAHB) has, for many years, developed, maintained, and offered to its members a computer model of the economic and fiscal impacts of residential development. Local Home Builders Associations can sponsor local versions of the study, which utilize some local data, such as wages, taxes, and fees, to generate a customized version of the national study. The impact model has been used in more than 700 localities in the U.S. as of 2012, according to the NAHB.¹ This level of usage likely makes the NAHB model the most widely applied of any development impact model.

The NAHB impact model consistently finds that house construction is very beneficial, generating a stream of mostly positive cash flow for the local government and local economy over the 15-year period examined. Such positive findings are inconsistent with the main body of independent research and empirical evidence showing that residential development typically generates net costs for local governments and represents an ongoing fiscal drain.

This type of modeling is complex and the details of the methodology are not likely to be closely examined by the public officials or planners who may use the study to

¹ *The Economic Impact of Affordable Housing Programs in Montana: Income, Jobs, and Taxes Generated*, June 2012 by NAHB Housing Policy Department, page 21.

<http://housing.mt.gov/content/docs/confElliotEisenberg.pdf>

guide public policy. Hence, the NAHB studies, once performed, are rarely contested and tend to stand for the best available evidence on the local impacts of new residential development.

The fact that the model is developed and promoted by the home-building industry raises questions about impartiality. How objective and accurate is this model? Does it fairly represent the costs and benefits, or is the model really a tool for promoting house construction? Are the results intended to be balanced and informational, or are they intended to sway the minds of local decision-makers towards approving more development than citizens might otherwise support?

This is a review of the methodology and results of the National Association of Homebuilders' model for the economic and fiscal impacts of homebuilding at the local level. The goal is to determine if the model's methodology is reasonable and whether results are likely to reflect actual impacts on local communities.

Examples of How this Model Has Been Used

In addition to use by local Home Builders Associations, the NAHB impact model has been used by state agencies, universities, economic development organizations, and affordable housing groups to demonstrate the positive effects of house construction.

The Illinois Housing Development Authority is using the NAHB model to show employment and tax revenue benefits from housing construction. According to an agency presentation, "Developers can use these numbers to convince skeptical residents of the economic value of affordable housing."²

The State of Montana's Housing Division has posted on their website the results of a statewide model performed by the NAHB to promote affordable housing construction.³ This Montana report includes only the revenue side of the model and does not address costs.

² See the presentation from the Agency's Assistant Director, Jennifer Novak Chan, April 17, 2012 at <http://www.ihda.org/about/documents/Economic%20Development%20and%20Housing%20Research.pdf>.

³ See: *The Economic Impact of Affordable Housing Programs in Montana: Income, Jobs, and Taxes Generated*, June 2012 by NAHB Housing Policy Department, at <http://housing.mt.gov/content/docs/confElliotEisenberg.pdf>.

The NAHB's own report⁴ cites the use of its model by The Center for Economic Development at the University of Massachusetts, which found that "Home building generates substantial local economic activity, including income, jobs, and revenue for state and local governments. These far exceed the school costs-to-property tax ratios. ...these factors were evaluated by means of a quantitative assessment of data from the National Association of Home Builder's Local Impact of Home Building model."

The NAHB similarly reported that the Association of Oregon Community Development Organizations decided to base its analysis of affordable housing on the NAHB model, stating that "This model is widely respected and utilized in analyzing the economic impact of market rate housing development," and that, compared to alternatives, it "is considered the most comprehensive and is considered an improvement on most previous models."

The model has also been used by the NAHB to directly promote house construction on their spin-off website called *Protect Home Ownership*.⁵

The NAHB Model

The NAHB impact model estimates the local revenues and costs associated with building 100 new single-family houses. The model is used to generate a revenue report and a cost-revenue comparison report. The results from this model are reported in a pair of studies available on the NAHB website representing a "typical metro area."⁶

1. ***The Local Impact of Home Building in a Typical Metro Area: Income, Jobs, and Taxes Generated***, June 2009, by the Housing Policy Department, NAHB, Washington, DC.
2. ***The Local Impact of Home Building in a Typical Metro Area: Comparing Costs to Revenue for Local Governments***, June 2009, by the Housing Policy Department, NAHB, Washington, DC.

⁴ *Background and a Brief Description of the Model Used to Estimate the Economic Benefits, The Metro Area Impact of Home Building in a Typical Metro Area: Income, Jobs, and Taxes Generated*, June 2009, by the Housing Policy Department, NAHB, Washington, DC, page 20.

⁵ See: <http://www.protecthomeownership.com/page.aspx/generic/sectionID=2319>

⁶ See: *The Local Economic Impact of Home Building*, <http://www.nahb.org/generic.aspx?sectionID=784&genericContentID=35601>.

The first study estimates all the revenues that new house construction generates. The second study estimates the cost to local governments from house construction and compares these costs with the revenues calculated in the first study. For convenience, the first study will be referred to here as the *Revenue Study* and the second as the *Costs Study*.

The conclusions of the NAHB impact model are that all initial costs incurred by local governments to serve new housing are quickly recovered and that a steady stream of surplus tax revenues and income are generated thereafter. The NAHB states that, in the typical case “... residential construction pays for itself and begins generating surplus revenue for local governments in the area after only a few years.”⁷

The impact model relies heavily on econometric modeling of statistical information generated by the Federal government. Input-output analysis, multiplier effects, and matrix analysis software are employed to generate the results. Even with the technical explanation provided in the reports, the methodology is not fully transparent and it was not possible to determine many of the actual calculations that are used. However, it was possible to review many of the assumptions used, the fundamental accounting employed, and to evaluate the findings of the NAHB model in the context of existing research on the topic.

The NAHB impact model generates results for building 100 single-family houses. However, this was found to be less intuitive than reporting the same results for a single house. Therefore, this review describes and analyzes the results of the NAHB impact model based on just one house. This also made it easier to compare the NAHB’s results with other studies which typically report impacts on a per-house basis.

The revenues reported by the model are reviewed in the next section with the *Revenue Study*, followed by a review of reported costs in *Cost Study* and a review of the net impacts in *Costs versus Revenues*.

⁷ NAHB *Cost Study*, page 1.

Revenue Study

The NAHB *Revenue Study* reports all the revenues or “local income” from a new house, but does not address the costs. Both the monetary flows associated with the construction of a single-family house and the spending by the future occupants who will move into the house are attributed to the house. Construction of the house takes place during the first six months of the 15-year study period, with occupants moving in immediately and beginning their spending throughout the remaining half of the first year, and every year thereafter.

As reported in the NAHB *Revenue Study* the model estimates and sums direct and indirect monetary flows attributed to the construction of new housing and counts them as income to the local community. It then calculates induced expenditures (or multiplier effects) which are said to result from the direct and indirect spending on construction. A similar process is applied to taxes, fees, and all other revenues to local government resulting from direct, indirect, and induced effects of construction. All of this spending is then translated into the number of jobs that could be supported if all of the money were used to pay for wages and business owner profits.

This is partially explained in the *Revenue Study* as follows:

“In other words, the model converts the local income earned in Phase I [direct and indirect construction spending] into local spending, which then generates additional local income. But this in turn will lead to additional spending, which will generate more local income, leading to another round of spending, and so on.”⁸

The ongoing local monetary flows resulting from the residents who move into the new house and begin spending their incomes and paying income taxes and other taxes are calculated in a similar manner. Annual direct, indirect and induced spending are combined and credited toward the house as an ongoing revenue stream. This combined occupant-related spending is said to create additional ongoing jobs in the community.

The general formula for treating revenues and income from house construction is shown in Figure 1 below.

⁸ NAHB *Revenue Study*, page 24. Parenthetical explanation added.

Figure 1

<u>Summary of NAHB Income Formula</u>	
Local Revenue from House Construction =	
<u>One-time income during house construction</u>	
<ul style="list-style-type: none"> ○ Direct expenditures on house construction + ○ Indirect expenditures resulting from direct expenditures + ○ Induced expenditures resulting from direct and indirect expenditures + 	
<u>Ongoing income resulting from the spending of the new house occupants</u>	
<ul style="list-style-type: none"> ○ Direct local spending by new occupants + ○ Indirect spending resulting from occupant spending + ○ Induced spending resulting from the direct and indirect occupant spending. 	

A summary of the revenues reported by the NAHB are provided in Table 1 below. This table is referenced in the following discussion of revenues.

Table 1

Summary of NAHB Revenue Model Results				
Impact per Typical New Single-Family House				
Category	Year-One House Construction Impacts			Ongoing Impacts
	Direct & Indirect Impact of Construction Spending	Induced Impact of Dir. and Indir. Construction Spending	Total Impact for Year One	Annual Direct, Indirect, and Induced Spending by Occupants
Local Income	\$142,333	\$68,773	\$211,106	\$30,609
Jobs Supported	2.13	1.11	3.24	0.53
Gov. Taxes	\$2,019	\$3,929	\$5,948	\$4,542
Gov. Fees	\$11,311	\$4,767	\$16,078	\$2,891
Total Gov. Revenue	\$13,330	\$8,696	\$22,026	\$7,433

Source: NAHB *Revenue Study*, summary tables, page 5.
 Model assumes: construction materials cost 30% of the \$321,000 average house sale price; property tax rate is 1% of house value (excluding raw land value); combination of impact fees and permit fees totals \$7,915.

Evaluation of Year-One Construction Revenues

The NAHB *Revenue Study* counts all government taxes and fees resulting from direct, indirect, and induced construction activity as 100% benefitting local government. For example, a total of \$13,330 is counted as general revenue to local government from the construction phase of a new house (both direct and indirect revenues). However, \$11,311 of this amount consists of fees for services provided by local government.⁹ These include impact fees and building permit charges. Since these services are provided at a cost to local government, they do not represent a benefit to the government. Instead they represent an economic exchange, which in many cases is subsidized by taxpayers and represents a net cost.

Impact fees and building permit fees are lumped together in the *Revenue Study* and represent the largest component of government revenue from construction activity, \$7,915 of the \$11,311 in government fees estimated by the NAHB. Impact fees are charged based on the local government's best estimate of the actual cost for providing the physical infrastructure (roads, schools, parks, etc.) needed to serve the new house. Impact fees are never legally set above the actual cost and typically only represent a fraction of the full cost to serve the house.

In reality, most cities have no impact fees, so this reported revenue would be non-existent in the typical city. Of those communities with impact fees, most charge new development for only a few of the one dozen categories of public infrastructure required to support development. Furthermore, of those cities with impact fees for one or more category of infrastructure, very few charge enough to recover 100% of the cost generated by the development. The remainder of the infrastructure costs are subsidized by existing taxpayers, resulting in a net cost to the community and a negative fiscal impact to local government.

The NAHB model counts all residential building permits fees as a 100% benefit to local government. In fact, permit fees go towards paying a portion of the costs of processing building permits and performing building inspections that are incurred by the local government. Most local governments do not charge the full cost of providing development services. Local taxpayers make up the difference in cost for these services, which represents a taxpayer subsidy of development. The benefit reported by the NAHB is actually a net cost in most cities. In those cities that do charge permit fees which are sufficient to cover expenses, there will be no impact.

⁹ NAHB *Revenue Study*, page 6.

Most of the remaining balance of the \$11,311 in government fees is for utility services provided by local governments, such as the cost for electricity from the municipal electric utility. These are counted by the NAHB as 100% benefits, whereas they reflect fees for the cost of services provided and should have little or no net impact on local government.

As described later, the NAHB model fails to calculate the corresponding government costs for providing either the development services or utilities in their *Cost Study*.

Also counted as benefitting local government is \$2,019 in taxes estimated by the NAHB to result from direct and indirect construction activity. However, most of the taxes included by the model are sale taxes (\$1,029) and income taxes (\$280) that usually go directly to the state, and therefore are not local revenue. Furthermore, taxes are paid to fund government services and therefore cannot be counted fully as a benefit. They can only be counted as a benefit to the extent that the taxes paid exceed the services received by development. Home construction and related industries require local road maintenance, public safety, emergency services, and fire protection services at a minimum. The cost of these services could easily consume the local taxes generated.

In summary, little if any of the \$13,330 reported as “government revenue” represents actual revenue. In fact (as noted above), it is possible that government costs will exceed these revenues, resulting in net negative impacts. The model takes a further step by inflating the \$13,330 in direct and indirect government revenues by another \$8,696 to reflect “induced revenues,” or the *multiplier effect*. This multiplier effect is supposed to account for the additional government benefit of initial spending as it moves through the local economy. The result is that the model reports \$22,026 in local government revenue, whereas the actual net revenue may be close to zero, or even negative.

Because this part of the NAHB model is titled “Income, Jobs, and Taxes Generated,” it is essentially looking only at the income streams and is ignoring the costs streams. In one sense, it is okay for an impact model to evaluate revenues separately from costs. However there are a number of caveats. First, costs must be evaluated at the same level of detail and accuracy as revenues. When revenues are merely fees for services rendered, the cost and the revenue are identical and there is zero impact. Therefore, there is no point in separately calculating costs and revenues under these

circumstances. Second, where indirect and multiplier effects are applied to revenue streams, they should also be applied to cost streams. However, the NAHB model applies these effects only to revenues, resulting in an overstatement of revenues relative to costs. It is not clear that multiplier effects are appropriate for use in fiscal impact analysis. If used, they should be applied only to the final difference between costs and revenues, or the net fiscal impact of house construction.

The unrealistically high figure of \$22,026 in local government revenues from the construction phase is later used in the fiscal impact section of the NAHB *Cost Study* to quickly pay down almost all of the infrastructure costs in the first year. This is a highly unlikely scenario and therefore the NAHB revenue figure is critiqued in more depth in the *Cost versus Revenues* section of this review.

Evaluation of Ongoing Revenues

After the first six months of the study period the house is assumed to be completed and occupied, and the NAHB model estimates the impacts for the remaining 14.5 years of the 15-year study period. Ongoing annual revenues to local government result from the occupants of the new house who pay taxes and fees. As with construction impacts, the model inflates these ongoing revenues with the indirect and induced spending they are said to generate. The NAHB estimates \$7,433 in annual taxes and fees to local government resulting from direct, indirect and induced household spending.

As reported separately in the *Cost Study*, the revenues to local government are offset by the ongoing service costs, estimated by the NAHB to be \$4,534. This figure represents only direct costs and is not inflated by indirect and induced costs. Subtracting the direct, un-inflated cost from the inflated revenue results in the NAHB estimate of an annual revenue surplus of \$2,899 to local government after the first year the house is built. If true, this surplus would be a huge bonanza to local governments.

However, these figures are essentially the same “revenue streams” that would be generated by any occupied house in the local metro area that is of comparable size and value. Using the NAHB accounting, all local houses would generate similar surplus revenues, to greater or lesser degrees. However, this is an unlikely proposition for many reasons. Local governments across the country are not flush with cash from the tax surpluses generated by all the houses that have been built

over the past 15 years. In fact they are financially struggling and many are making major budget cuts and service reductions due to the lack of adequate revenues to cover current operations.

If new houses resulted in the net local revenues and tax benefits claimed by NAHB, then those areas of the country with the most house construction over the past decade would be in the best financial condition today. However, the opposite is the case. States like California, Florida, Arizona and Nevada, that have seen the most residential development, are in the worst financial condition today. These states are also among the top in the nation in unemployment rates, foreclosures rates, and declining property values.

If each additional house generated tax surpluses such as those claimed by the NAHB, the cities with the most houses would have the lowest taxes. However, the opposite is generally the case: larger cities tend to have higher taxes. Since the residential sector requires more city services than the commercial and industrial sectors, it seems reasonable to conclude that housing tends to be a net drain on local government. This conclusion is borne out by studies cited later in this report.

Employment Impacts

The NAHB *Revenue Study* finds that the construction of a new house creates 3.24 temporary jobs during construction. Again, this figure represents the sum of direct construction jobs as well as indirect and induced employment calculated by the NAHB model. These jobs will last only for the year of construction and will disappear when the house is completed. For example, if a metro area builds 1,000 houses this year, it will need to build another 1,000 houses next year and every year thereafter to avoid job losses. In other words, the employment benefit associated with house construction is not actually associated with the construction of a single house, but rather with a *continuous stream* of annual house construction. In the metro area example, building 1,000 houses each year will simply maintain existing construction employment levels and will not add a single new job. New construction jobs would only result if the metro area increased its annual production of new houses from say 1,000 to 1,200 units. The metro area would then need to sustain the higher production level in subsequent years in order to avoid job losses.

The main point of this is that housing construction cannot be said to be creating new jobs unless it is occurring at a higher, sustained annual rate than in prior years.

Otherwise, housing construction is merely maintaining existing construction employment levels.

The NAHB *Revenue Study* also credits the new house with the ongoing spending by the new occupants. This direct household spending amplified by indirect and induced spending and is reported to result in the creation of 0.53 ongoing local jobs for the 15 years of the study. Since the spending is associated with the people living in the house, it can only constitute new spending if the people are new to the area. As the *Revenue Study* states, it is a reasonable assumption that the occupants are new to the area because the new house creates additional capacity within the community that will ultimately be occupied by new residents.¹⁰

If the logic used in the NAHB model is followed – that the occupants are new to the area and that the house should be credited with their spending – then the house can be said to create the *need* for at least one new job in order for the homebuyer to be able to afford the new spending, new mortgage, and new taxes. Many households require two incomes, and therefore need two new jobs. When the 0.53 jobs created through household spending are deducted from the new jobs needed by the occupants, this result in an overall net negative impact of 0.47 to 1.47 permanent new jobs *needed* per new house built. The local metro area must independently create these new jobs in order to meet the employment needs of new residents moving into new houses.

However, the creation of new jobs is more likely to influence people to move into an area than is the construction of new houses. People tend to move to a new area because there is a job available for them, not because a new house was built there. Therefore, it makes more sense to credit new jobs with the new spending of new residents. This accounting change would remove both the ongoing economic spending benefit and the ongoing employment benefit from new house construction and instead apply it to local job creation.

In summary, while construction of a house generates short-term construction employment, these are typically not new jobs. Instead they represent the continuation of existing jobs associated with a steady annual stream of local house construction and maintain the status quo. If the impacts of the occupants are assigned to the new house, as the NAHB model does, then each new house also

¹⁰ Even if occupants are from the same area, they will vacate another existing housing unit in order to move into the new house and someone from outside the area may move into this vacated unit.

generates the need for one to two permanent, full-time jobs for the occupants after the house is built. Since this is greater than the 0.53 jobs created by the household's spending, the result is an overall negative local employment impact.

Costs Study

The NAHB *Cost Study* focuses on the fiscal impacts to local governments resulting from house construction. Two basic cost areas are addressed in this part of the model: 1) the one-time capital costs for the infrastructure required to serve the new house, and 2) the ongoing costs for providing public services to the new house. These costs are estimated and then compared with revenues calculated in the *Revenue Study* to report a net fiscal impact.

While revenues to local governments from house construction are fairly easy to estimate, costs are much more difficult to quantify accurately. For example, the primary local tax revenue source is property taxes. These can be easily estimated by multiplying the new house's value by the tax rate. But estimating the cost of providing the dozens of services local governments offer to a typical single-family house requires considerable effort. This is one reason why the benefits of new development are often touted, while the costs are seldom mentioned.

Capital Costs

Each new house creates additional demand for physical infrastructure such as streets, schools, parks, libraries, fire stations, and other public facilities. The incremental demand from the typical new house can be estimated fairly closely based on the expected number of occupants and the added capacity needed to maintain existing service standards in the community. The costs for each category of infrastructure are fairly well established and local capital facilities plans often provide current local costs for facility expansion. Each of the twelve categories of basic physical infrastructure required by residential development can be assessed in terms of the demand and cost associated with a typical new house.

However, the NAHB *Cost Study* uses an unusual approach for estimating these infrastructure costs. A complex methodology is used to derive a figure for capital costs using federal data for state-level capital investment which does not appear to contain the information necessary to identify local government capital costs. The

result of this process is a total capital cost per single-family house of \$23,035 for nine categories of infrastructure, as shown in Table 2 below.

Table 2

**NAHB Local Government Capital Costs
for Serving a Single-family House**
2008 Dollars

Infrastructure Category	Cost Est.
Schools	\$9,120
Hospitals	\$990
Other Buildings	\$2,889
Highways and streets	\$1,816
Conservation & development	\$61
Sewer systems	\$2,273
Water supply	\$2,990
Other Structures	\$2,663
Equipment	\$232
Total	\$23,034

Source: Table 2, Page 7, NAHB *Cost study*

The NAHB categories do not appear to represent a complete list of the physical infrastructure that most municipalities will be required to provide to new residential development. The categories do not match standard infrastructure designations, so it is not clear whether they would include police stations, EMS facilities, fire stations, libraries, parks and open space, recreational facilities, and stormwater management systems. It is also not clear whether any of the land costs associated with the various categories of infrastructure are included with capital costs, as they should be. A new high school, for example, requires about 50 to 75 acres of land.

The NAHB capital cost estimating model uses an elaborate series of mathematical equations to derive results from data that doesn't appear to be appropriate for the purpose. The model uses national- and state-level government data from the U.S. Census and the Bureau of Economic Analysis (BEA). The NAHB report cites the BEA "wealth data files" as a primary data source for their calculations. However, no data exist under this name. The closest data offered by the BEA is the "Government Fixed Assets Tables." These data tables lump state and local governments together and there is no apparent way to separate them and identify only the *local* government assets, as NAHB claims to have done. A BEA official confirmed that state and local government assets could not be separated using their data.

Even if it were possible to somehow identify the local component of government assets, it's not clear how the NAHB could determine which asset values are associated with *residential* housing, as opposed to commercial and industrial development. Furthermore, it would be necessary to determine which of the local, residential, capital costs are attributed to *new* housing, and then to distinguish costs for *single-family* housing from multi-family.

Based on the description of the methodology provided in the *Technical Appendix*,¹¹ capital costs are based on historic data for state-wide government capital facilities. Figures for capital costs for new infrastructure are derived from historic maintenance, interest, and depreciation data.¹² Such data reflect a mix of capital facilities of various ages dating back at least 20 years. These historic capital costs will not reflect the cost of building infrastructure to today's standards and at today's construction costs. For example, a sewage treatment plant built today will cost many times more than a plant of similar capacity built in 1970 because the effluent treatment standards have increased. Street standards in many areas have been upgraded over the past 20 years. A new school will be more expensive because it is built to current codes for greater safety and earthquake resistance and requires more insulation, energy efficiency, and technology features than older schools. As a result, the NAHB's capital cost estimates are likely to be significantly lower than actual current costs.

The method used by the NAHB to estimate local government capital costs is based on an economic model used for business sectors that is adapted by the NAHB to local government by making a number of adjustments to the model. This model estimates production costs based on labor and capital. It is not clear that a model used for private sector commerce is suitable for use with government. The report does not indicate that any effort has been made to verify or validate the results, or to calibrate the model to actual data for any specific local governments. Such validation is necessary to assure that complex models (and the many assumptions they entail) are consistent with real world results, especially when the model is modified and used for an unintended purpose.

NAHB's figure of \$23,035 in capital expenses appears low compared with results from other studies. Transportation system costs are especially low, at \$1,816 per

¹¹ *Technical Appendix on Estimating Local Capital Owned and Maintained by Local Governments*, included with *The Local Impact of Home Building in a Typical Metro Area: Comparing Costs to Revenue for Local Governments*, June 2009, by the Housing Policy Department, NAHB, Washington, DC.

¹² Page 2 of *Technical Appendix*.

house for roads and highways. Actual transportation system costs are likely to be two to four times greater, even if the state and federal road costs are ignored. Evidence of this can be found in dozens of impact fee studies that have meticulously evaluated net costs to cities for expanding transportation systems. There are additional transportation system costs resulting from the failure of most metro areas to build adequate transportation infrastructure to maintain a constant level of service.¹³ Thus, there are both funded and unfunded transportation system costs. Unfunded costs are paid indirectly by local drivers through increased congestion and delays.

A recent study of actual local infrastructure costs in Austin, Texas, found that just six of the twelve categories had a cost of almost \$40,000 for serving a typical single-family house (Table 3, below). Additional infrastructure costs not included in the Austin study were fire & EMS facilities, police facilities, library facilities, general government facilities, solid waste facilities, and power generation and distribution facilities. As the Austin report notes, road system costs were based on a financially-constrained transportation plan. If level-of-service standards were maintained, the cost for roads would have been \$12,775 per house, increasing the total infrastructure cost per new house from \$39,623 to \$47,757.¹⁴ This is more than twice the cost estimated by the NAHB for all categories of infrastructure.

¹³ These costs manifest themselves as increased congestion, travel delays, and lost mobility. According to the Texas Transportation Institute's *2007 Urban Mobility Report*, over last 24 years we have built only 41% of the transportation infrastructure necessary to keep up with growing demand in the U.S.

¹⁴ The City of Austin has a level-of-service (LOS) standard of "D," which is highly congested. *Cost of Infrastructure to Serve New Residential Development in Austin, Texas*, Fodor & Associates, January 2011, Table 5-5, page 35.

Table 3

**Summary of Infrastructure Costs
for Typical New Single-family
House¹⁵**

Austin, TX (2010 Dollars)

Categories	Cost
School Facilities	\$12,803
Road System	\$4,641
Water Service Facilities	\$9,124
Wastewater System	\$5,006
Storm Drainage System	\$4,526
Park Facilities	\$3,523
Total Cost:	\$39,623

The NAHB model makes the reasonable assumption that all capital costs for new public infrastructure will be financed by general obligation bonds. The cost or liability for expanded infrastructure is actually incurred when the house is built, because new occupants will immediately need to have roads to get to work, schools for their children, and toilets that flush.

Bond financing of infrastructure increases capital costs by adding financing costs over the typical 20-year bond life. The NAHB model includes \$1,014 in interest cost for the first year only, based on their analysis showing that capital costs are almost fully repaid from revenues to local government in one year. However, even if this were true, the local government has financed new capital facilities on behalf of the development and all of the financing costs over the life of the bonds is attributable to the development. This treatment of financing costs by the NAHB model eliminates interest costs in years 2 through 15 of the study period and significantly reduces the cumulative cost of infrastructure.

Cost of Services

The annual cost for local government services to a new house is estimated by the NAHB using data from the *Census of Governments*, which is prepared by the U.S. Census Bureau. Average costs for providing local government services are calculated from the data and applied to new construction. According to the NAHB, the total

¹⁵ *Cost of Infrastructure to Serve New Residential Development in Austin, Texas*, Fodor & Associates, January 2011, Table 11-1, page 61.

cost for the government services is \$4,534 per year per house, as shown in Table 4 below.

Table 4

Service category	Cost per House
Education	\$1,697
Police	\$534
Fire protection	\$245
Corrections	\$172
Streets and Highways	\$66
Water supply	\$185
Sewerage	\$102
Health Services	\$226
Recreation and Culture	\$254
Other General Government	\$827
Electric Utilities	\$178
Gas Utilities	\$23
Public Transit	\$15
Other Government Enterprise	\$8
TOTAL	\$4,534

Source: NAHB *Cost Study*, Table 1, page 6.

These results were checked using the latest available data from the *2007 Census of Governments* and the matching *2007 American Housing Survey*. Using reasonable assumptions and excluding all capital costs, all debt payments, and all intergovernmental transfers (from state and federal government), a comparable figure of \$4,709 was calculated. However, this is an oversimplification that results in service costs that are too low for the following reasons:

1. The Census of Governments data represents average costs for all local governments serving a typical house. The data includes counties that provide far fewer services than cities. Therefore, the costs will be too low for cities, which fund more services.
2. Some capital costs and debt costs should be included with service costs (such as building repairs/replacements, computers, equipment, and furniture).
3. All intergovernmental transfers (revenues) were deducted entirely from local government service expenditures. However, some intergovernmental revenues are for capital expenditures and should therefore not be deducted

from service costs.¹⁶

4. A typical, new, single-family housing unit is generally larger and has more occupants than the average of existing housing, so it is likely that service costs would be higher.¹⁷

One fiscal impact expert estimated the service costs associated with a new house in the Northeastern U.S. at \$10,624 per year.¹⁸ This is more than twice the \$4,530 cost estimated by the NAHB model.

In addition to the above ongoing, annual service costs, new housing creates unique service costs to the local government for processing land use applications, plan reviews, building permits, and construction inspections. These “development services” costs do not appear to be included in the NAHB calculation of government services costs. Since the fees charged for these services are included by the NAHB as government revenues, the costs for providing these services to new housing must also be added to first year cost. The *Revenue Study* does not break out the development services charges from the impact fees in its figure of \$7,915 in total fees and does not document the sources for this figure. However, if it is assumed that development services fees are in the neighborhood of \$3,000 to \$6,000 per new house, then the remainder represents the impact fees. Since most development services by local governments are provided either at cost or below cost, the additional unreported cost to local governments will be at least \$3,000 to \$6,000 in the year the house is built.

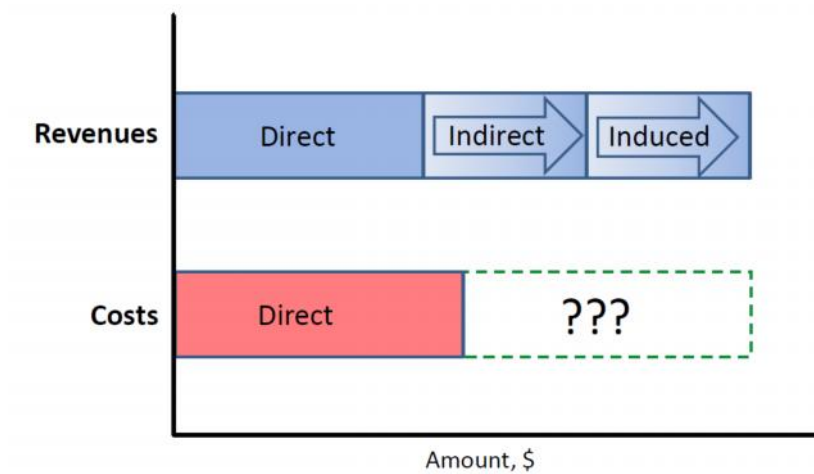
Finally, local government service costs are treated by the NAHB as direct costs only. No indirect or induced costs are calculated. Since these multiplier effects are applied to local government revenues, they should also be applied to the costs. Figure 2 shows how revenues end up being inflated relative to costs. This is true of all cost and revenue streams in the NAHB model.

¹⁶ The *Census of Governments* does not report whether funds to local governments from the state and federal government (intergovernmental transfers) go towards services/operations or capital expenditures. Deducting all intergovernmental transfers from services is a gross oversimplification that causes service costs to be understated. If intergovernmental revenues are included, the cost of services per new house is \$9,189 per year.

¹⁷ New occupied housing units have an average of 2.77 occupants, while the average for all housing is 2.53 occupants, according to the *2009 American Housing Survey* (issued March 2011), Table 2-9. New single family homes have a median size of 2,300 square feet, while the median for all single-family homes is 1,700 square feet (AHS, Table 1-3). This was accounted for in the above updated cost estimate of \$4,709 using the 2007 data (\$9,189 for costs including intergovernmental revenues).

¹⁸ Burchell, Robert, *The Local Fiscal Impact of Residential and Nonresidential Development: Response to The NAHB Model*, October 2006, Presentation to the National Impact Fee Round Table National Conference, Arlington, Virginia, slide 12 of presentation overheads.

Figure 2: Difference in treatment of costs and revenues in NAHB impact model.



Costs versus Revenues

The NAHB impact model concludes that the construction of the typical new house will generate enough surplus revenue for local government that it will effectively pay off the principal and interest on the initial infrastructure costs in less than two years. Furthermore, according to the NAHB, the house will continue to generate a net surplus for local government of \$2,899 a year.

Table 5 (below) provides a summary of the both the local government revenues and costs calculated by the NAHB model, along with the resulting net impacts (revenues - costs).

Table 5

Summary of NAHB Fiscal Impact Model Results

Impact per New Single-Family House

Category	Revenue	Cost	Net Impact
<u>Year One Impacts¹</u>			
Gov Taxes and Revenues	\$25,743		
Gov Services		\$2,267	
Gov Capital/Infrastructure		\$23,034	
Interest on Debt		\$1,014	
Totals for year one:	\$25,743	\$26,315	-\$573
<u>Ongoing Annual Impacts²</u>			
Gov Taxes and Revenues	\$7,433		
Gov Services		\$4,534	
Annual Totals:	\$7,433	\$4,534	\$2,899

(1) The first year of the NAHB 15-year study period includes all impacts of the construction phase and also assumes half a year of occupancy by the new owners. Therefore, half a year of government service costs and revenues are included in year one.

(2) Annual impacts apply to years 2-15 of the study.

Such results do not appear to match actual conditions in cities throughout the country, where the infrastructure to serve new housing is heavily subsidized by local taxpayers. If house construction was as lucrative for local governments as the NAHB impact model indicates, there would be no need to burden the entire tax base of the metro area with issuing and repaying bonds for the next 20 years to fund infrastructure for new houses. Instead, cities could quickly and easily pay for these capital costs just with revenues generated by the new houses themselves.

However, a far different picture emerges from metro areas that are growing rapidly. Instead of having plenty of revenues to pay off capital costs, these local governments and school districts are constantly struggling to fund adequate facilities. They are forced to go before voters year after year requesting approval for issuing more bonds. Existing residents are required to continually subsidize the infrastructure to serve new development through increased property tax rates to repay new bonds issued to expand schools, roads, sewers, fire stations, and other facilities. Such tax increases to fund new growth resulted in the citizen-led campaigns to limit property tax that spread across the country, starting with Proposition 13 in California in 1978. These property tax caps forced growing cities to slash services in order to pay for growth. For example, California's school system went from one of the best in the country to

one of the worst.

So how is it possible that the NAHB impact model generates such a positive fiscal impact for house construction? To locate the source of the revenue surplus reported by the NAHB, it is necessary to go back to the *Revenue Study* where a figure of \$22,027 in local taxes is reported.¹⁹ This figure represents all direct, indirect, and induced activity that contributes to taxes and government revenues during the construction phase. The details for the calculation of this figure are not fully apparent in the report, so it is not possible to assess their reasonableness or validity. For example, the direct revenues are only reported in combination with indirect revenues, so they cannot be separately verified as reasonable.

To learn more about the source of this tax revenue figure, other studies by NAHB were reviewed. One study, *The Direct Impact of Home Building and Remodeling on the U.S. Economy*, is cited in the *Revenue Study*²⁰ and contains a breakout of revenues that may explain why the NAHB estimate is so high.²¹ As shown in Figure 3 (below), this NAHB study has estimated \$22,749 in government revenues that include both state and local government revenues. If this is the source of the local government revenue used in the NAHB impact model, then state revenues have incorrectly been counted as local revenues. Under the “State and local” heading in the table, income taxes and sales taxes typically go to the state government. Income and sales taxes fund a broad range of state government services, so they would generally not be included in this type of local impact analysis.

In some states, income and sales taxes are returned to local government to fund specific programs and activities, such as road construction or school operations. However, the prior analysis of government services costs indicates that such intergovernmental transfers appear to have been specifically excluded from local government expenditures. Therefore, they should not be included here as revenues. Excluding state government revenues from this report (shown with arrows in Figure 3), leaves \$7,915 in permit and impact fees as the only local government revenue. This is the same figure for permit and impact fees used in the NAHB impact model.

¹⁹ Source: Revenue Study, page 5. The NAHB model increases the \$22,027 construction related revenue by ½ year of government revenues resulting from occupant spending (\$7433/yr) to reach the year-one figure of \$25,743 reported in Table 5 of this report.

²⁰ Cited on page 1 of the NAHB *Revenue Study*.

²¹ *The Direct Impact of Home Building and Remodeling on the U.S. Economy*, NAHB Special Studies, October 7, 2008, By Helen Fei Liu and Paul Emrath
<http://www.nahb.org/generic.aspx?sectionID=734&genericContentID=103543&channelID=311>

If the breakdown in Figure 3 is similar to that used in the impact model, then \$7,915 is the only revenue that could legitimately be considered local, and would be the correct number to use for total local government revenues. As described in the previous section, *Evaluation of Year-One Construction Revenues*, these fees rarely cover costs and typically represent a subsidy by local taxpayers.

Figure 3: Excerpt from the 2008 NAHB Study, *The Direct Impact of Home Building and Remodeling on the U.S. Economy*, Table 3 (highlighting and arrows added).

<i>Fiscal Impacts of New Residential Construction and Remodeling in 2008</i>	
	Average New Single Family Home
<i>Total government revenue generated</i>	\$89,216
Federal	\$66,467
Income taxes paid by employees	\$11,791
Income taxes paid by businesses	\$30,053
Social security taxes	\$22,414
Taxes on production & imports	\$2,209
State and local	\$22,749
Sales taxes	\$5,169
Income taxes paid by employees	\$3,080
Income taxes paid by businesses	\$6,586
Permit, hook-up, impact, etc. fees	\$7,915

Source: NAHB estimates, based primarily on the data from the U.S. Bureau of Economic Analysis.

The local government revenues reported in the first year are increased by the NAHB impact model's assumption that the house will be occupied half way through the first year. Half of the \$7,433 annual government revenue stream attributed to new occupants is added to the \$22,026 in construction revenues for a total reported local government revenue of \$25,743 the first year. This highly overstated revenue figure is then used to offset almost all of the \$23,034 in capital infrastructure costs the first year.

For ongoing impacts, the NAHB model uses the inflated annual local government revenue figure of \$7,433 generated by the house occupants' direct, indirect and induced spending. From this is subtract the un-inflated, and understated direct cost of annual services to the house of \$4,530. Using this skewed accounting, the NAHB model projects an annual surplus of \$2,899 to local government. However, most local

governments provide services on a financially-constrained basis, meaning that they can spend only as much for services as they receive in revenues. This implies that service expenditures will match revenues and there will be no ongoing surplus or deficit. As described in the next section, a closer look reveals that residential land uses do tend to run a deficit and are typically subsidized by a surplus from commercial, industrial, and agricultural land uses.

Literature on House Construction Impacts

The conclusions of the NAHB study are inconsistent with a large body of studies conducted over the past 40 years by independent researchers who are not funded by development interests. These studies show that new houses tend to generate negative fiscal impacts for local governments and that residential land use demands more in services than it provides in taxes. This point is made by one researcher who specifically critiques the NAHB model for overstating revenues and understating costs.ⁱ

The NAHB findings are also in sharp contrast to the hundreds of municipal and county impact fee studies conducted around the country that have rigorously and meticulously documented the high cost of residential development to local governments and taxpayers. Most states authorize local governments to charge impact fees to recover a portion of the capital costs for the facilities new growth requires. The accuracy and legitimacy of these fees has been thoroughly tested at every level of the U.S. legal system. If new residential development generated revenue surpluses such as those described by the NAHB, impact fees would be illegal throughout the country. Instead, the use of impact fees has increased steadily as local governments struggle to pay for the costs of residential development.

Numerous studies show that residential development tends to represent a net fiscal drain to the local government.^{ii iii iv v vi vii viii ix x xi} Studies that looked at the correlation between urban growth and local taxes found the following relationships:

1. Local population growth tends to increase the residential tax burden (measured as a percent of residential personal income).^{xii xiii xiv}
2. Areas with the most rapid growth have the greatest tax increases.^{xv xvi xvii}
3. Fast-growing areas that do not increase taxes will tend to see a reduction in public services.^{xviii}
4. Bigger cities tend to have higher taxes than smaller cities.^{xix}

These studies indicate that cities are unlikely to see real net fiscal benefits from growth. Instead, the likely outcome will be higher costs, resulting in either higher taxes or reduced services, or both. Furthermore, these outcomes are likely to be amplified by a rapid pace or large scale of development. Residential development, in particular, generates a need for more infrastructure and has higher services cost, resulting in a typically negative fiscal impact.

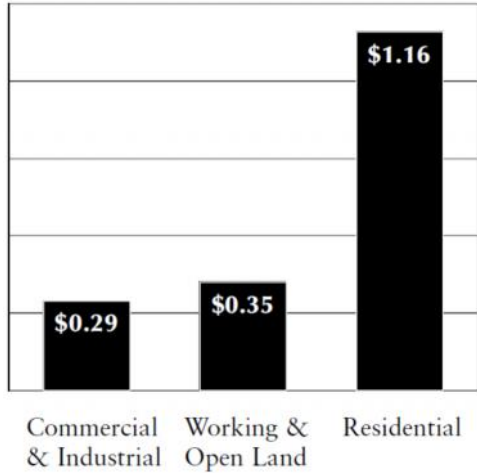
The best explanation for the negative fiscal impacts from urban growth is the high cost of the capital facilities and infrastructure new growth requires. As stated by former Maryland Governor Parris Glendening in 1997, *“Every new classroom costs \$90,000. Every mile of new sewer line costs roughly \$200,000. And every single lane-mile of new road costs at least \$4 million.”*²²

One study found that the failure of local property taxes to recover the cost of infrastructure for new development made the price of housing artificially low, resulting in more growth than an ideal market would otherwise generate.^{xx} The solution to this distortion of the housing market identified by the researcher was to charge full-cost impact fees to recover infrastructure expenses.

A number of studies have examined the fiscal impacts for different categories of land use, such as residential, commercial, and open space. While findings vary, residential uses consistently showed a negative impact. Commercial land use can sometimes show a positive impact, however it is difficult to envision commercial land uses without nearby residential uses. The American Farmland Trust has designed a Community Cost of Services study methodology to show revenue-cost balance for various land uses, including open space and farms. These studies have been performed widely all across the country and the results tend to show a net drain for residential uses and a net gain for open space uses (see Figure 4).

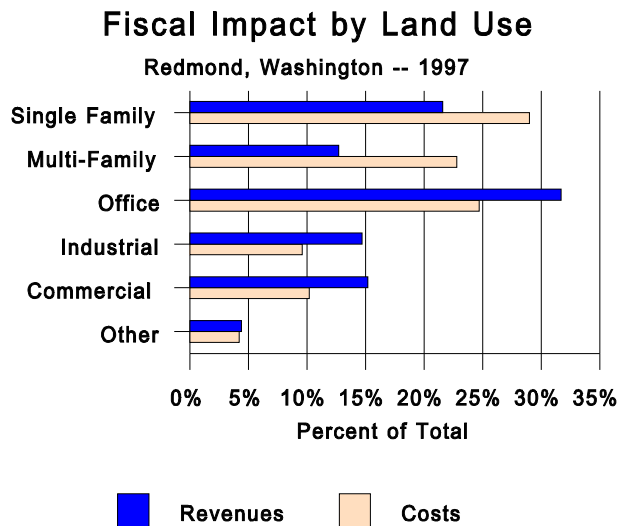
²² The Governor’s remarks were made at the Brookings Institution in 1997, as cited in F. Kaid Benfield, Matthew D. Raimi, and Donald D.T. Chen, **Once There Were Greenfields**, Natural Resources Defense Council, New York, 1999, p.91.

Figure 4: Median cost per dollar of revenue to provide public services to different land uses based on 151 studies from across the US (American Farmland Trust, 2010).



In Redmond, Washington an analysis by the city of costs and revenues for major land uses found that residential uses cost more to serve than they generated in revenues, while commercial and industrial uses generated a net surplus for the city (Figure 5).^{xxi} Some communities seek to encourage only commercial development in the hope that it will generate a fiscal surplus. However, commercial development is likely to generate a demand for nearby residential development as well.^{xxii}

Figure 5



Conclusions

The NAHB fiscal impact model portrays an unrealistically positive impact for house construction based on significantly understating costs relative to revenues. In this type of cost-benefit analysis, proper accounting techniques are critically important. The NAHB impact model lacks a consistent accounting framework applied to both costs and revenues.

The methodology developed by the NAHB is not fully transparent, lacks sufficient documentation for verification purposes, and has apparently not been validated at the local level with real-world data. None-the-less a number of basic accounting problems are apparent. The following is a summary of the key issues identified in this review:

- **Costs of development services by local governments are not counted.**
The fees charged by local governments for plan reviews, building permits, building inspections, and other development services are added by the NAHB model to the revenues generated by new houses, but no estimate is included for the cost local governments incur to provide these services to the new house. This results in a significant overstatement of local government revenues during the construction phase by about \$3,000 to \$6,000 per house.
- **Capital infrastructure costs to serve residential development are understated.**
The indirect method used by the NAHB to derive an estimate of infrastructure costs to service a new house is unusual, complex, and does not appear to be suitable for the task. The resulting cost figures are lower than costs reported elsewhere.
- **Capital infrastructure financing costs are not counted throughout the 15-year study period.**
The NAHB model retires all bonded debt for capital facilities to serve the development shortly after the first year. However, general obligation bonds issued to fund infrastructure are typically repaid over a 20-year life. All financing costs should be attributed to the development.
- **State government revenues are incorrectly counted as local government revenues.**

The figure used for *local* government revenues from house construction appears to match a related study by the NAHB in which *state* revenues are included. These state revenues account for \$14,835 of the \$22,749 amount attributed to local governments, resulting in an almost \$15,000 overstatement of local revenues per house in the first year of construction.

- **Indirect and induced effects are applied only to revenues and not to costs.**
All direct local revenues associated with both house construction and future occupancy are inflated by indirect and induced revenues calculated by the NAHB, while all costs are treated as direct costs only and are not inflated by indirect and induced costs. This results in a significant overstatement of revenues relative to costs.
- **The construction of a typical house creates no *new* jobs.**
The NAHB estimates 3.24 jobs are supported by construction of a single house. However, because house construction provides short-term employment, jobs in this industry depend on a *continuous stream* of local house construction every year just to maintain constant local employment levels. House construction can be credited with maintaining existing jobs temporarily. To generate *new* jobs, the industry would need to increase and sustain its annual house production at a higher level.
- **New houses create the need for more local jobs.**
The NAHB finds that spending by new house occupants creates 0.53 new local jobs. If the NAHB's accounting logic is followed that new houses should be credited with the spending of the house's occupants, then the house should also be assigned the need for new jobs to support the occupants and pay for the new mortgage, taxes, and expenses on their new home. Each new house will therefore require one to two full-time salaries to meet expenses. A better approach is to credit employment with spending.

The surplus revenues from house construction claimed by the NAHB are not apparent to financially-struggling local governments in fast-growing areas around the country. The overwhelmingly positive impacts reported by the NAHB model are also not consistent with the main body of academic and non-developer-funded research showing residential development generates net costs and represent a fiscal drain on local governments. This negative fiscal impact appears during the first year of construction and typically continues every year thereafter.

As a national advocacy organization for local home builders associations across the country, the NAHB has an obvious interest in promoting the construction of housing and therefore may not be viewed as a totally objective or neutral source of information. The local and regional affiliate homebuilder organizations are among the most politically-active organizations at the state and local government level. They hire full-time lobbyists and conduct political and media campaigns to influence public policy and public opinion. There is no comparable national group or organization providing neutral or counterbalancing information on the fiscal and economic impacts of residential construction. As a result, local governments are often exposed to only one perspective on home construction impacts: that of the homebuilding industry.



Copyright Notice

This document is copyrighted and may not be reproduced or distributed without written permission, except for non-profit educational purposes.

©2012 by Fodor & Associates LLC

Endnotes

- ⁱ Burchell, Robert, *The Local Fiscal Impact of Residential and Nonresidential Development: Response to The NAHB Model*, October 2006, Presentation to the National Impact Fee Round Table National Conference, Arlington, Virginia.
- ⁱⁱ Piedmont Environmental Council, *Taxes and Growth in Loudoun County*, Warrenton, VA, 1993.
- ⁱⁱⁱ Springfield Planning Department, *The Cost of Growth: 1971-1981*, June 1982 [225 5th St., Springfield, OR 97477].
- ^{iv} Vance, Tamara A., Arthur B. Larson, *Fiscal Impact of Major Land Uses in Culpeper County, Virginia*, Piedmont Environmental Council, Warrenton, VA, February 1988.
- ^v Oregon State University Extension Service, *Impacts of Urban Growth on Local Government Costs and Revenues*, Special Report #423, November 1974.
- ^{vi} Michael L. Siegel, Public Finance Consultant, Washington, DC, *The Influence of Land Use on Local Government Finances, an Overview, and Potential New Approaches*, testimony presented to the Virginia General Assembly, Richmond, September 26, 1998.
- ^{vii} Natural Resources Defense Council, *Developments and Dollars: An Introduction to Fiscal Impact Analysis in Land Use Planning*, New York, June 2000, Chapter 4. The text may be downloaded from NRDC's web site at: <http://www.nrdc.org/cities/smartGrowth/dd/ddinx.asp>.
- ^{viii} Frank, James E., *The Cost of Alternative Development Patterns: A Review of the Literature*, Urban Land Institute, Washington, DC, 1989.
- ^{ix} Altshuler, Alan A.; and Jose A. Gomez-Ibanez, *Regulation for Revenue: A Political Economy of Land Use Exactions*, Brooking Institute, Washington, D.C. and the Lincoln Institute of Land Policy, Cambridge, Massachusetts, 1993, page 77.
- ^x Berger, Mark C., Director, Center for Business and Economic Research, Gatton College of Business and Economics, University of Kentucky, *Smart Growth and The Costs of Sprawl in Kentucky: Intra-County Analysis (Phase II)*, Final Report, September 11, 2001.
- ^{xi} American Farmland Trust, *Alternatives for Future Urban Growth in California's Central Valley: The Bottom Line for Agriculture and Taxpayers*, Summary Report, Davis California, October, 1995.
- ^{xii} Ladd, Helen F., *Fiscal impacts of local population growth: A conceptual and*

empirical analysis, Regional Science and Urban Economics, 24: 661-686, 1994.

^{xiii} Buchanan, Shepard C., Bruce A. Weber, *Growth and Residential Property Taxes: A Model for Estimating Direct and Indirect Population Impacts, Land Economics*, Vol. 58, No. 3, August 1982, p 324-337.

^{xiv} Ladd, Helen F., *Fiscal impacts of local population growth: A conceptual and empirical analysis, Regional Science and Urban Economics, 24: 661-686, 1994.*

^{xv} DuPage County Development Department, *Impacts of Development on DuPage County Property Taxes*, Planning Division, DuPage County, Illinois, October 1991.

^{xvi} Metropolitan Planning Council, *Tax Policy: The Rules of the Regional Development Game*, Deborah Stone, Executive Director, Chicago, IL, January 1995.

^{xvii} Buchanan, Shepard C., Bruce A. Weber, *Growth and Residential Property Taxes: A Model for Estimating Direct and Indirect Population Impacts, Land Economics*, Vol. 58, No. 3, August 1982, p 324-337.

^{xviii} Ladd, Helen F., *Fiscal impacts of local population growth: A conceptual and empirical analysis, Regional Science and Urban Economics, 24: 661-686, 1994.*

^{xix} Brighton, Deb, *Community Choices: Thinking Through Land Conservation, Development, and Property Taxes in Massachusetts*, for the Trust for Public Lands, New England Region, 1999.

^{xx} Brueckner, Jan K., *Property Taxation and Urban Sprawl*, December 1999, found that "...by generating tax liabilities that lie well below the marginal cost of public infrastructure, the property tax makes urban development appear artificially cheap. Excessive development then occurs, with city populations and land areas expanding beyond socially desirable levels. An impact-fee regime, under which developers are charged the marginal infrastructure cost associated with their developments, would tend to correct this overexpansion."

^{xxi} Fodor, Eben, *Better, Not Bigger – How To Take Control of Urban Growth and Improve Your Community*, New Society Publishers, Gabriola Island, BC, 1999, page 81.

^{xxiii} *Developments and Dollars: An Introduction to Fiscal Impact Analysis in Land Use Planning*, Natural Resources Defense Council, New York, Chapter 4, 2000.