The Virginia Economic Development Partnership
Local Return on Investment Model:
A Tool for Analyzing the Local Fiscal Impacts of Economic Development Projects in Virginia

Charles B. Kennington
Economist - Research Division
Virginia Economic Development Partnership

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Introduction

In principle, a locality should not pursue an economic development project without an understanding for the effects that such a project will have on the community. Local officials engaged in economic development should consider the direct effects on the public treasury, local employment and the general quality of life effects of economic development. This is especially true when the disbursement of public money in the form of incentives is under consideration. Unfortunately, many of Virginia's counties and cities which are actively engaged in economic development are without a practical tool for conducting local fiscal impact analyses when evaluating proposed projects.

In an effort to assist local communities in evaluating economic development projects, Virginia Economic Development Partnership (VEDP) has developed a new, easy-to-use local fiscal impact tool. The model relies on effective tax rates for real and tangible personal property, machinery and tools taxes and local sales taxes. Multiplier effects, estimated using IMPLAN employment multipliers, and an econometric model based on existing COMPAS models, are used to predict labor market responses. This document explains the methodology underlying VEDP's Local ROI Model.

Tools Currently Available

A survey of available literature on the subject provides a strong theoretical background for anticipating fiscal and labor market impacts of economic development activities but very little in the way of practical, ready-to-use tools. What follows is an overview of some of the tools available in to Virginia localities.

FIT Tool

The Federal Reserve Fiscal Impact Tool (FIT) is a free application available from the Federal Reserve Board that is designed for local economic development professionals to assess the general costs and benefits of proposed development (Gorin, 2003). The greatest advantage of FIT is that it is free. Users simply need to request a copy using the Federal Reserve Board's website. A copy of the tool will be emailed or sent via CD. The M.S. Excel-based FIT provides a quick analysis of the incremental impact of potential economic development projects. Experienced Excel users will find the tool easy to use, but users who are unaccustomed to working in a spreadsheet environment may find the tool confusing.

More importantly, the FIT tool requires users to enter values for many critical parameters. Even skilled and experienced analysts may find it difficult to find a reliable data source for some parameters. For example, users are required to enter the nominal tax rates and assessment ratios for both real and personal property. Users are also expected to estimate difficult to quantify factors such as retail leakage, the share of retail sales occurring outside the locality and even economic impact multipliers. Without reliable estimates for these parameters, the output will not be meaningful. With so many important variables undefined, it's unlikely that the average economic development practitioner will find the FIT tool helpful.

WebLOCI

The LOCI, and the web-based version, WebLOCI, are local government fiscal impact tools developed by the Georgia Tech Enterprise Innovation Institute. The tool is considered user-friendly, allowing users to conduct analyses on their desktops with little training required. It is available to users outside of Georgia for a fee (Patrick-Crotty, 2007).

REMI Model

The REMI Model incorporates aspects of four different modeling approaches: Input-Output, General Equilibrium, Econometric and Economic Geography. REMI, a consulting organization catering to policy makers, asserts that each of these approaches has certain advantages and disadvantages when used alone. The REMI Model is designed to build on the strengths of each methodology. The REMI Model is used by many educations institutions and government agencies. Users must contract with REMI to use the model. REMI is an expensive tool and it generally requires users to have a certain skill level to conduct analyses properly (Morgan, 2010).

Survey

In November 2009, to gauge how often and by what method local economic development officials currently conduct fiscal impact analyses, VEDP conducted a survey of state localities. Of the 60 responding localities, 40 (67%) indicate that they "never" or "sometimes" conduct a fiscal analysis when contemplating economic development projects. Of those who do, the methods used are not standard across localities and are often ad hoc.

Table 1: Survey Results

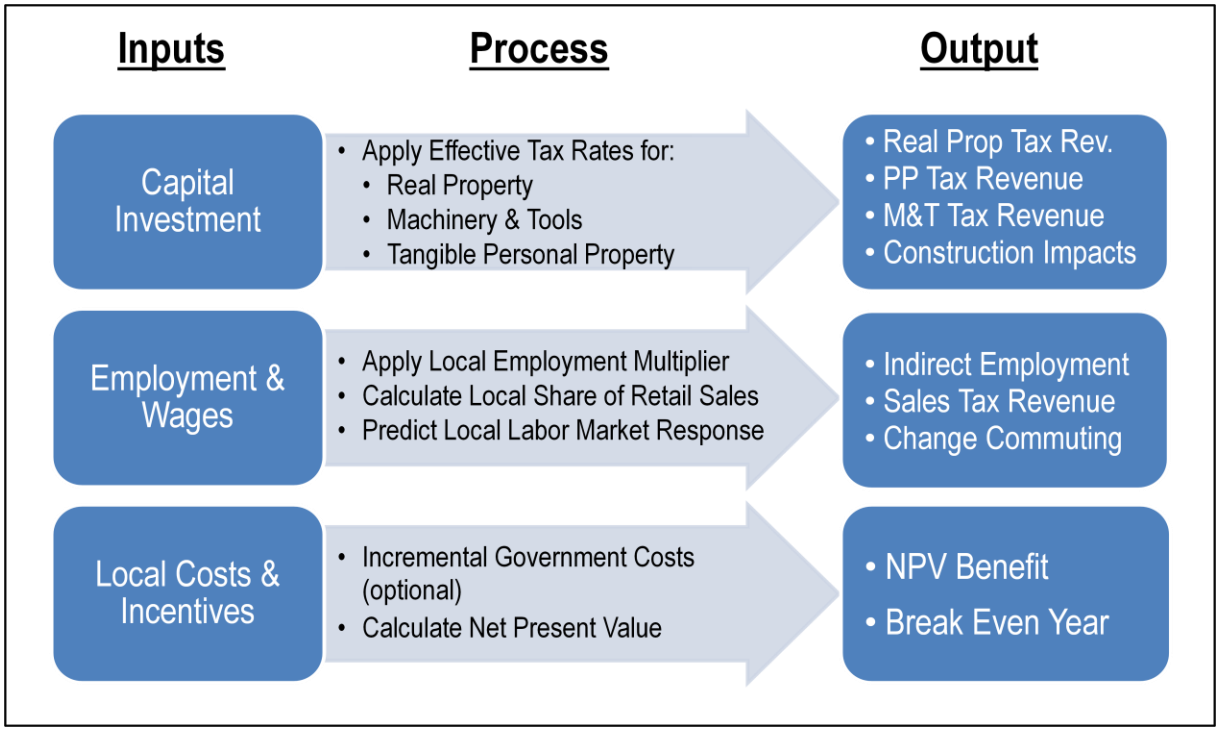
Tools Used	% of Responses
Fed FIT	2%
WebLOCI	5%
Spreadsheet program or similar	58%
None	25%
Other	10%

The survey also asked respondents to indicate their likelihood of using a VEDP-designed tool. 63% responded "very likely." 30% responded "somewhat likely," while only 7% indicated "not likely." Clearly, the feedback from local economic development professionals supports the creation of a VEDP-designed local fiscal impact tool. The results are not surprising given the lack of available tools.

How VEDP's Local ROI Works

Conceptually, the Local ROI model is much like VEDP's state-level Project ROI, which measures anticipated revenue from personal income tax and sales tax against the cost of state incentives. Only at the local level, the expected revenue streams are quite different. While the state model relies on personal income tax revenue (these account for approximately 70% of General Fund revenues) and state sales tax (which accounts for approximately 20% of General Fund revenues), local governments derive revenue primarily from taxes on real and personal property. In some communities, the local sales and use tax can also be significant. To estimate the revenue impact at the local level, the VEDP model estimates incremental revenue by applying effective tax rates for real property, tangible personal property, machinery and tools to user-provided capital investment totals.

Figure 1: Process Overview



Real Property Tax Revenue

The Code of Virginia authorizes localities to levy taxes on real property, which includes land and the improvements on it, with no restriction on the tax rate that may be imposed. By far, the real property tax is the most important source of tax revenue for Virginia localities. In fiscal year 2009, it accounted for 55.0% of tax revenue for cities and 65.8% for counties.

State law provides that all general reassessments or annual assessments shall be at 100% of fair market value. But in practice, real property reassessments usually lag market increases and tend to be conservative. To account for this discrepancy, the Virginia Department of Taxation conducts periodic

studies comparing the locally assessed value of property to its actual sales price for a sample of parcels sold in the study year. The resulting ratio, the "median ratio," is then multiplied by the average nominal tax rate per $100 of assessed value to determine the effective tax rate per $100 of true (market) value. The VEDP model uses the cost of real estate and the local effective tax rate (nominal rate multiplied by the median ratio) to estimate real property tax revenue (Knapp, 2011).

$$Real\ Property\ Tax\ Revenue = Cost \times [Nominal\ Tax\ Rate \times Median\ Ratio]$$

Note: Cost includes cost of land, capital leases, cost of publicly owned shell buildings, and construction costs. For each year in the analysis, real estate value is understood to appreciate by some factor, currently assumed to be 2.5%.

Tangible Personal Property Tax Revenue

The personal property tax is the second most important source of tax revenue for cities and counties. In fiscal year 2009, it accounted for 9.4% of tax revenue for cities and 11.5% of revenue for counties. Historically, motor vehicle taxes have accounted for the largest share of personal property tax revenue. But motor vehicles are only one component.

There are in fact sixteen other categories of personal property which may be taxed at the local level. Other categories include heavy tools and machinery, computer hardware, furniture and fixtures, and mobile homes, to name a few. Each category can potentially have its own applicable tax rate and assessment schedule. For simplicity, the VEDP model uses the effective tax rates on furniture and fixtures for each locality to estimate local tangible personal property tax revenue.

The effective rate is calculated by multiplying the nominal rate by assessment ratio for each year in the analysis. Often, local statutes provide for a sliding scale where the assessment ratio declines as the age of the property increases. In some cases, localities base tax rates on book value rather than original cost. For those localities, the model fully depreciates the value of the property over 10 years using straight line depreciation.

$$Personal\ Property\ Tax\ Revenue = Cost \times [Nominal\ Tax\ Rate \times Assessment\ Ratio]$$

Machinery & Tools Tax Revenue

In Virginia, certain machinery and tools are segregated as tangible personal property for local taxation. According to the Code of Virginia, the classes of machinery and tools that are segregated are those that are used for "manufacturing, mining, processing and reprocessing (excluding food processing), radio or television broadcasting, dairy, and laundry or dry cleaning." Like property taxes, the tax rates on machinery and tools vary by location, as does the assessment basis. Frequently, a sliding scale is used, with the effective tax rate varying according to the age of the property. Most localities assess machinery and tools

on the basis of original cost. In fact, fewer than ten counties and cities use fair market value or book value, rather than original cost as the assessment basis. The importance of machinery & tools taxes varies, but on average these taxes represent 1.8% of revenue for cities and 1.3% for counties.

To calculate machinery and tools taxes at the local level, the model uses local effective tax rates. When original cost is the assessment basis, effective tax rates are calculated by multiplying the nominal tax rate by the assessment ratio for each of the project years 1-20. When fair market value or book value is the assessment basis, the model assumes straight line depreciation over 10 years. The effective rate is then applied to the depreciated value to calculate tax revenue.

$$Machinery\ \&\ Tools\ Tax\ Revenue = Cost \times [Nominal\ Tax\ Rate \times Assessment\ Ratio]$$

Local Sales Tax Revenue

Local sales taxes are an important source of revenue for cities and counties in the Commonwealth. Local sales and use taxes accounted for 7.9% of local tax revenue on average for cities and 6.5% for counties in 2008. The relative importance of local sales and use taxes varies considerably among localities. The share of total revenue ranges from around 2% in smaller communities with little retail to over 20% in some areas.

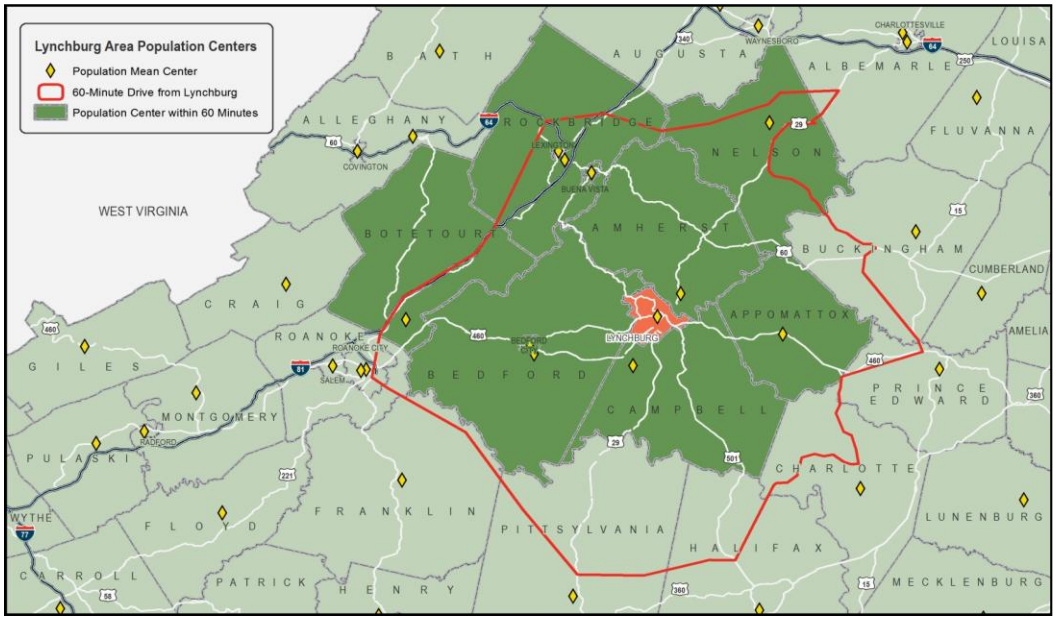
The general state sales tax rate is 5% (4% state tax and 1% local tax). VEDP's model estimates consumer purchases subject to sales tax based on average annual consumer expenditure patterns from the Bureau of Labor Statistics' Consumer Expenditure Survey. By multiplying the local sales tax rate (1%) to the share of expenditures subject to sales tax, an effective local sales tax rate is calculated. Because not all sales will occur in the locality where the project is located, the model allocates sales to the locality depending on the relative concentration of retail sales receipts. A locality's share of retail sales is calculated from total sales receipts at the local level as measured in the 2007 Economic Census (using Retail Trade, NAICS 44-45). Cities and counties whose population-density weighted center is within a 60 minute drive time are assumed to be within the subject locality's retail sales market.

The share is then estimated by dividing total receipts for the locality by total receipts in the theoretical retail sales market.

$$Locality's\ share\ of\ retail\ sales = \frac{Locality\ Sales\ Receipts}{Sales\ Receipts\ in\ Localities\ within\ 60\ Minute\ Drive}$$

The effective rate Local sales tax revenue is estimated by first figuring the share of expenditures subject to sales tax. This is derived from the Bureau of Labor Statistics Consumer Expenditure Survey, which is then multiplied by the local portion of the state sales tax, 1%. This percentage is then multiplied by the locality's

Figure 2: Local Retail Sales Market



Sources: U.S. Census Bureau, Esri, 2009.

estimated share of retail sales to yield an effective tax rate. This is multiplied by the total incremental payroll from total (direct, indirect and construction) jobs. The model also calculates sales tax on purchases of construction materials, and on the expenditures of construction workers.

$$\textit{Local Sales Tax Revenue} = 1\% \times \textit{Share of expenditures subject to sales tax} \times \textit{Total payroll from new jobs} \times \textit{Locality's share of retail sales}$$

Additional Revenue

The model explicitly estimates the incremental local tax revenues from real property, tangible personal property, machinery and tools taxes and local retail sales tax. Recognizing that some communities rely heavily on other sources of revenue, the model allows for inclusion of additional revenues which are user defined. For example, the Business, Professional, and Occupational License Tax, and the Merchants Capital Tax, may be included in a local return on investment analysis by entering the estimated total tax by year for the first five years in the "Additional Revenue" field.

Multiplier Effects

In addition to the direct jobs created, basic industry employment generates multiplier effects. A new or expanding industry creates indirect employment and output by increasing the demand for business

services, raw materials, intermediate goods, and the like. And, the increase in activity stimulates demand for consumer goods and personal services. Multipliers are derived from regional input-output models. A multiplier of 1.0 means that a newly created job spawns no additional indirect jobs. A multiplier of 2.0 suggests that for each new direct job, one additional job is created in the remainder of the economy. Multipliers can vary significantly by industry and geographic location. National, state and regional multipliers are available from various sources including IMPLAN and the U.S. Commerce Department's Bureau of Economic Analysis.

There are limitations to using multipliers derived from input-output modeling. For example, IO models are derived using the Leontief inverse which assumes implicitly that the labor supply curve is perfectly elastic and wages remain fixed. Theory suggests that labor supply is upwardly sloping which implies that a positive labor demand shock will exert upward pressure on wages. In a sense, standard IO modeling captures the additional employment component without providing for the associated wage adjustments, and in effect may overstate the indirect employment benefit (Shaffer, 2004).

Additionally, to be precise, one should estimate an IO model for each applicable industry at the smallest level of granularity (i.e. at the 6-digit NAICS level). In practice, however for a "what-if" ROI model, one may find that aggregating at a higher level provides a "close enough" estimate given the time required to generate so many models. For the VEDP model, 134 separate models are constructed in IMPLAN with industries aggregated at the 2-digit NAICS level. The resulting multipliers are used to estimate indirect employment in the city or county and the associated income and sales tax revenue.

Labor Market Response

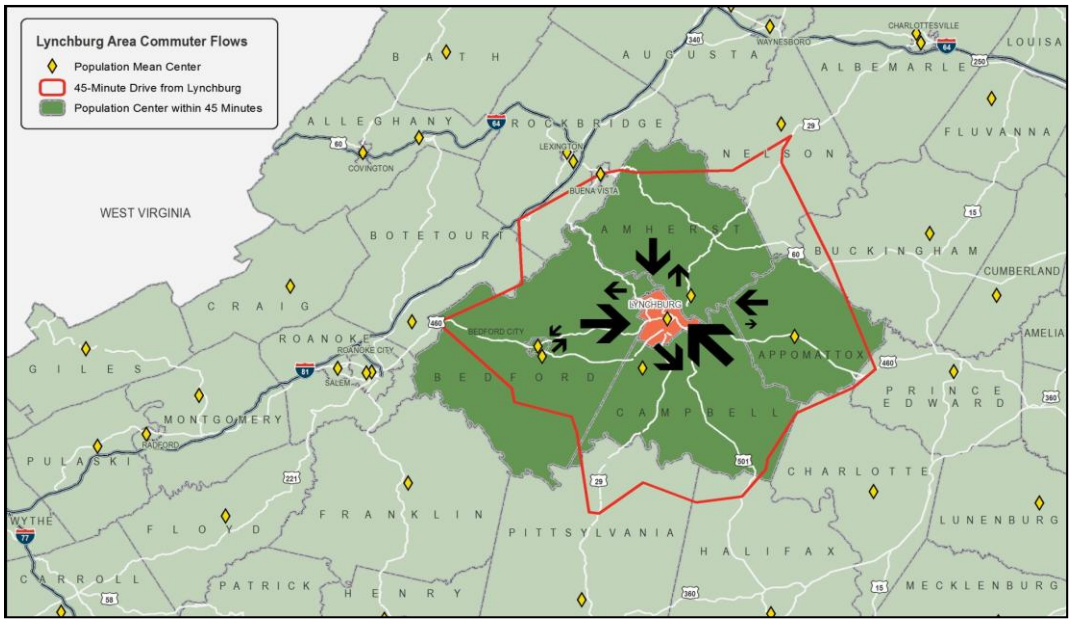
It is axiomatic that exogenous increases in local employment contribute to local economic growth. The extent to which a given locality will reap the benefits of job creation within its borders is not always clear however. Labor is mobile. Workers routinely commute across jurisdictional boundaries and will adjust their commuting patterns in response to new employment opportunities. It cannot be assumed that all labor market adjustments occur within the confines of the subject locality. To properly estimate the labor market effects of a positive employment shock, one must account for changes in flows across county and city lines.

Several well documented fiscal impact modeling systems can be found which are based on a similar conceptual labor market framework. Each of these cases is state specific and generally follows the same structure of the Community Policy Analysis System (COMPAS) promoted through the Rural Policy Research Institute. I draw heavily from published documentation on the models for Iowa (Swenson, 1998), Missouri (Johnson, 2004) and North Carolina (Renkow, 1997).

Following the COMPAS framework, local labor market is conceptualized where jobs are allocated among the locally unemployed residents, locally-employed residents, non-residents (incommuters), and residents who currently work in other counties (outcommuters).

For concreteness, the local labor market is defined as consisting of the subject locality and all cities and counties whose population-density weighted center is within a 45 minute drive from the subject locality's population weighted center. The labor market includes communities from adjacent states whose boundaries are within 25 miles of the Virginia state border (Esri, 2009). An example showing the population weighted centers is provided below. The arrows represent the relative size of the worker flows across county lines.

Figure 3: Local Labor Market



Sources: U.S. Census Bureau, Esri, 2009.

Following the COMPAS Model framework, a local labor market model consisting of four equations is constructed:

(1) Labor Force = f(employment, population, unemployment)

(2) Incommuters = f(employment, relative home prices, population-weighted distance, external employment, external labor force, relative income per capita)

(3) Outcommuters = f(employment, relative home prices, population-weighted distance, external employment, labor force, relative income per capita)

(4) Residual Unemployment = labor force + incommuters – outcommuters – employment

External employment is measured as total employment within a commuting distance of 45 minutes. Distance is defined as commute time in minutes to population density weighted center of locality. External labor force is measured as total labor force within a commuting distance of 45 minutes.

The system of equations is estimated using three-staged least squares regression. The results of the regression analysis are below, but to briefly summarize the results for the average city/county in Virginia, a 1% increase in employment is predicted to increase the local labor force by 0.14%, increase incommuting by 0.87% and decrease outcommuting by 0.59%.

Table 2: Regression Results

Variable	Labor force (log)	Incommuters (log)	Outcommuters (log)
Intercept	-1.3026*** (0.2195)	-2.3071*** (0.4552)	-1.5534*** (0.2612)
Employment (log)	0.1409*** (0.0389)	0.8734*** (0.0438)	-0.5886*** (0.0442)
Population (log)	1.0118*** (0.0521)	-	-
Unemployment (log)	-0.1175*** (0.0417)	-	-
Relative home price	-	0.3577* (0.2107)	-0.1545 (0.1218)
Distance	-	-0.0215*** (0.0073)	-0.0160*** (0.0042)
External employment (log)	-	0.6575 (0.7376)	0.2329*** (0.0193)
External labor force (log)	-	-0.3888 (0.7311)	-
Relative income per capita	-	-0.2770 (0.2997)	0.4075** (0.1718)
Labor force (log)	-	-	1.3967*** (0.0448)
R-sq	0.9723	0.9292	0.9645

Standard errors are in parentheses. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels respectively.

Costs Projections

Costs consist of user-provided estimates of the value of local incentives for each year in the project and estimated incremental costs for government services. With the exception of incremental government serviced-related costs, users must enter all estimated costs by year. The costs associated with the additional demand on government services are limited to education and public safety, which combined

account for 50% - 80% of city/county expenditures. Costs are per capita and are taken from the 2009 Amended Comparative Report of Local Government published by the Virginia Auditor of Public Accounts. Users may select to include these costs which are then calculated based on the estimated new labor force entrants which are derived from the labor market response model (equation 1).

Discounting

VEDP discounts projected costs and revenue to reflect the time value of money and to provide a means for comparing returns at different times on a like-to-like basis. The model uses the U.S. Department of Treasury's 20-year constant maturity nominal bond rate as reported by the Federal Reserve in the H.15 report.

Conclusion

The local return on investment model described here satisfies an important need in the economic development community. It provides local officials in Virginia a practical, easy-to-use tool for evaluating the fiscal impacts of economic development projects in their communities. The tool estimates local tax revenues from capital investment as well as the anticipated revenue from local sales taxes attributed to direct, indirect and construction employment. The tool provides an estimate for the share of employment likely to accrue to local residents taking into account the magnitude of the employment shock and the economic and spatial characteristics of the labor shed. Lastly, using a conservative discount rate, the model calculates net-present value returns and break-even year estimates making it easy to evaluate competing projects or the same project under varying project assumptions.

The web-based tool can be found on the Virginia Economic Development Partnership's Virginia Allies Information Exchange website: www.virginiaallies.org.

References and Further Reading

Barkley, David L., Mark S. Henry, and Mellie L. Warner. 2002. "Estimating the Community-Level Impacts of Attracting New Business: The Implications of Local Labor Market Adjustments" REDRL Research Report 02-2002-01, Regional Economic Development Research Laboratory, Clemson University

Comparative Report of Local Government Revenues and Expenditures, 2009. Virginia Auditor of Public Accounts. www.apa.state.va.us

Environmental Systems Research Institute, Inc. (Esri). 2009.

Federal Reserve Statistical Release H.15, Federal Reserve Board of Governors. www.federalreserve.gov/Releases/H15/

Gorin, Daniel. 2003. *Federal Reserve Fiscal Impact Tool (FIT)*, Software for Making a Quick Estimate of the Local Fiscal Impact of Economic Development Activity. Board of Governors of the Federal Reserve System.

Johnson, Thomas G., Daniel Otto, and Steven C. Deller. 2006. Community Policy Analysis Modeling. Blackwell Publishing

Knapp, John L. and Stephen C. Kulp. 2011. Virginia Local Tax Rates, 2010 . Weldon Cooper Center for Public Service, University of Virginia.

Levy, John M. 1990. Economic Development Programs for Cities, Counties and Towns. Praeger Publishers, Second Edition

Minnesota IMPLAN Group, Inc., IMPLAN System (data and software), 502 2nd Street, Suite 301, Hudson, WI 54016 www.implan.com

Morgan, Jonathan Q. 2010. "Analyzing the Benefits and Costs of Economic Development Projects". Community and Economic Development Bulletin No. 7, April 2010. University of North Carolina.

Patrick-Crotty, Carlianne. 2007. "Fiscal Impact Analysis Creates a Win-Win for Projects and Communities" *Economic Development America*, IEDC, Spring 2007

Renkow, Mitch, Dale M. Hoover, and Jonathan K. Yoder. 1997. "Commuting and Migration in North Carolina: Does Suburbanization Explain the Trends?" ARE Report No. 13, Dept. of Agricultural and Natural Resource Economics, North Carolina State University.

Shaffer, Ron., Deller, Steven C. and Marcouiller, David. 2004. Community Economics; Linking Theory and Practice. Oxford: Blackwell Professional Publishing.

Swenson, David and D.M. Otto. 1998."The Iowa Economic/Fiscal Impact Modeling System." *The Journal of Regional Analysis and Policy*. 28:64-75.

U.S. Bureau of Labor Statistics, Consumer Expenditure Survey, 2009.

U.S. Census Bureau. 2007 Economic Census.

U.S. Census Bureau. Census 2000.