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**The Montgomery County
Cost and Benefit Model**

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for

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This report documents a computerized model developed by IPPBR for the Montgomery County Action Council. The model was built upon a foundation of previous modeling work performed at IPPBR by Dr. Helga Upmeier and at Kansas State University by Dr. David Darling. The model was then customized to fit the Montgomery County economy.

Several IPPBR staff members were instrumental in developing the Montgomery County model. Dr. Norman Clifford, Associate Scientist, served as Principal Investigator on the project, and provided direction and oversight. Dr. David Burress, Associate Scientist, provided the model's theoretical framework. Dr. Helga Upmeier contributed her substantial knowledge of the impact of community tax abatements, and her experience with cost-benefit modeling. Chang-Erh Chou and Jingren Shi, graduate research assistants, performed the computer programming and data collection necessary to calculate Montgomery County multipliers.

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Any opinions expressed in this report are those of the author, not of IPPBR or of the Montgomery County Action Council.

THE MONTGOMERY COUNTY COST AND BENEFIT MODEL

Introduction

The Montgomery County cost and benefit model is a spreadsheet designed to help assess the impacts of granting various kinds of subsidies and tax abatements to a new (or expanding) firm. The current version of the model allows the user to analyze effects of firm locations or expansions in Coffeyville, Independence, Caney, or Cherryvale. The model allows the user (typically an economic development specialist) to customize inputs based on specific information about Montgomery County communities and about firms that are considering Montgomery County locations. The model then calculates results such as employment, income, and tax collections.

The Montgomery County model employs over 200 input variables in order to estimate the various fiscal and economic impacts of a project. Among these are:

- tax variables that capture the current structure of tax rates and tax bases in the various Montgomery County communities;
- income and employment variables that relate income and employment to retail expenditures and sales taxes;
- government cost variables that include costs for services and for infrastructure development;
- residential location variables that include estimates of commuting between communities and of net migration to Montgomery county; and
- multiplier variables that relate the initial income and employment generated in the community to secondary income that recycles within the community.

The model defines structural relationships between these variables, and traces the consequences of the firm's activities as they work their way through the community.

Using the Montgomery County Model

Because the Montgomery County model takes the form of a spreadsheet, it is very easy to use. In essence, the user provides data in the appropriate data input cells. The spreadsheet then computes results.

The spreadsheet actually contains two types of cells—protected and unprotected. The user should first turn on global protection for the spreadsheet. This feature is found under "file" in Lotus for Windows and under "options" in Excel. The use of the protection feature will prevent the user from making any inadvertent changes to the structure of the model. The contents of protected cells will appear in one color (typically dark gray) and the contents of unprotected cells in another color (typically blue). The user can change the values in the unprotected (blue) cells. Notes on appropriate data values accompany many of the unprotected cells. In some cases, default values are provided for instances where data specific to Montgomery County are not available.

After entering data into the unprotected cells, the user should also verify that the data really do correctly represent Montgomery County communities and the specific project under consideration. The user should also make sure that the data are in appropriate units as specified in the spreadsheet. Once the data have been entered and verified, the user should page to the end of the spreadsheet to find various tables of results.

The results of the model will only be as good as the input data. Hence it is important for the user to make every effort to obtain accurate data. The user should be wary of exaggerating the projected income and employment from a new or expanding firm.

Data and Assumptions

As is generally the case with economic models, the Montgomery County model is built from a set of data and a set of assumptions about the relationships among data items. The relationships among variables are embodied in formulas within the spreadsheet. Many of the complex data items, background assumptions, and relationships are discussed in detail below.

Discount rate and timing of project

The model presents results as annualized values. The model also includes present value calculations for key variables such as income and employment. The default discount rate for the model is 7.5 percent and the default time period of any project is 15 years. Both the discount rate and the time period of the project may be changed by the user. Time periods of up to 20 years are allowed.

Treatment of inflation

All projections for sales, input costs, etc. enter into the model in real terms. In other words, any future projections should be adjusted for anticipated inflation. All tax rates, wages, and other prices are assumed to be constant over the term of the project.

Market area of the firm

The model assumes that the new firm sells its goods in a national marketplace. In other words, it is assumed that sales by the new firm do not displace the sales of any other Montgomery County businesses. This model would not be appropriate to analyze the impact of a retail or other development where there is a significant proportion of local sales.

Property taxes

The projections for future property taxes depend on several model variables:

- the amount of property (real and personal) that the new firm purchases;
- the tax rates in the various Montgomery County communities; and
- the relationship between income and real property holdings.

The treatment of this last relationship is somewhat controversial. The model assumes that new community residents (migrants) purchase houses. It also assumes that current Montgomery County residents add to the value of their property holdings when their income increases. They may purchase more expensive homes, or they may enhance the value of their current homes. This increase in property values occurs with a time lag in the model. Property tax projections may be somewhat optimistic. A clear area for future research is the relationship between property value increases and income changes for existing Montgomery county residents.

Multipliers

The multiplier for income in Montgomery County is estimated to be 1.38. In other words, each dollar of wages paid to Montgomery County residents by the new firm is expected to generate another 38 cents in wages and salaries in service and other consumer industries.

The model currently contains no multipliers for the use of locally manufactured inputs by the new firm. For the cases on which the model was tested, this was not an important consideration. It should be pointed out that the model does provide linkages for local retail sales by the firm.

Location of retail sales

Retail sales enter into the model in the form of a matrix showing income by location versus sales by location. The data in the matrix are the result of a retail "gravity" model, where the distribution of a resident's retail sales depend on income and on the distance between the residence and various retail trade centers. The retail sales model was calibrated using Kansas retail sales tax data and data on income and population.

A further assumption used in the model is that out-of-county residents contribute 10 percent of retail sales in Montgomery county. This assumption is somewhat arbitrary. No data or supporting research was found to pin down this number precisely. However, the following facts support the use of a fairly small number for retail exports:

- The ratio of sales tax collections to income for Montgomery County is very close to the statewide average. Therefore, there is no evidence that Montgomery county is a strong retail magnet for people in adjoining Kansas counties.
- The population base in communities across the Oklahoma border is small. The entire population of Nowata County, OK is less than 10,000, compared to 37,000 for Montgomery County. While it is likely that a portion of the Oklahoma consumers orient their shopping patterns toward Coffeyville, there are simply not enough Oklahoma consumers to greatly affect Montgomery County sales.

Location of jobs versus location of residents

The model contains a block of data representing commuting patterns. Data from the 1990 Census reveal that 46 percent of Montgomery County manufacturing

workers commute 15 minutes or less to their jobs. The model assumes that these workers live in the same communities where they work. Other workers are distributed in proportion to the populations of adjoining communities.

Alternative data on commuting patterns can be substituted into the model. As one approach, IPPBR staff members are currently using Census data to develop a more flexible model. If this new approach proves to be successful, results will be provided to Montgomery County. Another approach might be for Montgomery County economic development specialists to conduct original surveys.

Interpretation of Results

Key results of the model (annualized values and present values) are printed in several tables at the end of the spreadsheet. The report tables can be adapted by the user to report additional variables.

All results should be interpreted cautiously. First of all, the data about the activity of the firm are projections, not actual fact. Second, key parameters of the model such as the multiplier, the ratio of income to property values, and the distribution of jobs by community are measured with some unknown errors. They are simply estimates based on economic theory and the available data. Finally, an entire set of potentially interesting variables falls outside the scope of the model—the model says nothing about impacts of development on pollution, congestion, land use patterns, or many other issues of potential community concern.

Analysis of Risk

The final (and perhaps the most important) section of the model looks at a quick analysis of risk. For the purposes of this model, the source of risk is that the Montgomery County economic development specialists do not always know with certainty whether a subsidy or abatement is absolutely necessary to bring new business into the community.

Consider two extreme cases: one in which a subsidy or abatements is completely unnecessary to bring a business to a community, and one in which they are absolutely essential. In the case that the subsidy or abatement is essential, the fiscal impact (combined government budget) represents the total impact on area governments. There is no additional cost to the community in terms of foregone revenue. In the other extreme case that the subsidy or abatement is completely unnecessary, the amount of the subsidy or abatement is a pure cost to the community. The benefits of development would have occurred regardless of the subsidy. In this case, the community is worse off by giving the abatement or subsidy by an amount equal to the subsidy or abatement itself.

Many cases will be intermediate between these two extremes. In that case, the economic development specialist should enter in the spreadsheet an estimate of the

probability that the firm will locate in the community without a subsidy. The model weights the two extreme scenarios according to their probabilities. The bottom line impact shows the combined effect of the growth brought about by the firm and the associated revenue loss due to the abatement or subsidy.

A simple numerical example may make the above more clear. Suppose that a firm receives an abatement that amounts to \$100,000 per year. Suppose that the income generated by the firm yields sales and property taxes to the community amounting to \$75,000 per year. If the firm would not have located without the abatement, the community receives a pure gain of \$80,000 per year. If the abatement was totally unnecessary, then the community gives up \$100,000 that it could have had, so the cost is \$100,000.

Now suppose that the probability that the firm would have located without an abatement is 25 percent (and the probability that the abatement is essential is 75 percent). The weighted benefit of granting the abatement is

$$.25 * (-\$100,000) + .75 * \$80,000 = \$35,000.$$

Summary

The Montgomery County model is designed to be a useful tool to help economic development specialists trace the possible impacts of a new development in their community. The inputs to the model should always be checked for their accuracy, and the results scanned for their reasonableness. The model is intended to provide information to decision makers. But it is intended to be only one of many inputs into the decision making process.