Market analysis

Estimating Economic Impact

The Three Rivers model analyzes the effects of commercial developments.

by Ryan Stokes

View this PowerPoint presentation for a demonstration of the Three Rivers Model's advanced applications and an illustration of RIMS II data.

Commercial real estate development is vital to every region's economy, supporting construction, architectural planning, engineering, and legal services, among many other business sectors. However, the actual development period only considers the one-time, short-term construction phase. The more-valuable economic impact is in the ongoing, long-term business operations phase that may last for decades. When evaluating the economic impact of commercial developments, both phases should be considered to gain a clear picture of a project's total value.

The Three Rivers Model

Understanding and quantifying economic impacts are crucial to many different stakeholders. Local governments must justify expenses, neighborhood groups are interested in job creation, and developers need to attract tenants. The Three Rivers Model measures both construction and business operations phases in terms of total output, total earnings, and total employment using the U.S. Bureau of Economic Analysis' Regional Input-Output Modeling System, more commonly known as RIMS II data.

For example, consider an office building that costs $15 million to build and houses 400 professional employees in a 10-county region. The construction phase generates $35 million in total output, $11 million in total earnings, and supports 290 jobs. However, this one-time impact is overshadowed by the ongoing business operations phase, which generates $100 million in total output, $39 million in total earnings, and sustains 860 jobs annually. (See "Economic Impacts of Commercial Real Estate Development.")

The magnitude and duration of economic impact in the construction phase are less than during the business operations phase. For example, nearly 300 jobs are supported in the construction phase for a relatively short time period. However, during the building operations phase, employment is greater and more sustainable.

The Three Rivers Model can be used throughout the U.S., considers both short- and long-term effects of developments, is fairly simple to learn since it uses only three variables, and can aggregate multiple projects to estimate overall economic impact.

While the Three Rivers Model can be used widely with minimal training to ensure better understanding of commercial real estate developments' effects on local economies, the process only accounts for gross economic impacts. It does not consider the additional expenses required such as the increased need for public services, more highways, or additional schools. Also absent from the Three Rivers Model is consideration for property taxes. Although a significant fiscal impact, property taxes depend on taxing districts, millage rates, and methodologies that are specific to each market. It is impractical to address unique taxing systems in a general model, but that does not minimize their significant impact. It is highly recommended that these fiscal contributions also be considered when using the Three Rivers Model.

As the Three Rivers Model foundation, RIMS II multipliers are used to estimate economic impacts. They measure the changes in final demand method — the additional purchases of goods and services by final users. Developed in the mid-1970s, RIMS II multipliers account for linkages between industries in a specified economy. A respected resource for measuring total economic impacts, RIMS II data is easily accessible, relatively inexpensive, and customizable to the county level. With some technical skill, commercial real estate professionals can use these multipliers to quantify both the short- and long-term impacts of specific developments. For more information on RIMS II data, visit www.bea.gov/regional/rims.

Quantifying Economic Impacts

The Three Rivers Model is a three-step process using appropriate RIMS II multipliers and three variables: building size (square feet), cost estimate (cost per sf), and occupancy estimate.

Step 1: Select RIMS II Data. RIMS II multipliers can be ordered online at www.bea.gov/regional/rims/index.cfm for a fee. However, a few parameters must be understood to select data appropriately.

First, users must consider the region's scope. Unique RIMS II data is available for each county or group of contingent counties throughout the country. Second, users must consider the annual and benchmark data series. The annual data are more current but the benchmark data are more detailed. Either data series can be used; the following example in this article uses annual data. Finally, the data type must be considered. The Three Rivers Model uses type II multipliers because they include induced effects — those of households.

Industry multipliers must be selected for each phase. The construction phase always should be based on construction industry multipliers. The business operations phase should be based on industry multipliers most closely matching the type of business occupying the property.

Returning to the example used in the introduction, assume a 100,000-sf building has construction costs of $150 psf. At full occupancy, the building will house one employee per 250 sf in the professional, scientific, and technical services industry. (See "Final Demand Multipliers.")

Step 2: Estimate Final Demand. The two phases stimulate demand by injecting money into an economy and creating direct, indirect, and induced effects, which Step 3 addresses in greater detail. Final demand includes the purchase of goods and services by final users and must be calculated for each phase. Along with the appropriate RIMS II multipliers, final demand is estimated using just building size (sf), cost estimate ($ psf), and occupancy estimate (density).

The first variable is a given and therefore requires no judgment. The next two are estimates that involve a certain amount of expertise. However, these variables easily can be subjected to a sensitivity analysis to accommodate differences in judgment.

The short-term construction phase final demand is simply total building costs. For the purposes of this model, it includes both hard and soft costs but excludes the purchase price of the land or existing structure. Final demand can be estimated using the following equation: *sf x cost psf = total building cost*. Continuing with the example, the final demand for a 100,000-sf building costing $150 psf is $15 million (*100,000 sf x $150 psf = $15 million*).

Estimating final demand — the value of goods and services purchased annually — in the long-term business operations phase is somewhat more complicated. Final demand is a function of the employees housed and a multiplier derived from the two employment multipliers: *Occupancy x derived multiplier = final demand.* Each component can be broken down further to determine the number of employees housed estimated from building occupancy:

building size/sf per employee = occupancy

A 100,000-sf building that is occupied by one employee per 250 sf will house 400 employees (*100,000 sf / 250 sf per employee = 400 employees housed*). The value of one employee per 250 sf was selected arbitrarily for this example, but is realistic for traditional office space.

Final demand produced annually per employee is based on multipliers of the specific region and industry. RIMS II reports two different employment multipliers — total employment and direct-effect multipliers — that are used to estimate final demand per employee housed.

direct effect employment multiplier/total employment multiplier x $1,000,000 = final demand per employeer

In this example, the direct effect and total employment multipliers are 2.1554 and 17.6334. Dividing 2.1554 by 17.6334 results in a quotient that, if multiplied by $1 million, equals $122,234 of final demand produced annually per employee (*2.1554/17.6334 x $1,000,000 = $122,234*).

Therefore, 400 employees generating $122,234 in final demand result in about $49 million in total final demand from business operations annually (*400 employees x $122,234 in final demand = $48,893,600*).

Step 3: Apply Multipliers. In Step 1, the appropriate final demand multipliers are selected. In Step 2, final demand is estimated for both phases. In Step 3, the three multipliers are applied to final demand to yield economic impacts. These multipliers account for direct, indirect, and induced effects. For example, in the construction phase, direct effects include labor and materials, indirect effects include healthcare services or utilities, and induced effects are effects from household spending. Each of the three economic impacts is addressed by total output, which is the value produced by the final demand dollars cycling through the economy; total earnings, which are the amount of total output paid in compensation; and total employment, which is the number of jobs created or sustained.

The first two multipliers are dollar-for-dollar multipliers. That is, for every $1 increase in final demand, total output or total earnings will increase by the amount of the multiplier. However, the employment multiplier is reported per $1 million in final demand. Hence, a multiplier of 10 represents 10 jobs per $1 million in final demand. Also, full- and part-time jobs are not distinguished in the employment multiplier; therefore, the value is not full-time equivalent.

Applying the appropriate multipliers identified in Step 1 to the final demands calculated in Step 2 yields the following economic impacts in Step 3 for each phase. (See “Construction Phase” and “Business Operations Phase.”)

Economic Impacts of Commercial Real Estate

Final Demand Multipliers

	Construction	Professional
Total output	2.3339	2.0506
Total earnings	0.7593	0.7903
Total employment	19.3875	17.6334
Direct-effect employment		2.1554

Source: Bureau of Economic Analysis RIMS II

Using the Model

This straightforward model, which has unambiguous inputs and includes ongoing business operations, was developed for commercial real estate practitioners. The inputs are definitive or have reasonable limits, leaving little room for opinion. The all-important business operations phase is given appropriate consideration. This makes the Three Rivers Model easy to use, difficult to manipulate, and comprehensive in its estimations.

However, interpreting the results requires some user judgment. For example, it may be inappropriate to consider the business operations phase of a company that is simply moving across town. In such a scenario, additional questions must be asked: Was the company looking to relocate outside the region? Does the new space allow the company to expand? Will the old space house new operations entering the region? Is the old space functionally obsolete requiring modernization or redevelopment? These significant factors are just a few that should be considered in this situation. Similar considerations must be made for each individual scenario.

Fortunately, the Three Rivers Model is adaptable to such unique situations. It can measure the economic impact of new construction, the build-out of existing space, new business operations, anticipated corporate growth, and even the ongoing impact of residential developments. This flexibility allows it to be used for a wide range of applications such as site selection for a large distribution center, the leasing of vacant office space, or the construction of a new apartment complex.

Estimating Total Final Demand

Construction Phase	Step 1: Choose Multipliers	Step 2: Estimate Final Demand	Step 3: Apply Multipliers	Total Final Demand (Rounded)
Total output	2.3339	$15,000,000	35,008,500	$35 million
Total earnings	0.7593	$15,000,000	11,389,500	$11 million
Total employment	19.3875	$15,000,000	291	290 jobs

Business Operations Phase	Step 1: Choose Multipliers	Step 2: Estimate Final Demand	Step 3: Apply Multipliers	Total Final Demand (Rounded)
Total output	2.0506	$48,893,600	100,261,216	$100 million
Total earnings	0.7903	$48,893,600	38,640,612	$39 million
Total employment	17.6334	$48,893,600	862	860 jobs

Three Rivers Applications

Quantifying the economic impact of commercial real estate development is often ambiguous. The Three Rivers Model is a fairly simple way of measuring gross economic impacts. It is based in RIMS II data that is highly regarded, easily obtained, and inexpensively purchased. With only two estimates, it is subjected to a sensitivity analysis, thus accommodating differing judgments.

The Three Rivers Model provides evidence to support a development’s economic impact and sets the foundation for a more-detailed analysis: Each phase can

be considered separately, multipliers can be disaggregated, total value added can be observed, properties can be allocated for different uses, building operations can be considered, and sales and employment taxes can be estimated. However, these are advanced analyses and outside the scope of this article.

Another advanced application of the Three Rivers Model is to apply it to several projects simultaneously. Due to its simplicity, it is reasonable to use the Three Rivers Model for 15, 20, or more projects concurrently. Using the model in this way, commercial real estate projects' economic impacts can be estimated for a specific development company, professional organization, master plan, or geographical region.

Commercial real estate development is vital to a region's economic activity and fiscal health. Specifically, commercial properties have significant impacts on local government via corporations' income taxes, sales taxes, employment taxes, and business property taxes. Quantifying these economic impacts provides important insight into the projects' value. Though significant in its own right, the economic impact of a project's construction phase is dwarfed by the business operations phase both in terms of magnitude and duration.

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