commercial development

IMPACT ANALYSIS BEFORE AND AFTER CONSTRUCTION

By C. Fred DeKay, Ph.D. and Barbara M. Yates, Ph.D.

Property developers often conduct economic and fiscal impact analyses on proposed development projects as part of an application for a permit or zoning change or in an effort to obtain public sector incentives. Government agencies and jurisdictions conduct these types of analyses for public projects or to review proposals for private projects.[1] Once the initial purpose of the study has passed, the report often collects dust on someone's shelf and is not considered again. Developers rarely have an incentive to revisit the impact analysis after the projected development is completed. However there are lessons to be learned by determining why the actual results differ from the original predictions.[2]

An early view of Union Station.

This article presents a case study of a before and after construction comparison of the economic and fiscal impacts of an urban commercial development. The authors conducted a survey of the tenants in the Union Station Development in downtown Seattle to assess the economic activity at the development during 2003 and to compare the results with the project impact analysis completed in 1996 prior to construction.[3] The process of completing this task and the comparisons between the two studies gave us insights into some issues surrounding the methodology and interpretation of impact analyses, including some of the difficulties involved in the "before and after" comparison process itself. For example, what kinds of adjustments need to be made to ensure a valid comparison and how does one assess whether the original estimates were good predictions?

We begin with some general background on economic and fiscal impact analysis, followed by more details on the Union Station Development. We then present and compare the economic and fiscal impacts of the project estimated before and after construction. Where the estimates differ, we examine possible reasons, noting some that might call for adjustments to the original projections before comparing them with the 2003 results. We conclude with some summary observations and recommendations for conducting impact analyses and before and after construction case studies.

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A CASE STUDY

Do current economic impact analysis methodologies provide accurate forecasts for urban commercial development activities? Economic and fiscal impact analyses prepared before and after the construction of a large urban commercial development in Seattle provide a case study of how actual results might differ from the original predictions. Changes in general economic conditions accounted for some of the differences, but income and tax revenue impacts were also affected by the eventual space utilization. For example, e-commerce and non-revenue generating activities were unanticipated in the tenant mix assumptions. Also, the use of state-wide averages as parameters underestimated the experience in a large urban setting. The case study suggests some things to consider when conducting an impact analysis of a business development project.

ECONOMIC AND FISCAL IMPACT ANALYSIS

The construction of a new commercial development supports a stream of economic activity with potential effects on local employment, income, and tax receipts. Economic and fiscal impact analysis attempts to track and measure those effects.[4] Accepted economic methodology recognizes three types of impacts: direct, indirect, and induced.[5] Direct impacts include the income and employment generated by the development project itself during and after construction. Indirect effects include purchases by businesses in the development from local material suppliers or service providers. Induced effects are the so-called "second round" or "multiplier" effects from spending the income generated by the direct impacts. For example, induced effects would include the impacts on the economy caused by the spending of wages by the development's employees in local retail stores. This spending creates jobs for the employees of the stores, further contributing to regional economic activity. These combined effects within a given political jurisdiction can also produce fiscal effects in the form of additional revenues from taxes and fees and additional demands for public services.

Union Station development site before construction with Seattle's skyline in the background.

At this point in time, the developer Nitze-Stagen acquired several acres of underutilized property at the southern edge of downtown Seattle with plans to redevelop the area into a modern office complex with six buildings, five of them new, and two parking garages. The property contained the old Union Pacific Railroad Station, a building constructed in 1911. Part of the redevelopment plan included preservation and restoration of this historic building.

It is common to assume that any income, employment, and tax revenue impacts associated with a proposed development are net new effects in the jurisdiction that would not occur without the development. Yet some of the activity might simply be transferred from another location in the same jurisdiction and the net impact of the new construction might actually be dependent on the new activity at the vacated sites. The indirect and induced effects can be particularly problematic, since it must be assumed that the spending represented by these effects occurs within the jurisdiction and, moreover, can be accommodated there without displacing other business activity. Needless to say, accurate estimates for indirect and induced impacts would depend critically on accurate estimates of the direct impacts. This case study focuses on the direct impacts of the Union Station Development on employment, income, and city revenues, estimated before and after construction.

THE UNION STATION DEVELOPMENT: PRECONSTRUCTION ANALYSIS

In 1996, the Puget Sound region was poised to enter an exceptional period of economic expansion that was fueled by the emergence of communications and internet-based businesses and the development of the hardware and software infrastructure that made those activities possible. In 1995, for the first time in more than four years, vacancy rates for the commercial real estate market in downtown Seattle had dipped below 10 percent. The market was one year into a recovery that was to last until 2001 and would see vacancy rates plummet to1.6 percent.

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As part of the project planning process, the developer commissioned an economic impact study for the proposed activity for the purpose of assessing the effects of such a large-scale construction project on the local economy. This EIS was

Table I

The Union Station Development Project Proposed in 1996

Proposed Project, 1996	
Site size (acres)	9.1
Building size (square feet)	
Office	1,088,500
Retail	34,500
Office and retail, Subtotal	1,123,000
Parking (square feet)	385,000
Parking Slots	1,100
Total developed square feet	**1,508,000**

prepared in 1996 by Ben Frerichs of Economic Consulting Services, Inc. at a time when the project was in the early planning phase. Since actual ground breaking did not begin until the middle of 1997, the report required numerous assumptions about how the project was going to be executed and what type of tenants the finished buildings would attract.[6]

The original study focused on the direct economic (employment and business gross receipts) and fiscal (tax and fee revenues) impacts of the Union Station Development (USD) on the city of Seattle for a typical (steady state) post-construction year.[7] Table 2 shows these projected effects, along with the estimated construction costs ($196 million) of the development described in Table 1. All monetary values are expressed in 1995 dollars. The 1996 study assumed the occupancy rate would average 90 percent over the business cycle and used that assumption in computing steady state employment for the project.[8]

A key factor determining these economic and fiscal impacts is the type of business occupying the development. The 1996 study projected that the businesses likely to occupy the office space portion of the buildings in the development would come from the following industries: professional and scientific instruments; finance, insurance, real estate; business services; computer services; legal services; and miscellaneous professional services (engineering, architecture, management consultants, and accountants). The types of jobs represented by firms from these industries are typically higher wage employment opportunities.

Steady state employment (3980) was estimated by dividing the total number of square feet of space by the average number of square feet per employee and then multiplying by the expected occupancy rate. The number of square feet of space per employee for office and retail uses was based on averages experienced in typical high rise offices in the Seattle market area, 250 square feet per office employee and 600 square feet per retail employee. Occupancy rates were estimated at 90 percent for office space and 95 percent for retail space.

The 1996 study projected steady state business gross incomes (or receipts) for the USD at about $451 million. Business gross income was estimated by multiplying the number of square feet for retail or office space by an estimate of revenue per square feet. The business gross income per square foot was obtained by dividing an estimate of business gross income per employee by the number of square feet per employee (250 for office; 600 for retail). Business gross income per employee was estimated by relating Washington state business gross income (upon which the state's business and occupation taxes are levied) to non-agricultural wage and salary employment for the same Standard Industrial Classification categories that were expected to occupy the buildings.

The construction and ultimate business activity were expected to generate increases in tax revenues for the city of Seattle. Seattle charges fees for construction permits and imposes taxes on business gross receipts, retail sales (including construction), assessed property value, and utility purchases. All of the space was assumed to yield taxable business gross receipts. Retail sales tax revenues were computed by multiplying the estimated retail sales receipts by the appropriate tax rates. Retail sales receipts were assumed to be a function of the space allocated to retail, the number of employees, and the average income per employee derived from state-wide data. The 1996 study assumed that real property would be assessed at the costs of construction and that personal property would be assessed at 10 percent of the value of construction. Finally, the city of Seattle imposes a 6 percent tax on utility revenues, which were estimated at $3.00 per square foot of office and retail space. In total, tax revenues were projected to increase by about $2.87 million.

Table 2

Economic and Fiscal Impact Comparisons

	1996 Projections Unadjusted
Permanent employment	3980
Business activity (revenues or expenses)	$ 450,675,000
Construction expenditures (1997-2003)	$ 196,007,500
Tax revenues, City of Seattle	$2,873,705

THE UNION STATION DEVELOPMENT: POSTCONSTRUCTION ANALYSIS

In 2004, Nitze-Stagen commissioned a review of the 1996 report to assess the accuracy of the projected economic and fiscal impacts of the Union Station Development. With the site completely developed, we could observe and measure what had actually occurred in terms of site development, occupants, business activity, employment patterns, construction costs, assessed values, and fiscal impacts on government jurisdictions. Most of these actual values are not available in published form on a project basis, thus the data had to be derived from confidential surveys of the current tenants.

We began by interviewing the building managers to obtain updated building-level data and tenant information. We reviewed the websites of all major tenants and contacted them for information on their 2003 activities. We obtained confidential information from major tenants via telephone conversations, e-mail inquiries or personal visits to their offices. Not all tenants responded to the survey, and not all responses were complete. About 65 percent of tenants provided some useful data and the building managers provided estimates of employment for nearly all tenants. When responses were incomplete and follow up telephone calls were unable to produce answers, we made estimates of values based on parameters derived from other tenants conducting similar activities or from other data sources. These attempts to match activities helped reduce, but naturally could not eliminate, sampling error.

Other data sources included published government reports, the budgets of local public agencies, annual reports of the tenants, and records provided by the property managers. We based the estimated fiscal impacts on tax records for the property, when available. When records were not available, we made estimates based on tax rates and base definitions set forth in the laws and regulations of the state of Washington and the city of Seattle. The 2003 study found that a significant portion of the employment at the USD site does not have directly attributable gross receipts. The 2003 estimates of activity recognized this by substituting an estimate of expenses for non-gross receipts generating activity, such as back-office business support functions and government services, tenant categories not considered in the 1996 report.

Union Station Development after underground garage construction. Structures to the left of Union Station are entryways to the bus tunnel.

The estimates of the economic and fiscal impacts of the USD for 2003 (in 2003 dollars) appear in Table 3, along with the original 1996 projections. Both the construction costs and the business gross receipts values turned out to be substantially higher, however employment and tax revenues came in lower than originally forecast. Construction costs were $306 million compared to the originally projected $196 million. Business gross income (or expenses) reached $752 million rather than $451 million. Employment, however, was 3,671 in 2003, below the projected 3,980. Finally, the estimated additional revenues for the city of Seattle in 2003 were $2.6 million compared to the 1996 estimate of $2.9 million. We are well aware that some differences are affected by the extreme difficulty of acquiring accurate information on a specific development project basis even after construction. In the next section we consider other possible reasons (some obvious, some less so) why the 1996 projections and the 2003 measures don't match.

Table 3

Economic and Fiscal Impact Comparisons

	1996 Projections	*2003 Estimates*
Permanent employment	3980	3671
Business activity (revenues or expenses)	$ 450,675,000	$751,821,376
Construction expenditures (1997-2003)	$ 196,007,500	$306,847,318
Tax revenues, City of Seattle	$2,873,705	$2,578,117

COMPARING THE ANALYSES: REASONS FOR DIFFERENCES

Differences Related to Changes in the Project and the Economic Environment

One obvious question in comparing the impact results is whether the actual project turned out to be the same as the proposed development. The completed Union Station Development differs slightly from the initial plan in 1996 (see Table 4). The space is slightly larger overall with increases in the amount of office space (1.5 percent), retail space (13 percent) and parking space (30 percent). Total developed square feet are 1,644,920 compared with the 1996 plan for 1,508,000. While accounting for some of the difference in construction costs and related fees and tax revenues, the impact of the larger development on differences in employment and business receipts is small, since almost all of this increase is in the parking garages.

Table 4

Comparison of the Union Station Development Project Proposed in 1996 and the Actual Project in 2003

	Proposed Project, 1996	*Actual Project, 2003*	*Percent Difference*
Site size (acres)	9.1	9.25	2%
Building size (square feet)			
Office	1,088,500	1,104,321	1%
Retail	34,500	38,907	13%
Office and retail, Subtotal	1,123,000	1,143,228	2%
Parking (square feet)	385,000	501,692	30%
Parking Slots	1,100	1,251	14%
Total developed square feet	1,508,000	1,644,920	9%

There are several general economy-related factors that could account for some of the differences. For example, for a valid comparison between the projections made in 1996 and the actual effects in 2003, both should be valued using the same prices. Between 1996 and 2003, the price level as measured by the Consumer Price Index for the Seattle Metropolitan Area increased 26.3 percent. Items reported in dollars from the 1996 study need to be increased by 26.3 percent when comparing them with the 2003 values.

In addition, productivity has increased significantly since 1996. National productivity data show that output per hour worked (and by inference output per employee and receipts per square foot) has increased by 26.5 percent since 1995. The 1996 projections for business gross receipts would not have accounted for productivity changes up to 2003, or any other unspecified future date, and therefore should be considered conservative estimates of future real values.

Finally, any true comparison must recognize that the 1996 study was not trying to predict what the impacts would be in 2003. The goal of the 1996 report was to project the long run, steady state annual impact of the development in a typical or average year and thus assumed a long run average 90 percent occupancy rate. The year 2003 was not the long run steady state average year that the 1996 study was trying to project. In fact, 2003 was a year characterized by the initial recovery from an economic recession in the local region. While the national recovery began in late 2001, Washington's unemployment rate was still among the highest in the nation in 2003. The 2003 occupancy rate for the development was 86 percent, partly because 2003 was still in the recovery phase of the business cycle and partly because one of the buildings was completed in 2002 and had not yet achieved steady state occupancy. To account for these differences we would need to adjust the 1996 numbers for employment and receipts down about 4.7 percent.

Table 5

Adjusted Economic and Fiscal Impact Comparisons

	*Adjusted 1996 Projections**	*2003 Estimates*	*Difference as a % of 1996 Adj.*
Permanent employment	3868	3671	-5%
Business activity (revenues or expenses)	$ 698,892,136	$751,821,376	8%
Construction expenditures (1997-2003)	$ 263,981,649	$306,847,318	16%
Tax revenues, City of Seattle	$ 4,238,304	$2,578,117	-39%

*Adjusted for project size, inflation, productivity increases, and occupancy rate.

One could argue that for a valid comparison between the preconstruction and post-construction estimations of economic and fiscal impacts that both sets of estimations should be based on the actual constructed development. Furthermore, the original estimates should be adjusted to reflect general economic changes in inflation, productivity,

and the state of the business cycle. Table 5 shows the 1996 projections adjusted where relevant for these four factors, along with the 2003 estimates. After these adjustments, we would expect the 1996 estimate of employment in 2003 to be 3,868, around 5 percent above the actual 2003 value. The adjusted 1996 estimate for business activity in 2003 increases to $699 million, within approximately 8 percent of the 2003 estimate. Construction expenditures when adjusted are approximately $264 million, about 16 percent below the 2003 figure. The adjusted 1996 estimate for tax revenues to the city of Seattle rises to $4.2 million, 39 percent above the estimate in 2003.

Differences Related to Tenant Mix

Some of the remaining differences in the estimated impacts in the two studies can perhaps be attributed to differences in the assumed tenant mix. The types of firms originally projected to occupy the USD are indeed represented in the current list of tenants, as shown in Table 6. The 1996 study did not provide an estimate of the proportion of the total represented by each of these categories of tenants and employment, so no detailed comparison is possible.

Table 6

Union Station Development Tenants by Category, 2003

Industry	*Number of tenants*	*Employment*
Law Firms	5	97
Professional Services and Research	5	526
E-commerce or Internet Products	6	1664
Banks, Venture Capitalists	5	39
Government or Non-Profit	3	593
Retail stores or Restaurants	6	37
Other, including property managers	8	554
Total	38	3,510

While the expected categories of activity, other than government services, are well represented in the actual tenants, the actual gross business receipts (or expenses when receipts are not relevant or attributable) are substantially higher than the 1996 estimate. A couple of factors related to the specific tenants actually occupying the USD might contribute to this discrepancy. First, using state-wide gross income per employee estimates probably underestimates the gross receipts for businesses located in the major urban area of the state. Further, the state-wide proportions of the different categories of employment used to estimate the overall gross receipts per employee probably underestimate the proportions of the higher wage activities, such as consulting or legal services, that would appear in first class office space in the major metropolitan area for the state. Second, a new breed of business emerged after the 1996 study. Internet retailers, two of whom occupy the site, have much higher receipts per employee than the typical businesses expected to occupy the site in 1996. For example, Blue Nile, the jewelry and diamond internet retailer, has $1.5 million in sales per employee, nearly eight times the average for all tenants.[9]

Current wage patterns at the USD reflect the predominance of organizations with high percentages of information technology workers and skilled business professionals. Average earnings per employee are about $94,000 per year, more than double the national average for full-time workers and about 150 percent of the average for college graduates in the United States. These patterns have emerged even though a large portion of the space is occupied by government offices, where wages tend to be near the average. While, as stated earlier, the higher construction costs in the 2003 report are related in part to the larger size of the actual development, they are also associated with the choice of tenant improvements of higher quality than expected. This is consistent with the existence of higher wage employees, who typically expect a higher quality work environment. The higher wage tenants can also account in part for the lower actual employment observed in 2003, since a higher quality work environment likely includes greater square feet per employee than the average assumed in the 1996 projections.

While the adjustments for project size and general economic factors reduced the amounts by which the original projections underestimated income and construction expenditures, they increased the overestimation of city tax revenues. The tenant mix might also explain some of the difference in estimated tax revenues for the city of Seattle (see Table 7).

Seattle imposes a tax on the gross receipts of businesses (the Business and Occupation (B&O) Tax) with higher rates on professional and business services than rates on retail sales gross receipts. However, a significant fraction (14 percent) of the USD office space is currently used by government and non-profit organizations without taxable business gross receipts. Furthermore, a large block of property, the preserved Union Station Terminal building, was sold to Sound Transit and thus was removed entirely from the property tax rolls. On the other hand, personal property was assessed at 14 percent of construction costs in 2003 (even after accumulated depreciation) rather than the 10 percent used in the 1996 report. The higher value of personal property perhaps reflects in part the higher income and often higher tech tenants actually

Union Station Development under construction, July 1999. (The Kingdome, lower left, was replaced with a new stadium.)

occupying the development. The greater use of technology, especially telecommunications, also likely contributed to higher than expected utility tax revenues.

Retail sales tax revenues were lower than expected because a sizable share of the retail space was occupied by banks and property managers. Offsetting that loss in part were additional taxes on retail revenues from the garages not foreseen in 1996.

Another factor differentiating the studies relates to the large volume of internet sales being conducted by companies in the development. This type of activity was not foreseen in the 1996 study. Many of these retail sales involve out of state consumers. Unfortunately, survey responses do not provide sufficient information to allow us to estimate accurately the volume of retail sales by internet firms that is subject to the Washington state retail sales tax. To be conservative, none of the e-commerce firms' sales receipts were included in the retail sales tax base. Thus, taxable retail sales receipts and retail sales revenues might be slightly underestimated in the 2003 study.[10]

SUMMARY AND RECOMMENDATIONS

Forecasting far into the future is never easy, yet economic and fiscal impact analysis for any new proposed development requires just that, since most projects are expected to last many years. Even small errors in estimates can cumulate over time, leading to diverging paths between the forecast and the actual impacts. On the other hand, the forecast and actual impacts might be close simply as a result of offsetting errors, i.e., the blessing of St. Offset. In spite of the inherent difficulty of the process, the demand for impact analysis estimates continues. Our experience in attempting to determine the actual economic and fiscal impacts of a large urban commercial development eight years after the original projections has left us with some thoughts regarding issues to consider when conducting the original impact analysis and any subsequent comparison

Table 7

Comparison of Tax Base and City of Seattle Revenue Impacts

	*Adjusted 1996 Projection**	*2003 Estimates*	*Difference as a % of 1996 Adj.*
TAX BASE			
Business Gross Receipts Tax Base	$698,892,136	$524,513,460	-25%
Retail Sales Tax Base	$10,860,910	$ 6,362,874	-41%
Utilities Tax Base	$ 3,957,533	$ 6,323,910	60%
Real Estate Tax Base, buildings only	$ 263,981,649	$177,402,500	-33%
Personal Property Tax Base	$ 26,398,165	$35,289,994	34%
TAX REVENUES (City of Seattle)			
Business Gross Receipts Tax	$2,869,906	$1,546,362	-46
Retail Sales Tax	$92,318	$54,084	-41
Utilities Tax	$237,453	$379,435	+60
Real Estate and Personal Property Taxes	$1,038,627	$596,233	-43
Total Tax Revenues, City of Seattle	**$ 4,238,304**	**$2,578,117**	**-39%**

* Adjusted for project size, inflation, productivity increases, and occupancy rate.

Left: The Union Station entry way, during construction.

Right: Union Station entry way after construction.

with the actual results.

Our estimates of the economic and fiscal impacts as of 2003 for the Union Station Development in Seattle differed in a number of respects from the forecasted impacts made in 1996 prior to construction. Several of the differences relate to changes in economic conditions and the project itself. Some differences arise from an actual tenant mix different from that assumed in the initial impact study. In some cases, methodological changes in the earlier study might have produced estimates closer to the 2003 results; in many cases, key parameter changes would have been very hard to predict. We summarize below what we view as the key sources of the differences in the results between the two impact studies and follow with a few recommendations.

Differences associated with project and economic assumptions:

1. Changes in project size and configuration. In this case the changes were small. However, these types of changes are very important, since space drives employment and income estimates and thus, directly and indirectly, determines the tax base for important local revenue sources.

2. State of the economy. The post-construction analysis took place during the early stage of recovery from a recession, not consistent with the long-run steady state assumption underlying the initial study. The effect of economic cycles on the economic and fiscal impacts of a particular project could be interesting and important to know, but any comparison of before and after studies needs to be based on similar economic states.

3. Inflation. Inflation was not considered in the original study. Assuming constant prices is common in impact analyses, where costs and benefits are thought to be affected equally by general price level changes. Comparisons between studies over time though do require an adjustment for inflation.

4. Productivity growth. Productivity changes were not considered in the original study, yet they can be important where employment is used as the driver for estimating business income.

Differences associated with tenant mix assumptions:

1. Tenant mix and fiscal impacts. The mix of tenants assumed by the original study did not exactly match the actual in 2003. The tenant mix can affect personal property values, and thus property tax revenues, and perhaps tax rate categories for certain business income taxes. Designated retail space might not yield expected sales tax revenues if it is occupied by tenants such as banks or property managers. Use of various utilities, e.g., telecommunications, could be affected by the tenant mix, with impacts on associated tax revenues.

2. E-commerce activities. The effect of e-commerce activities on retail sales and sales tax estimates for that location was not considered in the 1996 study. Forecasting and treating e-commerce sales may become an increasing problem in future business development impact analysis.

3. Non-revenue generating activities. Government agencies and the back office operations of private firms were not included in the tenant mix of the initial study. In the case of government occupancy, one could argue that society values the activity by the value of the actual expenditures, as well as the tax revenues forgone, when it occupies space that could be occupied by revenue generating business-

It goes without saying that the accuracy of surveys depends on engaging the participation of the tenants. When an office complex has multiple tenants, you can expect that not all tenants will provide complete responses to surveys requesting private information. Property managers are invaluable in providing basic information on tenant characteristics. Their cooperation and letters of introduction provide valuable credibility for the survey and motivation to tenants to participate.

es. For the business support services, the issue is more one of where the income and any related taxes will be attributed. Any attribution method will have some degree of arbitrariness and be a source of possible error.

4. Use of state-wide averages. State level averages on income per employee were used in the original study, yet a case can be made for different (higher) values for a modern facility in a large urban setting.

This list simply suggests some possible sources of difference between projected and actual economic and fiscal impacts for a commercial office development project and is by no means comprehensive. Whether any given difference is considered large or small depends on the loss function of the user of the study. The relative, not absolute, size of the error and how the estimate feeds into other impacts would seem to be critical in evaluating the accuracy of impact studies. Is what is being estimated a driver for other values; is it a big proportion of the projected impacts? We recommend that sensitivity analysis be considered to isolate the key drivers of the impact results and to give users the tools to engage in some "what if" kinds of analyses. For example, how would the results differ if the project office space were to increase by 10 percent, if 20 percent of the total space were occupied by non-revenue generating activities, or if the average income per employee were 10 percent above the state-wide average.

Finally, we must recognize that even though we can observe actual activity after the project is completed, our vision is not perfect. It goes without saying that the accuracy of surveys depends on engaging the participation of the tenants. When an office complex has multiple tenants, you can expect that not all tenants will provide complete responses to surveys requesting private information. Property managers are invaluable in providing basic information on tenant characteristics. Their cooperation and letters of introduction provide valuable credibility for the survey and motivation to tenants to participate. Without their cooperation, unless the analyst conducting the survey has prior contacts with the tenants, he or she will have a difficult job convincing them to divulge proprietary data. We found that the developer, unless also serving as the property manager, is unlikely to have sufficient influence with the tenants to encourage participation.

We recommend that more "before and after" analyses be conducted and published to help identify potential sources of forecast error. This shared experience can help analysts improve methodology and avoid repeating errors. We hope this case study adds to our knowledge both of impact analysis and the issues involved in making valid before and after comparisons.

NOTES

1 Some examples of fiscal and economic impact analysis are: Brooks (1984) and Braun (1990).

2 Some examples of post-construction assessment are Connaughton and Madsen (2001) and Sanders (2001). Bernthal and Regan (2004) is one of many assessing the impact of sports venues and events.

3 Nitze-Stagen, Inc., the developer of the property, contracted with the authors to perform this study. The authors wish to thank Kevin Daniels, President of Nitze-Stagen and his staff for their support of this research.

4 For a guide to fiscal impact analysis methodology see Burchell, Listokin, et al (1985). A PC-based fiscal impact model developed by Georgia Tech is discussed in Lann, and Riall (1999).

5 A recent example of these types of impacts applied to employment can be found in Phillips, Hamden and Lopez (2004).

6 To avoid potential bias, we chose to not contact the author of the original analysis. The authors of this article are responsible for any misinterpretations of the original report.

7 The original study also estimated revenue effects on the county and state and possible impacts on city government expenditures. This article focuses on the revenue effects on the city of Seattle.

8 The occupancy rate for downtown Seattle office space averaged 91 percent over the 1993 to 2003 period, a period that encompassed a full cycle from trough to trough.

9 The 2003 study used an estimate of Amazon.com's expenditure at the site rather than prorated receipts to reflect the business support nature of the activities. Otherwise the discrepancy between the studies would have been much larger.

10 We excluded e-commerce sales from the sales tax base. If we assume that 2 percent of Amazon.com's and Blue Nile's gross receipts is taxable retail sales in Washington state, and allocate a portion of those sales to Union Station activity, our estimate of city tax revenues increases by about $192,000. This would reduce the discrepancy to –35 percent.