2012

Economic Impact of Intel's Oregon Operations

PREPARED BY:

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ECONorthwest is solely responsible for its content.

ECONorthwest specializes in economics, planning, and finance. Established in 1974, ECONorthwest has over three decades of experience helping clients make sound decisions based on rigorous economic, planning and financial analysis.

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PURPOSE OF THE REPORT

Intel Corporation ("Intel") commissioned ECONorthwest to estimate the economic impacts associated with Intel's Oregon operations. This is the fourth analysis of Intel's economic impacts in this state, all of which have been conducted by ECONorthwest. The first analysis, covering Intel's Oregon operations from its inception in 1974 through 1997, was produced in October 1998. The second analysis covered the 1998 to 2001 time period, and was released in February 2003. The third effort measured the economic impacts associated with Intel's Oregon operations between 2005 and 2009, with a focus on economic impacts in 2009. The current analysis focuses on measuring the economic and fiscal impacts of Intel's 2012 Oregon operations.

All of the economic and fiscal impacts reported in this study are gross impacts and do not represent net impacts. These gross impacts represent an upper bound estimate of the economic activity that can be traced back to the company, but do not necessarily reflect or measure the creation of new jobs or income.

BY THE NUMBERS

STATEWIDE IMPACTS

1 Intel is largest private employer in the state of Oregon

16,500 | The number of Intel employees in Oregon

3.1 | Jobs created statewide for every direct job at Intel

67,579 | Total jobs attributable to Intel statewide

$5.4 billion | Total income generated statewide by Intel

5.3% | Amount of income in the state generated by Intel

$79,207 | Average gross personal income for Intel's direct, indirect, and induced jobs statewide

$43,643 | Average gross personal income in Oregon

$26.7 billion | Total economic impact of Intel

8.7% | Percent of Oregon output attributable to Intel

$136 million | Property tax revenue generated by Intel

$192 million | Personal state income tax revenue generated by Intel

PORTLAND METRO

9.2% of jobs and 6.1% of personal income in the Portland-metro area

WASHINGTON COUNTY

16.7% of jobs and 25.2% of personal income in Washington County

INTEL'S HISTORY IN OREGON

Intel Corporation has a long history as a technology innovator and supporter of education within the high-tech industry and the Silicon Forest of Oregon. Founded in 1968, Intel expanded beyond California for the first time when it bought property in Aloha in 1974. The attractions were an abundant water supply, reasonably priced electricity, a strong education system and labor force, and the convenient travel distance from the Silicon Valley.

On January 30, 1974, *The Oregonian* reported that, "a major electronics manufacturer has taken options on a site in Washington County for a plant..." That company was Intel, which had reported sales of $66 million in 1973. *The Oregonian* cited comments by Intel co-founder, Gordon Moore on why Intel chose Oregon: "Oregon is one of the few places we've found where people still take pride in their work," Moore said. "This state has a stable, well-trained labor force. As a growing company, we have to be assured of a supply of energy. We couldn't get that assurance in the Bay area, but we got it here."

A welcome to the state given by Secretary of State Clay Myers bore the tone of a return salute. "This is a high-growth and labor-intensive kind of industry that is good for the state," Myers said. "Intel will provide many jobs with a maximum of energy conservation." Intel broke ground on the Aloha Campus on April 3, 1974 and the campus opened in 1976 with just a few hundred employees. Intel's presence from that point forward helped position Washington County as the center of Oregon's growing technology industry.

Six campuses in Washington County comprise Intel's largest and most comprehensive site in the world – a global center of semiconductor research and manufacturing and the anchor of Oregon's economy.

Intel's Oregon operations have since transitioned from a small manufacturing fab in Aloha to six campuses in Washington County, which comprise Intel's largest and most comprehensive site in the world – a global center of semiconductor research and manufacturing and the anchor of Oregon's economy.

As Intel grew, it stimulated other high-tech companies to locate in the area. "Intel has made Hillsboro the economic engine for the entire state," Gordon Faber, Hillsboro's mayor said in 2000. "It's impossible to find a high-tech company in Washington County that isn't touched, if not founded, by someone from the world's largest chip-maker," added *The Oregonian* that same year.

Intel's advancements in technology, position in the market, and quality brand name draw suppliers close to its US fabrication sites and can pave the way for additional foreign direct investments into the US. Many of Intel's global suppliers have set up distribution, sales, and supply companies here in the US in order to be closer to Intel and better integrate into Intel's supply chain. An Intel executive who works directly with suppliers commented, "We see suppliers opening applications labs and supply bases within a mile or two of our campus. Japan-based companies and European-based companies have opened sites near our Oregon campuses to get in front of our people and to work closely with Intel."

Intel's suppliers in Oregon receive some of the most significant benefits of the Intel relationship. These suppliers have access to Intel's talented workforce and strategic consulting, as well as materials, equipment, and ideas not available elsewhere in the technology market. Intel's Oregon-based suppliers are strategically located to reduce logistics-related expenses and take part in the cluster's exchange of capital, workforce, and innovation. By responding to Intel's supply requirements, local vendors grow their capabilities and create further self-sustaining opportunities for growth. The gravitational pull of Intel creates supply-chain clusters in each of their manufacturing locations. As the President of a local Oregon Chamber of Commerce described, "As a native Oregonian, I have seen the ecosystem and watched it grow. Their supply chain wants to be located close to Intel which then draws other companies."

Although Intel has been contributing to Oregon's economy since 1974, the leaps in the site population and capital spending in Oregon have principally occurred since 1993, when the Oregon Legislature passed a bill creating the Strategic Investment Program (SIP). The SIP is a tax-equity program established to encourage investment in

Oregon by capital intensive, above-average wage industries making new investments in Oregon. Intel negotiated its first two SIP agreements in 1994, a third in 1999, and a fourth in 2005. Intel has fulfilled the investment portions of the 1994 and 1999 agreements and is currently investing under SIP'05.

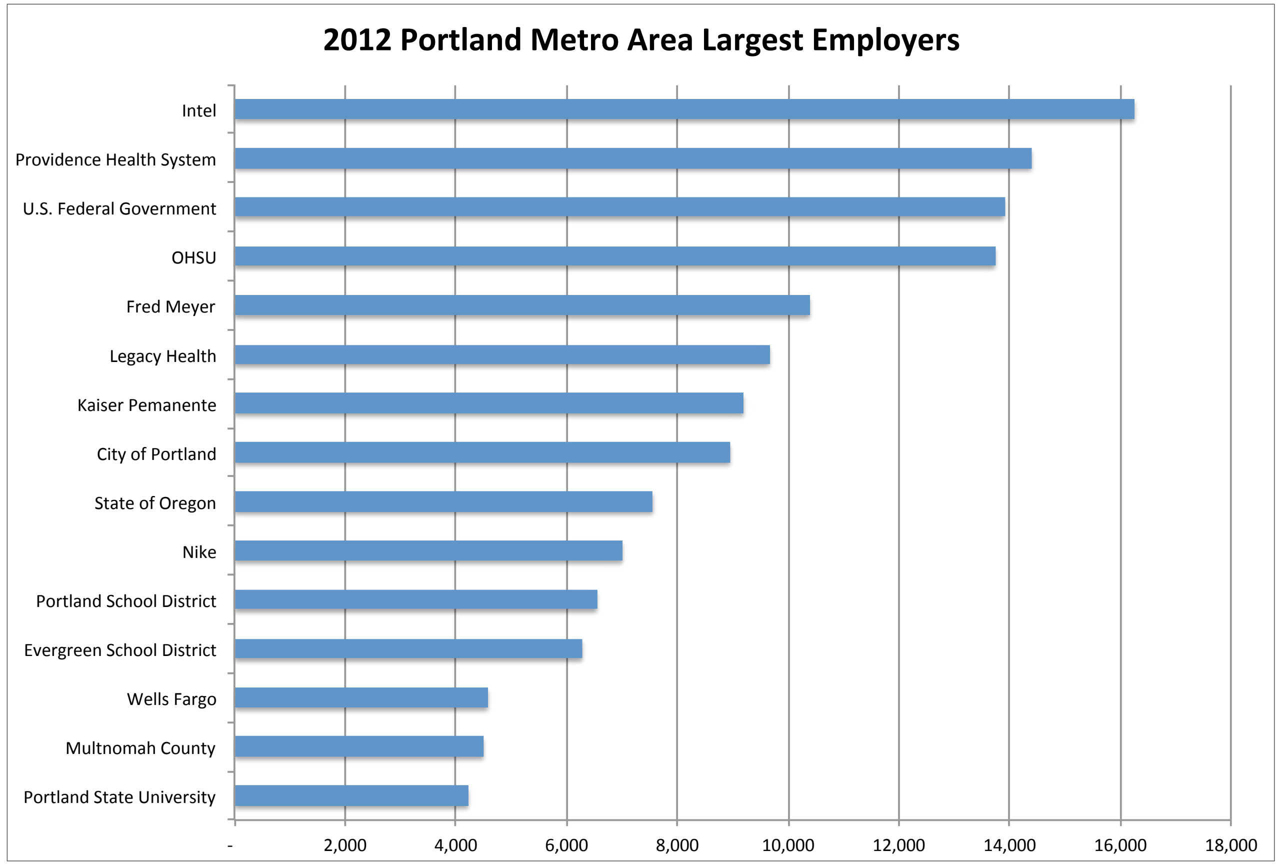
Taken together, Intel's Oregon operations now make up Intel's largest concentration of facilities and talent in the world. At the same time, with a site population of approximately 16,500 at the end of 2012, Intel has become Oregon's largest private employer.

INTEL AND THE OREGON ECONOMY

Most of this report focuses on precise estimates of the jobs, income, and outputs generated by Intel's activities in Oregon. But before reporting the details, it is important to understand the general role that Intel plays in the Oregon economy as major traded-sector manufacturer.

Metropolitan and state economies consist of local and traded-sector firms. The local sectors sells services to people inside the region or state. They include retailers, wholesalers, restaurants, entertainment providers, as well as sizeable shares of the finance, legal, healthcare, and education sectors. A vibrant local-sector is the foundational capacity of an economy. Traded-sector firms, like Intel, design products for sale outside the region or state. They attract dollars into the area, which they in turn spend on direct labor, suppliers, and the full array of local sector services.

Figure 1. 2012 Portland Metro Area Largest Employers



Source: Portland Business Journal

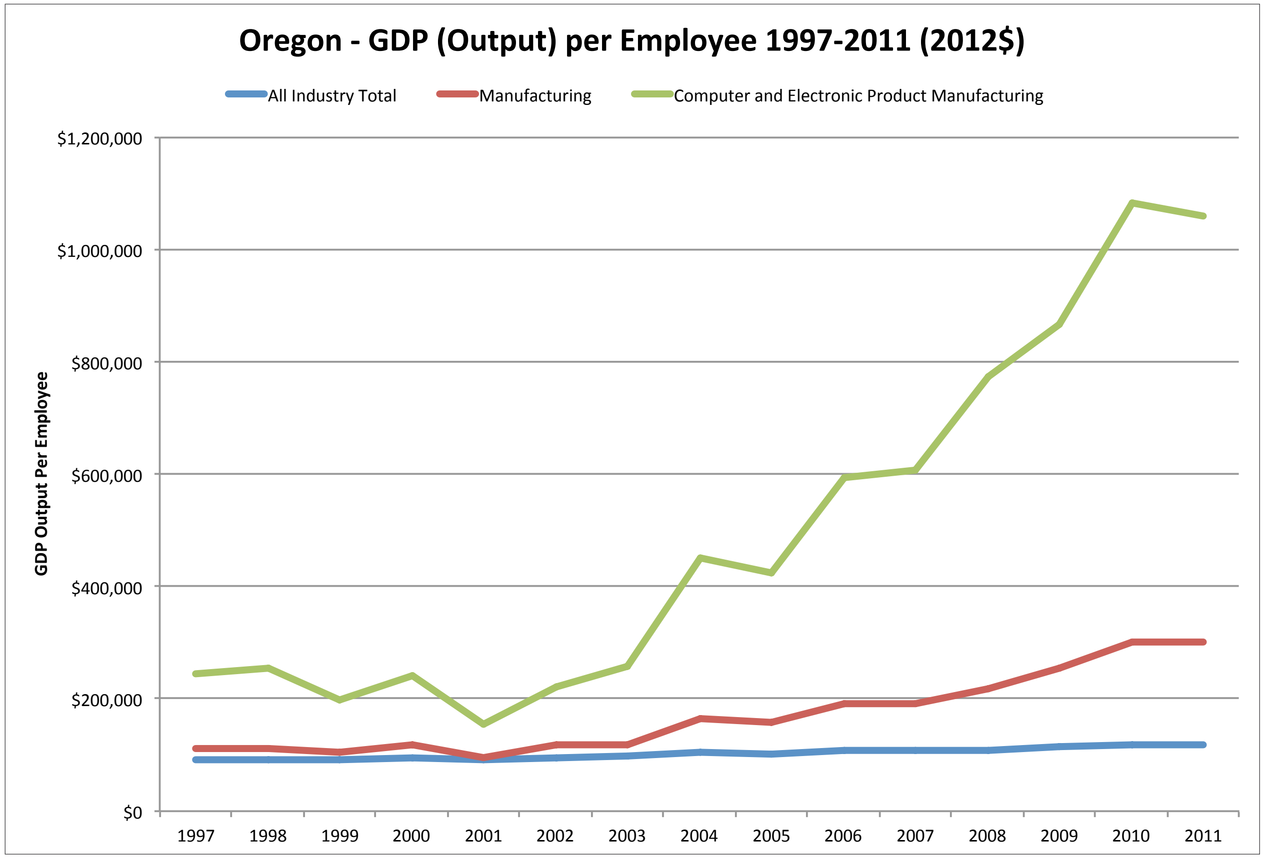
Figure 1 displays the 15 largest employers in the Portland-metro area for 2012. Intel was the largest employer and one of only two traded sector companies on the list. The majority of the largest employers are government agencies and health care providers.

During 1990-2008, the U.S. lost many traded sector firms because of globalization[1]. Generally, manufacturers with labor intensive, low-value added activities moved to countries with lower labor costs. The U.S. typically retained manufacturers that required highly skilled workers and whose processes added significant value to the goods they produced. The computer and electronics sector experienced explosive growth in worker productivity (or, value added per employee) because of continuous innovation in product design. The rapid growth in industry productivity was foreseen by Intel co-founder Gordon Moore, whose prediction is popularly known as "Moore's Law." Moore estimated that the number of transistors on integrated circuits would double about every two years—increasing chip performance.

Productivity gains in the computer and electronics sector are easily seen in Oregon's broad economic reports. For example, Figure 2 shows GDP in constant 2012 dollars (2012$) per worker in Oregon from 1997 to 2011 for selected industries. The real output (2012$) per employee in the computer and electronic manufacturing subsector increased from $243,000 in 1997 to $1.06 million in 2011. During the same period the average for all industries in Oregon increased from $90,000 to $120,000.

Intel co-founder Gordon Moore predicted that the number of transistors on integrated circuits would double about every two years—now popularly known as "Moore's Law."

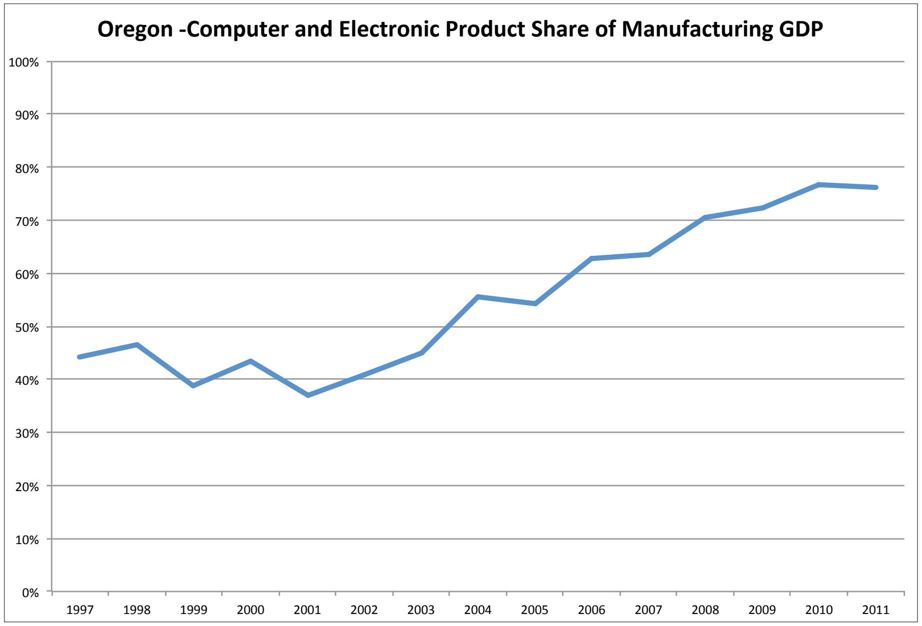
Figure 2. Productivity per Worker in Oregon from 1997 to 2011



Source: ECONorthwest, BEA, BLS

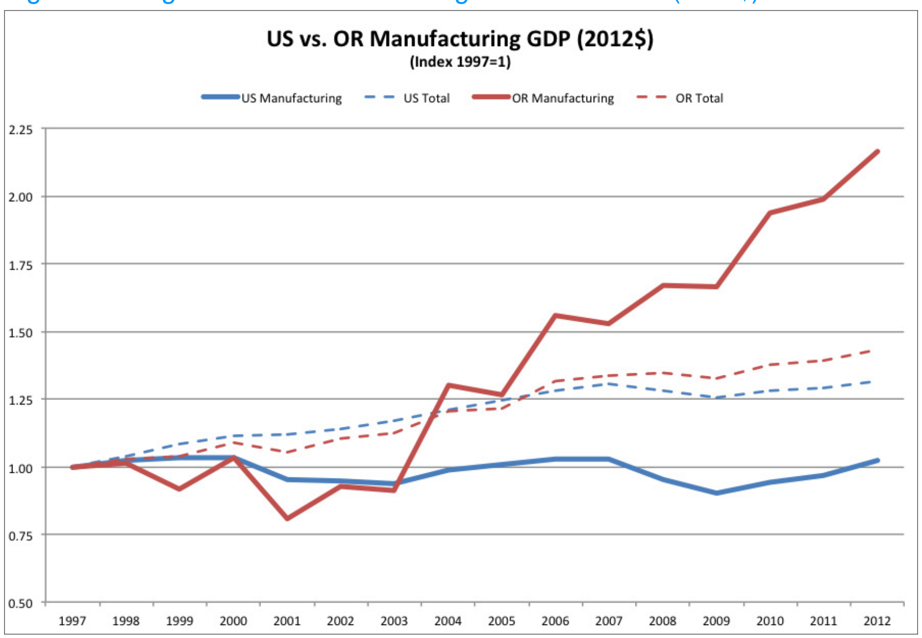
[1]See Spence, Michael and Sandile Hlatshwayo. March 2011. *The Evolving Structure of the American Economy and the Employment Challenge.* Council on Foreign Relations

Figure 3. Computer and Electronics Share of Oregon Manufacturing GDP



Source: ECONorthwest, US BEA

Figure 4. Oregon vs. US Manufacturing GDP 1997-2012 (2012$)



Source: ECONorthwest, US BEA

For Oregon, sizable computer and electronics employment levels combined with surging worker productivity has generated strong growth in Oregon's manufacturing GDP levels. In 2012, Oregon ranked second nationally (only behind Indiana) for the proportion of state GDP represented by the manufacturing sector (27.76%)[2]. While the share of the manufacturing sector as a proportion of total state GDP is large and has been increasing, the composition of the manufacturing sector has changed significantly from the late 1990s. Computers and electronics currently represent nearly 80% of the manufacturing sector in Oregon—the share has steadily increased from 37% in 2001 (see Figure 3).

Not only does manufacturing represent a large portion GDP, it has also been the fastest-growing sector in Oregon since 1997—increasing its share of GDP by 117%. Oregon's real GDP growth has slightly outpaced the U.S. since 1997—the manufacturing sector, however, has been responsible for 50% of GDP growth in Oregon compared to only 1% nationally from 1997 to 2012 (see Figure 4)[3].

Intel is clearly not responsible for all the good news in Oregon's GDP growth. But as the major player in the rapidly growing computer and electronics sector, the presence of Intel has significantly shaped the state's economic landscape.

[2]U.S. Bureau of Economic Analysis. Gross Domestic Product by State (millions of current dollars). http://www.bea.gov/itable/. Data extracted on October 24, 2013 from BEA website. Data last updated June 6, 2013.

[3]Ibid

METHODOLOGY

Economists have developed several approaches for measuring the economic impacts of companies—that is, their contributions to the communities in which they operate. The most common method estimates the economic impacts associated with a company's spending on payroll, non-payroll goods and services, capital investments, charitable contributions, and taxes. This method is often referred to as the "expenditure approach."

The expenditure approach is typically conducted within an input-output modeling framework. Input-output models provide a comprehensive picture of the economic activities in a given area using mathematical relationships that describe the flow of resources and commodities between local and non-local industries, households, and the final users of the goods and services. This input-output analysis is conducted using a software program called IMPLAN[4]. See the appendix for a more complete discussion of the methodology, limitations, and appropriate interpretation of economic impacts.

Economic impact analysis employs specific terminology to identify different types of economic impacts. *Direct* impacts are those associated with payroll and employment at Intel. They also include the direct output of Intel's activities in Oregon, which is estimated using labor and non-labor operating expenses.

IMPLAN estimates *indirect* impacts using data on Intel's purchase of goods and services from other Oregon-based businesses. These businesses, in turn, purchase a wide array of intermediate goods and services they need to operate. Because these purchases represent interactions among businesses, indirect effects are often referred to as "supply-chain" impacts. The resulting direct and indirect increases in employment and income enhance overall economic purchasing power, thereby *inducing* further consumption and investment-driven stimulus. These induced effects are often referred to as "consumption-driven" impacts.

Intel's economic impacts are measured at three geographic levels. First, we consider the economic impacts of Intel on Washington County. We then examine the spillover effects of Intel's Washington County operations on the three-county Portland-metro area[5]. Finally, we measure the total impacts for the state of Oregon[6].

Intel's economic impacts can be measured in several ways. This report focuses on three of the most common measures:

- Output represents the value of goods and services produced. This is the largest, most encompassing measure of economic activity and includes personal income (discussed below).
- Personal income consists of total payroll costs (including bonuses and benefits) paid to workers, as well as self-employment income earned by individuals.
- Jobs represent the number of people working full- or part-time jobs.

Under an expenditure approach, Intel's economic impacts in Oregon are attributed to its operating expenditures (payroll and non-payroll operating expenses), capital spending, charitable contributions, and taxes. The fiscal impact of Intel's operations will also be briefly summarized.

[4]The IMPLAN model is widely used and well respected. The United States Department of Agriculture (USDA) recognizes the IMPLAN modeling framework as "one of the most credible regional impact models used for regional economic impact analysis," following a review by experts from seven USDA agencies. IMPLAN was selected as the analysis framework for monitoring job creation associated with the American Recovery and Reinvestment Act (ARRA) of 2009.

[5]In this study, the Portland-metro area consists of Washington, Multnomah, and Clackamas counties.

[6]Economic impact models for each of the three geographic areas were built using IMPLAN 2011 data.

OPERATIONS

The approach used to measure the impacts associated with Intel's day-to-day operations of their Oregon operations is called "Analysis By Parts." This approach relies on detailed payroll and non-payroll operating expense data supplied by Intel to build a custom production (or expenditure) function of their Oregon operations. Intel supplied detailed operating costs for 2012, including item-by-item expenditures and the location of vendors. With this information we were able to over-ride the default regional purchase coefficients[7] for all directly affected sectors in IMPLAN and significantly improve the reliability of economic impact measures. Intel's products are sold throughout the world. As a result, almost all of the revenues used to support Intel's Oregon operations are from non-Oregon sources that were it not for Intel's presence in Oregon, likely would have accrued to businesses outside of the state. As such, the majority of economic contributions associated with Intel represent *net* gains for the economy. The economic impacts associated with Intel's operations in Hillsboro, Oregon, are not limited to Washington County. Intel's operations also generate significant spillover impacts for businesses and households in the three-county Portland-metro area and elsewhere in Oregon.

Table 1. Economic Impacts of Intel's 2012 Operations (in 2012 dollars)

Impact Area/ Type of Impact	DIRECT	INDIRECT	INDUCED	TOTAL
Washington County				
Output	$20,675,297,238	$213,539,643	$1,276,419,206	$22,165,256,088
Income	$2,784,916,096	$127,380,972	$448,523,825	$3,360,820,893
Jobs	16,576	2,647	10,893	30,116
Portland Metro				
Output	$20,675,297,238	$426,146,188	$2,173,726,316	$23,275,169,742
Income	$2,784,916,096	$207,350,181	$749,105,033	$3,741,371,310
Jobs	16,576	4,155	18,384	39,115
Oregon				
Output	$20,675,297,238	$435,263,957	$2,295,777,497	$23,406,338,693
Income	$2,784,916,096	$210,281,648	$788,281,584	$3,783,479,328
Jobs	16,576	4,224	19,368	40,168

Source: ECONorthwest, Intel, IMPLAN 2011

Table 1 summarizes the economic impacts from operations, including:

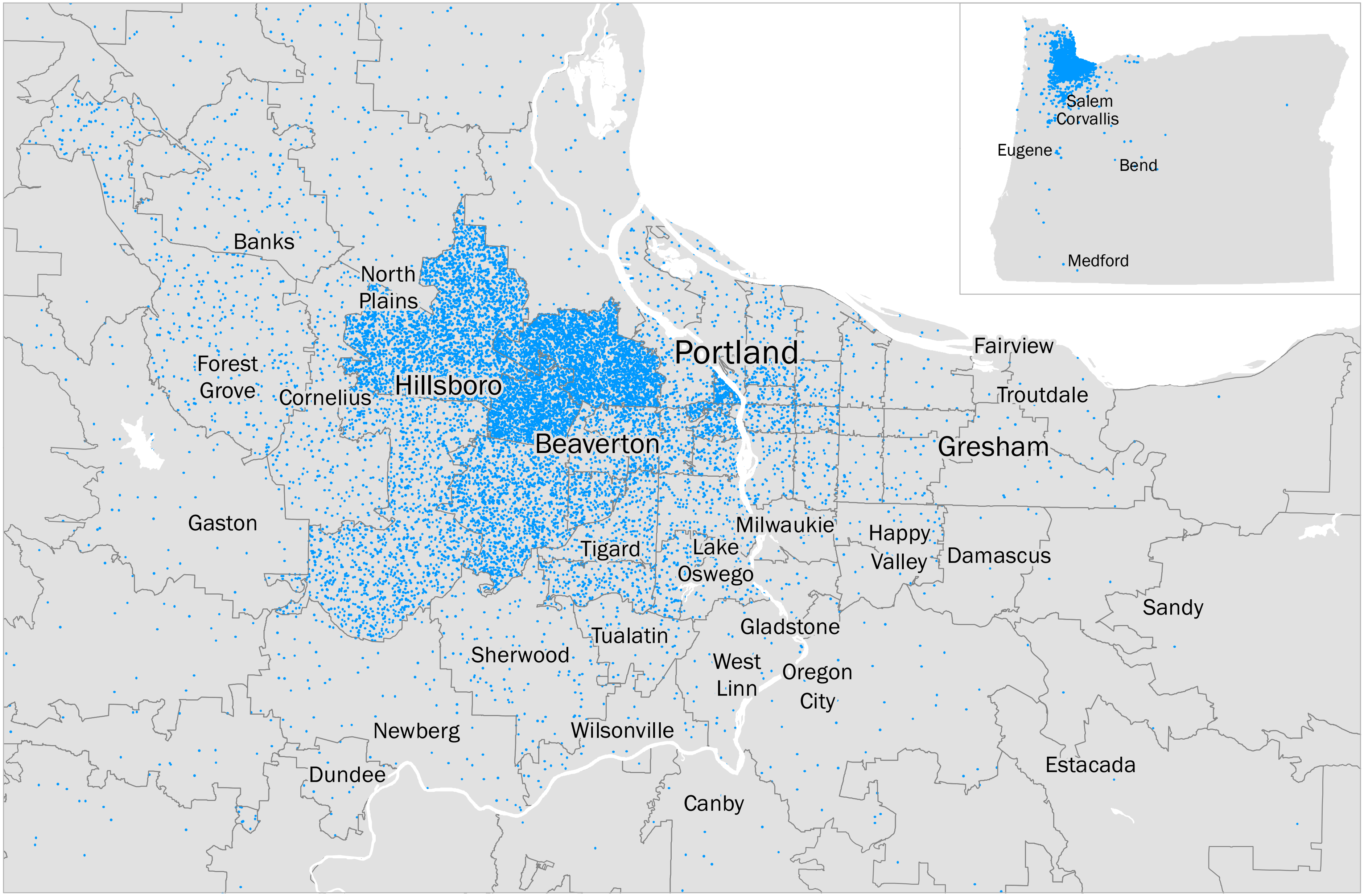
- $23.3 billion in economic activity, including $3.7 billion in personal income, and over 39,000 jobs in the Portland-metro area[8]
- Over 1,000 jobs in Oregon outside of the Portland-metro area

[7]Regional Purchase Coefficients (or RPCs) describe the ability of the study area economy to accommodate a change in final demand. IMPLAN has geographic-specific RPCs for each of the 440 sectors in the model. RPCs range from 0.0 to 1.0. An RPC of 0.0 demonstrates that the commodity is not available locally. An RPC of 1.0 indicates that all (100 percent) of the change in demand for the commodity can be satisfied by local industries.
[8]Output in this report was estimated based on the ratio of income to output for the semiconductor industry in Washington County using IMPLAN 2011 data.

Figure 5. Geographic Distribution of Intel's Oregon Employees' Residences

NUMBER OF INTEL EMPLOYEES

1 dot represents 1 Intel employee. Dot locations are randomly distributed within the zip code.

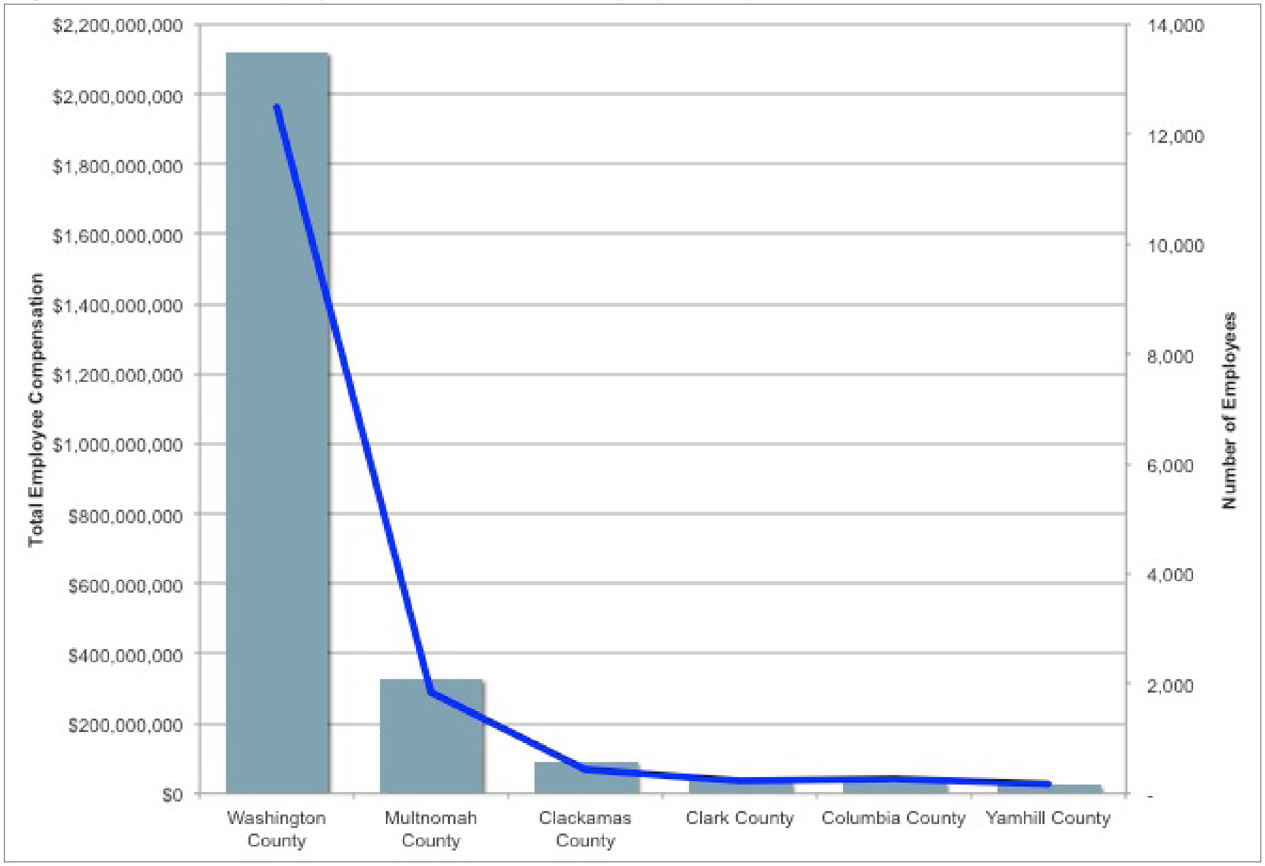


Source: ECONorthwest, Intel

Intel's Oregon operations are centered in Hillsboro; however, as shown in Figure 5. Geographic Distribution of Intel's Oregon Employees' Residences, Intel employees reside throughout the Portland-metro area and statewide. The dispersion of employees statewide helps spread the economic impacts associated with consumer spending to other parts of the region.

Figure 6 shows the distribution of of Intel's employee residence by county for 2012 and the total incomes (including benefits and bonuses) in each of the counties. More than 12,000 employees live in Washington County, earning more than $2 billion in 2012. The vast majority of Intel's employees live in Oregon, however about 250 reside in Clark County, WA, earning around $35 million in 2012.

Figure 6. 2012 Intel Employee Residence and Salary by County



Source: ECONorthwest, Intel

CAPITAL SPENDING

In instances where a company has ongoing operations and conducts a capital expansion project, the capital project represents an alternative or tangential activity. In order not to confuse this activity with ongoing operations, the direct and indirect impacts associated with project spending are generally classified as indirect impacts. Intel increased capital spending attributed to its Oregon locations from $2.5 billion in 2011 to $4.2 billion in 2012, which represents a nominal increase of 70%. Capital spending varies from year to year and generates economic impacts that are temporary in nature and unfold as investment spending occurs. Of the $4.2 billion in capital spending in 2012, approximately $1.7[9] billion was initially directly spent with Oregon suppliers; these dollars generate additional indirect and induced economic impacts, which are summarized in Table 2. The majority of indirect impacts reported accrue to workers and business owners in Oregon's construction sector or in supply-chain related enterprises.

Table 2. Economic Impacts of Intel's 2012 Capital Spending (in 2012 dollars)

Impact Area/ Type of Impact	DIRECT	INDIRECT	INDUCED	TOTAL
Washington County				
Output	$0	$1,773,574,146	$572,004,858	$2,345,579,003
Income	$0	$1,066,896,237	$201,107,662	$1,268,003,899
Jobs	-	15,102	4,800	19,902
Portland Metro				
Output	$0	$2,218,765,175	$961,429,073	$3,180,194,248
Income	$0	$1,262,955,805	$335,975,809	$1,598,931,614
Jobs	-	18,255	7,847	26,101
Oregon				
Output	$0	$2,340,998,307	$1,009,704,544	$3,350,702,851
Income	$0	$1,298,340,573	$350,410,350	$1,648,750,924
Jobs	-	18,996	8,251	27,247

Source: ECONorthwest, Intel, IMPLAN 2011

The economic impacts generated by capital spending include:

- Almost 20,000 jobs in Washington County, over 26,000 jobs in the Portland-metro area, and over 27,000 jobs statewide
- These jobs generated $1.6 billion in personal income in the Portland-metro area and $1.7 billion throughout Oregon
- Total output due to capital spending was $3.2 billion in the Portland-metro area and $3.4 billion statewide

[9] Indirect capital spending was calculated using IMPLAN 2011 data which attributes products directly manufactured in Oregon as well as the wholesale or sales markups for imported products attributable to Oregon retailers.

CHARITABLE CONTRIBUTIONS

Intel's economic impacts in Oregon include significant contributions to charities, nonprofits, and schools. When Intel makes cash contributions, the recipient uses those payments to purchase goods, services, or labor. Intel's donations of equipment and in-kind contributions free up program funds to spend on other goods and services. Both actions generate indirect and induced impacts, (as summarized in Table 4.) Intel's contributions from 2010 to 2012 are displayed in Table 3—since 2005, contributions have increased from $5.2 million to $7.3 million, an increase of 40%, or 5.8% annually.

The economic impacts generated through charitable contributions include:

- 131 jobs in the Portland-metro area and an additional 33 jobs elsewhere in Oregon
- Personal income of $6.6 million in the Portland-metro area and $7.3 million statewide

Since 2005, Intel's charitable contributions in Oregon have increased 40%, or 5.8% annually.

Table 3. Intel's Charitable Contributions, 2010 through 2012 (nominal dollars)

YEAR	Washington County	Portland Metro	Oregon
2010	$1,751,034	$5,924,656	$6,666,922
2011	$1,806,316	$6,055,489	$6,792,474
2012	$1,894,328	$6,238,426	$7,276,701
Total	$5,451,678	$18,218,571	$20,736,097

Source: ECONorthwest, Intel

Table 4. Economic Impacts of Intel's 2012 Charitable Contributions (in 2012 dollars)

Impact Area/ Type of Impact	DIRECT	INDIRECT	INDUCED	TOTAL
Washington County				
Output	$0	$2,213,164	$826,802	$3,039,966
Income	$0	$1,551,825	$290,685	$1,842,510
Jobs	0	33	7	40
Portland Metro				
Output	$0	$8,365,582	$4,139,086	$12,504,668
Income	$0	$5,196,191	$1,446,801	$6,642,992
Jobs	0	98	34	131
Oregon				
Output	$0	$9,483,561	$4,671,175	$14,154,736
Income	$0	$5,769,233	$1,553,490	$7,322,723
Jobs	0	124	40	164

Source: ECONorthwest, Intel, IMPLAN 2011

COMBINED ECONOMIC IMPACTS

The combined economic impacts from Intel's 2012 operations, capital spending, and contributions are listed in Table 5. All of the economic measures listed in Table 10 can be categorized as direct, indirect, or indirect impacts, which all contribute to a "multiplier effect".[10] Economic multipliers provide a shorthand way to better understand the linkages between a company and other sectors of the economy, with larger economic multipliers representing greater interdependence between a company's operations and the rest of the economy. The employment multiplier associated with Intel's 2012 operations is 3.0 for Washington County, 3.9 for the Portland-metro area, and 4.1 for the State of Oregon. A multiplier of 3 indicates that every one job at Intel is linked to an average of two jobs elsewhere.

Smaller economies will have a larger propensity to import and, as a result, smaller economic multipliers. However, Intel's spending has a particularly potent effect on the local and state economies for the following reasons: 1) Intel employees' above average wages support more consumption-related spending, 2) Intel has already developed strong supply-chain relationships with businesses in the Portland-metro area and the state, 3) Intel's supply-chain relationships are with local firms that, on average, have above average wages that will, in turn, support additional consumption-related spending.

Almost all the revenues used to support Intel's Oregon operations are from Non-Oregon Sources that, were it not for Intel's presence in Oregon, likely would have accrued to businesses outside the state. A such, the majority of the economic contributions represent net gains for the economy.

Table 5. Intel's 2012 Total Economic Impacts (in 2012 dollars)

Impact Area/ Type of Impact	DIRECT	INDIRECT	INDUCED	TOTAL
Washington County				
Output	$20,675,297,238	$1,989,326,953	$1,849,250,866	$24,513,875,057
Income	$2,784,916,096	$1,195,829,034	$649,922,172	$4,630,667,302
Jobs	16,576	17,782	15,700	50,058
Portland Metro				
Output	$20,675,297,238	$2,653,276,945	$3,139,294,475	$26,467,868,658
Income	$2,784,916,096	$1,475,502,177	$1,086,527,643	$5,346,945,916
Jobs	16,576	22,507	26,265	65,348
Oregon				
Output	$20,675,297,238	$2,785,745,826	$3,310,153,216	$26,771,196,280
Income	$2,784,916,096	$1,514,391,454	$1,140,245,424	$5,439,552,975
Jobs	16,576	23,343	27,659	67,579

Source: ECONorthwest, Intel, IMPLAN 2011

[10]The economic impact multipliers reported here are called Type SAM multipliers and are calculated as: (direct + indirect + induced)/direct.

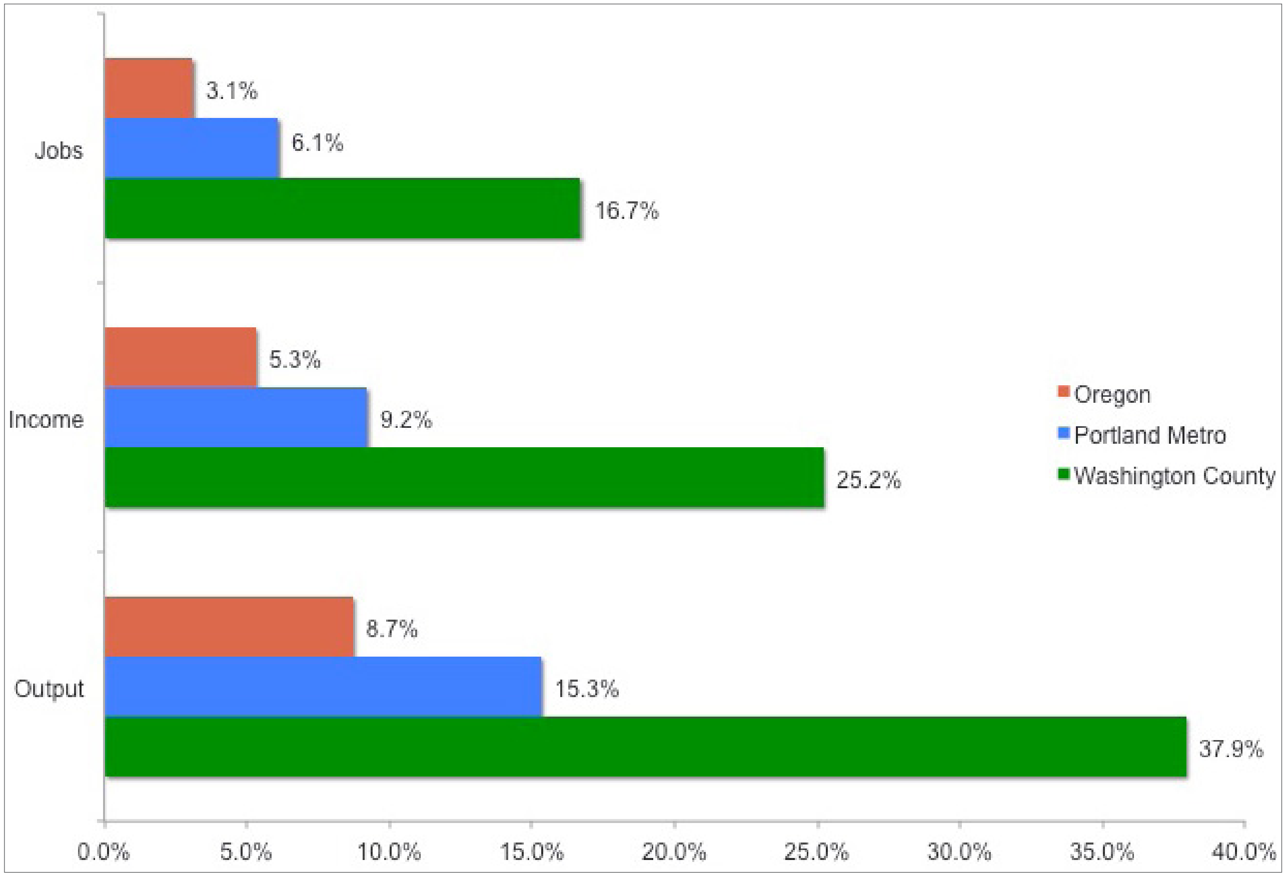
The key findings from Intel's combined economic impacts include:

- Intel directly employed 16,576 people in 2012, with an average annual income of $168,000. By comparison, the average annual income for an employee was $60,173 in Washington County, $51,374 in the Portland-metro area, and $43,643 in Oregon[11].
- The total number of jobs in the State of Oregon was 67,579, which accounted for $5.4 billion in personal income. The annual average gross personal income for Intel's direct, indirect, and induced jobs statewide was $79,207—81% higher than the 2012 state average of $43,643.

As displayed in Figure 7, the economic impacts of Intel's total operations represent a large share of regional output, personal income, and jobs.

- Intel's total output represents 37.9% of the Washington County total, 15.3% of the Portland-metro area total, and 8.7% of the state total.
- The economic impacts from Intel represent 16.7% of jobs and 25.2% of personal income for Washington County. Their impact is significant for the entire Portland-metro area, representing 6.1% of jobs and 9.2% of personal income.

Figure 7. Intel's Economic Impacts as a Share of Regional Total, 2012



Source: ECONorthwest, Intel, IMPLAN 2011

[11]2012 Covered Employment and Wages Summary Report. Oregon Labor Market Information System www.qualityinfo.org. Gross incomes include full benefits loads.

FISCAL IMPACTS

To measure the fiscal impacts from Intel's 2012 operations, the property and personal state income taxes generated directly, indirectly, and induced were calculated for the three geographic regions. The calculation is not representative all of fiscal revenues, but only for property and state income taxes. The following assumptions were used to calculate the fiscal impacts:

- The incomes used to calculate the fiscal impacts were all base incomes and do not include any benefits or bonuses. For Intel employees, the base salaries were provided directly to ECONorthwest. For all indirect and induced incomes, the figures provided by IMPLAN were reduced by 30.8% to account for benefits loading and bonuses[12].
- Personal state income tax revenue as a percentage of income was calculated for the entire population in each county in Oregon[13]. Direct, indirect, and induced incomes generated in each county were then multiplied by the county average to determine the estimated state income taxes generated.
- Property tax revenue as a percentage of income was calculated for each county[14]. Property taxes for residential and multifamily housing were used to represent the income spent on personal residences, thereby excluding property tax for commercial properties.
- The direct, indirect, and induced incomes generated in each county were multiplied by the percent of county average income spent on property tax to determine the estimated revenues.
- Direct property taxes[15] represent the property taxes paid directly by Intel.
- Indirect property taxes are calculated based on the indirect income generated multiplied by the county average where the income is earned.
- Induced property taxes include the property taxes generated by Intel employee income based on their county of residence as well as the other induced income multiplied by the county average where it is earned.

Table 6. Fiscal Impacts from Intel's 2012 Operations (in 2012 dollars)

Impact Area/ Type of Impact	DIRECT	INDIRECT	INDUCED	TOTAL
Washington County				
Property Tax	$20,825,864	$27,476,857	$57,600,705	$105,903,426
Income Tax	$89,836,429	$47,064,375	$25,579,058	$162,479,862
Total Fiscal Revenue	$111,630,846	$74,541,232	$83,179,763	$268,383,287
Portland Metro				
Property Tax	$20,825,864	$34,411,905	$77,772,782	$133,010,551
Income Tax	$89,836,429	$57,635,249	$42,081,542	$189,553,220
Total Fiscal Revenue	$111,630,846	$92,047,154	$119,854,325	$322,563,772
Oregon				
Property Tax	$20,825,864	$35,064,006	$79,626,324	$135,516,194
Income Tax	$89,836,429	$58,733,974	$43,599,212	$192,169,614
Total Fiscal Revenue	$111,630,846	$93,797,979	$123,225,536	$327,685,808

Source: ECONorthwest, Intel, IMPLAN 2011, Oregon Department of Revenue, US Census

Table 6 lists the fiscal impacts generated from Intel's 2012 Oregon operations, the following revenues were generated:

- $290 million in fiscal revenue for Washington County, and $344 million for the Portland-metro area.
- $136 million in property tax statewide, $192 million in personal state income tax, and total fiscal impacts of $329 million in the state.

[12]BLS National Compensation Survey, http://www.bls.gov/ncs/data.htm [13]Oregon Department of Revenue, US Census [14]Ibid
[15]Intel Corporation paid Washington County $20,825,864 in Real and Personal Property Taxes for the 2012-13 tax year. In addition, Intel also paid $11,151,987 in SIP contract payments for the 2012-13 tax year. Of those SIP contract payments, $5,501,987.24 are fee in lieu of real property tax payments. For the 2012-13 tax year Intel paid a total of $31, 977,851 in property taxes and SIP payments.

Appendix: Overview of Economic Impact Analysis Using IMPLAN

APPENDIX: OVERVIEW OF ECONOMIC IMPACT ANALYSIS USING IMPLAN

Introduction

Researchers, policy makers, industry officials, and others are often interested in measuring the change in regional economic activity resulting from an initial stimulus such as a business expansion project, a change in government policies, or the entry of an industry. Economic impact analysis provides a framework for analyzing these changes. One economic modeling framework that captures the direct, indirect, and induced effects of spending on a project is called input-output modeling. Input-output models provide an empirical representation of the economy and its inter-sectoral relationships.

Input-output models are mathematical representations of the economy that show how different parts (or sectors) are linked to one another. These models are built on a mathematical input-output (I-O) framework developed by Wassily Leontief, a Nobel laureate in economics. The strengths of the input-output modeling framework include:

- A double-entry accounting framework that results in a model structure that is well-ordered, symmetric, and where, by definition, inputs must be equal to outputs;
- A reasonably comprehensive picture of the economic activities within a region, with mathematical equations that describe the flow of commodities between producing and consuming sectors, the flow of income between businesses and institutions, and the trade in commodities between regions;
- Model construction using secondary source data that are gathered and vetted by government agencies; and
- The ability to cost-effectively create input-output or economic impact models for any region.

In general terms, the IMPLAN model works by tracing how spending associated with an industry circulates through an economy or study area. That is, changes in one sector or multiple sectors trigger changes in demand and supply throughout the economy. Initial changes in the model spread through the economy via supply- and demand-chain linkages, altering the equilibrium quantities of inputs and outputs and associated jobs, income, and value-added. These multiplier effects continue until the initial change in final demand leaks out of the economy in the form of savings, taxes, and imports.

Input-output models that rely on survey or primary source data are expensive to construct. As a result, special modeling techniques have been developed to estimate the necessary empirical relationships. These techniques use a combination of national technological relationships and state- and county-level measures of economic activity, and have been packaged into the IMPLAN (for IMpact Analysis for PLANning) modeling software. This is the modeling system ECONorthwest often uses in its analysis.

The Origins of the IMPLAN Model

IMPLAN was developed by the Forest Service of the US Department of Agriculture in cooperation with the Federal Emergency Management Agency and the Bureau of Land Management of the US Department of the Interior to assist federal agencies in their land and resource management planning. U.S. government agencies, other public agencies, and private firms including ECONorthwest have applied the model to a wide variety of public and private sector projects.

IMPLAN has been distributed by the Minnesota IMPLAN Group, Inc., since 1993. The IMPLAN modeling system is widely used and well-respected—there are currently more than 1,500 public and private users of the IMPLAN modeling software. The selection of IMPLAN by the United States Department of Agriculture (USDA) as its analysis framework for monitoring job creation associated with the American Recovery and Reinvestment Act (ARRA) of 2009 is a testament to its credibility.

The model is distinguished from typical input-output models in that it is not survey-based; survey-based input-output models place significant demands on data, and are uneconomical to apply in most situations. Rather, IMPLAN employs secondary source data, available by state, county and zip code, to define a model for any region in the United States.

Two sources of data are particularly central to the IMPLAN models: the National Income and Product Accounts published annually by the Bureau of Economic Analysis (BEA) of the U.S. Commerce Department, and the BEA input-output model for the United States. The IMPLAN modeling process utilizes the national input-output model and county- and zip code-level economic activity data to derive input-output models for units as small as a zip code, although county-level data is more commonly used as the smallest unit.

The process that develops the county-level input-output model generates coefficients that are internally consistent, in that county data sum to state totals and state data sum to national totals. This generally is not the case with survey-based input-output models, which limits their applicability to large-scale projects that affect a number of interrelated regions. (Arguably, however, an input-output model estimated from survey data has more accurate coefficients, because the survey can be customized to the problem at hand. In contrast, IMPLAN derives its coefficients using a combination of the national input-output survey model and local activity data; conceivably, this will produce somewhat different results from a direct, local survey. Given the difficulty and expense of input-output surveys, however, the disadvantages of the IMPLAN approach are slight.)

Scope of the IMPLAN Analysis

Economic impact analysis distinguishes between direct, upstream, and downstream impacts. Figure 1 summarizes the types of upstream and downstream impacts. The terms refer to the economic relationships between the services associated with economic action being analyzed and the broader regional economy. Activities associated with the economic action itself, including construction and operations, count as direct impacts.

Most commonly, economists follow the upstream impacts, which result from the projects' spending on all the goods and services it buys locally and on the payroll for its workers. Impacts continue moving upstream as suppliers and employee households spend money, triggering more spending and employment in the local economy. Using an input-output model, we can then follow the subsequent impacts going upstream to suppliers and induced household spending in the economy. Downstream impacts are largely associated with changes in prices to goods and services as a result of the project or action. In many cases the economic action being considered will have no – or minimal – effects on prices (due to the scale of the action with respect to regional, national and global markets) and therefore are not estimated.

Limitations of Input-Output Models

Like many quantitative tools, input-output models rely on a set of assumptions. The use of simplifying assumptions imposes certain limitations on the use of input-output modeling. These limitations should be fully understood and guide its use.

Input-output models are static models that measure the flow of inputs and outputs in an economy at a point in time. With this information and the balanced accounting structure of an input-output model, an analyst can: 1) describe an economy at one time period, 2) introduce a change to the economy, and then 3) evaluate the economy after it has accommodated that change.

This type of analysis is called "partial equilibrium" analysis. Partial equilibrium analysis permits comparison of the economy in two separate states, but does not describe how the economy moves from one equilibrium to the next. In partial equilibrium analysis, the researcher assumes that all other relationships in the economy remain the same (other than the initial economic stimulus).

Contrary to dynamic models, static models assume that there are no changes in wage rates, input prices, and property values. In addition, underlying economic relationships in input-output models are assumed constant, i.e., there are no changes in the productivity of labor and capital, and no changes in population migration or business location patterns.

Input-output models have fixed production relationships, including the following assumptions:

- Constant Returns to Scale means that an industry's production function is linear, and an increase in output requires all inputs to increase proportionately.
- Fixed Commodity Input Structure means that input-output models do not allow changing input prices to affect the production decisions of businesses.
- No Supply Constraints means input-output models show how local industries respond to some initial change in final demand, but assume that supplies of raw materials and intermediate goods are unlimited.
- Sector Homogeneity, in input-output modeling, means industry sectors are assumed to be homogenous. That is, all businesses within an industry sector 1) produce commodities in fixed proportions and 2) produce identical commodities that are perfectly substitutable.

Furthermore, economic impact analysis does not typically measure the potential economic development impacts of construction and expanded operations associated with a project or economic action. Large investments in infrastructure can start a cycle of economic expansion, which economists refer to as an expansion of the "production possibilities frontier" of the economy. Such an effect is difficult to quantify at best, though local infrastructure improvements could lead to other businesses such as manufacturers, located in and around the project of interest.

Economic impact analysis, on its own, cannot tell us whether a project or economic action improves the efficiency of the economy. This is true, in part, because of the fixed relationships amongst factors of production and fixed prices for consumers. Substitutions away from higher cost conditions cannot take place in input-output models. As a result there is no direct accounting for consumer or producer surpluses. It is also true that the measures employed in input-output models are measures of levels in the economy and not values in the way prices represent value. So, for example, expenditures on clean up in the case of a polluting activity will result in new jobs and output even though the pollution itself harms the economy rather than enhances the economy.

Typically economic impact analysis does not assess potential counterfactual scenarios that consider how scarce resources would have been allocated, should the proposed project or economic action never occur. It does not consider how funding and operating the project could divert spending from other potential uses (in economics, this is termed the "substitution effect"). This kind of analysis assumes that if the investments are undertaken willingly by private entities the investment is a first-best use of those resources. If it is a public action then the assumption is that the action has been judged as meritorious with respect to other competing uses of funds. The analysis also assumes that access to national and international capital markets is unrestricted and that this investment does not drive out other worthwhile investments.

For these and other reasons, economic impact analysis is not a substitute for an analysis of alternative actions that makes use of benefit-cost appraisal techniques. But if these limitations are well understood and respected, economic impact analysis can play an important role in understanding the relationships between a given economic action, or economic sector, and levels of activity in the broader economy.

Modeling Process

The process of economic impact modeling with IMPLAN involves three general steps:

- Creation of study area database;
- Customization of IMPLAN model and coefficients;
- Estimation of the impact of an activity on the model of the study area economy.

The IMPLAN model allows substitution and incorporation of primary data at each stage of the model-building process, greatly increasing the model's accuracy and flexibility. In addition to being able to directly modify the IMPLAN database statistics, the user can alter import and export relationships, utilize modified input-output functions, and change industry groupings. IMPLAN allows the creation of aggregate models consisting of industries grouped together for a specific purpose.

Once a regional input-output model has been specified, impact analysis may be performed on that model. New industries or commodities can be introduced to "shock" the regional economy, industries or commodities may be removed or disaggregated, and reports can be generated to show the consequences (on output, employment, and value-added) of various impacts.

The key to input-output analysis is the construction of the input-output or transactions table, which shows the flow of commodities from each of a number of producing industries to all consuming industries and final demand (ultimate consumers). Given that many industries produce more than one commodity, production information is often tabulated on an industry-by-commodity basis into a "Make" matrix, containing the value of commodities produced by different industries, and a "Use" matrix, containing the value of commodities used by each industry in the production process. These matrices are combined to produce the input-output transactions table showing each industry buying and selling from other industries.

From these industry flows, two other structural tables are developed: (1) a table of technical coefficients or direct requirements and (2) a table of direct and indirect coefficients or total requirements. The entries in the former are interpreted as the dollar value of the minimal requirements from each of the contributing industries in order for each producing industry to produce one dollar's worth of output. The entries in the latter table are interpreted as the amount of output from the contributing industries required – both directly and indirectly – to deliver one dollar's worth of the producing industry's output to final demand.

The IMPLAN program uses an ordered series of steps to build the model. We describe them here to provide the interested reader with a view of the sequence of steps employed, and the types of data needed to model the impacts.

Defining the Study Areas

The first step is the definition of the study area or study areas. Study area databases are created, corresponding to these areas. These databases contain the representation of the behavior of the study area economies, but do not contain any information about the specific project under study. Ideally, the study area boundaries should be defined such that most of the project's suppliers and workers come from within the defined region. For projects with both a construction and operating phase it is possible to define the study areas for each type of expenditure differently. This allows the analyst to add detail, when useful, without overcomplicating the analysis.

The construction activities associated with a specific economic action will draw mostly from construction labor within a localized geography. However, for large industrial projects requiring specialized labor, the labor market and specialized construction materials may come from an entire state or larger area. Ideally, the analyst will have access to detailed information about any specialized requirements of the construction process and be able to make a suitable judgment about the geography chosen for the construction impact analysis.

The economic geography of operations for a business or a project may be different. Operating supplies, such as utilities and maintenance services, are most likely going to be locally sourced. The same is true for labor, especially in the case of long-term operations. Census data can be used to determine the degree of long-distance labor commuting that might be associated with the local labor market. Often the economic impact analysis of operations can be measured for a single county or metropolitan region, not an entire state.

Customizing the IMPLAN Coefficients

The process of customizing the IMPLAN model does not stop with the development of the Study Area Databases. Part of the expertise of input-output practitioners is in the customization of the model coefficients. In this section, we describe the various steps in the customization process.

From the Study Area Databases, a mathematical concept called the Social Accounting Matrix is constructed, using computer procedures incorporated in the IMPLAN modeling system. The initial study area data in this transformation can be viewed and edited in a spreadsheet program. The matrix is a complex table that contains an array of different transfers between market participants. The database elements are organized into five main groups: Final Demand, Sales, Value Added, Employment, and Total Industry Output. These elements can be further divided into those that are specific to commodities and those that relate to industries.

The user may edit the Regional Purchase Coefficient and the Directly Allocated Exports Coefficient for each commodity. Both of these coefficients are calculated from the Social Accounting Matrix so they may only be modified after that matrix has been constructed. The IMPLAN program contains internal checks, which enforce data integrity and will not allow values outside the specific, valid range for these coefficients to be accepted by the model.

Building the Input-Output Accounts

After creating the social accounting matrix, the input-output accounts for the model are constructed. The input-output accounts are formed by transforming parts of the social accounts from an "industry-by-commodity" format to an "industry-by-industry" format; it combines submatrices into a single "transactions" submatrix, as described in general above. The input-output accounts may be constructed with either aggregated or unaggregated industry data. The unaggregated data is made up of 440 IMPLAN-defined industries that correspond to one or more NAICS industry codes, and comprise the entirety of each economy. The creation of aggregated industries from individual industries will reduce the size of the industry matrix (and processing time).

Estimating Multipliers

The last step in building the model is to estimate the multipliers. Five different sets of multipliers are estimated by IMPLAN corresponding to five measures of regional economic activity: Total Industry Output, Personal Income, Total Income, Value Added, and Employment. Multiplier analysis is used to estimate the regional economic impacts resulting from a change in final demand. Impacts can be in terms of direct and indirect effects (commonly known as Type I multipliers), or in terms of direct, indirect, and induced effects (Type II and Type III multipliers). More specifically, direct effects are production changes associated with the immediate effects of final demand changes. Indirect effects are production changes in backward-linked industries caused by the changing input needs of directly affected industries. Induced effects are the changes in regional household spending patterns caused by changes in household income—generated from the direct and indirect effects.

IMPLAN calculates two types of multipliers for each of the five impact measures. The first output multiplier represents the value of production, from indirect and direct effects, required from all sectors by a particular sector in order to deliver one dollar's worth of output. The second output multiplier adds in the induced requirements. The size of the multiplier is not a measure of the amount of activity or the importance of a given industry for the economy. It is an estimation of what would happen if that industry's sales to final demand ratio increased or decreased. In other words, output multipliers can be used to gauge the interdependence of sectors: the larger the output multiplier, the greater the interdependence of the sector on the rest of the regional economy.

Performing Impact Analysis

Once the model is complete, impact analysis can be performed on the model. Impact analysis involves posing a change in the demand for commodities and using the multiplier model to examine the effects that producing and delivering the commodities may have on a region's employment, income, and output. Several types of economic impact analyses can be carried out simply by varying structural, technological, and/or trade factors within the model. For instance, the user may add or remove sectors from the model, or change the size of an industry, or the user may change production functions, or make changes in commodity imports and exports. To perform a full economic impact analysis with IMPLAN, all of the relevant structural, technological, and trade-related adjustments must already be incorporated in the regional model.

In order to keep track of and organize all of the information needed to describe a change in the final demand for commodities, IMPLAN uses the general concept of a "scenario" to capture all of the information about the change(s) in commodity demand for which impacts are being estimated. Scenarios are made up of several building blocks.

At the lowest level is a transaction; this is the actual expenditure that represents the final demand for a commodity. Descriptive information about this transaction, such as what commodity is involved, when it occurred, and how it was measured, are collectively referred to as an event. A collection of events, which have descriptive information in common and occur together, are referred to as an activity. For instance, the group of events that make up an activity may be related to each other by what caused them to take place or why they took place.

A scenario is a collection of one or more activities (which includes, in turn, events with transactions), specifying where the activity(s) occurred and at what amount(s). A scenario may be viewed as equivalent to a management, planning, or policy alternative. Units of measure are assigned to each activity and can be in physical terms, monetary terms, household consumption, or any other terms appropriate for the problem under study. The unit price represents the transaction rate -- the total amount of purchases necessary to participate in one unit of an activity.

In order to run an economic impact analysis, the user must build a data file of changes in final demand. All activities that will be included in the analysis must be defined: providing information about who initiated the demand change, the base year of the activity, the transaction basis (commodity purchase or an industry's output), conversion rate (which gives a scale of the transactions occurring in the activity), and measurement units. There is a finite list of causal agents to choose from when describing the activity, comprised of the following choices: households, federal government, state/local government, enterprises (investment), and industry. Once the activity is defined, the next step is to define events that occur in the activity, in much the same way as for the activity itself.

Project Phases

Often projects and economic actions will have multiple phases of implementation that need to be treated independently in economic impact analysis. A typical project might involve the construction of a new facility or piece of infrastructure and also involve the ongoing operations of that new asset. These phases are different in terms of both the nature of the economic effects and the time frame for measuring those effects in the broader economy.

Construction Activities

Construction impacts are one-time impacts summarizing the changes in output, labor income, and employment associated with construction of buildings, infrastructure, and other forms of capital. This economic activity will, in turn, generate additional tax and fee revenues for state and local governments. These impacts are temporary in nature and occur as spending unfolds.

Most impact studies of construction projects include the entire value of construction put-in-place. That is all construction and management jobs, all equipment installed, and all the building materials and services used. However, for large infrastructure developments doing so may overstates the true direct impacts on the economy. That is because some workers, equipment, and materials used in construction come from out of area. Their impact on the local economy is limited to whatever spending they cause in the state.

Where feasible ECONorthwest chooses to avoid overstating impacts. The scope of direct construction impacts included in an analysis is limited to only the portion of jobs and construction spending paid to workers and businesses based in the analysis geography. In cases where equipment is purchased from outside this geography and installed locally, the analysis only counts the cost of installing that equipment as having a direct impact.

For construction impacts spending and employment for the entire period of development is needed. In practice, the temporary nature of these spending and jobs impacts make it possible to abstract from the actual construction schedule (a 16 month project could get represented as a single year construction period) so long as the total values are not distorted in their representation.

Operations Related Activities

The operation of businesses and programs are recurring impacts summarizing the changes in output, labor income, and employment resulting from normal business operations once development is complete. The economic activity attributed to businesses will also generate fiscal impacts for state and local governments. As opposed to one-time impacts, recurring impacts will continue as long as the venture continues to operate.

While changes in operations often will be permanent, or long-term, typically, the analysis will identify a single year of operation for analysis purposes. This year will often be the first year of full operations, or in the case of retrospective analysis a recent year of operations for which sufficient data is available.

The scope of the analysis of operations includes as many industries as will directly handle the services associated with the economic action that is being analyzed. Sometimes this will include only a single industry (or single firm within an industry), but often with a little investigation the analyst or project sponsor will have useful information about the changing operations of other key industries closely related to the project or economic action being evaluated. The analysis will improve as more details are available directly from sources close to the project.

Outside the Scope of Analysis

IMPLAN measures the economic impacts of a project's spending on goods, services, and labor as money flows throughout the local economy over the course of a year. Money used to produce goods and provide services within the scope of analysis (time and location) are counted towards having economic impacts. But not all uses of money cause measureable impacts. The following are typically not considered:

- Downstream economic activity.
- Labor, goods and services from outside the

local economy, such as new business activity and employment in locations where imports originate.

- Asset transfers are not a source of economic impacts because they do not cause anything new to be produced. For example, the sale of land.
- Interest and other finance charges.
- Savings that occur when businesses and workers retain rather than spend earnings.
- Savings are often invested, but IMPLAN does not account for them since the value of investments occur in future years. Undoubtedly some employees associated with new economic activity will buy houses, but the impacts of this investment spending are not counted by IMPLAN.

Model Outputs

The IMPLAN model provides estimates of impacts of the expenditures on income, and employment that follow from direct, indirect, and induced expenditures. By writing special fiscal impact modules, the model also can be used to estimate impacts on the tax revenue collected through property taxes, sales taxes, corporate income taxes, and other fiscal devices.

Economic impacts are classified by their relationship to the activity in question. For this analysis, the three types of impacts are defined, with regard to the terminal expansions, as follows:

- Direct impacts are those occurring at the terminals and include the jobs, output, and incomes earned at the terminals.
- Indirect impacts are production changes in backward-linked industries caused by the changing input needs of directly affected industries. Suppliers to the directly involved industry will also purchase additional goods and services; this spending leads to additional rounds of indirect impacts. Because they represent interactions among businesses, these indirect effects are often referred to as supply-chain impacts.
- Induced impacts are the changes in regional household spending patterns caused by changes in household income. The direct and indirect increases in employment and income enhance the overall purchasing power in the economy, thereby inducing further consumption- and investment-driven stimulus. Employees at the terminal, for example, will use their income to purchase groceries or take their children to the doctor. These induced effects are often referred to as consumption-driven impacts.

These three types of economic impacts are measured in terms of output, labor income, and employment resulting from spending in the study area:

- Output represents the value of goods and services produced, and is the broadest measure of economic activity.
- Labor income consists of employee compensation and proprietary income, and is a subset of output.
    - Employee compensation includes workers' wages and salaries, as well as other benefits such as health, disability, and life insurance; retirement payments; and employer paid payroll taxes.
    - Proprietary income (owner-operated business income) represents the payments received by small-business owners or self-employed workers. Business income would include, for example, income received by private business owners, doctors, accountants, and lawyers.
- Jobs, according to IMPLAN's methodology, are measured in terms of full-year-equivalents (FYE). One FYE job equals work over twelve months in a given industry (this is the same definition used by the federal government's Bureau of Labor Statistics). For example, two jobs that last six months would together count as one FYE job. A job can be full-time or part-time, seasonal or permanent; IMPLAN counts jobs based on the duration of employment, not the number of hours a week worked. Job impacts from operations are for one year of normal operations.

IMPLAN estimates taxes including those incurred indirectly and through induced spending and employment. IMPLAN has only limited fidelity for tax rates by industrial classification, asset classes and geography for these secondary effects, and the results should be seem as illustrative and not construed to be the detailed analysis of a tax professional.

Using Model Results

Models of the economy, like any model, are simplified representations of real and complex phenomena. The simplifications employed in economic models allow analysts to test ideas about how the world works without engaging in expensive and time intensive experimentation. Models are not a substitute for empirical results but rather build upon available knowledge and theories in a manner that permits inferences to be made about proposed actions, or to isolate and examine one element of a complex system like the economy.

The correct use of model results involves a set of responsible practices agreed upon by a professional community of experienced analysts. These practices include identifying the assumptions that are employed, noting any known limitations of the models, providing guidance on how to interpret and employ the results, and thoroughly documenting any aspects of the analysis that are novel or unique. The intent of these practices is to allow other knowledgeable analysts to interpret and reproduce analytic results to some reasonable degree.

Economic impact studies tell us something about the possible answers to a very specific set of questions. What other economic activities might occur if a particular economic action is undertaken? Or, what is the role of a particular industry or firm in the broader economy? Responsible analysis place “answers” to such questions in an appropriate context by recognizing the inherent uncertainty of future outcomes and the influence of numerous external forces. Used appropriately such models are powerful tools for the evaluation of proposed actions and the development of policy.