THE MICROSOFT ECONOMIC IMPACT STUDY

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EXECUTIVE SUMMARY

For nearly three decades Microsoft Corporation, the world's leading producer of software for personal computers, has been one of the fastest growing companies in Washington. Today, Microsoft not only employs several thousand people in the greater Seattle area but also supports many other jobs in the local economy because of its indirect impact on business activity. The objective of this study is to assess Microsoft's total contribution to the Washington, King County, and City of Redmond economies.

In 2004, with facilities in 80 countries, the software company registered $38.5 billion in sales and employed 57,090 workers worldwide. About one-half of Microsoft's operations were located on its campus in Redmond, Washington:

- Microsoft revenue attributable to Washington operations amounted to $19.0 billion in 2004, up from $1.1 billion in 1990.

- In 2004, Microsoft employed 28,240 people in the state. They earned $4.1 billion in labor earnings (wages, salaries, and non-wage benefits) and received an additional $1.2 billion in stock option income.

- Not counting stock option income, annual labor earnings at Microsoft averaged $145,000 per employee, more than three times the state mean of $46,200. Including stock option income, average employee compensation came to $188,900.

- To support operations, the company purchased $1.2 billion in goods and services from Washington producers. This amounted to $43,600 per Microsoft employee.

Microsoft's employment impact in Washington extended well beyond the 28,240 people working for the company, since its employee compensation ($5.3 billion in labor earnings and stock option income) and other operating expenditures (including $1.2 billion for locally produced goods and services) created job opportunities in other state businesses through the multiplier process.

- Excluding the impact of stock option income, Microsoft accounted for an estimated $21.7 billion of Washington Gross State Product or 8.6 percent of the total in 2004, according to simulations with the Washington Projection and Simulation Model.

- The total economic impact of Microsoft amounted to 145,160 jobs (wage and salary employees and proprietors) and $11.2 billion of personal income. This represented 4.0 percent of total Washington employment and 5.2 percent of personal income.

- The implicit employment multiplier was 5.1, implying that every job at Microsoft supported 4.1 jobs elsewhere in the economy. This is significantly higher than multipliers found in most other industries, including aerospace.

- Directly and indirectly, Microsoft generated $923.4 million in Washington state and local taxes.

- Including stock option income and capital expenditures, the company's impact on Washington amounted to 194,620 jobs (5.4 percent of total employment) and $15.2 billion in personal income (7.1 percent of total income). Note that this impact should <u>not</u> be considered the company's normal or expected impact, since stock option income and capital expenditures are unpredictable and could conceivably be negligible in the future.

- Taking into account its indirect impact, Microsoft was the single largest contributor to economic growth in Washington between 1990 and 2004, accounting for one-fifth (22.3 percent) of the total gain in state employment.

While Microsoft has made a noticeable difference in the Washington economy, its relative impact on King County and the City of Redmond is even greater:

- In 2004, excluding the impact of stock option income and capital expenditures, Microsoft accounted for 101,430 jobs or 7.2 percent of the total employment in King County.

- The company generated $7.9 billion in personal income or 9.0 percent of total county income. Microsoft raised King County per capita income by $1,551.

- Directly and indirectly, Microsoft generated an estimated $251.1 million in taxes for King County tax jurisdictions.

- Between 1990 and 2004, Microsoft was responsible for one-half (51.6 percent) of King County's employment growth. The lift from the software company kept the county out of recession in 1993 and significantly reduced the county's overall job loss during the 2001-03 downturn.

- Microsoft's impact on the City of Redmond, where the company is headquartered, was substantial, amounting to 45,830 jobs or more than two-fifths of the city's total employment.

- The company generated an estimated $19.2 million of the city's $48.8 million in tax revenue in 2004.

While these findings are impressive, they still understate Microsoft's impact. Unlike any company before it, Microsoft has created great wealth in the community. Moreover, like a magnet, it has drawn other software and high-tech companies to the area. Finally, several former Microsoft employees have tapped their riches and expertise to start new business enterprises and charitable foundations.

Microsoft faces a number of challenges in the years ahead, including the rapidly changing nature of computer and information technologies and the unpredictable future of the new economy. Nevertheless, Microsoft's willingness to diversify, its substantial financial resources, and its skilled and creative workers should maintain it as a significant growth force in the Washington, King County, and City of Redmond economies for some time to come.

THE MICROSOFT ECONOMIC IMPACT STUDY

1. INTRODUCTION

For two hundred years big businesses have played a central role in the Washington economy. At the turn of the nineteenth century, the Hudson's Bay Company, the first large-scale corporate enterprise in North America, established a fur-trading post in Fort Vancouver and helped open up the Pacific Northwest to Euro-American settlement. Led by Weyerhaeuser Company, which owned one-fourth of the state's timberland, Washington became the nation's number one producer of lumber in the early 1900s. The Boeing Company, despite its ups and downs, has been the world's leading manufacturer of commercial aircraft and the largest private employer in the state since the beginning of the jet age fifty years ago.

When Microsoft moved to Washington in 1979, it was a $3-million company employing 30 people. After two decades of extraordinary growth, Microsoft emerged as the world's top producer of software for personal computers. By 2004, with offices in 80 countries, the software giant had sales of $38.5 billion and 57,090 employees worldwide. Today, about one-half of Microsoft's operations are located on the campus of its Redmond headquarters.

Microsoft's impact on the local economy is substantial. Like Boeing and Weyerhaeuser, Microsoft not only employs thousands of people but also supports many more jobs in other industries through its indirect impact on business activity in the state (the so-called "multiplier effect").

The objective of this study is to measure Microsoft's economic impact on Washington, King County, and the City of Redmond. More specifically, the investigation covers the following topics:

1. The history of Microsoft.

2. The current operations (production, employment, income, and markets) of the company.

3. The impact of Microsoft on the Washington, King County, and City of Redmond economies.

4. The impact on state and local taxes.

5. The company's contribution to economic growth.

The study draws upon the analytical capabilities of the Washington Projection and Simulation Model (Bourque, Conway, and Howard, 1977; and Conway, 1990). Developed at the University of Washington, WPSM is an interindustry econometric model designed for forecasting and impact analysis. Through its depiction of the interrelationships (i.e., purchases and sales) among the sectors of the state economy (businesses, households, and government), the model has the ability to measure the impact of changes in one industry (such as computer software) on the rest of the economy.

The study begins in Section 2 with a brief history of the company. The discussion highlights Microsoft's product development, its growth over the past 30 years, and its current operations. The third section, which is the centerpiece of the study, presents estimates of the company's impact on the Washington economy. Several sources of Microsoft's impact are analyzed, including employee earnings, purchases from Washington suppliers, income from stock options exercised, and capital expenditures. Sections 4 and 5 present estimates of Microsoft's economic impact on King County and the City of Redmond, respectively. The county and city impacts, like that of the state, are expressed primarily in terms of jobs, personal income, and tax revenue. Section 6 concludes the study with a few summary comments.

2. MICROSOFT CORPORATION

History

Microsoft was founded as a partnership in Albuquerque, New Mexico, by William H. Gates and Paul G. Allen in 1975. The company had one product, three employees, and less than $25,000 in sales during its first full year of operation. Gates and Allen had moved to Albuquerque to be next to MITS Computer, which had developed the Altair microcomputer kit. Their first product was Microsoft BASIC, a programming language for the Altair. Microsoft BASIC was an adaptation of BASIC, a main-frame computer language, which Gates and Allen had learned in high school in Seattle, Washington.

During the next few years, Microsoft not only improved BASIC but adapted other programming languages to the microcomputer. It released a version of FORTRAN, a scientific language, in 1977 and a version of COBOL, a business language, in 1978. By 1979, when the company moved to Washington, it had more than $3 million in annual revenues and employed 30 people.

The following year marked a major milestone for the company. In 1980, Microsoft signed a contract with IBM to help develop the personal computer. IBM asked Microsoft to develop versions of BASIC, FORTRAN, COBOL, and Pascal (another programming language) for the IBM personal computer. Later in the year, Microsoft signed another contract with IBM to provide the operating system for the personal computer.

The operating system is the heart of the computer. It has also been the key to Microsoft's success. Microsoft released DOS 1.0 for the IBM personal computer in 1981, but IBM failed to maintain exclusive rights. When companies such as Compaq developed IBM-compatible computers, it opened up a multi-billion dollar market for Microsoft's disk operating system (renamed MS-DOS) and other personal computer software. Recognizing its vast market potential, Microsoft incorporated in 1981 and established a national sales network.

The personal computer industry and Microsoft have grown at astonishing rates since 1981, when the IBM personal computer revolutionized the computer industry. Industry revenue has climbed at a 25 percent annual rate, while Microsoft sales have soared at a 35 percent rate (Figure 1). In 2004, with revenue of $38.5 billion, Microsoft was the world's largest producer of software for the personal computer.

In general, Microsoft's business strategy has been to develop a product for virtually every need. Over the years the company has not only introduced several operating systems (e.g., MS-DOS in 1981, Windows 3.0 in 1990, and Windows XP in 2001) but also many software applications.

Figure 1
MICROSOFT REVENUE

Billions of Dollars
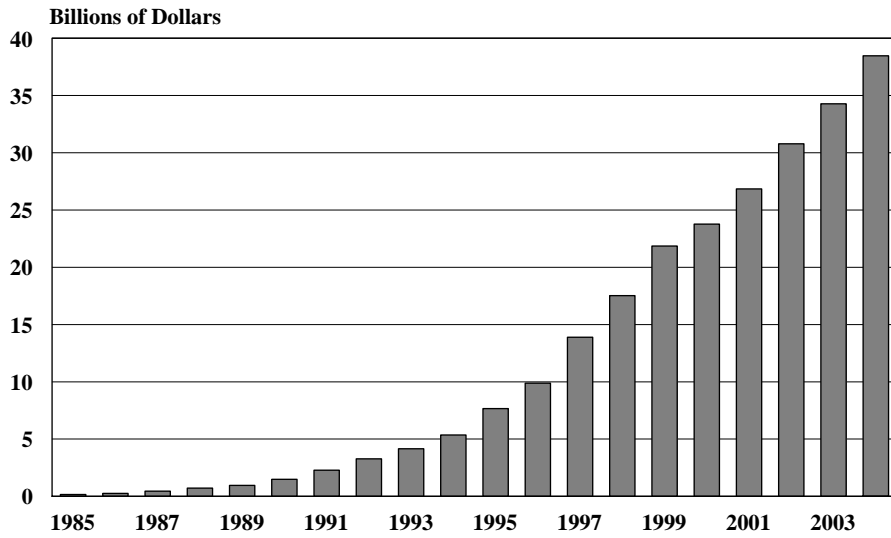
Figure 2
MICROSOFT EMPLOYMENT

Thousands

Washington   Worldwide
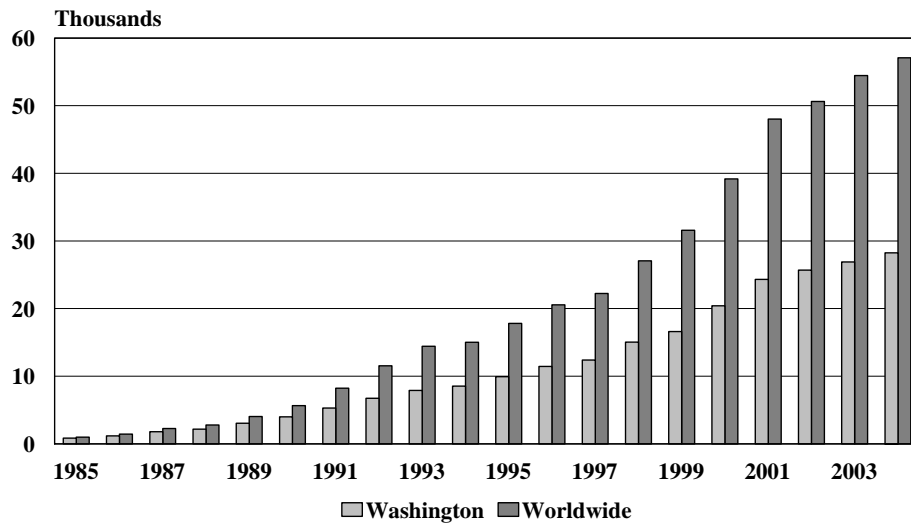
Microsoft's most successful application has been Office, which is an integrated suite of programs for personal and business use. Office XP, which was released in 2001, combines Word (a word processor), Excel (a spreadsheet), PowerPoint (a graphical presentation program), Access (a relational database program), Outlook (an e-mail and personal information management system), Internet Explorer (an internet browsing and application program), and Publisher (a desktop publishing program). In recent years, as the market for desktop computers and software has shown signs of maturing, Microsoft has begun to diversify its product lines, extending its reach into other markets. Most notable have been its initiatives into the Internet, home entertainment, business enterprise software, and hand-held devices.

In addition to being the top producer of software of personal computers, Microsoft has become a major employer. When the company entered into agreements with IBM in 1981, it employed 100 people. Four years later, the number reached 1,000. Between 1985 and 2004, Microsoft added on average 3,000 employees per year, bringing total employment worldwide to 57,090.

As Microsoft has expanded, it has devoted an increasingly greater proportion of its personnel to marketing and service, resulting in a geographical shift of its workforce away from Washington (Figure 2). In 1985, 83 percent of the company's employees worked in the state. Today, the share is slightly less than 50 percent. Between 1985 and 2004, Microsoft out-of-state operations added close to 34,000 workers, while in-state operations added 27,000.

Nevertheless, Microsoft's employment growth in Washington has been substantial, and the company has emerged as one of the state's largest employers. In 2004, Microsoft employed more than 28,000 people in Washington, making it the state's second largest private employer, behind only Boeing (55,000 employees).

Current Operations

Headquartered in Redmond, Washington, Microsoft currently has offices in 80 countries. In 2004, company revenue totaled $38.5 billion (Table 1).[1] Washington operations accounted for $19.0 billion, about one-half of the company total.
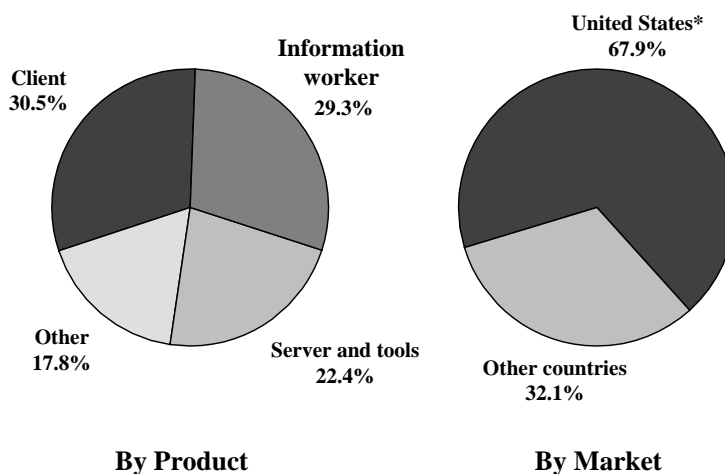
As the company has grown, it has diversified its product offerings, reducing its dependence upon the desktop market. Microsoft's products are organized into seven segments, the top three of which account for four-fifths of the company's revenue (Figure 3). With sales of $11.7 billion in 2004, the largest segment was Client, which produces Windows XP and other Windows operating systems. Information Worker, whose principal product is Microsoft Office (Word, Excel, and other desktop applications), returned $11.2 billion in revenue. The third major segment is Server and Tools, which sold server products (e.g., Windows Server) and developer tools and services worth $8.6 billion. The four remaining segments, which all together accounted for $6.5 billion in sales, include Home and Entertainment (Xbox and video games), MSN (e-mail, MSN Search, MSN portals, and other internet services), Business Solutions (Microsoft Retail Management System and business applications), and Mobile and Embedded Devices (including Windows Mobile software and MapPoint).

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[1]Microsoft reports revenue for the fiscal year ending June 30. For purposes of this study, revenue as well as other economic variables (e.g., employment, labor earnings, and Gross State Product) are measured on a calendar-year basis. Employment is the estimated average monthly employment over the calendar year.

Figure 3

MICROSOFT REVENUE, 2004

Client
30.5%

Information
worker
29.3%

United States*
67.9%

Other
17.8%

Server and tools
22.4%

Other countries
32.1%

By Product

By Market

Includes original equipment manufacturers (OEM's)

In 2004, Microsoft employed 57,090 people worldwide, including 28,240 in Washington. Most Washington employees worked on the Redmond campus. In 2004, workers statewide earned a total of $4.1 billion in wages, salaries, and non-wage benefits (excluding income from exercised stock options). The average income was $145,000, more than three times the state mean, which was an estimated $46,200. Microsoft's average labor income was approximately $40,000 greater than that at Boeing, which traditionally has offered one of best compensation packages in Washington.[2]

In addition to the company's remarkable success and well-paid employees, there are two characteristics that distinguish Microsoft from most businesses. The first is its strong orientation to international markets. Like Boeing, Microsoft sells products all over the world. Microsoft software is written in 30 languages and available in 80 countries. In 2004, 32 percent of company revenue was earned from the sales of corporate software licenses and packaged software outside North America (Figure 3). Even this figure, which is high by most standards, understates the importance of international markets, since a portion of original equipment manufacturers (OEM) license sales was made to foreign computer makers as well as to domestic computer makers who in turn sold computers abroad. Considering the ultimate destination of Microsoft software and

[2]As noted later, stock option income provided a healthy supplement to Microsoft's labor earnings, making the effective pay difference between Microsoft and other industries even greater.

Table 1

**MICROSOFT REVENUE, EMPLOYMENT,
AND LABOR EARNINGS, 2004**

Revenue (mils. $)	38,474.0
From Washington operations	19,031.5
From other operations	19,442.5
Employment	57,090
In Washington establishments	28,240
In other establishments	28,850
Labor earnings* (mils. $)	4,094.1
Average labor earnings* ($/employee)	144,980

*Washington only.

other products, international markets overall probably accounted for more than 50 percent of company sales in 2004.

The second distinguishing characteristic is Microsoft's emphasis on research and development. This is not only evident by the large number of computer scientists and programmers employed by the company but also by the financial resources devoted to turning out new products. Over the past several years, approximately one out of every six dollars of revenue has been poured backed into research and development, most of which takes place on the Redmond campus. In 2004, this amounted to roughly $7 billion. In Washington, not even Boeing spends as much on research and development as Microsoft. In 2005, at the height of the 787 development program, Boeing's research and development expenditures amounted to $2.2 billion companywide. This represented one out of every twenty-five dollars of the aerospace company's revenue.

3. WASHINGTON STATE IMPACT

Note on Methodology

Not only is Microsoft the world's leading producer of software for personal computers, it also plays a critical role in the Washington State and King County economies. In 2004, Microsoft's job impact in Washington extended well beyond its 28,240 employees, since the company's payroll and other operating expenditures created employment opportunities in other businesses around the state.

The immediate impact of Microsoft sales falls on company production, employment, and income. However, Microsoft operations also lead to demands on other local businesses, such as paper products and computer repair services, to help supply the goods and services needed to support software production. Through the operation of their so-called backward linkages, these businesses in turn stimulate activity in other sectors of the economy. Simultaneously, the income earned by workers at Microsoft and its supporting businesses generates a demand for consumer

goods and government services that imparts yet another round of economic activity in the state through the so-called multiplier (responding) process.

The Washington Projection and Simulation Model provides a means of measuring the total (direct and indirect) impact of Microsoft on the state economy.[3] The impact-estimating procedure is a straightforward exercise. Using WPSM, the behavior of the economy is first simulated <u>with Microsoft output</u> (as well as its employment, labor earnings, and in-state purchases) to produce a baseline projection of the Washington economy over a period of time. The simulation is then repeated but <u>without Microsoft output</u> to yield a conditional projection. The difference between the two projections is a measure of the total economic impact (the so-called multiplier effect) on Washington of the software company. Since WPSM is a comprehensive model of the state economy, the impact can be expressed in terms of output (production or sales), employment, and labor income by industry, labor force, the unemployment rate, resident population, personal income, consumption expenditures, state and local government spending, and fixed investment, among other economic and demographic variables.

Additional economic models are used to conduct the King County and City of Redmond impact analyses. Due to data limitations, these models are simpler and less precise than the state model. Nevertheless, when used in conjunction with the state model, the county and city models provide reasonable estimates of the local economic impact of Microsoft.

Direct Economic Impact

The impact of Microsoft stems from its employment and labor earnings as well as its expenditures for goods and services in the state. This is termed the company's direct economic impact.

According to Microsoft's books, operating expenditures in Washington totaled $19.0 billion in 2004 (Table 2).[4] This figure does not include capital expenditures for buildings and equipment. The company employed 28,240 workers, who earned $4.1 billion in labor earnings (wages, salaries, and non-wage benefits). In addition, Microsoft paid out $4.4 billion for goods and services, of which $1.2 billion were spent in Washington. Imported goods and services amounted to $3.2 billion. Another $10.5 billion of the company's operating expenditures covered non-wage categories of value added, such as employer's contribution to social insurance, depreciation, rent, net interest payments, indirect business taxes, and profit.

Most of the in-state expenditures went for services, including $920.5 million purchased from various professional and business services (e.g., contract programming, software development, and telecommunications) and $45.8 million purchased from financial activities (financial, insurance, and real estate services). Notable procurements of locally produced goods included $50.9 million from construction (principally maintenance and repair), $70.1 million from printing (e.g., books and other publications), and $21.0 million from machinery (e.g., computer parts and repair). The $73.3 million purchase from wholesale and retail trade is largely the mark-up on goods procured from in-state vendors. The cost of the goods themselves are shown as in-state

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[3]Refer to Appendix A for technical notes describing the impact estimating procedure.

[4]When profit is included, total operating expenditures equal the total value of production or sales.

Table 2

MICROSOFT OPERATING EXPENDITURES, 2004

Millions of Dollars

	Total	Supplied in Washington	Imported
Goods and services	4,394.2	1,231.6	3,162.6
Goods*	526.8	147.8	379.0
Services	3,867.4	1,083.8	2,783.6
Trade and transportation	206.8	73.3	133.5
Financial activities	150.8	45.8	105.0
Professional and business services	3,320.6	920.5	2,400.1
Other services	189.2	44.2	145.0
Value added	14,637.3	14,637.3	0
Labor earnings	4,094.1	4,094.1	0
Other value added**	10,543.2	10,543.2	0
Total expenditures	19,031.5	15,868.9	3,162.6

 *Includes construction but excludes trade and transportation margins associated with other purchased goods. Trade and transportation margins are included as part of purchased services.

 **Includes employer's contributions to social insurance, depreciation, rent, net interest payments, indirect business taxes, and profit.

purchases or imported purchases from the industries that produce them depending upon the locations of the manufacturers.

Washington State Economic Impact

Tables 3 and 4 show Microsoft's <u>total impact</u> on the Washington economy, taking into account the multiplier effect. The first column in Table 3 shows the actual level of the Washington economy in 2004 (i.e., <u>with</u> Microsoft). The second column is a projection of what the economy would have looked like <u>without</u> Microsoft. The difference between the two columns is an estimate of Microsoft's total economic impact. Table 4 separates the total impact into two parts: the impact due to Microsoft's employment and labor earnings; and the impact due to Microsoft's in-state purchases. Also shown in Table 4 is the company's total impact as a percent of Washington's total economic activity.

In terms of the broad measures of economic activity in the state, Microsoft <u>directly and indirectly</u> supported about 9 percent of Gross State Product, 4 percent of total employment, and 5 percent of personal income in 2004:

    1. <u>Gross State Product</u>. Gross State Product, like its national counterpart (Gross Domestic Product), is the broadest measure of economic activity in the state. In 2004, Washington Gross State Product was estimated to be $253.1 billion. Microsoft directly and indirectly accounted for $21.7 billion or 8.6 percent of total Gross State Product.

2. <u>Output</u>. The impact of Microsoft on total output in the private sector amounted to $29.3 billion. This figure includes the output of Microsoft. Thus, its impact on other industry output was $10.3 billion. Most of the indirect impact fell on nonmanufacturing industries, chiefly trade and services.

3. <u>Employment</u>. Including the indirect impact, 145,160 jobs (wage and salary employment and proprietors) in the state depended upon Microsoft. This represented 4.0 percent of the 3.6 million jobs in Washington. Most of the indirect jobs were found in trade, services, and government. The employment multiplier was 5.1 (=145,160/28,240), implying that for every Microsoft job there were 4.1 supporting jobs in the economy. The wage and salary employment multiplier, which excludes proprietors, was 4.2 (=119,030/28,240).

4. <u>Personal income</u>. Directly and indirectly, Microsoft accounted for $11.2 billion in personal income or 5.2 percent of the state total income ($215.4 billion). Without Microsoft, Washington per capita income would have been $520 lower, according to the WPSM simulation.

5. <u>Population</u>. The equivalent of 233,220 people living in the state depended upon Microsoft in 2004. The implied population multiplier was 8.3 (=233,220/28,240), meaning that each Microsoft employee directly and indirectly supported the economic livelihoods of 8.3 Washington residents.

The implied Microsoft employment multiplier is higher than that found for most industries. Wage and salary employment multipliers, for example, typically range between two and three. In a 1989 study by the author and others, the Boeing wage and salary employment multiplier was estimated to be 3.2.[5] Today, it is estimated to be 3.5. The corresponding Microsoft multiplier at 4.2 is appreciably higher.[6] On a per employee basis, Microsoft's impact on the economy stemming from its labor income is larger than Boeing's, since Microsoft workers earn on average $40,000 more per year than Boeing employees. Microsoft also spends substantially more per employee than Boeing for locally produced goods and services, since the aerospace company imports most of the components that make up its commercial aircraft. In 2004, Microsoft spent approximately $44,000 per employee for Washington produced goods and services, compared to roughly $30,000 for Boeing. Thus, on balance, Microsoft pumped about $54,000 more per employee into the economy than Boeing, giving rise to the software company's higher multiplier.[7]

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[5]Pascall, G., D. H. Pedersen, and R. S. Conway, Jr. "The Boeing Company Economic Impact Study," The Boeing Company, 1989.

[6]Note that there is no single multiplier for an economy. Multipliers vary across industries and over time. There are also different types of multipliers. In addition to employment and population multipliers, there are output, income, and tax multipliers. For a given multiplier, such as the Microsoft employment multiplier, there is even a short-run multiplier (measuring the short-run impact of a specific change in economic activity) and a long-run multiplier (measuring the long-run impact). The multipliers presented in this study are long-run multipliers.

[7]Typically, a dollar of labor income has a greater impact on the Washington economy than a dollar of in-state purchases. Thus, much of the difference between the Microsoft multiplier and the Boeing multiplier is due to Microsoft's higher labor earnings per worker.

Table 3

MICROSOFT IMPACT ON WASHINGTON ECONOMY, 2004

	2004 Washington	Without Microsoft	Impact (Difference)
DIRECT IMPACT			
Output (mils. $)	19,031.5	0	19,031.5
In-state expenditures (mils. $)	1,231.6	0	1,231.6
Employment	28,240	0	28,240
Labor earnings (mils. $)	4,094.1	0	4,094.1
TOTAL IMPACT			
Gross State Product (mils. $)	253,085.0	231,409.1	21,675.9
Output (mils. $)	374,596.0	345,283.0	29,313.0
Goods	126,341.7	125,330.4	1,011.3
Services	248,254.3	219,952.6	28,301.7
Employment	3,623,140	3,477,980	145,160
Proprietors	671,320	645,190	26,130
Wage and salary employees	2,951,820	2,832,790	119,030
Goods	521,300	516,540	4,760
Resources	85,420	83,910	1,510
Construction	170,810	169,750	1,060
Manufacturing	265,070	262,880	2,190
Services	2,430,520	2,316,250	114,270
Wholesale and retail trade	440,290	421,860	18,430
Transportation and utilities	90,940	89,490	1,450
Information	92,630	59,210	33,420
Financial activities	157,340	151,760	5,580
Professional and business services	311,430	300,220	11,210
Health and other services	744,960	722,500	22,460
Government	592,930	571,210	21,720
Unemployment rate (%)	6.3	6.4	-0.1
Personal income (mils. $)	215,375.7	204,182.2	11,193.5
Labor earnings	166,307.7	156,668.4	9,639.3
Other income	49,068.0	47,513.8	1,554.2
Per capita income ($)	34,699	34,179	520
Population, July 1	6,207,050	5,973,830	233,220

Table 4

MICROSOFT IMPACT ON WASHINGTON ECONOMY, 2004

	Employment and Labor Income Impact	In-State Purchases Impact	Total Impact	Percent of Washington
DIRECT IMPACT				
Output (mils. $)	19,031.5	---	19,031.5	5.1
In-state expenditures (mils. $)	---	1,231.6	1,231.6	---
Employment	28,240	---	28,240	0.8
Labor income (mils. $)	4,094.1	---	4,094.1	2.5
TOTAL ECONOMIC IMPACT				
Gross State Product (mils. $)	19,603.3	2,072.6	21,675.9	8.6
Output (mils. $)	25,972.7	3,340.3	29,313.0	7.8
Goods	612.4	398.9	1,011.3	0.8
Services	25,360.3	2,941.4	28,301.7	11.4
Employment	110,730	34,430	145,160	4.0
Proprietors	18,510	7,620	26,130	3.9
Wage and salary employees	92,220	26,810	119,030	4.0
Goods	2,660	2,100	4,760	0.9
Resources	1,000	510	1,510	1.8
Manufacturing	540	520	1,060	0.6
Construction	1,120	1,070	2,190	0.8
Services	89,560	24,710	114,270	4.7
Wholesale and retail trade	14,340	4,090	18,430	4.2
Transportation and utilities	940	510	1,450	1.6
Information	32,710	710	33,420	36.1
Financial activities	4,160	1,420	5,580	3.5
Professional and business services	3,410	7,800	11,210	3.6
Health and other services	15,860	6,600	22,460	3.0
Government	18,140	3,580	21,720	3.7
Unemployment rate (%)	-0.1	-0.0	-0.1	-1.3
Personal income (mils. $)	9,266.7	1,926.8	11,193.5	5.2
Labor earnings	8,129.0	1,510.3	9,639.3	5.8
Other income	1,137.7	416.5	1,554.2	3.2
Per capita income ($)	502	18	520	1.5
Population, July 1	180,730	52,490	233,220	3.8

As shown in Table 4, the impact of Microsoft's purchases of goods and services from Washington suppliers, which totaled $1.2 billion in 2004, was substantial. Altogether, in-state purchases supported 34,430 jobs, including 4,090 in wholesale and retail trade, 16,530 in services (information, financial activities, professional and business services, and health and other services), 3,580 in government, and 520 in manufacturing. But the impact of Microsoft's employment and labor earnings was even greater, amounting to 110,730 jobs. This included 56,140 in services (counting the 28,240 Microsoft employees), 14,340 in wholesale and retail trade, and 18,140 in government. In other words, the induced impact of Microsoft's employment and labor income accounted for about four-fifths of the company's total impact on Washington employment. Comparing the impacts in terms of personal income leads to a similar conclusion.

State Tax Impact

Microsoft's contribution to state and local government tax revenues is much more than its direct tax payments. Most of the company's tax impact stems from its role as an employer of a large and highly paid workforce as well as from the effect of both the company and its employees in supporting other jobs and businesses in the economy.

Table 5

**MICROSOFT IMPACT ON WASHINGTON
STATE AND LOCAL TAXES, 2004**

Millions of Dollars

	Washington State and Local Taxes	Total Impact	Percent of Washington
Sales and use taxes	7,836.5	346.3	4.4
Business and utility taxes	2,287.0	85.4	3.7
Property taxes	6,196.3	276.6	4.5
Other taxes	5,003.4	215.1	4.3
Total	21,323.2	923.4	4.3

The total impact of Microsoft on state and local taxes in Washington amounted to $923.4 million in 2004 (Table 5). This figure includes taxes collected by state government as well as by all local governments (counties, cities, and special tax districts) in Washington. Microsoft generated an estimated $346.3 million in sales and use taxes, $270.5 million of which flowed into state coffers. Directly and indirectly, Microsoft contributed $85.4 million in business and utility taxes, $276.6 million in property taxes, and $215.1 million in miscellaneous taxes. Overall, Microsoft accounted for 4.3 percent of all state and local taxes paid in Washington.

Impact of Stock Option Income and Capital Expenditures

Tables 3 and 4 provide a conservative estimate of Microsoft's impact on the Washington economy, since the analysis excludes the effect of exercised stock options and capital expenditures. Together, stock option income and capital expenditures added another two billion dollars to the local economy in 2004.

Like many high-technology companies, Microsoft offered a stock option program to its employees. After working for a period of time, an employee had the option of purchasing a limited number of Microsoft shares at the price that the stock sold for when the employee was hired. If the stock price increased during that period, the employee stood to earn additional income. Despite a recent decision to terminate the stock option program, it was still continuing to generously supplement employee income in 2004. Stock option income for Washington employees amounted to $1.2 billion, effectively representing a 30 percent boost in pay. This meant that, when both stock option income and labor income were counted, total employee compensation for the year averaged $188,900.

Table 6

MICROSOFT CONSTRUCTION

Millions of Dollars

	Construction
1990	18.6
1995	195.9
2001	191.1
2004	100.6

When evaluating the impact of stock option income, there are two important considerations to keep in mind. First, not all of the money from exercised stock options is spent. About 30 percent goes for taxes, while another 40 percent is saved.[8] But in 2004 this still left nearly $400 million dollars to build homes, buy cars, take vacations, and support everyday living. Second, the impact of stock option income in 2004 also includes the residual impact of the income received from stock options exercised in earlier years. This residual impact is far from inconsequential, since stock option income earned by Microsoft employees in Washington from 2000 to 2003 amounted to $17.8 billion.

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[8]A study of King County household consumption (Conway, 1992) showed that when per capita income increased from $24,790 to $43,916, per capita spending increased from $21,334 to $30,013. In other words, these households spent only 45 percent of their additional income. In the present study, it is assumed that Microsoft employees, who have higher incomes and, presumably, higher propensities to save, spend 30 percent of their stock option income.

Table 7

**MICROSOFT IMPACT ON WASHINGTON ECONOMY CONSIDERING
INCOME FROM STOCK OPTIONS EXERCISED, 2004**

	Total Impact	Percent of Washington
DIRECT IMPACT		
Output (mils. $)	19,031.5	5.1
In-state expenditures (mils. $)	1,231.6	---
Employment	28,240	0.8
Labor earnings (mils. $)	4,094.1	2.5
Income from stock options exercised (mils. $)	1,239.8	---
TOTAL ECONOMIC IMPACT		
Gross State Product (mils. $)	24,295.5	9.6
Output (mils. $)	31,204.8	8.3
Goods	1,172.2	0.9
Services	30,032.6	12.1
Employment	171,670	4.7
Proprietors	31,240	4.7
Wage and salary employees	140,430	4.8
Goods	5,630	1.1
Resources	1,830	2.1
Construction	1,260	0.7
Manufacturing	2,540	1.0
Services	134,800	5.5
Wholesale and retail trade	22,170	5.0
Transportation and utilities	1,790	2.0
Information	34,180	36.9
Financial activities	6,780	4.3
Professional and business services	13,400	4.3
Health and other services	29,670	4.0
Government	26,810	4.5
Unemployment rate (%)	-0.0	-0.5
Personal income (mils. $)	13,898.1	6.5
Labor earnings	11,955.4	7.2
Other income	1,942.8	4.0
Per capita income ($)	665	1.9
Population, July 1	287,180	4.6

Table 8

MICROSOFT IMPACT ON WASHINGTON ECONOMY CONSIDERING INCOME FROM STOCK OPTIONS EXERCISED AND CAPITAL EXPENDITURES, 2004

	Total Impact	Percent of Washington
DIRECT IMPACT		
Output (mils. $)	19,031.5	5.1
In-state expenditures (mils. $)	1,231.6	---
Employment	28,240	0.8
Labor earnings (mils. $)	4,094.1	2.5
Income from stock options exercised (mils. $)	1,239.8	---
Construction (mils. $)	100.6	0.4
TOTAL ECONOMIC IMPACT		
Gross State Product (mils. $)	25,279.1	10.0
Output (mils. $)	33,532.2	9.0
Goods	2,326.2	1.8
Services	31,206.0	12.6
Employment	194,620	5.4
Proprietors	35,920	5.4
Wage and salary employees	158,700	5.4
Goods	11,990	2.3
Resources	2,360	2.8
Construction	5,840	3.4
Manufacturing	3,790	1.4
Services	146,710	6.0
Wholesale and retail trade	24,930	5.7
Transportation and utilities	1,990	2.2
Information	34,570	37.3
Financial activities	7,520	4.8
Professional and business services	15,030	4.8
Health and other services	33,390	4.5
Government	29,280	4.9
Unemployment rate (%)	-0.0	-0.7
Personal income (mils. $)	15,211.8	7.1
Labor earnings	12,986.7	7.8
Other income	2,225.1	4.5
Per capita income ($)	681	2.0
Population, July 1	322,960	5.2

Table 7 shows that the size of Microsoft's impact increases appreciably when the spending effects of exercised stock options are considered.[9] For example, the impact on jobs rises from 145,160 (4.0 percent of Washington total employment, as shown in Table 4) to 171,670 (4.7 percent), while the impact on personal income rises from $11.2 billion (5.2 percent) to $13.9 billion (6.5 percent). In other words, the income from exercised stock options supported an additional 26,510 jobs and $2.7 billion in personal income (including the $1.2 billion in stock option income) in 2004.

When expenditures on equipment and buildings are counted, Microsoft's impact balloons even more. In 2004, Microsoft spent millions of dollars on computers and office buildings for its growing workforce. While equipment procurement tends to have little impact on the economy, since most equipment is imported, building construction can create hundreds of local jobs. In 2004, Microsoft spent $100.6 million on new construction, most of which went for office buildings on the Redmond campus (Table 6). This level of spending was sufficient to support the equivalent of 800 full-time construction jobs during the year.

But there is more to the capital expenditures impact than what Microsoft spends. For example, when Microsoft hires new employees, population increases, spurring the construction of new homes. When Microsoft's new employees spend their earnings, they boost retail sales, putting pressure on merchants to expand their floor space. Investment spending is triggered throughout the economy, as it builds up its stock of capital in order to operate at a higher level.

The rapid expansion of Microsoft and the growth that it imparted to the rest of the economy induced $1.4 billion in capital expenditures for equipment and structures in 2004, according to simulations with the Washington Projection and Simulation Model. This in turn had a substantial impact on employment and income in the state. Taking into account capital expenditures and exercised stock options, Microsoft's total impact amounted to 194,620 jobs or 5.4 percent of total state employment (Table 8). In other words, all things considered, Microsoft directly and indirectly accounted for one out of every 19 jobs in the state. This is a remarkable achievement for a company that has been operating in Washington for less than thirty years. Microsoft's impact on Gross State Product and personal income was even higher. The company accounted for $25.3 billion of Gross State Product (10.0 percent of the state total) and $15.2 billion of personal income (7.1 percent) in 2004.

Impact on Growth

Due to its rapid ascendancy, Microsoft more than quintupled its economic impact in just fourteen years (Figure 4). In 1990, the company employed 4,000 people in Washington and indirectly supported another 21,270 jobs. Altogether this amounted to 0.9 percent of the state's 2.8 million jobs. Fourteen years later, after adding 24,240 people to its Washington payroll, Microsoft accounted for 5.4 percent of total state employment, according to the impact considering stock option income and capital expenditures.

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[9]Note that the stock option and capital expenditures impacts should not be considered Microsoft's normal or expected impact, since stock option income and capital expenditures are unpredictable and could conceivably be negligible in the future. In that regard, the first impact (Tables 3 and 4) is the most appropriate one to use as the basis for economic forecasting and policy analysis.

Table 9

MICROSOFT IMPACT ON WASHINGTON GROWTH, 1990-2004*

	Washington Change	Change Due to Microsoft	Percent of Washington Change
Microsoft employment	24,240	24,240	100.0
Gross State Product (mils. $04)	99,534.9	23,678.7	23.8
Output (mils. $04)	143,497.9	30,759.0	21.4
Employment	760,180	169,350	22.3
Personal income (mils. $04)	84,410.6	13,810.4	16.4
Population, July 1	1,304,000	284,320	21.8

*Based on impact considering stock option income and capital expenditures.

Figure 4

MICROSOFT IMPACT ON WASHINGTON EMPLOYMENT

Percent of Total Employment
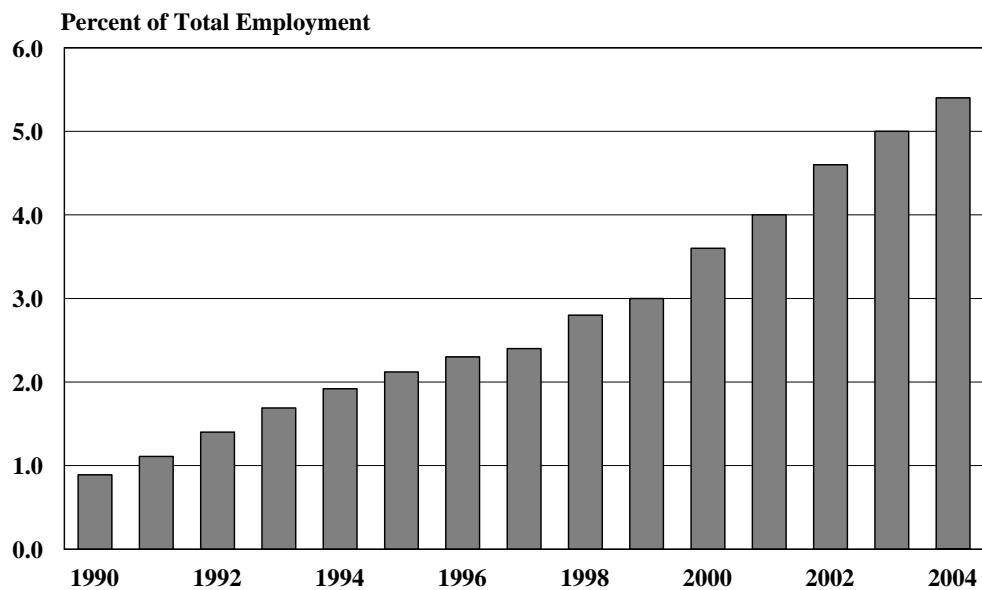
This means that Microsoft has made a very significant contribution to recent growth. Between 1990 and 2004, Washington employment expanded at a 1.7 percent annual rate, adding 760,180 jobs (Table 9). While the state continued to grow faster than the nation, its growth rate had been slowed by a significant slide in Boeing employment. During the fourteen-year period, which witnessed two aerospace downturns, Boeing eliminated close to 50,000 aerospace jobs, costing the state approximately 150,000 jobs altogether.

The airplane company's slump would have hurt a lot more had it not been for the lift provided by Microsoft and its 24,240 new employees. Taking into account the company's indirect impact on the economy, Microsoft generated a total of 169,350 new jobs between 1990 and 2004, effectively offsetting the Boeing slide. Microsoft, which accounted for 22.3 percent of the state's total job gain, has been the single largest contributor to economic growth since 1990.

4. KING COUNTY IMPACT

King County Economic Impact

With about 1.8 million residents and 1.4 million jobs, King County is the largest manufacturing and commercial center west of Minneapolis and north of San Francisco. It is the headquarters for Boeing and Weyerhaeuser, world leaders in aerospace and forest products. Downtown Seattle is a base for businesses that provide specialized financial, legal, engineering, and management services to customers all over the Pacific Northwest. The ports of Seattle and Tacoma make up the nation's third largest port complex (behind New York and Los Angeles/Long Beach). The University of Washington consistently ranks among the top three universities in federal funds for research. And, in spite of competing attractions such as Mount Rainier, the county is the focus of the state's visitor and convention industry.

Table 10

**MICROSOFT EMPLOYMENT BY
PLACE OF RESIDENCE, 2004**

	Average Employment
King County	25,940
Redmond	6,040
Seattle	5,300
Bellevue	3,990
Other King County	10,610
Other Washington	2,300
Washington	28,240

King County is also the home of Microsoft. Last year virtually all of its Washington employees worked in King County. More significantly, from the standpoint of the company's impact on the county, more than nine out of ten employees lived and spent their money in the county (Table 10). More than one-half of the workforce resided in Redmond, Bellevue, and Seattle, which lie

on an east-west line running through the heart of the county. One out of every five employees lived in Redmond, where the company is headquartered. The 25,940 employees residing in King County brought home an estimated $3.8 billion in labor income and another $1.1 billion in stock option income. These employees, representing just 2.7 percent of the total number of persons employed in King County, accounted for 5.6 percent of the county's personal income, not taking into account the multiplier effect.

Table 11

MICROSOFT IMPACT ON KING COUNTY ECONOMY, 2004

	King County Economy	Total Impact	Percent of King County
DIRECT IMPACT			
Employment	---	28,240	2.0
Labor earnings (mils. $)	---	4,094.1	5.0
TOTAL IMPACT			
Employment	1,407,010	101,430	7.2
Proprietors	232,330	12,530	5.4
Wage and salary employees	1,174,680	88,900	7.6
Personal income (mils. $)	87,617.6	7,858.0	9.0
Labor earnings	81,548.8	7,625.3	9.4
Other income	6,068.8	232.7	3.8
Per capita income ($)	49,286	1,551	3.1
Population, July 1	1,777,750	106,850	6.0

As the center of Microsoft operations as well as the home of most its employees, King County has been the primary beneficiary of the company's impact on the Washington economy, as evident in Table 11. Whether measured in terms of employment or income, the county garnered about 70 percent of the state impact.[10] In 2004, Microsoft accounted for 101,430 jobs or 7.2 percent of the total employment in King County, not counting the impact of income from exercised stock options or capital expenditures.[11] The company was responsible for $7.9 billion

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[10]The other 30 percent of the impact was spread around the state. There are several mechanisms for this dispersal. For example, state taxes generated by the impact pay for jobs in Olympia; the demand for food creates employment opportunities in Yakima; and people who commute to King County for work support retail jobs in their home counties. Commuters play a big role in determining the size of an impact when the geographical area under study is small.

[11]The economic impact presented for King County in Table 11 does not consider stock option income or capital expenditures. As a consequence, it is comparable to the Washington impact reported in Tables 3 and 4. As noted previously, these impacts more fairly characterize Microsoft's normal or expected impact on the economy, since stock option income and capital expenditures vary widely from year to year.

of personal income or 9.0 percent of the county total. Microsoft raised King County per capita income by $1,551.

The Microsoft employment multiplier for King County was 3.6 (=101,430/28,240), implying that each Microsoft job supported 2.6 other jobs in the county. Of the 73,190 jobs indirectly generated by Microsoft, there were 60,660 wage and salary employees, mostly engaged in trade, services, and government, and 12,530 proprietors. The average labor income of all workers indirectly affected by Microsoft was $48,250. This was less than the county average of $57,960 because the indirect impact included a sizable number of part-time and low-wage jobs in retail trade and personal services.

County Tax Impact

Including its indirect impact on taxes (through the output, jobs, and income created in other county businesses), Microsoft generated $251.1 million in King County local taxes in 2004 (Table 12). This includes all taxes paid to local governments (county, cities, and special tax districts) in the county. Reflecting the size of Microsoft's economic impact on the county, the amount constituted 7.0 percent of all local taxes collected in 2004. More than half of the revenue came from property taxes paid by businesses and households, while nearly one-third came from sales and use taxes. Business and occupations taxes and other taxes contributed smaller amounts.

Table 12

MICROSOFT IMPACT ON KING COUNTY LOCAL TAXES, 2004

Millions of Dollars

	King County Local Taxes	Total Impact	Percent of King County
Sales and use taxes	1,006.2	73.5	7.3
Business and utility taxes	383.0	16.8	4.4
Property taxes	1,931.2	141.0	7.3
Other taxes	271.4	19.7	7.3
Total	3,591.8	251.1	7.0

Impact on Growth

Since 1990 the King County economy has struggled. It barely escaped a recession in 1991, when the national economy slumped, and it dodged another dip in 1993, when Boeing was forced to cut production and eliminate thousands of jobs. Between 1990 and 1995, county employment expanded at a 0.7 percent annual rate, the lowest five-year growth rate in two decades. The second half of the 1990s was a different story. A surging national economy, a high-tech boom, and an aerospace rebound energized the county economy, causing it to a reach a peak employment growth rate of 4.3 percent in 1997. Unfortunately, the good times did not last. In fact, in 2001, due to a Boeing downturn in the late 1990s, the sudden collapse of the dot-coms, and the aftershock of September 11, which led to the third round of Boeing lay-offs in the

Table 13

MICROSOFT IMPACT ON KING COUNTY GROWTH, 1990-2004*

	King County Change	Change Due to Microsoft	Percent of King County Change
Microsoft employment	24,240	24,240	100.0
Employment	234,960	121,130	51.6
Personal income (mils. $04)	35,688.8	9,655.9	27.1
Population, July 1	260,540	128,510	49.3

*Based on impact considering stock option income and capital expenditures.

Figure 5
KING COUNTY EMPLOYMENT GROWTH

■Actual ☐Without Microsoft
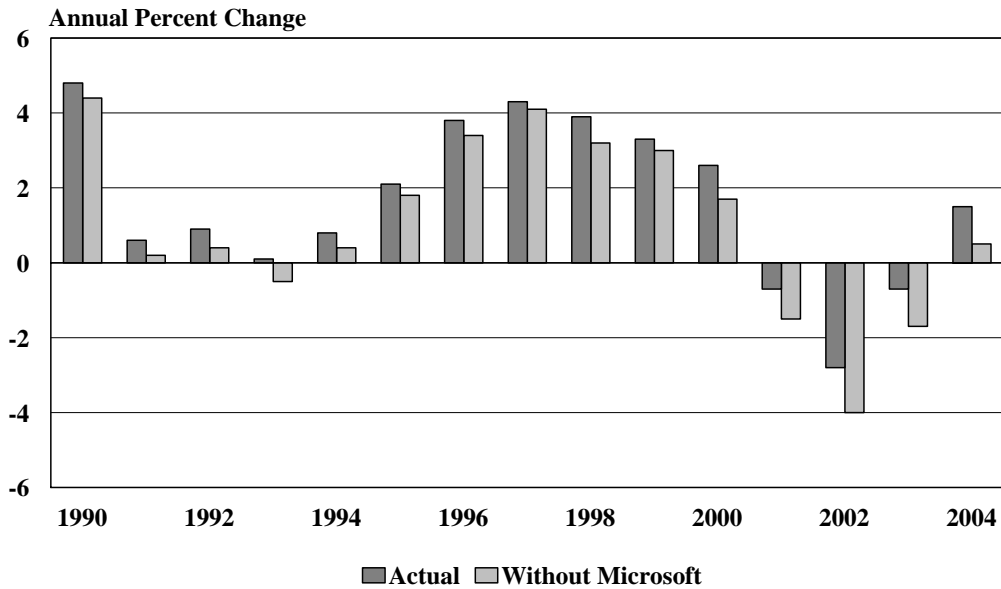
fourteen-year period, the county fell into its worst recession in thirty years. Overall, King County employment grew at a 1.3 percent rate between 1990 and 2004. This was less than the growth rate for the rest of Washington (1.9 percent) and much less than the county's growth rate for the 1980s (3.7 percent).

The situation would have been much worse had it not been for Microsoft. During this period, Microsoft increased employment in its King County facilities by 24,240 (Table 13). The direct and indirect impact of this expansion amounted to 121,130 jobs or 51.6 percent of the total gain in county employment between 1990 and 2004.[12] This meant that over the fourteen years Microsoft was responsible for almost one out of every two new jobs in King County. Without the boost from Microsoft, King County employment would have expanded at only a 0.7 percent annual rate between 1990 and 2004.

Microsoft also provided lifts to the county economy at two critical points during this time period, as shown in Figure 5.[13] In 1993, when the economy nearly stalled, Microsoft was raising the county employment growth rate by 0.6 percentage points. Without the Microsoft expansion, county employment would have declined 0.5 percent. In other words, Microsoft was the sole reason why King County side-stepped a downturn, albeit a mild one, in 1993.

More significant was the company's role in the 2001-03 recession. Over the three-year period, King County lost 61,300 jobs (4.2 percent of total employment). Were it not for the offset stemming from Microsoft's on-going growth, the county job loss would have amounted to 104,300 jobs (7.2 percent).

5. CITY OF REDMOND IMPACT

City of Redmond Economic Impact

The City of Redmond, located in eastern King County, is headquarters for the Microsoft Corporation. Home to 46,970 people, it ranked as the seventh largest city in the county in 2004 (Table 14). With an estimated 103,780 jobs, it was one of the few places in the county where there was more employment than population.[14] Reflecting the affluence of the communities located east of Lake Washington, Redmond enjoyed a high per capita income. In 2004, it stood at an estimated $60,492, about 20 percent above the King County average.

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[12]This analysis takes into account stock option income and capital expenditures.

[13]The bars on the left in Figure 5 show the actual employment growth rates for King County. The bars on the right show what the growth rates would have been without the boost from Microsoft. These growth rates are calculated from simulations of Microsoft's impact taking into account stock option income and capital expenditures.

[14]The City of Redmond employment estimate is based on incomplete information and is therefore subject to some measurement error. In a special tabulation conducted for this study, Washington Employment Security Department reported that there were approximately 79,460 wage and salary employees covered by the state's unemployment compensation program working in the census tracts that most closely approximated the Redmond city boundaries in the first quarter of 2004. Based on county employment data, it was estimated that there were about 7,180 more employees who were not covered by the unemployment program as well as 17,140 self-employed workers in the city. The final employment estimate of 103,780 is comparable in definition to the Washington and King County total employment estimates, which are published by the U.S. Bureau of Economic Analysis.

Microsoft is the city's largest employer. In 2004, employment on the Redmond campus averaged 25,740 jobs, representing one out of every four jobs in the city. Excluding income from stock options, these workers earned $3.7 billion in labor income, over three-fourths of Redmond's total labor earnings. According to Microsoft records, 6,030 of the employees, with estimated earnings of $874.2 million, made their home in Redmond.

Table 14

MICROSOFT IMPACT ON CITY OF REDMOND ECONOMY, 2004

	Redmond Economy	Total Impact	Percent of Redmond
DIRECT IMPACT			
Employment, Redmond campus*	---	25,740	24.8
Labor earnings, Redmond campus (mils. $)	---	3,731.7	46.0
Employment, Redmond residents**	---	6,030	---
Labor earnings, Redmond residents (mils. $)	---	874.2	---
TOTAL IMPACT			
Employment	103,780	45,830	44.2
Proprietors	17,140	2,820	16.5
Wage and salary employees	86,640	43,010	49.6
Personal income (mils. $)	2,841.0	1,284.1	45.2
Labor earnings	8,115.8	4,816.7	59.4
Other income	-5,274.8	-3,532.6	67.0
Per capita income ($)	60,492	12,939	21.4
Population, July 1	46,970	14,230	30.3

  *Microsoft employees who work in Redmond.
**Microsoft employees who are Redmond residents.

Taking into account the company's indirect impact, Microsoft supported a total of 45,830 jobs in Redmond, according to an analysis with an economic base model built specifically for this study. This amounted to 44.2 percent of the total employment in the city. Microsoft was responsible for $1,284.1 million in personal income or 45.2 percent of the city total. The company had the effect of boosting per capita income by $12,939. An estimated 14,230 residents, nearly one out of every three people living in Redmond, were directly or indirectly dependent upon the software company. Microsoft's impact would have been even greater were it not for the fact that more

than three-fourths of the people working on the Redmond campus did not live or spend a significant amount of their money in the city.[15]

City Tax Impact

In 2004, the City of Redmond collected $48.8 million in taxes (Table 15). Taking into account its indirect impact, Microsoft generated $19.2 million in tax revenue or 39.3 percent of the total. This included $7.2 million in sales and use taxes, $3.4 million in business and utility taxes, $7.1 million in property taxes, and $1.4 million in other taxes.

Table 15

MICROSOFT IMPACT ON CITY OF REDMOND TAXES, 2004

Millions of Dollars

	Redmond Taxes	Total Impact	Percent of Redmond
Sales and use taxes	18.8	7.2	38.4
Business and utility taxes	11.4	3.4	30.0
Property taxes	13.8	7.1	51.7
Other taxes	4.8	1.4	29.3
Total	48.8	19.2	39.3

6. CONCLUSION

Microsoft is the latest in the line of big businesses that have had a major impact on the Washington economy. While the fur-trading venture of the Hudson's Bay Company two hundred years ago was profitable, the company's most valuable legacy was the knowledge that it passed on to future settlers about the geography and economic opportunities of the Pacific Northwest territory. Five years after Weyerhaeuser Company purchased 900,000 acres of forest land from the Northern Pacific Railroad in 1900, Washington became the top lumber producer in the United States. Founded by a lumberman in 1916, The Boeing Company is currently the world's leading producer of commercial airplanes and employs 60,000 people in the Puget Sound region.

Weyerhaeuser and Boeing are still mainstays in the state economy, but they are no longer major sources of growth. In fact, since 1990 timber harvest restrictions and technological advances in mills have reduced forest products employment by 10,000. And, despite Boeing's recent rebound, productivity gains, a weak world economy, and fallout from September 11 have led to the loss of 50,000 aircraft jobs over the same period.

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[15]Labor earnings are measured by place of work, while personal income is measured by place of residence. A residence adjustment is used to account for the difference between the two income concepts. In Table 14, the large negative value for other income, which includes the residence adjustment along with other components of personal income, indicates that most of the people who work in Redmond live elsewhere.

In contrast, Microsoft has expanded rapidly during this period. Between 1990 and 2004, as revenue climbed at a 25 percent annual rate, the software company added 24,240 employees in the state, providing a welcome boost to the economy. Directly and indirectly, Microsoft accounted for one-fifth of Washington's employment growth and one-half of King County's employment growth over the fourteen-year period. By 2004, not including the impact of stock option income, one out of every 25 jobs in the state and one out of every 14 jobs in the county were dependent upon Microsoft.

Microsoft's economic impact on the state and county economies has been particularly notable in recent years. Between 2001 (the date of the previous Microsoft impact study) and 2004, the software company directly and indirectly generated an estimated 51,730 new jobs in the state. As a consequence, Microsoft's employment impact increased from 4.0 percent of total Washington employment to 5.4 percent. There were several reasons for this substantial gain: 5,060 additional Microsoft jobs; a 40 percent increase in the average labor earnings of Microsoft employees; the impact of $13 billion in stock option income paid during the four-year period: and changes in labor productivity that had the effect of significantly raising the company's employment multiplier. The employment opportunities created by Microsoft could not have come at a better time, as Washington and King County were suffering their worst recessions in three decades because of back-to-back Boeing downturns and the dot-com bust.

While these numbers are impressive, they still do not adequately describe the role of Microsoft in the economy. Indeed, it is not an overstatement to say that Microsoft has had an *immeasurable* impact on the local economy. Unlike any company before it, Microsoft has created immense wealth in the community, not only for its leaders but also for its employees and many other shareholders in the area. Moreover, like a magnet, Microsoft has drawn other software and high-tech companies to the region. Some want to work with Microsoft, while others want to take advantage of its emerging technologies and its large pool of skilled workers. Finally, several former Microsoft employees, the most prominent being Paul Allen, have drawn upon their riches and expertise to start new enterprises and charitable foundations.

Microsoft faces a number of challenges in the years ahead, including the rapidly changing nature of computer and information technologies and the unpredictable future of the new economy. Nevertheless, Microsoft's willingness to diversify, its substantial financial resources, and its skilled and creative workers should maintain it as a significant growth force in the Washington, King County, and City of Redmond economies for some time to come.

Appendix A

TECHNICAL NOTES

A-1. DEFINITIONS AND CONVENTIONS

Gross State Product

Washington Gross State Product is the counterpart to U.S. Gross Domestic Product (GDP). It is the value of Washington's total production of goods and services for final use. Gross State Product can be measured in two ways. First, it is the sum of goods and services purchased by households (personal consumption expenditures), government (federal, state, and local government expenditures), the capital sector (gross private domestic investment), and the foreign sector (net exports to foreign countries and the rest of the United States). Second, it is the sum of value added (gross product originating) in industry, households, and government. Gross State Product, which in this study is valued in 2004 dollars, is the most comprehensive indicator of economic activity in the state.

Output

Except for wholesale and retail trade and transportation services, industry output is defined as the value of production or sales. Output is valued at producers' prices in 2004 dollars. For trade and transportation, output is the value of trade and transportation margins (mark-ups). Output measured in purchasers' prices (what customers pay) equals output measured in producers' prices (what producers receive) plus trade and transportation margins.

Employment

Adopting the concept used by the U.S. Bureau of Economic Analysis, employment is the annual average number of full and part-time wage and salary employees and proprietors (self-employed workers). In a given year, total employment is greater than the number of persons employed, as measured by the U.S. Bureau of Labor Statistics, because of workers holding more than one job.

Personal Income

The major components of personal income are labor earnings, property income (dividends, interest, and rent), transfer payments, and contributions to social insurance. Labor earnings include wages, salaries, proprietors' income, and other labor income earned by job-holders. Personal income is valued in 2004 dollars.

A-2. IMPACT ANALYSIS METHODOLOGY

Input-Output Models

The input-output model, as represented by the table of output, employment, and income multipliers, is the analytical method most commonly used to measure economic impacts. Six

input-output models for Washington State have been constructed, the most recent one being for 1997 (Conway *et al.*, 2004).

An input-output model shows how industries and households in the economy are interrelated. When one industry expands or declines, the model estimates the production, employment, and income changes in other industries affected directly or indirectly by the demands of the original industry. For example, an increase in Microsoft production raises the company's demand for professional and business services. The increase in activity in professional and business services in turn leads to higher levels of employment and income in that industry and an increase in consumer spending.

Although the Washington input-output model attempts to capture the interactions among industries and households in the state, it still represents a somewhat simplified depiction of economic behavior. In particular, the model is subject to four restrictions that affect the precision of the impact estimates: (1) a static depiction of impacts; (2) constant input-output coefficients; (3) a simple specification of the interactions among production, income, and personal consumption; and (4) a neglect of the indirect impacts of induced private investment, state and local government spending, and population change. In estimating impacts, the fourth restriction is the most significant. Since the input-output model does not take into account induced investment, public expenditures, or migration, it tends to significantly understate the magnitude of economic impacts. For a more complete account of the properties of the Washington input-output model in the context of impact analysis, refer to Conway (1991).

Washington Projection and Simulation Model

The Washington Projection and Simulation Model is a regional interindustry econometric model designed for forecasting and impact analysis. With a comprehensive specification of the structure of the state economy, WPSM is formulated to overcome many of the shortcomings of the input-output model. WPSM VI, whose structure is described here, is the sixth generation of a model originally developed at the University of Washington (Bourque, Conway, and Howard, 1977). The latest effort to update the model was undertaken by Dick Conway & Associates and the Economic Policy Research Center in the university's Department of Economics.

The features of WPSM VI are shown in Table A-1. The model generates economic forecasts on an annual basis, the projection horizon extending up to 10 years. The system of equations is formulated to predict the behavior of 163 endogenous variables. The model consists of 125 behavioral equations, 38 accounting identities, and 39 exogenous variables, the last of which primarily express economic conditions in the United States. WPSM identifies 24 Washington industries (Table A-2) and three public sectors. For each industry, there are projections of output, employment, and labor earnings. Among the other economic and demographic variables predicted by the model are Gross State Product, personal consumption expenditures, investment, state and local government expenditures, labor force, the unemployment rate, personal income, wage and salary disbursements, population by age and sex, net migration, and the Seattle consumer price index.

Impact Estimation Procedure

This study draws upon the simulation capabilities of the Washington Projection and Simulation Model to measure the direct and indirect economic impact of Microsoft. In general, the impact estimation procedure is a straightforward exercise. Employing WPSM, the behavior of the state

Table A-1

FEATURES OF WASHINGTON PROJECTION AND SIMULATION MODEL VI

Projection Horizon

   1-10 years

Model Size

   163 endogenous variables
    39 exogenous variables
   125 behavioral equations
    38 identities

Industry Detail

   24 industries, each having projections of
       output
       employment (wage and salary employees and proprietors)
       labor earnings (wages, salaries, proprietors' income, and other labor income)

Other Selected Endogenous Variables

       Gross State Product
       personal consumption expenditures
       residential and nonresidential investment
       state and local government expenditures
       exports (including federal government expenditures)
       labor force
       unemployment rate
       personal income
       per capita income
       population by age and sex
       net migration
       Seattle consumer price index
       single-family home price

Table A-2

**CLASSIFICATION OF INDUSTRIES IDENTIFIED IN
WASHINGTON PROJECTION AND SIMULATION MODEL VI**

Industry	NAICS Code
Agriculture	111-112
Other resources	113-115,21
Construction	23
Food and beverages	311-312
Textiles and apparel	313-315
Wood products	321
Paper products	322
Printing	323
Petroleum products	324
Chemical products	325
Nonmetallic mineral products	327
Metals and products	331-332
Machinery	333-335
Aircraft and parts	3364
Other transportation equipment	Other 336
Other manufacturing	316,326,337,339
Wholesale and retail trade	42,44
Transportation and warehousing	48
Utilities	22
Information	51
Financial activities	52-53
Professional and business services	54-56
Health services	62
Other services	61,71-72,81

economy is first simulated <u>with Microsoft output</u> (and thus its employment and labor earnings) to produce a baseline projection over a period of time. The simulation is then repeated but <u>without Microsoft output</u> to yield a conditional projection. The difference between the two sets of projections is a measure of Microsoft's total (direct and indirect) impact on the state economy. Since WPSM is a comprehensive model, the impact can be expressed in terms of employment and income by industry, population, personal income, household expenditures, state and local government spending, and fixed investment, among other economic and demographic variables.

Since WPSM defines the information industry (NAICS 51) but not specifically Microsoft (which is part of the software publishing industry, NAICS 5112), it is necessary to take into account the differences between Microsoft and the information industry in terms of their respective interindustry purchases, employment, and wages when simulating Microsoft's economic impact. Although Microsoft is part of information, simulating changes in the information industry as a whole would not give the desired impact results. After determining the Microsoft employment-output ratio, for example, one can enter WPSM and alter the information industry employment-output ratio through the use of an ADD-FACTOR to yield a ratio that is equal to that for Microsoft (as determined by company records). Similar adjustments to the model can be made to take into account differences in wage rates (income-employment ratios) and in-state expenditures for goods and services (in-state expenditures-output ratios). In effect, add-factoring in this case is tantamount to introducing a new business or industry, specifically Microsoft, into the simulation model.

Employment Multiplier

Employment multipliers are one means of standardizing the measurements of economic impacts for purposes of comparison. The employment multiplier for a given industry is defined as the ratio of its total employment impact to its direct employment impact. In 2004, for example, Microsoft sales of $19.0 billion directly supported 28,240 jobs in Washington and indirectly supported 116,920 jobs in other state industries for a total of 145,160 jobs, according to a simulation with WPSM (see Table 4). Note that this impact does not consider the effects of stock option income or capital expenditures. The Microsoft employment multiplier is 5.1 (=[28,240+116,920]/28,240). In this instance, the multiplier can be interpreted to mean that, on average, each Microsoft job indirectly supported the equivalent of 4.1 other jobs in the state economy. Microsoft's wage and salary employment multiplier, which excludes proprietors, is 4.2 (=119,030/28,240). Compared to other industries, Microsoft has high multipliers because of its above-average labor income and its high level of in-state expenditures per employee.

King County and City of Redmond Impacts

Estimating the economic impact of Microsoft on King County and the City of Redmond is a two-step procedure:

1. Estimate Microsoft's direct employment and income impacts on the county and city.

2. Using economic models of the county and city, estimate Microsoft's total employment, income, population, and tax impacts.

The estimated county impact is based on an analysis conducted with the Seattle City Light Model (SCLM), an econometric model of King County and the Seattle City Light service area (Conway, 2000). Although SCLM has more than five hundred forecasting equations, its simulation

properties are not as strong as those of WPSM, since it does not have an explicit input-output framework. It is therefore necessary to adjust SCLM's simulations in order to maintain consistency between the county and state impact estimates. As a whole, however, the adjustments to SCLM are minor.

The city impact analysis is conducted with an economic base model, which identifies twelve employment categories, including eight major sectors: resources (agriculture, forestry, fishing, and mining); construction; manufacturing; transportation and public utilities (including communications); wholesale and retail trade; financial activities; services; and government.

The core of the economic base model, which is the least sophisticated of the three impact models used in this study, is specified in terms of income. Following standard procedures for building economic base models, a single income multiplier is estimated for the city. This multiplier, when combined with the estimate of Microsoft's labor earnings (after deducting the income of people who work on the Redmond campus but live outside the city), leads to an estimate of the city's total personal income impact. Employment-income ratios (i.e., the number of jobs in wholesale and retail trade, for example, supported per dollar of personal income in the city) are then used to estimate the indirect employment impact.

Since the economic base model is a simple model, at least compared to WPSM, it is subject to appreciable measurement error. Nevertheless, the results obtained from the model still constitute a reasonable estimate of Microsoft's impact on the City of Redmond economy.

A-3. MICROSOFT DATA

Microsoft's direct economic impact on Washington is its employment, labor earnings, and expenditures for goods and services procured from state businesses in calendar-year 2004. This information, which is critical to the analysis, was provided by the company.

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