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IMPLICATIONS FOR THE WASHINGTON ECONOMY OF THE EXEMPTION FROM SALES AND USE TAXES ON PURCHASES OF MACHINERY AND EQUIPMENT

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For

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EXECUTIVE SUMMARY

In 1995 the Washington legislature exempted manufacturers from sales tax on purchases of machinery, equipment, and related structures. The initial exemption that became effective for purchases of qualifying machinery and equipment after July 1, 1995 was expanded in 1996 to include purchases of machinery equipment used by a manufacturer for research and development purposes, and for repairs and replacement parts.

A detailed economic analysis of the potential effects of the exemption for the Washington economy was prepared and presented to the Manufacturing Tax Study Committee in February 1995. The study was updated in 2000 to reflect new data and assess the results of the earlier study. The updated analysis confirmed the conclusion of the 1995 study that the tax incentive would more than pay for itself. In fact, the updated study found that the impact of the tax exemption was better and the payback occurred earlier than initially predicted. This study incorporates new and revised investment spending and State GDP data to update the impact of the exemption through 2016. In addition this study provides an analysis of extending the exemption to a non-manufacturing sector industry; extending the exemption to consumables used in the manufacturing process; and assessing the impact of restrictive interpretation of qualifications for the exemption such as dual use provisions.

An exemption from sales taxes essentially reduces the effective purchase price of machinery and equipment thereby providing a stimulus for investment. Increased capital investment stimulates growth in real output in all sectors of the economy, creates new jobs, generates additional household income and additional revenue for government at all levels.

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- The existing exemption from the sales tax on purchases of machinery and equipment will provide a substantial incentive to invest in Washington resulting in a 22.3 percent increase in new spending for machinery and equipment between 2007 and 2016. This investment will expand capital that will create additional final demand. Washington State GDP is projected to increase $49.3 billion (2000) dollars to Washington State GDP between 2007 and 2016

- The expansion of real output caused by the stimulus provided by the existing sales tax exemption on machinery and equipment spending will create nearly 54,100 new jobs for all Washington residents by 2016.

- Increased economic activity (output) and new jobs will create additional income for Washington residents. The existing sales tax exemption for machinery and equipment is expected to provide Washington households with $22 billion (2000 dollars) of additional income by 2016.

- The sales tax exemption will more than pay for itself in additional net tax revenues. State and local governments are expected to realize $2.05 billion in additional net tax revenues between 2007 and 2016. The majority of the revenue gain ($2.028 billion) will be realized by the State while local governments will gain an additional $23 million in net revenues.

- Extending the sales tax exemption to consumable goods used in the manufacturing process enhances the value of the tax exemption for new machinery and equipment by lowering the effective cost of operation. The actual impact will depend on the amount of money spent annually on consumables which varies from industry to industry. Assuming that consumables account for about 3.6 percent of the value of output, extending the exemption to these goods will increase GDP an additional $313.7 million (2000$) by 2016; increase household income an additional $166.7 million (2000$) annually; and create as many as 4,287 more new permanent jobs by 2016.

- Extending the sales tax exemption on machinery and equipment spending to non-manufacturing sector industries would increase spending on new machinery and equipment. The effect of the exemption will vary according to the capital intensiveness of the industry. For example, using the capital intensive telecommunications industry as a proxy, the impact of new investment stimulated by the exemption on economic activity is expected to increase the annual growth rate in real GDP by 0.5 percent per year so that by 2016 the Washington economy would be $2.4 billion (2000$) larger than otherwise. Job growth would be stimulated in the entire economy, household income would rise and the Washington State Treasury would realize an annual average net revenue gain of nearly $46 million (2000$) between 2007 and 2016.

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IMPLICATIONS FOR THE WASHINGTON ECONOMY OF EXEMPTING PURCHASES OF MACHINERY AND EQUIPMENT BY MANUFACTURERS FROM THE SALES TAX

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In 1995 the Washington legislature exempted manufacturers from the sales tax on purchases of machinery, equipment, and other producer goods ("M&E exemption") by Washington manufacturers. The initial exemption that became effective for purchases of qualifying machinery and equipment after July 1, 1995 was expanded in 1996 to include purchases of machinery equipment used by a manufacturer for research and development purposes, and for repairs and replacement parts.

A detailed economic analysis of the potential effects of the exemption for the Washington economy was prepared and presented to the Manufacturing Tax Study Committee in February 1995. The study was updated in 2000. Table 1 compares the updated projected impacts of the M&E exemption described in this study for a ten-year horizon with the results of the 1995 and 2000 studies and actual performance for Washington. For ease of comparison the results of the pervious studies have been expressed in constant 2000 dollar terms.

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Table 1
Comparison of Impacts from Previous Studies
(Ten-year Impacts)

	1995 Study 1996-05	2000 Study 1996-05	Actual* 1996-05	2008 Update 2007-16
GDP (Mil 2000$)	$69.4	$84.6	$81.5	$49.3
Income (Mil 2000$)	$19.7	$19.4	$16.5	$22.0
Net new jobs	81,000	97,600	284,900	54,094

* Source: BEA; BLS

As can be seen in Table 1 the 1995 analysis of the M&E exemption underestimated the impact on State GDP while the 2000 analysis overshot slightly. Household income estimates in both studies overestimated the impact of the exemption while actual job growth was significantly larger than projected in 1995 and 2000.

An exemption from Washington state sales taxes essentially reduces the effective purchase price of machinery and equipment thereby providing a stimulus for investment. Increased capital investment stimulates growth in real output in all sectors of the economy, creates new jobs, generates additional household income, and additional revenue for government at all levels. According to the U.S. Census Bureau, purchases of machinery and equipment by the manufacturing sector in the United States totaled $149.3 billion in 2006, up 13.5 percent from 2005 levels.[1] Capital expenditures on structures for the manufacturing sector rose 22.3 percent to $44.7 billion in 2006. During this same period capital investment in Washington significantly outperformed the nation. In its Annual Survey of Manufacturers the Census Department reported that spending on machinery and equipment by the Washington manufacturing sector increased 58 percent to $2.4 billion while expenditures on structures by manufacturers grew nearly 38 percent to $583 million.

[1] U.S. Census Bureau. 2006 Annual Capital Expenditures Survey. January 28, 2008.

Increased investment in capital goods stimulates growth in real output in all sectors of the Washington economy, creates new jobs, and generates additional income for Washington residents and revenue for State and local governments. Expansion of the exemption to additional industries will increase capital spending and stimulate economic activity and job creation.

I. OBJECTIVES

This study has several objectives.

1. Update the results of the 1995 and 2000 analyses using current data on capital spending and GDP by industry for the U.S. and Washington.

2. Analyze the implications for Washington of expanding the sales and use tax exemption to a non-manufacturing sector industry.[2] For purposes of this study the telecommunications industry was chosen as a non-manufacturing proxy because of its capital intensiveness.

3. Examine the impact of extending the exemption to expenditures on consumables used in the manufacturing process.

4. Assess the implications for the Washington economy of restrictive interpretations of the existing exemption.

[2] For purposes of this analysis the manufacturing sector is defined to include businesses in NAICS codes 311 through 339 and NAICS codes 5111 and 5182, information and data processing services and software publishing.

II. METHODOLOGY

The methodology employed in analyzing the impact for the Washington economy of eliminating the sales tax on spending for machinery and equipment was a multi-stage process.

1. **The first step involved estimating the responsiveness of investment to a change in taxes.**

   Eliminating a tax such as the Washington sales tax stimulates investment by improving the after-tax rate of return for an investment in machinery and equipment. The expected effects on machinery and equipment spending were determined by calculating the increase in the after-tax rate of return for investment that would result from elimination of the 8.2 percent average state and local sales tax.[3] The response of investment in machinery and equipment to an increase in the after-tax rate of return was estimated through the use of sensitivity (elasticity) estimates recently published in the regional economics literature as discussed in a later section.

2. **Selection of a baseline against which changes in investment spending would be compared.**

   A baseline projection of real economic growth by industry for the Washington economy through 2015 was provided by Moody's Economy.com, a widely respected regional economic forecasting firm. Moody's forecasts the Washington economy to grow at an average annual rate of 3.5 percent through 2015. This forecast is predicated on continuation of existing fiscal incentives including the sales tax exemption for manufacturers.

   It is important to note that this economic projection was completed before the current slowdown in the U.S. and Washington State economy became evident. The problems in the housing market and credit/banking crisis have combined to precipitate a cyclical

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[3] Due to local rate variability, local tax rates published by the Washington State Department of Revenue were averaged. When added to the State tax rate of 6.5 percent this provided a statewide average of 8.2 percent.

downturn that will culminate in slower than expected growth in 2008 and 2009. However, assuming that recovery from the cyclical downturn follows historical precedent (1981-82; 1990, 2000), the long-term average growth is unlikely to be significantly affected.

In order to arrive at a baseline path of spending on new machinery and equipment by industry sector, we assumed that spending on machinery and equipment for individual industries would grow at the rate of growth for real private fixed investment in non-residential non-computer equipment and machinery. The forecast for this component of national GDP was provided by Macroeconomic Advisers, LLC.[4]

So as to accurately reflect the impact of capital spending on the State economy, an assumption had to be made regarding the share of every dollar spent on new machinery and equipment that stays in Washington. Since Washington is not a closed economy, some portion of every dollar spent by firms on capital equipment goes to suppliers out of state. For purposes of this study, we assumed that two-thirds of spending by Washington businesses and consumers stays within the state.[5]

3. Estimating the implications of sales tax for spending on machinery and equipment.

The total spending on machinery and equipment in Washington that would result from an exemption from the sales tax was calculated by applying an effective investment multiplier for each industry to the baseline of new capital spending. Our analysis incorporated an investment elasticity of -0.209.

Machinery and equipment spending resulting from the sales tax exemption also stimulates the demand for new structures. The U.S. Census Bureau reports data for capital expenditures on structures by industry along with machinery and equipment. The estimates of construction spending in Washington were estimated using the same

[4] *Long-Term Outlook for the U.S. Economy*, Macroeconomic Advisers, LLC. December 19, 2007.
[5] See Randal C. Coon and F. Larry Leistritz (1997), Appendix Table 2.

approach as for machinery and equipment spending. These estimates were reduced by 30 percent to account for the portion of construction spending that is assumed to go to out-of-state sources.

Increased investment in machinery and equipment as a result of improved after-tax returns provided by exemption from the sales tax expands the capital stock of the Washington economy. Removing the exemption eliminates the incentive to invest, reduces capital spending, and reduces the level of capital stock in the Washington economy, which generates real output. The path of this expansion in output through 2016 was estimated by calculating the impact the lower level of new investment would have on output assuming a 10-year life for machinery and equipment and adjusting for depreciation. The annual percentage increase was divided by 0.209 (the full amount that capital stock and output ultimately increases as a result of the sales tax elimination) to estimate the effect on gross output due to the change in investment. The resulting adjusted investment multiplier was applied to gross output by industry through 2016.

4. **Estimating the macroeconomic impacts on Washington of extending or removing the existing sales tax exemption for manufacturers.**

The final step in the analysis was the calculation of the economic impacts for Washington resulting from the estimated reduction in investment spending on new machinery and equipment, new construction, and the resulting output decline due to the capital stock adjustment associated with a lower level of investment.

These economic impacts were estimated through the use of state-specific impact multipliers that measure the full interaction of the flow of output between and among individual industries. These multipliers are calculated through the use of an input-output model that describes and quantifies how output and demand are allocated among the individual industries within the economy.

The multipliers are coefficients for the individual cells of the input-output matrix for the economy that allocate output and final demand by industry. Multipliers are normally calculated for output, employment, and earnings (income). The multipliers enable the measurement of the impact of a change in final demand by one industry such as communications on final demand (output), income generated, and employment for other industries in a specific economy such as Washington. The summation of the impacts for all industries describes the implications of a change in final demand in one industry for the full state economy. In essence, the multiplier measures the impact of a dollar of new final demand on the economy as that dollar is spent and re-spent at subsequent levels of demand throughout the entire economy.

For illustrative purposes, a simple example relevant to this analysis would be the purchase of a new drill press. The full effect on the Washington economy is the spending on the drill press (direct effect) and the machine tool supplier's spending on inventory, wages, etc. (secondary effect) and the supplier's employee's spending on food (tertiary effect) and so forth.

The multiplier effect calculation for this analysis was made by applying industry-level final demand multipliers for gross output, employment, and household income to the estimates of increased final demand resulting from changes to application of the sales tax. The multipliers used for this analysis are the current industry-level final demand multipliers for Washington estimated by the U.S. Bureau of Economic Analysis.[6]

The impact of extending or eliminating the sales tax on net state tax revenues was calculated by estimating:

- Changes to revenues from the sales tax on expenditures for machinery and equipment; and

[6] Department of Commerce, Bureau of Economic Analysis, RIMS II Handbook, "Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System," Third Edition, 1997.

- Changes to revenues that would result from taxes paid on output created by eliminating the sales tax exemption for capital expenditures. These revenues include retail sales taxes on consumption and property taxes paid on new investment in machinery and equipment, and structures.

5. The Responsiveness of Investment to a Change in Taxes

The implicit behavioral model underlying the approach used in this analysis is based on the theory that the decision to invest in machinery and equipment is primary and that investment in the structures needed to house the machinery and equipment is secondary. While a firm may need to buy new machinery and equipment to expand its operations, it can often adapt existing structures to meet its needs, thereby eliminating the need to make new investment. In the analysis that follows, the behavioral model employed assumes that the decision of whether or not to invest is based on the after-tax return to investment on machinery and equipment. Investment in structures is assumed to increase proportionally to the machinery and equipment investment. This view is supported by the typical quantitative result that the aggregate (macroeconomic) investment decision regarding machinery and equipment is much more sensitive to measures of the expected return on investment (or, equivalently, the cost of capital) than is the aggregate investment decision regarding structures.

The effect of eliminating the sales tax on investment in machinery and equipment on the after-tax return on such investment can be illustrated by a realistic hypothetical example. Suppose that the machinery and equipment required by a manufacturing firm cost $1,000.00. The Washington average sales and use tax of 8.2 percent (6.5 percent state and 1.7 percent local) on this capital expenditure is $82.00. If no sales tax were collected on this expenditure, the effective cost of the machinery and equipment to the company would be $918.00 ($1,000.00 less $82.00).

To keep the illustration simple, assume that the machinery and equipment has a useful life of only one-year.[7] Therefore, the firm must recover the cost of the machinery and equipment (or depreciate it) within one year and also earn a return over one year. The company also must hire workers, purchase materials, purchase services, purchase electricity and other energy, and pay rent on the buildings used to house its operation.[8]

Gross receipts during the year are $12,500. Operating expenses[9] take $11,250 of these receipts leaving $1,250 to cover the full depreciation of the initial investment (recall that a one-year life for the machinery and equipment is assumed) and to provide a return on that investment. Pre-tax income for investment after the $1,000 depreciation charge is deducted amounts to $250 (note that the full cost of the machinery and equipment, including the sales tax paid, is depreciated). Further assuming an effective corporate (business) income tax rate of 40 percent implies that the corporate income tax payments would be $100, leaving $1,150 after-tax net income. Given the initial investment of $1,000 in machinery and equipment, the after-tax rate of return on investment is 15 percent.

This illustration also can be used to show the after-tax rate of return on investment when there is no sales tax on machinery and equipment investment. If the sales tax on machinery and equipment investment were eliminated, the total investment would be only $924.21 (i.e., the cost of the machinery and equipment alone without the addition of the 8.2 percent sales tax). Gross receipts and operating expenses would be unchanged leaving the same $1,250 of net revenue available for investment in machinery and equipment as was available in the situation when there was a three percent sales tax on

[7] This simplifying assumption does not affect any of the conclusions drawn below. For example, the same results would follow if the machinery and equipment were assumed to have a 10-year useful life.

[8] Assuming that the building is rented (or leased) converts the capital cost associated with structures to an operating expense again in the interest of simplicity. Assuming the building was owned would not change the results but would complicate the arithmetic.

[9] Operating expenses include labor costs, purchased materials and services, electricity and other energy, and building rental.

investment. Without the sales tax, depreciation is only $924.21 (instead of $1,000) leaving $325.79 of net income before tax. Corporate income taxes (assuming a 40 percent tax rate) on this income would be $130.31 leaving $1,119.69 in after-tax income. Given the initial investment of $924.21, this after-tax income implies a 21.2 percent after-tax rate of return on investment (versus a 15 percent rate of return when an 8.2 percent sales tax is imposed on investment). The 21.2 percent after-tax return is 41 percent higher than the 15 percent return.

Clearly, when investment in machinery and equipment is expected to earn 21.2 percent, one would expect more investment spending than when the same investment was expected to earn only 15 percent. Therefore, eliminating the sales tax on investment increases investment. The question is how much investment will increase.

6. Selection of an Appropriate Investment Elasticity

There is a considerable body of economics literature describing the determination of business fixed investment and response to changes in the price of capital and the national economy level. In a recent paper Beaulieu, McKenzie, and Wen review previous estimates of the impact of the marginal and average effective rate and calculate their own estimates based on Canadian Provincial performance.[10] They report that Chirinko, Fazzari, and Meyer (1999) estimated an elasticity of capital stock with regard to the tax-adjusted cost of capital of -0.25 and that Cummins, Hasset and Hubbard (1998) obtained even higher elasticities.

Earlier, Wasylenko reviewed the analytical models and empirical results of studies that relate taxation to economic development and performance and reported a wide range of elasticities in tax analyses.[11] For example, Bartik (1994) has suggested an average elasticity of -0.3 for the tax responsiveness of location and economic growth for states or

[10] Beauliu, Eugene, Kenneth J. McKenzie, and Jean-Francois Wen. “Factor Taxes and Business Location”. University of Calgary, November 2006.
[11] Wasylenko (1997).

regions, and that the range of elasticity estimates is between -0.1 and -0.6.[12] Wasylenko reports that of 38 quantitative studies that examined the total tax responsiveness of aggregate economic activity (manufacturing employment or investment or aggregate gross state product), 23 studies indicated statistically significant elasticities with the median values ranging from -0.58 to -.02.[13] Further, of 34 studies examining business tax elasticities, 24 reported statistically significant elasticity estimates with median values ranging from 0.0 to -0.26. Wasylenko concludes that while taxes do not appear to have a substantial effect on economic activity among states, the degree to which a specific state's tax rate will affect economic activity depends on the degree to which the state's tax burden deviates from that in competing states. "As long as the tax elasticity is negative and significantly different from zero, high-tax states will lose more economic activity than average or low-tax states."[14]

Other regional economics and policy literature supports the proposition that "state and local business tax policies targeted to increase the return on new capital investment in a particular industry can be expected to generate new investment."[15] This proposition has been supported on both theoretical and empirical bases. The empirical studies at the state or regional level have estimated the sensitivity of investment (or plant location) directly to the income tax rate[16] and also indirectly via the corporate income tax rate's effect on the after-tax return on investment.[17]

Bartik (1985) evaluated three different model specifications to estimate the responsiveness of new plant locations to changes in state corporate and property tax rates and found that a 10 percent increase in the corporate income tax rate within a given state

[12] Op. Cit. Wasylenko, p. 45. Also see Bartik (1994).
[13] Op. Cit. Wasylenko, p. 45.
[14] Op. Cit. Wasylenko, p. 48.
[15] Papke (1987), p. 201.
[16] For example, see Bartik (1985) and Benson and Johnson (1986). The former study focus on the effect of the corporate income tax rate on plant location while the latter focuses on the effect of rates of taxes on all income on capital expenditures.
[17] For example, see Papke and Papke (1986) and Papke (1987).

causes a reduction in new plant locations within a range of 2.2 percent and 3.4 percent. His alternative specifications, which resulted in smaller elasticities, included dummy variables to account for important unmeasured regional characteristics that influence locational patterns.[18]

Benson and Johnson found that a 10 percent increase in the tax rate on all income in a given state reduces capital expenditures by between 5.8 percent and 10.2 percent. Papke and Papke (1986) conclude that a 10 percent increase in the after-tax rate of return on investment causes a 20 percent increase in investment. To compare the Papke and Papke (1986) results to those that related investment (plant location) to tax rates, a change in tax rates must be converted to an implied change in after-tax rate of return.

An analogous result can be obtained by examining the impact of the existence of a corporate (business) income tax rate which also has a negative effect on the after-tax rate of return on investment. A 10 percent reduction in a corporate (business) income tax rate (from 40 percent to 36 percent) raises the after-tax rate of return on investment to 16 percent from 15 percent, or an increase of 6.7 percent.

Using the Bartik results to illustrate the conversion of corporate income tax rate elasticities to after-tax rate of return elasticities, the results indicate that a 10 percent cut in corporate tax rates will produce a 3.4 percent increase in investment (new plant locations). The 10 percent cut in corporate taxes also produces a 6.7 percent increase in after-tax returns. Therefore, a 6.7 percent increase in after-tax returns in investment would cause investment to increase by 3.4 percent. As a result, a 10 percent increase in after-tax returns on investment would cause a 5.1 percent increase in investment (i.e., the after-tax rate of return elasticity is 1.5038 times the tax rate elasticity.)[19]

[18] Bartik (1985).

[19] This linear conversion of elasticities is a conservative approximation to the exact logarithmic conversion. For the Bartik (1985) results, the exact logarithmic conversion would produce an elasticity of investment with respect to

Bartik's work has the most direct relevance to the analysis of the potential impact on investment resulting from an exemption of the Washington sales and use tax. Bartik's elasticity estimates cannot be applied directly to the estimated change in after-tax returns since he measured sensitivity of new plant locations to corporate income tax rates rather than the sensitivity of direct investment spending to after-tax returns. However, if it is a reasonable assumption that new plant locations are a proxy for new investment in plant and equipment, then we can calculate an appropriate elasticity from Bartik's analysis.

We arrived at the 0.209 elasticity estimate used in this analysis by multiplying Bartik's implied elasticity of 0.51 discussed above by the 41 percent increase in the after-tax rate of return that a Washington manufacturing firm would experience from elimination of the sales tax presented in Table 1 (0.51 X 0.41= 0.2091). Bartik's work is not disaggregated by industry; however, Papke estimated elasticities of new capital expenditures per production worker with respect to after-tax rates of return by industry.[20] While Papke's estimates exceed the high end of the ranges reported by Wasylenko, they do give an idea of how elasticities vary by industry.

III. IMPACT OF THE SALES TAX EXEMPTION FOR MANUFACTURERS: UPDATE

Eliminating a tax such as the Washington sales tax improves the after-tax rate of return for an investment in new machinery and equipment and stimulates investment. Increased investment stimulates growth in real output in all sectors of the Washington economy, creates new jobs, and generates additional income for Washington residents. Continuance of the sales tax exemption for machinery and equipment will generate a significant net gain in tax revenue for the state and local governments. The estimates of the impact of the exemption presented in this study incorporate current estimates of capital expenditures for equipment and structures by industry

the after-tax rate of return of 0.556 instead of 0.511 or the after-tax rate of return elasticity is 1.6365 times the corporate income tax rate elasticity.

20 Leslie Papke (1987).

and revisions to industry definitions and GDP growth for the U.S. and Washington State published by the Bureau of Economic Analysis.

- **The exemption from the sales tax on purchases of machinery and equipment will provide a substantial incentive to invest in Washington.**

  The increase in the after-tax rate of return for investment provided by the elimination of the sales tax would result in a 22.3 percent increase in new spending for machinery and equipment between 2007 and 2016. Investment spending on machinery and equipment in Washington is projected to increase $4.4 billion (2000 dollars) between 2007 and 2016. The estimates of output, earnings, employment, and state revenue impacts are shown in Appendix I.

- **Increased spending on new machinery and equipment would stimulate investment in structures and would increase gross output through an expansion of capital stock.**

  Although spending on construction of most structures is not included in the sales tax exemption, an increase in new investment in machinery and equipment would result in a gain in construction spending for structures designed to accommodate the new machinery and equipment of $1.3 billion (2000 dollars) over the 2007 to 2016 period.

  Gross output in the Washington economy will increase as spending on new machinery and equipment expands capital stock and thereby the productive capacity of the economy. As indicated earlier, a total of $39.2 billion (2000 dollars) of additional gross output will result from the increased productive capacity between 2007 and 2016.

- **The expansion in output and investment resulting from the sales tax exemption will increase the size of the entire Washington economy as the dollars spent by manufacturing firms circulate through all the other sectors of the economy.**

The combination of additional productive capacity and new final demand generated by the exemption for capital expenditures from the sales tax will add $49.3 billion (2000) dollars to Washington State GDP between 2007 and 2016

- **Expanded output will create new jobs for Washington residents.**

  The expansion of real output caused by the stimulus of removing the sales tax on machinery and equipment spending would create nearly 54,100 new jobs for all Washington residents by 2016. Since the output that would be created by new investment spending would occur in all industries, these new jobs would be created throughout the entire economy.

- **Increased output and new jobs will create additional real income for Washington residents.**

  Increased economic activity (output) and new jobs will create additional income for Washington residents. The sales tax exemption for machinery and equipment is expected to provide Washington households with $22 billion (2000 dollars) of additional income by 2016.

- **Washington taxpayers will benefit as the increased economic activity caused by the sales tax extension boosts tax revenues for the state and local governments.**

  Over the FY 2007-2016 period Washington taxpayers will gain $2.05 billion in net tax revenues. Granting an exemption from the sales tax for machinery and equipment results in foregone sales tax revenues for the state local governments. However, these lost sales tax revenues are more than offset by revenue gains resulting from the investment stimulus provided by the exemption. The revenue offsets will come from several sources:

- Sales taxes on eligible consumption prompted by increased final demand. This was calculated by multiplying the sales tax rate by 70 percent of the new final demand created by the new investment resulting from elimination of the sales tax. This reflects the fact that personal consumption expenditures account for 70 percent of total GDP for the U.S. economy. Care was taken to exempt consumption of food consumed at home from the sales tax.

- Property taxes on the additional structures that will accompany the investment in machinery and equipment. This was estimated by multiplying the projected new spending by an average property tax rate for Washington.

- New Business and Occupation taxes. This revenue was estimated by multiplying the Business and Occupation tax rate by the value of final demand created by the exemption.

Local governments also will benefit from the increased economic activity caused by the sales tax exemption. Between 2007 and 2016 net tax revenues to local governments are projected to increase an additional $23 million.

IV. IMPLICATIONS OF EXTENDING THE EXEMPTION TO ADDITIONAL INDUSTRY SECTORS

Our analysis also examines the impacts on the Washington economy that would result from extending the exemption from sales taxes on purchases of machinery and equipment and qualifying structures by other industries. For purposes of this study the broadcast and telecommunications ("telecommunications") industry was selected for analysis due to the highly capital intensive nature of the industry.[21] We expect similar results for other non-manufacturing industries consistent with their level of capital intensiveness. Table 2 ranks spending on equipment and structures by major industry sector for 2006. After

[21] In this study the telecommunications industry is defined to include businesses in NAICS codes 5151, 5152, 516, 5171 through 5175 and NAICS code 5179.

manufacturing the finance and insurance (largely depository institutions); real estate, rental and leasing (led by automotive equipment rental and leasing); and information industries account for the largest share of spending on equipment. Within the information sector, telecommunications and broadcasting accounts for nearly 80 percent of capital expenditures for equipment.

Table 2
Capital Expenditures for Structures and Equipment
Companies With Employees by Industry: 2006
(Million $)

	Equipment	**Structures**	**Total**
Manufacturing	$149,280	$41,745	$191,026
Finance and insurance	$126,797	$42,636	$169,433
Real estate and rental and leasing	$81,939	$40,507	$122,447
Information	$70,209	$34,408	$104,617
Transportation and warehousing	$47,463	$19,913	$67,376
Retail trade	$43,634	$43,300	$86,934
Utilities	$39,096	$30,871	$69,967
Health care and social assistance	$34,150	$41,266	$75,416
Wholesale trade	$32,534	$10,368	$42,902
Mining	$30,335	$67,995	$98,330
Prof, scientific, and technical svc	$23,310	$6,980	$30,290
Admin/support and waste mgt	$15,523	$3,541	$19,064
Accommodation and food services	$13,573	$21,978	$35,551
Other svc (except public admin)	$9,342	$16,621	$25,963
Arts, entertainment, and recreation	$5,371	$11,622	$16,994
Educational services	$5,068	$17,522	$22,590
Forestry, fishing, and agric svc	$2,283	$385	$2,667
Management of companies	$1,994	$860	$2,854
Expend serving multiple industries	$1,453	$453	$1,905
Total	$761,066	$455,528	$1,216,594

The sales tax exemption typically is implemented or realized in distinct phases associated with business activity. The first of these is by manufacturers of machinery and equipment followed by research and development activities, and finally for production of consumable products.

As shown in Table 3 the telecommunication and broadcasting industry is comprised of several major segments and is highly capital intensive. The telecommunications industries account for about 94 percent of equipment spending while the broadcasting component makes up the remaining six percent. When viewed in comparison to manufacturing, spending on equipment by the broadcast and telecommunications industry is about 36 percent as large as total manufacturing spending.

Table 3
Capital Expenditures for Machinery and Equipment: Telecommunications
(Million $)

	U.S. 2005	U.S. 2006	% Chg	WA 2005	WA 2006	% Chg
Manufacturing	$131,502	$149,280	13.5%	$1,509.5	$2,383.9	57.9%
Broadcasting and Telecommunications	$45,759	$54,743	19.6%	$640.6	$1,094.9	70.9%
Radio and television broadcasting *	$1,894	$1,879	-0.8%	$26.5	$37.6	41.7%
Cable and other subscription programming*	$507	$1,013	99.8%	$7.1	$20.3	185.4%
Internet publishing and broadcasting	$314	$429	36.6%	$4.4	$8.6	95.2%
Wired telecommunications carriers	$19,354	$21,981	13.6%	$271.0	$439.6	62.2%
Wireless telecommunications carriers (ex satellite)	$10,882	$15,321	40.8%	$152.3	$306.4	101.1%
Telecom resellers, satellite, and other telecom	$2,780	$2,744	-1.3%	$38.9	$54.9	41.0%
Cable and other program distribution	$10,028	$11,376	13.4%	$140.4	$227.5	62.1%

* Excludes internet
Source: 2006 Annual Capital Expenditure Survey, U.S.Census Bureau

Exempting a sales/use tax on equipment improves the after-tax rate of return for an investment in new machinery and equipment and stimulates investment. Increased investment stimulates growth in real output in all sectors of the Washington economy, creates new jobs, and generates additional income for Washington residents. Higher tax revenue from increased economic activity more than offset the costs of extending the exemption and provide a net positive return to the Treasury. Specific implications include:

- Investment in new machinery and equipment by the non-manufacturing sector industry would increase.

  An exemption from the sales tax increases the after-tax rate of return on investment and provides an incentive for new investment in equipment. The impact of an exemption for regulated industries such as telecommunications and utilities will depend largely on the degree of market power the industry has. To the extent that a regulated industry can exert monopoly power and can pass the sales and use tax along to consumers in their rate structure, an exemption has relatively less value than for an industry facing competition. In the case of telecommunications one would expect that the value of the exemption would be less for regulated wired telecommunications carriers (land lines) than for non-regulated providers such as wireless. As shown in Table 3 the wired telecommunications industry accounts for about 40 percent of total telecommunications equipment expenditures.

  However the rapidly changing structure of the telecommunications industry, notably the growth in wireless (cellular) and internet telephony (e.g. voice over internet protocol) has reduced the effective market power of the regulated segment. Consequently the value of an exemption to the entire telecommunications industry may in fact be larger than appears at first glance. For purposes of this study we have assumed that the value of the sales tax exemption is uniform across the industry and it is recognized that the impact may be somewhat overstated.

  Based on data for the composition of GDP by detailed industry provided by the BEA RIMS II multiplier system, we have assumed that 55 percent of the telecommunications equipment is produced by Washington manufacturers. It should be pointed out that this estimate is an aggregate for the entire industry. Individual company experience is likely to differ from this aggregate. Reflecting this, extending the exemption to telecommunications is expected to increase spending on new machinery and equipment by $195.3 (2000$) million annually over the next decade. Spending on structures is expected to increase an average of $136.2 million per year. The impact of extending he exemption to telecommunications is summarized in Appendix II.

- The annual growth rate and size of the Washington economy measured by Gross Domestic Product will increase in response to higher capital spending by the telecommunications industry.

  Higher levels of investment spending on machinery and equipment will increase final demand in all sectors of the Washington economy since more dollars will be circulated throughout all other sectors of the economy. The Washington economy is expected to grow at a 3.3 percent average annual rate over the next decade. This growth is predicated on a continuation of existing fiscal policy including the sales tax exemption for manufacturers. Extending the sales tax exemption to a non-manufacturing sector industry such as telecommunications would increase the annual growth rate in real GDP by 0.5 percent per year so that by 2016 the Washington economy would be $2.4 billion (2000$) larger than if the exemption was not granted.

- More jobs would be created in all sectors of the Washington economy.

  Increased economic activity resulting from extending the sales tax exemption would stimulate job growth in the entire economy. Providing the sales tax exemption for the telecommunications industry would support the as many as 17,890 additional new permanent jobs by 2016.

- Household income for all Washingtonians would increase.

  Increased real economic activity and more new jobs means higher real income for Washington consumers. Providing the exemption from sales taxes for telecommunications would increase household income by $706 million (2000$), or $107 per capita between 2007 and 2016.

- Extending the sales tax exemption would increase revenue for the Washington State Treasury.

  Extending the sales tax exemption for purchases of machinery and equipment to the telecommunications industry would result in an annual average net revenue gain of nearly $47.8 million (2000$) between 2007 and 2016.

V. IMPLICATIONS OF EXTENDING THE EXEMPTION TO CONSUMABLES

Extending the sales tax exemption to a wide range of consumable products used in the manufacturing process would reduce the cost of these necessary items used in the employment of new machinery and equipment to produce additional output. This would enhance the incentive to invest provided by the exemption for machinery and equipment. Generally speaking these consumable items are tools and other items necessary for the manufacturing process that typically have a useful life of less than one year and are used up in the process. Examples include dies and molds, chemicals that don't cause a chemical reaction or become a part of the final product; lubricants; blades, drills and drill bits; paper used to make patterns; spray paint nozzles; end mills; silencers; welding rods; grinding wheels; batteries; tape and other adhesive products that don't remain with final product; and air caps.

The impact of extending the exemption to this category of products will depend on the size of expenditures for these goods. Generally speaking the importance of these consumable goods to manufacturers is greater than for non-manufacturing industries. Most of these consumables are purchased from suppliers through wholesale distributors. Consequently, while these goods are the output of a wide range of industries, they represent the purchase of output supplied by the wholesale trade industry.

Since expenditures on consumables are consolidated in the aggregate cost of materials in manufacturing sector accounts, and spending varies among manufacturing industries, it is difficult to accurately estimate the actual annual expenditures on consumables. However, since these represent purchases of output of the wholesale trade industry by manufacturers, the share of output by manufacturers allocated to wholesale trade in RIMS II multipliers (calculated form the input-output matrix for the national economy) provides a rough estimate of their size relative to gross output. The Washington State detailed industry output multipliers suggests that the wholesale trade sector accounts for 3.6 percent of gross output generated by the manufacturing sector. Using this as a guide, we estimate that Washington manufacturers will spend an average of $326.3 (2000$) million annually on consumables between 2007 and 2016 as a result of the tax exemption.

Extending the exemption to consumables will increase Washington State GDP an additional $454.6 million (2000$) by 2016; increase household income an average of $166.7 million (2000$) annually, and create as many as 4,287 additional permanent jobs by 2016.

VI. IMPACT OF RESTRICTIVE INTERPRETATIONS OF ELIGIBILITY FOR THE MACHINERY AND EQUIPMENT SALES TAX EXEMPTION

Currently there are restrictions that limit the qualification of machinery and equipment by manufacturers for the sales tax exemption that work to reduce the potential economic benefits to the Washington economy. Chief among these is the so-called "dual-use" provision governing machinery and equipment that can be use for qualifying and non-qualifying purposes. In order to qualify for the M&E exemption, machinery and equipment must be "used directly in a manufacturing operation, testing operation, or research and development operation".[22] Further, machinery and equipment must meet a majority use threshold in order to qualify; that is the

[22] Washington State Department of Revenue. "Manufacturers' Sales/Use Tax Exemption" August 2007.

equipment must be used more that 50 percent of the time for a qualifying purpose.[23] With regard to research and development the Department of Revenue draws a distinction between use of machinery and equipment for activities that take place within the manufacturing operation and those that precede or follow manufacturing. For example, a firm that purchases a computer that can be used in a qualifying R&D activity or to directly support manufacturing such as running a machine control program but that also can support administrative or financial applications is subject to the tax at the time the majority use threshold for qualifying purposes is no longer met. The firm or person claiming the exemption is responsible for record keeping and measurement. This places a substantial administrative burden and cost on the firm to accurately record usage so as to retain the exemption and avoid a tax liability.

In the second instance, machinery and equipment used in design and product development prior to manufacturing or for product redesign after manufacturing is deemed not eligible for the exemption. However, machinery and equipment that is used both for product design and manufacturing may be eligible for the exemption. Prototypes may or may not qualify for the exemption depending on use. If a prototype is not used to make, build, or test a different product or to directly support manufacturing it does not qualify. The Department presumes that a test product or prototype does not qualify and it is falls to the manufacturer to provide documentation and evidence to support the claim for exemption. This also places an additional administrative burden on the firm.

It is difficult to quantify the impact of these restrictions. However since most are directed at research and development activities, it is reasonable to assume that firms in industry sectors with large expenditures for R&D would be most significantly affected. Capital expenditures are the smallest category of R&D expenditures at an estimated nine percent.[24] Table 4 compares R&D expenditures by manufacturing industry as reported by the National Science Foundation to total capital expenditures by industry reported by the Commerce Department.

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[23] The Department provides for alternative measures of majority use such as value and volume.
[24] Dougherty, Sean M., et. al. "International Comparison of R&D Expenditure: Does an R&D PPP make a difference?"

Table 4
U.S. Expenditures for Industrial R&D; 2003

	Capital Expenditures	R&D Expenditures	R&D CapX	R&D CapX
	(Mil $)	(Mil $)	(Mil $)	% of Total
All industries	$886,846	$204,004	$18,360	2.1%
Manufacturing industries	$149,065	$123,384	$11,105	7.4%
Chemicals	$24,434	$23,001	$2,070	8.5%
Plastics and rubber products	$7,540	$1,764	$159	2.1%
Nonmetallic mineral products	$4,708	$474	$43	0.9%
Primary metals	$3,985	$530	$48	1.2%
Fabricated metal products	$7,331	$1,374	$124	1.7%
Machinery	$5,928	$6,304	$567	9.6%
Computer and electronic products	$17,703	$39,001	$3,510	19.8%
Electrical equipment	$2,862	$2,073	$187	6.5%
Transportation equipment	$27,797	$34,273	$3,085	11.1%
Aerospace products and parts	$2,984	$15,731	$1,416	47.4%
Miscellaneous manufacturing	$5,158	$7,455	$671	13.0%
Medical equipment and supplies	$3,170	$6,386	$575	18.1%
Other misc manufacturing	$1,988	$1,069	$96	4.8%

National Science Foundation, Division of Science Resources Statistics. 2006.
Research and Development in Industry: 2003. NSF 07-314. Raymond M. Wolfe
U.S. Census Bureau. 2006 Annual Capital Expenditures Survey. January 28, 2008

Assuming that nine percent of R&D expenditures are for capital, machinery and equipment spending on R&D ranges from a low of 0.9 percent of total capital expenditures (nonmetallic mineral products) to a high of 47 percent (aerospace products).

It is instructive to note that the industry where R&D capital expenditures account for the largest share of total capital expenditures in the aerospace products industry which is the largest manufacturing sector industry in Washington.

The restrictions on qualifying M&E expenditures will not affect all of this spending; however the combination of increased costs for compliance and potential disqualification of M&E works to erode the incentive provided by the exemption. Consequently these restrictions reduce the after-tax returns from investment in new M&E and limit the positive impact on economic growth, income generation, and job growth provided by the total exemption.

VII. CONCLUSION

The exemption for the manufacturing sector from sales taxes on purchases of machinery and equipment and related structures provides an important incentive to invest. This investment creates additional capacity in the economy which generates new final demand, household income, and tax revenue. Importantly, this investment is a catalyst for job creation in all sectors of the economy.

Extending the sales tax exemption for purchases of machinery and equipment to other industries, including consumables in the exemption, and eliminating restrictive regulatory interpretations will provide significant benefits to the Washington economy in terms of increased economic output, income generation, and job creation and enhanced tax revenue. This study selected the telecommunications industry as a prototype for expansion due to its high capital intensiveness. Similar results can be expected from extending the exemption other industries consistent with their capital expenditures.

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APPENDIX I

UPDATED BASELINE: EXTENSION OF SALES TAX EXEMPTION FOR MANUFACTURING

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
NEW SPENDING (MIL 2000$)										
Machinery & Equipment	$394.7	$401.5	$413.7	$426.3	$437.0	$447.1	$457.0	$466.3	$475.5	$484.7
Structures	$113.0	$114.9	$118.4	$122.0	$125.1	$128.0	$130.9	$133.6	$136.2	$138.9
GDP (MIL 2000$)										
Total Manufacturing+ Info & DP	$2,078.2	$2,774.8	$3,452.5	$4,089.9	$4,669.1	$5,202.6	$5,695.9	$6,148.7	$6,569.5	$6,962.1
New Construction	$146.6	$149.1	$153.6	$158.3	$162.3	$166.1	$169.8	$173.3	$176.7	$180.2
Total	$2,224.8	$2,923.9	$3,606.1	$4,248.2	$4,831.4	$5,368.8	$5,865.7	$6,322.0	$6,746.2	$7,142.3
EARNINGS (MIL 2000$)										
Total Manufacturing+ Info & DP	$915.8	$1,223.6	$1,523.2	$1,805.2	$2,061.6	$2,297.9	$2,516.4	$2,717.1	$2,903.6	$3,077.7
New Construction	$85.7	$87.1	$89.8	$92.5	$94.9	$97.1	$99.3	$101.3	$103.3	$105.3
Total	$1,001.5	$1,310.8	$1,613.0	$1,897.8	$2,156.5	$2,395.0	$2,615.6	$2,818.3	$3,006.9	$3,183.0
EMPLOYMENT (JOBS)										
Total Manufacturing+ Info & DP	18,668	24,454	29,810	34,598	38,702	42,268	45,337	47,931	50,136	52,003
New Construction	2,058	2,049	2,066	2,084	2,092	2,098	2,100	2,099	2,095	2,090
Total	20,726	26,503	31,876	36,681	40,795	44,366	47,438	50,029	52,231	54,094
FY STATE REVENUES										
Foregone Sales Tax	$190.7	$194.1	$198.6	$204.6	$210.1	$215.1	$219.9	$224.4	$228.9	$233.3
Retail Sales Tax	$136.9	$191.6	$243.0	$292.3	$337.9	$379.6	$418.1	$453.6	$486.4	$516.9
B&O Tax	$16.4	$22.9	$29.0	$34.9	$40.4	$45.4	$50.0	$54.2	$58.1	$61.8
Property Tax	$11.0	$15.4	$19.6	$23.6	$27.2	$30.6	$33.7	$36.6	$39.2	$41.7
Net Revenue	$164.2	$230.0	$291.7	$350.8	$405.6	$455.6	$501.8	$544.4	$583.7	$620.4
ANNUAL REVENUE GAIN	($26.4)	$35.9	$93.0	$146.3	$195.5	$240.5	$282.0	$320.0	$354.9	$387.1
FY LOCAL REVENUES										
Foregone Sales Tax	$49.6	$50.5	$51.6	$53.2	$54.6	$55.9	$57.2	$58.4	$59.5	$60.6
Retail Sales Tax	$18.9	$26.5	$33.6	$40.4	$46.7	$52.4	$57.7	$62.6	$67.2	$71.4
Local Property Tax	$8.6	$8.8	$9.0	$9.3	$9.5	$9.7	$10.0	$10.2	$10.4	$10.6
Net Revenue	$27.5	$35.3	$42.6	$49.6	$56.2	$62.2	$67.7	$72.8	$77.5	$82.0
ANNUAL REVENUE GAIN	($22.0)	($15.2)	($9.1)	($3.6)	$1.6	$6.2	$10.5	$14.5	$18.0	$21.3

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APPENDIX II

IMPACT OF EXTENDING THE EXEMPTION TO TELECOMMUNICATIONS

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Equipment Spending (Mil 2000$)	$925.2	$953.9	$985.4	$1,018.9	$1,040.3	$1,061.1	$1,079.1	$1,092.1	$1,106.3	$1,120.7
Structures Spending (Mil 2000$)	$806.8	$831.8	$859.2	$888.4	$907.1	$925.2	$941.0	$952.3	$964.6	$977.2
Non computer equip spending	-2.1%	3.1%	3.3%	3.4%	2.1%	2.0%	1.7%	1.2%	1.3%	1.3%
New Equipment Investment	$174.0	$179.4	$185.4	$191.7	$195.7	$199.6	$203.0	$205.4	$208.1	$210.8
BASELINE GDP (MIL 2000$)	$261,401	$269,119	$280,156	$291,082	$300,664	$310,545	$320,367	$329,837	$339,344	$349,091
% Chg	3.2%	3.0%	4.1%	3.9%	3.3%	3.3%	3.2%	3.0%	2.9%	2.9%
GDP Impact	$585.1	$828.8	$1,065.4	$1,291.5	$1,497.7	$1,693.6	$1,878.1	$2,049.6	$2,212.7	$2,369.0
'% Chg	0.2%	0.3%	0.4%	0.4%	0.5%	0.5%	0.6%	0.6%	0.7%	0.7%
NEW GDP (MIL 2000$)	$261,986	$269,948	$281,221	$292,373	$302,161	$312,239	$322,245	$331,887	$341,557	$351,460
% Chg	3.4%	3.3%	4.5%	4.4%	3.8%	3.8%	3.8%	3.6%	3.6%	3.6%
EARNINGS (MIL 2000$)	$267.1	$378.3	$486.3	$589.5	$683.6	$773.1	$857.3	$935.6	$1,010.0	$1,081.4
EMPLOYMENT (JOBS)	5,350	7,416	9,328	11,068	12,569	13,925	15,123	16,159	17,075	17,890
STATE REVENUES (CY 2000$)										
Foregone Sales Tax	$71.5	$73.7	$76.1	$78.7	$80.3	$81.9	$83.3	$84.3	$85.4	$86.5
Gain from Retail Sales Tax	$43.6	$61.7	$79.3	$96.1	$111.5	$126.1	$139.8	$152.6	$164.7	$176.3
Gain from B&O Tax	$4.9	$7.0	$8.9	$10.8	$12.6	$14.2	$15.8	$17.2	$18.6	$19.9
Gain from Property Tax	$5.6	$5.7	$5.9	$6.1	$6.3	$10.2	$11.3	$12.3	$13.3	$14.2
Total Revenue	$54.0	$74.4	$94.2	$113.1	$130.3	$150.5	$166.9	$182.1	$196.6	$210.5
Net Annual Revenue Gain	($17.4)	$0.7	$18.1	$34.4	$50.0	$68.5	$83.5	$97.7	$111.1	$123.9