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**PORTLAND STATE
UNIVERSITY'S IMPACT
ON THE PORTLAND SMSA
ECONOMY**

by
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PREFACE

Portland State University's contribution to the metropolitan Portland economy is both diverse and considerable. A 1982 study estimated that the expenditures made by the University, its faculty and staff, and its full-time students generated over \$150 million in gross output in the region. Given the changes that have taken place over the past five years, a re-examination of the University's economic impacts is warranted. This report examines Portland State University's contribution to metropolitan economic activity based on data from the 1985-86 academic year.

The approach taken in this report differs in several respects from the 1982 study. In addition to estimating the effects of University, faculty/staff, and student expenditures, this report estimates the increase in metropolitan economic activity attributable to the University's alumni. A model of the metropolitan economy permitting more detailed analysis of sectoral output and employment changes generated by the University has also been developed in the interim. Thus the estimates reported here will differ from the earlier study due to changes that the University has experienced and to differences in the model used to estimate economic impacts.

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Portland State University has experienced rapid growth in its forty one year history, and is now the largest higher educational institution in the Portland metropolitan area. The University's mission during this period has been principally education, and its contributions in this area can be readily documented: nearly one-half million people have consumed PSU curricular offerings and approximately 45,000 degrees have been awarded at the undergraduate and graduate levels. The quality of this contribution is further endorsed by the national and international reputations held by a number of the University's degree programs.

Viewed in economic terms Portland State is a major firm, producing a large and diverse output and making a sizeable contribution to the metropolitan and state economies.

This report presents estimates of the economic impacts of the University on the Portland metropolitan area. Two approaches were pursued in the study, reflecting alternative definitions of the economic basis of a higher educational institution. In the first approach, Portland State is treated as a conventional establishment, and its direct impact on the local economy is represented by the transactions that comprise the scope of activities related to its operation. These transactions are then linked to an input-output model of the metropolitan economy to measure the corresponding indirect and induced ("multiplier") increases in production and employment.

The second approach focuses on the output of the University and its economic value to the metropolitan area. In this case output is represented by the increase in the productivity of the University's alumni, and the value of this output is measured in terms of the real increase in the incomes earned by alumni residing in the Portland metropolitan area. Productivity gains derived from higher education contribute to growth of the area's stock of human capital while, from the alumni's perspective, the gains in income represent the return on their investment in education.

PSU's "Establishment" Impacts

Although Portland State University is an educational and research institution, its volume of business transactions would rank it among the 15 largest of the state's 17,000 conventional service establishments. This section examines the expenditure accounts of the University to determine the impact of its operations on the metropolitan economy. The accounts are divided into three general categories: 1. Expenditures for supplies, services, equipment and construction; 2. Expenditures for faculty and staff; 3. Nontuition expenditures of full time students. The outlays contained within these accounts are then allocated as final demands on the corresponding producing sectors in the input-output model of the metropolitan economy. This model then determines the magnitude and composition of indirect and induced economic activity generated by the initial sectoral final demands.

Several standard conventions are maintained in the allocation of the University accounts to the input-output final demand sectors. First, a distinction is made in the accounts between direct expenditures to local and nonlocal establishments in recognition of the fact that purchases of goods and services from other regions do not generate indirect and induced economic activity in metropolitan Portland. Second, gross outlays in the faculty/staff accounts correspond with their purchases of both private goods and public services. Since public goods producing sectors are not members of the input-output interindustry framework, outlays (in the form of federal, state and local taxes) for their products are not considered in determining final sectoral demands. Finally, the input-output model is defined in terms of producer accounts, which necessitates the decomposition of retail expenditures into trade margins (i.e., the value of services provided in the wholesale and retail trade sectors) and corresponding production margins (i.e., the value originating in the sector that produced the retail good).

Transactions comprising the three operating expenditure accounts for the 1985-86 academic year are summarized in Tables 1, 2 and 3. Table 1 presents outlays for supplies, services, equipment and construction, which totalled nearly \$25 million. Of this total, the PSU Office of Business Affairs estimates that approximately 70 percent was spent locally, resulting in a direct impact on the metropolitan economy of almost \$18 million. Table 2 presents wage and salary outlays for the University's 876 faculty

Table 1

**Portland State University Expenditures
for Supplies, Services, Equipment,
and Construction, 1985-86
(in thousands)**

<u>Expenditure Item</u>	<u>Outlay</u>	<u>% Local</u>	<u>Local Outlays</u>
Supplies	\$988	75	\$741
Communication & Shipping	1,797	95	1,707
Utilities	1,767	100	1,767
Maintenance & Repair	1,303	95	1,238
Rentals & Leases	524	100	524
Fees & Services	5,008	80	4,006
Equipment	5,701	50	2,851
Travel	759	40	304
Library Acquisitions	1,562	10	156
Construction	4,232	85	3,597
Other	<u>1,235</u>	<u>80</u>	<u>988</u>
Total	\$24,867	72%	\$17,879

Sources: Office of Business Affairs, Portland State University
 Controllers Office, Oregon State Board of Higher Education

Table 2

Direct Impact of Portland State University
Faculty/Staff Wages & Salaries,
1985-86 (in thousands)

<u>Gross Wages and Salaries</u>	
Faculty	\$23,860
Staff	<u>9,405</u>
Total	\$33,265
<u>Taxes</u>	\$8,582.37
<u>Disposable Income</u>	\$24,682.63

Sources: Office of Business Affairs, Portland State University
Controller's Office, Oregon State Board of Higher Education

Table 3

Direct Expenditures of
Portland State University Students,
1985-86

	Financial Need <u>Per Student</u>	Total Expenditure <u>(in thousands)</u>
Books & Supplies	\$330	#3,130
Housing	1,728	16,394
Food	1,215	11,527
Transportation	540	5,123
Other	810	7,684
Total	\$4,623	\$43,858

Sources: Office of Business Affairs, Portland State University
Financial Aid Office, Portland State University

and 596 staff. Gross outlays totalled \$33 million. The accounting for taxes results in a direct impact of nearly \$25 million. Table 3 presents data on full time student expenditures. The PSU Office of Financial Aid estimates that, excluding tuition, the annual financial need of a full time student totals approximately \$4,600. Multiplying this figure by the 9,487 full time Portland State University students gives a total direct impact of \$44 million.

The combined direct impacts from Tables 1 to 3 are summarized in Table 4. The total direct outlays associated with PSU purchases, faculty/staff and student expenditures equals \$86 million.

The direct outlays were then allocated to the input-output model's final demand sectors. The resulting allocations are presented in Table 5. Table 6 presents the direct, indirect, and induced changes in output and employment associated with the direct expenditures. The impacts of PSU operations on metropolitan economic activity are estimated at \$168 million in output and 5,200 person-years employment respectively. This represents approximately one percent of the total output and employment in the metropolitan region.

The multipliers associated with output and employment are 1.95¹ and 3.53. These multipliers are interpreted as follows: for each dollar's expenditure by the University and its faculty, staff, and students in the local economy, an additional \$.95 in indirect

Table 4

Direct Impact of
Portland State University,
1985-86 (in thousands)

Portland State University	
Purchases	\$17,879
Faculty/Staff Expenditures	24,683
Student Expenditures	<u>43,858</u>
Total	\$86,420

Table 5

Direct Impacts of
Portland State University - Related
Local Expenditures

<u>Economic Sector</u>	<u>University</u>	<u>Student</u>	<u>Faculty/staff</u>	<u>Total</u>
Agriculture/Forestry/Fisheries				216,222
Mining			--	--
Contract Construction	3,597,000			3,597,000
Food & Kindred Products		9,106,097	1,869,493	10,975,590
Textiles & Apparel			335,976	335,976
Wood Products			206,243	206,243
Pulp & Paper Products	741,390	2,473,261	202,916	3,417,567
Petrol & Chemical Products			355,936	355,936
Rubber & Leather Products			43,244	43,244
Stone, Clay, & Glass Products			19,959	19,959
Primary & Fabricated Metal Prod.			59,877	59,877
Machinery			23,286	23,286
Electrical Equipment & Instruments	2,252,290		202,916	2,455,206
Transportation Equipment			465,710	465,710
Miscellaneous Manufacturing			96,468	96,468
Transport. Communications & Utilities	2,011,000	5,122,980	1,407,110	8,541,090
Electrical Services	1,767,000		528,914	2,295,914
Wholesale & Retail Trade	754,320	3,078,057	5,578,540	9,410,917
Finance, Insurance, & Real Estate		16,393,536	6,050,904	22,444,440
Services	6,756,000	7,684,470	6,499,981	20,940,451
Local Government Enterprises			352,609	352,609
Federal Electric Utilities			23,286	23,286
State & Local Electric Utilities			76,510	76,510
Scrap			66,530	66,530
Total	17,879,000	43,858,401	24,682,630	86,420,031

Table 6

**Direct, Indirect, and Induced Impacts
of Portland State University-Related
Local Expenditures**

<u>Economic Sector</u>	<u>Sectoral Output</u>	<u>Sectoral Employment (person-years)</u>
Agriculture/Forestry/Fisheries	2,641,012	49
Mining	41,048	1
Contract Construction	6,889,209	126
Food & Kindred Products	15,916,170	140
Textiles & Apparel	866,966	26
Wood Products	2,128,505	31
Pulp & Paper Products	7,239,071	107
Petrol & Chemical Products	2,580,269	18
Rubber & Leather Products	463,570	12
Stone, Clay, & Glass Products	758,494	14
Primary & Fabricated Metal Products	2,573,165	37
Machinery	463,507	10
Electrical Equipment & Instruments	3,640,286	94
Transportation Equipment	1,623,303	22
Miscellaneous Manufacturing	304,169	8
Transport, Communications & Utilities	16,592,599	311
Electrical Services	4,480,752	34
Wholesale & Retail Trade	19,949,301	665
Finance, Insurance, & Real Estate	39,133,550	418
Services	37,657,849	2997
Local Government Enterprises	1,658,452	71
Federal Electric Enterprises	109,535	1
State & Local Electric Utilities	339,648	2
Scrap	<u>259,822</u>	<u>--</u>
Total	168,310,252	5,193

and induced activity is generated and, for each individual employed by the University, an additional 2.5 person-years employment is generated locally.

PSU's "Human Capital" Impacts

The credit for formalizing the concept of human capital and relating it to the economic growth process largely goes to T.W. Schultz, Nobel Laureate in Economics. Education is considered to be an investment in human capital, and the return on this investment is defined to be the increase in an individual's productivity in the production of goods and services. Productivity gains, in turn, are linked to increases in income under the proposition that wages correspond to the value of the marginal product of labor. Thus the economic benefit of education for an individual is the gain in income derived from the greater productivity that education generates.

The increase in income attributable to education is offset by the costs associated with obtaining education. These costs are comprised of two parts. The first is associated with the expenditure a student must make to obtain an education (i.e. tuition and living expenses). The second is associated with the income foregone during the course of study (i.e. what the student would have earned had he/she remained in the labor force).

The net economic benefit of higher education to an individual is thus represented by the difference between the initial costs and

subsequent increases in income. A common approach for evaluating this situation is to view it as an investment problem, and convert the stream of costs and benefits to a single net value at one point of time. This conversion is achieved using present value analysis, a method commonly employed in evaluating investments. In this section, the net benefits of educational investments are calculated (in aggregate and annualized form) for PSU alumni residing in the metropolitan area.

The key values associated with the determination of the net economic benefits of higher education to PSU alumni residing in the metropolitan area are presented in Table 7. The PSU Office of Alumni Relations estimates that 30,000 of the 45,000 graduates of the University have remained in metropolitan Portland, and that 57 percent of these resident alumni are males and 43 percent are females. Using U.S. Census Bureau data on median incomes earned with respect to level of education, it is reported that males with 16 years education earn approximately \$9,400 more annually than those with 12 years. For females the increase in median annual income amounts to \$5,800.

To determine the net benefit resulting from an individual's investment in higher education, we construct an educational and employment profile of the "typical" PSU graduate. The average age of this individual at graduation is 30. At the point of graduation, this individual has accumulated costs whose present value, calculated with respect to entry into the University four years earlier, amounts to \$86,000 for males and \$49,000 for

Table 7

Direct Impact of
Portland State University Alumni
on the Portland SMSA Economy

	<u>Males</u>	<u>Females</u>	<u>Total</u>
Portland State University Alumni in SMSA	17,100	12,900	30,000
Median Income, 16 years education, 25+ years old	\$28,206	\$13,644	
Median Income, 12 years education, 25+ years old	18,825	7,839	
Difference	\$9,381	\$5,805	
Present value (per student)			
• Benefits	\$115,104	\$71,227	
• Costs	86,085	49,319	
• Net Benefit	29,019	21,908	
• Annualized	1,836	1,386	
 Gross Annualized Net Benefits	 \$31,395,600	 \$17,879,400	 \$49,275,000
Taxes	8,100,065	4,612,885	12,712,950
 Direct Annualized Net Benefits	 \$23,295,535	 \$13,266,515	 \$36,562,050

Sources: Office of Alumni Relations, Portland State University
Current Population Reports, U.S. Bureau of the Census.

females.² Following graduation, the typical alumnus becomes employed for 32 years, retiring at age 62. The present value of the higher incomes earned over this time span amounts to \$115,000 for males and \$71,000 for females. Thus the net present benefit of the PSU degree for males equals \$29,000, and for females equals \$22,000. Translated to an annual basis, this means that the decision to obtain a PSU degree produces an annual real increase of \$1,800 in male alumni income and \$1,400 in female alumni income. Multiplying these values by the number of male and female alumni in the area results in an estimate of \$50 million as the annualized value of the increase in human capital in metropolitan Portland attributable to PSU. Of this total approximately \$13 million is contributed to federal, state, and local taxes. The remaining \$37 million represents the annual increase in disposable income.

CONCLUSION

As an educational service establishment Portland State University's contribution to metropolitan economic activity was estimated to total nearly \$170 million in sectoral output and 5,200 jobs. This is commonly termed the "substitution effect". It indicates the potential loss of local economic activity in the University's absence. It thus assumes that the presence of the University attracts faculty, staff, and students from outside the metropolitan area, and retains resident students who would other-

wise have been compelled to leave the area to obtain comparable higher education or employment.

The focus on University-related expenditure impacts ignores potential long range and indirect benefits of Portland State, including the effect of its presence in attracting new business to the metropolitan area, the value of the services it contributes to area residents and institutions, and its role as an innovation and research incubator, whose findings are profitably disseminated to local businesses and public organizations.

Alternatively, the estimate of Portland State University's annual human capital benefits, totalling \$50 million, provides a useful basis for evaluating the University's educational contribution. This contribution can be viewed from several perspectives. For the individual considering an investment in higher education the analysis shows that, at 30 percent, the aggregate real monetary return is attractive. The individual's investment covers only part of the total cost of education, however, with the remainder accounted for by state appropriations and other external sources. The value of the individual human capital returns thus also pertain in a limited way to the investment made by the general public in the higher educational system. The benefits associated with the public's investment in Portland State University would encompass the individual monetary returns to alumni residing in the state, the consumptive value from the acquisition of knowledge in terms of enriching the lives of graduates, their

families and communities, and the enhancement of social welfare from more capable and informed contributions to the democratic process at the local, state, and national levels. Because most of the social benefits of education defy measurement, and because the focus of this study is limited to the metropolitan area, no attempt was made to estimate the return on public investment in Portland State. As a result, this report has been limited to the University's major tangible by-products given the difficulties of quantifying its principal contribution.

Model Documentation

The model employed in this report is a 24 sector input-output system covering the four county Portland SMSA, and was developed by the Center for Urban Studies for activity and program assessments. The interindustry transactions component of the model is based on the IMPLAN system developed by the U.S. Forest Service. The IMPLAN system, in turn, is derived from the U.S. Department of Commerce national input-output model.

Notes

¹In contrast with the regional product multiplier of 1.95 obtained in this study, the 1982 study of the economic impacts of Portland State University conducted by the Center for Urban Studies reported a gross output multiplier of 2.587. These two multipliers are based on different definitions of regional economic activity. Gross output, for example, is comprised of the value of regional product plus the value of household income. Because household income is directly derived from the value of regional product, however, the gross output measure (and the gross output multiplier) double counts the value of household income. By way of comparison, the gross output multiplier for the present study would be 2.502 and the corresponding effect of Portland State University expenditures on gross output in the Portland SMSA totals \$216, 215, 800. This represents a 16 percent increase over the value previously estimated for the 1981-82 academic year.

²These totals are based on tuition and living expenses of \$6,093 annually, and foregone income equal to the respective incomes reported in Table 7 for males and females with 12 years education. Thus the annual costs for males totals \$24,918, and for females totals \$13,932. These costs are then discounted at a rate of 5 percent to determine present values at the time of entry into the higher educational system.