

**Economic Impact Analysis:
Phase II
University of Northern Colorado
Local and Regional Multiplier Effects**



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July 2006

Executive Summary

This report presents the findings from the second phase of the University of Northern Colorado Economic Impact Study. The first phase, which was completed in September 2005, examined the direct impact of spending by the University and its faculty, staff, and students on the local, regional and state economies. The present report provides a more comprehensive view by adding estimates of the indirect and induced "multiplier effects" to the previous baseline analysis.

Highlights of the analysis indicate:

- UNC's annual operational budget is nearly 2% of Weld County's gross product.
- UNC is one of five Weld County enterprises to employ over 1,000 people.
- Using UNC's budget as a proxy for total value of output, UNC is one of only seventeen Weld County enterprises that produced goods and services exceeding \$100 million in value.
- UNC non-payroll purchases of goods and services from businesses in Weld County (\$6.9 million), Larimer County (\$2.0 million), and the rest of Colorado (\$16.9 million) contributed to statewide economic impacts of \$66.4 million during fiscal 2003-04.
- State appropriations to the university in fiscal year 2003-04 totaled \$33.59 million. In comparison, the total impact of spending by the university, its employees, and its students within Colorado is estimated at more than \$340 million.
- Local spending by the University of Northern Colorado, its employees, and its students supports 1,441 non-university jobs in Weld County and 2,010 in Northern Colorado.
- Aggregating the effects of UNC operational expenditures with spending by faculty, staff, and students resulted in direct, indirect, and induced impacts on output of \$131 million in Weld County and \$175 million in Northern Colorado.
- The income, or value-added, impacts are \$72.1 million in Weld County and \$99 million in Northern Colorado.
- The tax impact for the state and local government sectors stemming from university, faculty, staff, and student spending within Weld and Larimer Counties was over \$13 million during the study period.

Introduction

This report represents the second phase of the University of Northern Colorado Economic Impact Study. The University plays a major role in the economies of Greeley and Weld County. For example, UNC's annual operational budget is nearly 2% of Weld County's gross product. UNC is also one of Weld County's five largest employers and is one of only seventeen enterprises in the County with production valued at over \$100 million. The University's spending, as well as that of its faculty, students, and staff, all add to the region's prosperity through community purchasing and job creation.

In Phase I of the study, the task force examined the direct effects of these expenditures on the local, regional and state economies, providing a baseline estimate of the economic impact of the University. The primary goal of this second report is to present the indirect and induced "multiplier effects" estimated in Phase II. Inclusion of these impacts provides a more comprehensive picture of the total monetary impacts of the UNC within the region.

Key findings of the study:

- State appropriations to the university in fiscal year 2003-04 totaled \$33.59 million. In comparison, the total impact of spending by the university, its employees, and its students within Colorado is estimated at more than \$340 million.
- Local spending by the University of Northern Colorado, its employees, and its students supports 1,441 non-university jobs in Weld County and 2,010 in Northern Colorado.
- Aggregating the effects of UNC operational expenditures with spending by faculty, staff, and students resulted in direct, indirect, and induced impacts on output of \$131 million in Weld County and \$175 million in Northern Colorado.
- The income, or value-added, impacts are \$72.1 million in Weld County and \$99 million in Northern Colorado.
- The tax impact for the state and local government sectors stemming from university, faculty, staff, and student spending within Weld and Larimer Counties was over \$13 million during the study period.

In addition to the measurable economic impacts, there are numerous intangible benefits to the region arising from the existence of the University of Northern Colorado. These are often ignored or underrepresented in economic impact analyses. While these impacts cannot be directly measured, Phase III of the study will provide a descriptive analysis of faculty, staff, student, and/or alumni contributions to the community and identify other ways in which the University enhances the quality of life and cohesiveness within the City of Greeley and the region. In anticipation of the third phase, the present study also examines student preferences for amenities in the Greeley area (see appendix A).

Indirect and Induced Effects

In the initial phase of this study, the task force identified the direct economic impacts of UNC on the surrounding community. However, focusing on only the direct impacts is analogous to reading only the first chapter of a best-selling novel; the reader often misses out on the most meaningful and important parts of the story. Direct spending leads to indirect and induced impacts on both output and income.

To understand the significance of indirect and induced effects, consider the following example:

In fiscal year 2004, UNC spent approximately \$60,000 on purchases of paper goods from Northern Colorado Paper, also located in Greeley. This purchase is the direct output effect. In order to supply this output, Northern Colorado Paper must hire employees and other resources and compensate them through wages, interest, and rent. In addition, profit accrues to the business owners. These are the direct value-added income effects.

The story continues as Northern Colorado Paper's employees, proprietors, and suppliers spend their direct value-added income on additional goods and services in the Greeley area. These purchases represent the indirect output effect while the income generated from the production of this output is the indirect value-added income effect.

Even when including these indirect impacts, the economic picture remains incomplete. The income generated from those indirect effects becomes the basis for a new round of spending. The goods and services produced in this and all subsequent rounds are the induced output effects. Similarly, the income generated from this and each subsequent round of production constitutes the induced value-added income effects.

The indirect and induced effects are often referred to as "multiplier" effects because the ultimate impact is larger than the original expenditure.

The indirect and induced multiplier effects generated from the activities of the University of Northern Colorado are the subject of this report. The task force was primarily interested in the indirect and induced impacts at three regional levels: (1) Weld County, (2) Northern Colorado (defined as Weld and Larimer Counties combined), and (3) the State of Colorado as a whole.

Any spending that occurs beyond these areas is considered to be a "leakage" and is not counted in the calculation of the multiplier effects. Leakages can occur when the university, its employees, and/or its students make initial purchases from companies located outside the designated area of study. They also occur when employees of local companies patronized by UNC or its faculty, staff, or students make non-local purchases. (More details on indirect and induced effects are included in appendix B.)

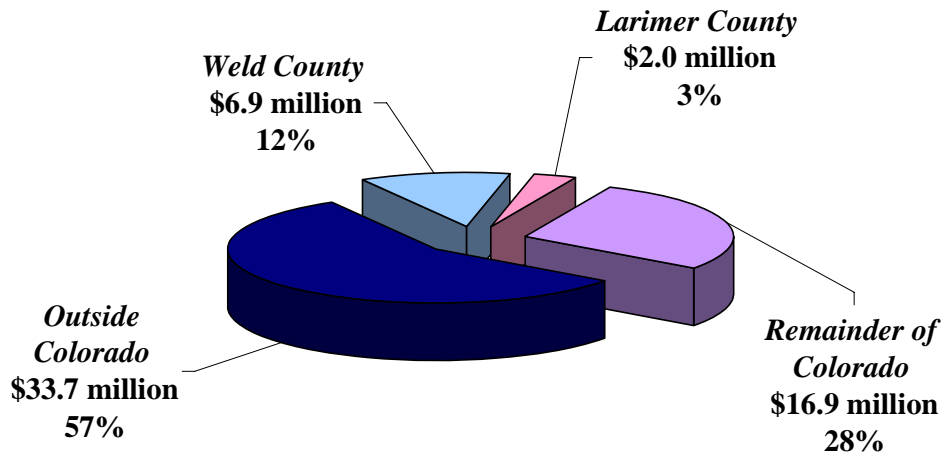
Indirect and Induced Effects Resulting from the UNC Operational Budget

The total operating budget, including gross payroll, for the University of Northern Colorado for the fiscal year 2003-2004 was approximately \$125.1 million. Payroll during that period accounted for about \$65.7 million, leaving \$59.4 million for university purchases of goods and services.¹

Figure 1 presents the breakdown of this \$59.4 million. \$6.9 million (12%) was spent in Weld County. An additional \$2 million (3%) was spent in Larimer County for a total of \$8.9 million (15%) in Northern Colorado. A further \$16.9 million was spent in the rest of Colorado for a total of \$25.8 million (43%) in the state as a whole. The remaining \$33.7 million (57%) was spent out of state and internationally and is therefore a leakage as defined above.

Many of UNC's purchases are made at local outlets of large national corporations. For example, payments for purchases from King Soopers are made to the Tennessee billing headquarters for King Soopers. Other out-of-state expenditures include payments for electricity from Excel Energy headquartered in Minnesota; heating gas purchased primarily from Duke Energy headquartered in Texas and ATMOS Energy headquartered in Arizona; computer equipment from Apple Computers based in Texas, Gateway Computers in California, Dell Computers in Illinois, and Hewlett Packard headquartered in California, IBM in Texas; the list is very extensive. University purchasing data was organized by payment address zip code, therefore any purchases made from the local distributor or outlet of a large national corporation will be viewed as a leakage in this study if payment was made to a location in another state.

Figure 1. University Operating Expenditures, 2003-2004



The input-output modeling software program, IMPLAN, was utilized in estimating the indirect and induced effects stemming from UNC's total expenditures for goods and services, employee

¹ The total amount differs slightly from the total reported in the Phase I report due to the elimination of intra-university budgetary payments and transfers in Phase II.

expenditures, and student purchases. The IMPLAN development group provides an estimate of the demand function for public higher education facilities using the 1992 Bureau of Economic Analysis (BEA) Benchmark study. This function estimates the percentage of a higher education institution's budget spent in various industry sectors within the economy. It also regionalizes that demand based on the industry make-up of the region under study. To better understand this process, consider the following example:

Suppose UNC were to spend \$297,000 (0.5 percent of the total non-payroll operating budget of \$59.4 million) on meat products for student cafeteria use. Since there is a large meat packing industry in Weld County, much of that demand could be met by local supply. For this example, it will be assumed that 75 percent of the demand is met by local suppliers. This would represent a local (or regional) purchasing coefficient (LPC or RPC) of 0.75 and the expenditure allocated to the local industry stemming from the University's demand for meat products would equal \$222,750 (75% of \$297,000).

Now, suppose UNC were to buy a product that is not produced locally. In this case, the LPC for that commodity equals zero, regardless of how much money UNC spends on the product. The total supply would be imported from outside the local or regional economy and the entire expenditure would be a leakage from the local economy.

In addition to the demand functions, the IMPLAN modeling system provides estimates of the local or regional purchasing coefficients (i.e., the percentage of demand for each sector that can be met by local suppliers). The regional purchasing coefficients for Weld, Larimer, and Colorado were all adjusted to better estimate the true impacts of UNC's activities on those economies.² The members of the UNC Economic Impact Task Force believe the impacts presented in this Phase II report are the best estimates possible, given the data available. All indirect and induced impacts were estimated using the full social accounting matrix (SAM) modeling system developed by Minnesota IMPLAN Group, Inc.

The results for Weld County, Northern Colorado, and Colorado are provided in Table 1, with monetary impacts measured in millions of dollars. These are cumulative impacts, meaning that in order to isolate Larimer County impacts, one must subtract the Weld County numbers from the Northern Colorado numbers; and in order to isolate Colorado impacts that do not include Northern Colorado, one must subtract Northern Colorado results from the Colorado impacts.

² While IMPLAN's estimates provide a very reliable regional modeling structure, the software also allows a user to adjust model parameters to better fit the model to the individual attributes of the industry and/or economy being analyzed.

Table 1. Operational Expenditure Impacts, FY 2004

	Direct	Indirect + Induced	Total Impact	Multiplier
<i>Total Output (\$ millions)</i>				
Weld County	6.89	2.66	9.55	1.39
Northern Colorado (Weld and Larimer Counties)	8.83	3.53	12.36	1.40
Colorado Total	25.72	16.91	42.63	1.66
<i>Employment (# jobs)</i>				
Weld County	44.00	26.20	70.20	1.60
Northern Colorado (Weld and Larimer Counties)	59.20	35.40	94.60	1.60
Colorado Total	169.80	139.40	309.20	1.82
<i>Value-Added (\$ millions)</i>				
Weld County Value-Added	4.28	1.56	5.84	1.37
<i>Labor Income</i>	1.73	0.90	2.63	1.52
<i>Employment Compensation</i>	1.55	0.73	2.27	1.47
<i>Proprietors' Income</i>	0.18	0.18	0.36	1.95
<i>Other Property Type Income</i>	2.32	0.52	2.84	1.22
<i>Indirect Business Taxes</i>	0.23	0.14	0.37	1.61
Northern Colorado Value-Added (Weld and Larimer Counties)	5.34	2.09	7.44	1.39
<i>Labor Income</i>	4.92	1.86	6.78	1.38
<i>Employment Compensation</i>	2.05	0.98	3.03	1.48
<i>Proprietors Income</i>	0.33	0.22	0.55	1.68
<i>Other Property Type Income</i>	2.67	0.71	3.38	1.27
<i>Indirect Business Taxes</i>	0.29	0.19	0.48	1.64
Colorado Total Value-Added	13.50	10.29	23.79	1.76
<i>Labor Income</i>	8.66	5.80	14.46	1.67
<i>Employment Compensation</i>	6.97	4.72	11.69	1.68
<i>Proprietors Income</i>	1.69	0.97	2.66	1.58
<i>Other Property Type Income</i>	3.99	3.51	7.49	1.88
<i>Indirect Business Taxes</i>	0.85	0.98	1.83	2.16

Table 1 indicates that the University of Northern Colorado spent \$6.89 million in Weld County during fiscal year 2003-04. This spending directly supported 44 jobs in the County and led to direct value-added income of \$4.28 million.

Breaking the value-added income down into its components indicates that the 44 jobs were earning employee compensation of \$1.55 million (roughly \$35,227 each on average), enhancing proprietor incomes by about \$180,000, earning other property income (rents, dividends, royalties) of \$2.32 million, and leading to indirect business tax revenues (from excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses) of \$230,000.

As noted earlier, the economic impact of direct spending is only the beginning of the story. The total impact column reported in Table 1 reflects the direct expenditure effects plus the indirect and induced effects. The multiplier column shows the calculated multiplier estimated by the model results for output, employment, and value added categories. This multiplier estimate is calculated by dividing the total impacts by the corresponding direct expenditure.

Multiplier estimation allows the users of this study to approximate the total economic impact associated with a change in purchasing behavior by UNC. For example, an additional expenditure of \$100,000 in Weld County by UNC would generate indirect and induced effects of \$39,000 for a total increase in output of \$139,000. Value-added income would increase by a total of \$137,000.

The interpretation and use of the employment multiplier is a bit more complex. Based on direct expenditure effects, 6.39 jobs are supported in the Weld County economy for every \$1 million spent locally by UNC. When including the indirect and induced impacts, that number increases to 7.35 jobs per \$1 million.

Multiplier effects for Northern Colorado and the State as a whole can be interpreted using the same methodology.

The University of Northern Colorado, a publicly-funded institution, received \$33.59 million in state appropriated funds for the 2003-2004 fiscal year. The total direct economic impact of UNC on the State of Colorado, summing direct output and value-added, was \$39.22 million, yielding an economy-wide rate of return on appropriation dollars of 117 percent for the State of Colorado. After including the indirect and induced effects, the total economic impact of UNC's expenditures is \$66.42 million, resulting in a rate of return on appropriation dollars of 198 percent.

Indirect and Induced Effects Resulting from Faculty and Staff Expenditures

The effects generated by non-student employees include expenditures of faculty, staff, administration, and non-student hourly employees. Impacts associated with student income and spending patterns are discussed in the following section of this report.

Total gross payroll for the University's 1,605 non-student employees totaled approximately \$65.7 million in the 2003-2004 fiscal year. Total net payroll for the same period for non-student

employees totaled \$46.7 million. The total net payroll paid within Colorado was \$42.2 million or 90.36 percent; less than 10 percent of UNC net payroll dollars directly left the state.

Net payroll is equal to gross payroll minus state and federal taxes withheld, pension fund withholding, and the employees' share of fringe benefit costs. The net-to-gross payroll ratio is approximately 71 percent. Net payroll therefore serves as a good proxy for the income that UNC employees have available for spending and saving. Although it is possible that many UNC employees save a portion of their net earnings, it is assumed for the purpose of this analysis that this additional savings is very small. UNC makes available a variety of pension contribution programs that offer ample opportunity to save sizable portions of one's earnings on a pretax basis. It is assumed that most UNC employees take advantage of these savings programs and therefore spend most of their remaining net income.

The demand patterns for households across income stratifications are estimated by the IMPLAN development group using the 1992 BEA Benchmark study discussed in the previous section. The same methodology for regional assessment of demand patterns is employed for these household institutions as for the governmental institution in the above section. The BEA benchmark study and information from BEA's Consumer Expenditure Survey serve as the basis for constructing these household demand functions.

The payroll impact model results for Weld County, Northern Colorado, and Colorado are provided in Table 2.

Table 2. Non-student Employee Expenditure Impacts, fiscal year 2004

	Direct	Indirect + Induced	Total Impact	Multiplier
<i>Total Output (\$ millions)</i>				
Weld County	33.86	8.62	42.48	1.25
Northern Colorado (Weld and Larimer Counties)	38.42	9.76	48.18	1.25
Colorado Total	42.22	17.31	59.53	1.41
<i>Employment (# jobs)</i>				
Weld County	219.90	86.20	306.10	1.39
Northern Colorado (Weld and Larimer Counties)	251.10	98.30	349.40	1.39
Colorado Total	288.30	150.50	438.80	1.52
<i>Value-Added (\$ millions)</i>				
Weld County Value-Added	12.13	5.16	17.29	1.43
<i>Labor Income</i>	6.53	2.90	9.42	1.44
<i>Employment Compensation</i>	5.53	2.32	7.85	1.42
<i>Proprietors Income</i>	1.00	0.57	1.57	1.58
<i>Other Property Type Income</i>	4.28	1.78	6.06	1.42
<i>Indirect Business Taxes</i>	1.33	0.48	1.81	1.36
Northern Colorado Value-Added (Weld and Larimer Counties)	13.84	5.87	19.71	1.42
<i>Labor Income</i>	7.42	3.28	10.70	1.44
<i>Employment Compensation</i>	6.32	2.64	8.96	1.42
<i>Proprietors Income</i>	1.10	0.64	1.74	1.58
<i>Other Property Type Income</i>	4.92	2.05	6.96	1.42
<i>Indirect Business Taxes</i>	1.51	0.54	2.05	1.36
Colorado Total Value-Added	17.92	10.54	28.46	1.59
<i>Labor Income</i>	9.75	5.97	15.72	1.61
<i>Employment Compensation</i>	8.54	5.04	13.58	1.59
<i>Proprietors Income</i>	1.22	0.92	2.14	1.76
<i>Other Property Type Income</i>	6.20	3.62	9.82	1.58
<i>Indirect Business Taxes</i>	1.97	0.96	2.93	1.49

As with the results from direct spending, it is necessary to subtract the Weld County numbers from the Northern Colorado numbers in order to isolate Larimer County impacts and to subtract the Northern Colorado results from the Colorado impacts in order to isolate Colorado impacts that do not include Northern Colorado.

Table 2 indicates that the University of Northern Colorado's net payroll paid to residents of Weld County totals \$33.86 million. These payroll dollars directly support 219.9 non-university jobs in the County leading to direct value-added income of \$12.13 million.

Breaking value-added down further shows that those 219.9 jobs were earning employee compensation of \$5.53 million (a little over \$25,000 each on average); enhancing proprietor incomes by about \$1 million; earning other property income (rents, dividends, royalties) of \$4.28 million; and leading to indirect business tax revenues (from excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses) of \$1.33 million within Weld County.

The total impact column reported in Table 2 again reflects the direct expenditure effects plus the indirect and induced effects. The multiplier column shows the calculated multiplier estimated by the model results for output, employment, and value added categories. Multiplier estimation allows the users of this study to approximate the total economic impact associated with a change in net payroll distributed by UNC.

For instance, if UNC were to approve a 5 percent across-the-board increase in payroll, direct payroll paid to Weld County residents would increase by \$1.69 million. One could estimate that Weld County's total output production would increase by \$2.11 million, including direct, indirect, and induced effects. Multiplying the \$1.69 million increase by the value-added multiplier of 1.43, yields an increase in value-added income of approximately \$2.42 million. The total impact on regional employment resulting from a 5 percent across-the-board wage increase would translate to approximately additional 12.26 jobs.

Indirect and Induced Effects Resulting from Student Expenditures

Student expenditure patterns were estimated using data generated from a survey conducted in the Spring 2006 semester (see appendix C for details). Student expenditures did not include tuition since it is University revenue and is spent by the University to fund operations. Likewise, expenditure patterns for on-campus residents excluded their costs for room and board to avoid the double-counting of those funds.

The student survey specifically asked students about their spending patterns, including the percentage of their expenditures made in Weld County and in Larimer County for a wide variety of goods and services. This information was then used to generate the demand function and regional purchasing coefficients for students. These were entered into the IMPLAN software to generate the indirect and induced impacts of student spending in Weld and Larimer. Unfortunately, constraints on the survey length prohibited gathering data on expenditures in other parts of Colorado, so the state model was not employed in the assessment of student impacts.

The direct, indirect, and induced effects of student spending in Weld and Northern Colorado (Weld plus Larimer) are provided in Table 3.

Table 3. UNC Student Expenditure Impacts, estimated for fiscal year 2005

	Direct	Indirect + Induced	Total Impact	Multiplier
Total Output (\$ millions)				
Weld County	55.67	23.28	78.95	1.42
Northern Colorado (Weld and Larimer Counties)	80.37	33.75	114.12	1.42
Employment (# jobs)				
Weld County	823.40	240.80	1,064.20	1.29
Northern Colorado (Weld and Larimer Counties)	1,270.40	355.10	1,625.50	1.28
Value-Added (\$ millions)				
Weld County Value-Added	34.80	14.20	49.00	1.41
<i>Labor Income</i>	1.59	0.77	2.36	1.49
<i>Employment Compensation</i>	11.75	6.20	17.95	1.53
<i>Proprietors Income</i>	4.12	1.53	5.64	1.37
<i>Other Property Type Income</i>	13.70	5.14	18.85	1.38
<i>Indirect Business Taxes</i>	5.23	1.33	6.56	1.25
Northern Colorado Value-Added (Weld and Larimer Counties)	51.07	20.82	71.89	1.41
<i>Labor Income</i>	25.19	11.24	36.43	1.45
<i>Employment Compensation</i>	19.90	9.14	29.04	1.46
<i>Proprietors Income</i>	5.29	2.10	7.38	1.40
<i>Other Property Type Income</i>	17.89	7.69	25.58	1.43
<i>Indirect Business Taxes</i>	8.00	1.89	9.89	1.24

* Due to lack of data, no estimates of the total impact of student spending outside of Northern Colorado are available.

Table 3 shows that the total estimated spending in Weld County by all UNC students is \$55.67 million, an average of \$4,584 per student. These student expenditures directly support 823.4 jobs in the County, leading to total value-added income of \$34.8 million dollars.

Breaking value-added down further shows that those 823.4 jobs are earning employee compensation of \$11.75 million (roughly \$14,270 each); enhancing proprietor incomes by \$4.12 million; earning other property income (rents, dividends, royalties) of \$13.7 million; and leading

to indirect business tax revenues (from excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses) of \$5.23 million.

The total impact column reported in Table 3 again reflects the direct expenditure effects plus the indirect and induced effects. The multiplier column shows the calculated multiplier estimated by the model results for output, employment, and value-added categories.

Multiplier estimation allows the users of this study to approximate the total economic impact associated with a change in net payroll distributed by UNC. For instance, if the amount spent by UNC students in Weld County were to increase by \$1,000, Weld County's total output production would increase by an estimated \$1,420, including the \$1,000 original increase in spending. Value-added would increase by approximately \$1,410, and regional employment would increase by approximately .0135 jobs. This means that one additional job would be generated if student spending in Weld County increased by a total of approximately \$74,000.

Summary of Indirect and Induced Effects of Expenditures

The previous three report sections explain the direct, indirect, and induced effects for three separate expenditure groups: (1) university operations, (2) non-student employees, and (3) students. In this section, these effects are aggregated to estimate the total economic impact of the University as a whole. Table 4 provides these results.

Table 4. Total of Direct, Indirect, and Induced Impacts of Expenditures from UNC Operations, UNC Non-student Employees, and UNC Students, fiscal year 2004

	Direct	Indirect + Induced	Total Impact	Multiplier
Total Output (\$ millions)				
Weld County	96.42	34.56	130.98	1.36
Northern Colorado (Weld and Larimer Counties)	127.62	47.04	174.66	1.37
Colorado Total*	148.31	67.97	216.28	1.46
Employment (# jobs)				
Weld County	1,087.30	353.20	1,440.50	1.32
Northern Colorado (Weld and Larimer Counties)	1,580.70	488.80	2,069.50	1.31
Colorado Total*	1,728.50	645.00	2,373.50	1.37
Value-Added (\$ millions)				
Weld County Value-Added	51.21	20.92	72.13	1.41
<i>Labor Income</i>	9.85	4.57	14.42	1.46
<i>Employment Compensation</i>	18.83	9.25	28.08	1.49
<i>Proprietors Income</i>	5.30	2.28	7.58	1.43
<i>Other Property Type Income</i>	20.30	7.44	27.74	1.37
<i>Indirect Business Taxes</i>	6.79	1.95	8.74	1.29
Northern Colorado Value-Added (Weld and Larimer Counties)	70.25	28.78	99.03	1.41
<i>Labor Income</i>	37.53	16.38	53.91	1.44
<i>Employment Compensation</i>	28.27	12.76	41.03	1.45
<i>Proprietors Income</i>	6.72	2.96	9.68	1.44
<i>Other Property Type Income</i>	25.48	10.45	35.93	1.41
<i>Indirect Business Taxes</i>	9.80	2.62	12.42	1.27
Colorado Total Value-Added*	82.49	41.65	124.14	1.50
<i>Labor Income</i>	43.60	23.01	66.61	1.53
<i>Employment Compensation</i>	35.41	18.90	54.31	1.53
<i>Proprietors Income</i>	8.20	3.99	12.19	1.49
<i>Other Property Type Income</i>	28.08	14.82	42.90	1.53
<i>Indirect Business Taxes</i>	10.82	3.83	14.65	1.35

*Colorado totals are understated due to the lack of data on student spending outside Northern Colorado. The totals are the sum of impacts for the entire state for direct university expenditures and non-student employee spending and for Northern Colorado only for students.

Total spending by the University, its non-student employees, and its students totaled \$96.42 million in Weld County and directly supported 1,087.3 jobs within the County, leading to total value-added income of \$51.21 million.

Breaking value-added down further shows that those 1,087.3 jobs are earning employee compensation of \$18.83 million, an average of \$17,318 each; enhancing proprietor incomes by \$5.3 million; earning other property income (rents, dividends, royalties) of \$20.3 million; and leading to indirect business tax revenues (from excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses) of \$6.79 million.

The total impact column reported in Table 4 again reflects the direct expenditure effects plus the indirect and induced effects. The multiplier column shows the calculated multiplier estimated by the model results for output, employment, and value-added categories. The total output multiplier indicates that an extra \$100,000 expenditure by the University, its employees, or its students made within Weld County would increase Weld County's total output production by an average of \$136,000, including the \$100,000 original increase in spending. Value-added would increase by approximately \$141,000, and regional employment would increase by approximately 1 job.

Direct, Indirect, and Induced Tax Effects

In Phase I of this economic impact study, the direct tax revenue effects stemming from the existence of UNC were estimated. While the methodology used for those estimates was accurate given the data available during the Phase I analysis, Phase II data availability and the impact model refinement allowed the task force to estimate fiscal impacts that are much more detailed and deemed more reliable. Part of the advantage of employing an input/output impact modeling structure such as IMPLAN's social accounting matrix is that the internal relationships defined within the matrix system allow for improved estimates of governmental fiscal budgeting impacts. The fiscal revenue impact estimates resulting from the IMPLAN analyses performed on each region are presented in Table 5.

Table 5. Tax Impacts

	<i>UNC Operations</i>	<i>Non-student Employees</i>	<i>Students</i>	<i>Total Tax Impacts</i>
<i>Weld</i>				
State and Local Govt.				
Sales Tax	\$126,253	\$762,189	\$2,903,243	\$3,791,684
Income Tax	\$37,813	\$166,791	\$441,531	\$646,136
Property Tax	\$102,303	\$616,197	\$2,342,714	\$3,061,213
Other Tax	\$109,551	\$421,277	\$1,432,270	\$1,963,098
<i>Total</i>	<i>\$375,920</i>	<i>\$1,966,454</i>	<i>\$7,119,758</i>	<i>\$9,462,131</i>
<i>Northern Colorado (Weld and Larimer Counties)</i>				
State and Local Govt.				
Sales Tax	\$163,482	\$865,239	\$4,399,782	\$5,428,503
Income Tax	\$51,271	\$189,058	\$677,226	\$917,555
Property Tax	\$132,500	\$699,466	\$3,550,122	\$4,382,088
Other Tax	\$135,478	\$479,134	\$2,084,169	\$2,698,781
<i>Total</i>	<i>\$482,731</i>	<i>\$2,232,897</i>	<i>\$10,711,299</i>	<i>\$13,426,927</i>
<i>Colorado Total*</i>				
State and Local Govt.				
Sales Tax	\$743,570	\$1,187,728	\$4,399,782	\$6,331,080
Income Tax	\$241,701	\$261,399	\$677,226	\$1,180,326
Property Tax	\$602,659	\$959,947	\$3,550,122	\$5,112,728
Other Tax	\$461,540	\$639,377	\$2,084,169	\$3,185,086
<i>Total</i>	<i>\$2,049,470</i>	<i>\$3,048,451</i>	<i>\$10,711,299</i>	<i>\$15,809,220</i>

*Due to lack of data, no estimates of the total tax impact of student spending outside of Northern Colorado are available. As a result, the student tax impacts presented here, which are for spending within Northern Colorado, understate the overall impact within the state.

The total tax impact for the state and local government sectors stemming from university, faculty, staff, and student spending within Weld County was over \$9 million during the study period, while the effect for Northern Colorado exceeded \$13 million..

The state tax impacts for the student expenditure model were not estimated because of the absence of student expenditure data with regard to the entire state. Therefore, the total tax impact column for the State of Colorado reflects only the sum of the tax impacts from university operational expenditures and faculty and staff expenditures.

Comparison of UNC's Impact with other Institutions

The type of analysis performed in this report is not unique. Many institutions of higher learning around the nation have performed similar impact analyses in recent years. The political and social environments of many regions have resulted in skepticism of higher education's value, especially those institutions that partially rely on state-appropriated funds. It is primarily because of these environments and attitudes that universities around the country have allocated scarce resources into studying and publicizing their "return" to their host communities and states. Impact analysis is a valuable tool when employed correctly and with the right intentions. On the other hand, multipliers can be estimated by including a plethora of "expenditures" that can lead to inflated impacts due to double-counting. The developers of the IMPLAN system advise that output multiplier calculation greater than 2.0 should be viewed with caution. That is not to say that a multiplier value greater than 2.0 is impossible, but it does warrant further analysis to test its accuracy. Table 6 shows the estimated output and employment multipliers from this analysis as well as those from similar impact studies performed around the nation. The results from the UNC study are consistent with those from other regions.

Table 6. Comparison of Multipliers Among Selected Universities

University	Study Year	Output Multiplier*	Employment Multiplier*
<i>University of Northern Colorado</i>	<i>2006</i>	<i>1.39-1.66</i>	<i>1.39-1.8</i>
Purdue University	1996	2.013	1.54
Portland State University	1995-1996	1.91	1.78
University of Nevada – Reno	2000	1.84	1.9
Montana State University – Bozeman	1995	1.87	1.76
DePauw University	2005	1.52	3.75
University of Colorado	1999	1.93-2.5	1.74-1.98
University of Georgia – Athens	1999	1.44	1.64
University of Wisconsin – Eau Claire	2005	1.41	1.29
Bowling Green State University	2004	1.56	1.52
Middle Tennessee State University	2004	1.16	2.58
Pittsburg State University	2002	1.38	1.6
Humboldt State University	2004	1.11	1.29
Lethbridge University	2004	1.5	1.5

*The impact reports for these universities either explicitly reported these multipliers or provided the impact data enabling the estimation of these multipliers.

Conclusion

The charge of the economic impact task force was multifaceted; (1) to identify and measure the direct, indirect, and induced impacts accruing to the local, regional, and state economies from the existence of UNC; and (2) to examine the contributions stemming from the civic engagement of UNC and its faculty, staff, and students, which enhances the economic, social, and political health of the community.

This report presents the analysis from Phase II of the study, which expands on the findings of Phase I by adding estimates of the indirect and induced impacts to the direct impacts.

The study shows that the University has a substantial economic impact on the surrounding geographic area. The task force estimates that for each dollar spent locally, economic activity in that region increases by \$1.39 to \$1.66. The analysis also shows that 11 to 12 new jobs are created for each \$1 million of spending by UNC and its faculty, staff, and students. University spending in Weld County also generated state and local tax revenues of approximately \$9 million in 2003-2004 and yielded a return on state appropriations of 198 percent.

The task force also examined student preferences for a variety of potential amenities in the Greeley area (see appendix A). The most significant finding is that students desire improved employment and shopping opportunities in Greeley. Incorporating student suggestions into future planning initiatives may enhance student involvement in the community and may increase their economic impact in the region.

Phase III of this study will examine the effects of the University of Northern Colorado on its surrounding community and state that are non-monetary in nature. These impacts are often ignored or underrepresented in such analyses. The goal of Phase III of this project is to identify the level of participation in civic, social, and faith-based activities by the university community. Such involvement enhances the quality of life and cohesiveness within the City of Greeley.

Appendix A: Student Preferences for Greeley Area Amenities

In addition to questions on spending patterns, our student survey attempted to gauge student interest in potential amenities for the Greeley area. Specifically, we provided a list based on suggestions from a survey pre-test and proposals by UNC and Greeley officials and asked the following question: "For the following list of Greeley area amenities, please mark the five items that you think would most enhance your UNC experience."

The purpose of this question was to determine the types of facilities or services that might enhance students' economic impact in Greeley by inducing them to spend more of their disposable income in the local area. This one of the many different types of intangible effects the task force will explore in Phase III of the Economic Impact Study.

The responses to this question are summarized in Table A-1.

Table A-1. Student Ranking of Selected Amenities

Amenity Choices	Rank	Percent of Students Ranking it in Top Five	Number of Students Ranking it in Top Five*
Greater employment opportunities	1	49.3%	1130
Larger mall/better stores	2	41.8%	960
Nicer/classier/safer night/dance clubs	3	28.4%	652
More cultural/community activities that are student friendly	4	27.1%	621
Natural foods grocery store	5	26.7%	613
More under 21 establishments	6	26.6%	610
Downtown/campus shuttle for late night transportation	7	24.4%	560
More UNC visibility/atmosphere in the Greeley community	8	22.9%	525
Concert/sports venue	9	20.1%	461
'Bar hop' street downtown	10	19.3%	442
Free designated driver 'taxi' type service	11	17.3%	397
Safer and more numerous bike lanes/paths	12	17.2%	395
More coffee shops	13	16.8%	385
Variety of ethnic food markets	14	16.7%	383
Closer or better access to a large recreational swimming pool	15	16.6%	380
Broader availability of UNC logo merchandise	16	16.1%	370
Greeley to Denver shuttle	17	14.3%	327
Arcades/laser tag	18	9.0%	207
Downtown parking garage	19	5.7%	130
Other (unspecified)	20	5.4%	125

*Number of respondents = 2294

As Table A-1 portrays, the most desirable characteristic by far is "greater employment opportunities," with almost half (49.3 percent) of students ranking that item in the top five. This is followed by "larger mall/better stores" at 41.8 percent. "Nicer/classier/safer night/dance clubs" comes in as a distant third, with only 28.4 percent ranking it in the top five.

Based on this survey question, it would appear that students are more interested in greater employment and shopping opportunities than additional entertainment options. It is important to note, though, that students may be thinking about both the short-term and the long-term in responding to this question. If the Greeley area were to add additional service sector jobs, the community might be able to keep students in the area during their college careers but would be likely to lose them to other localities after graduation. However, if Greeley can attract employers that are able to pay high wages and provide stable and rewarding careers, it is probable that more students would be likely to remain after graduation. This information should be useful in planning ways to enhance the long term economic impact of the University's students on the Northern Colorado economy.

Appendix B: Direct, Indirect, and Induced Effects

To understand the significance of indirect and induced effects, recall the following example from the text:

In 2004, UNC spent approximately \$60,000 on purchases of paper goods from Northern Colorado Paper, also located in Greeley. This purchase is the direct output effect. In order to supply this output, Northern Colorado Paper must hire employees and other resources and compensate them through wages, interest, and rent. In addition, profit accrues to the business owners. These are the direct value-added income effects.

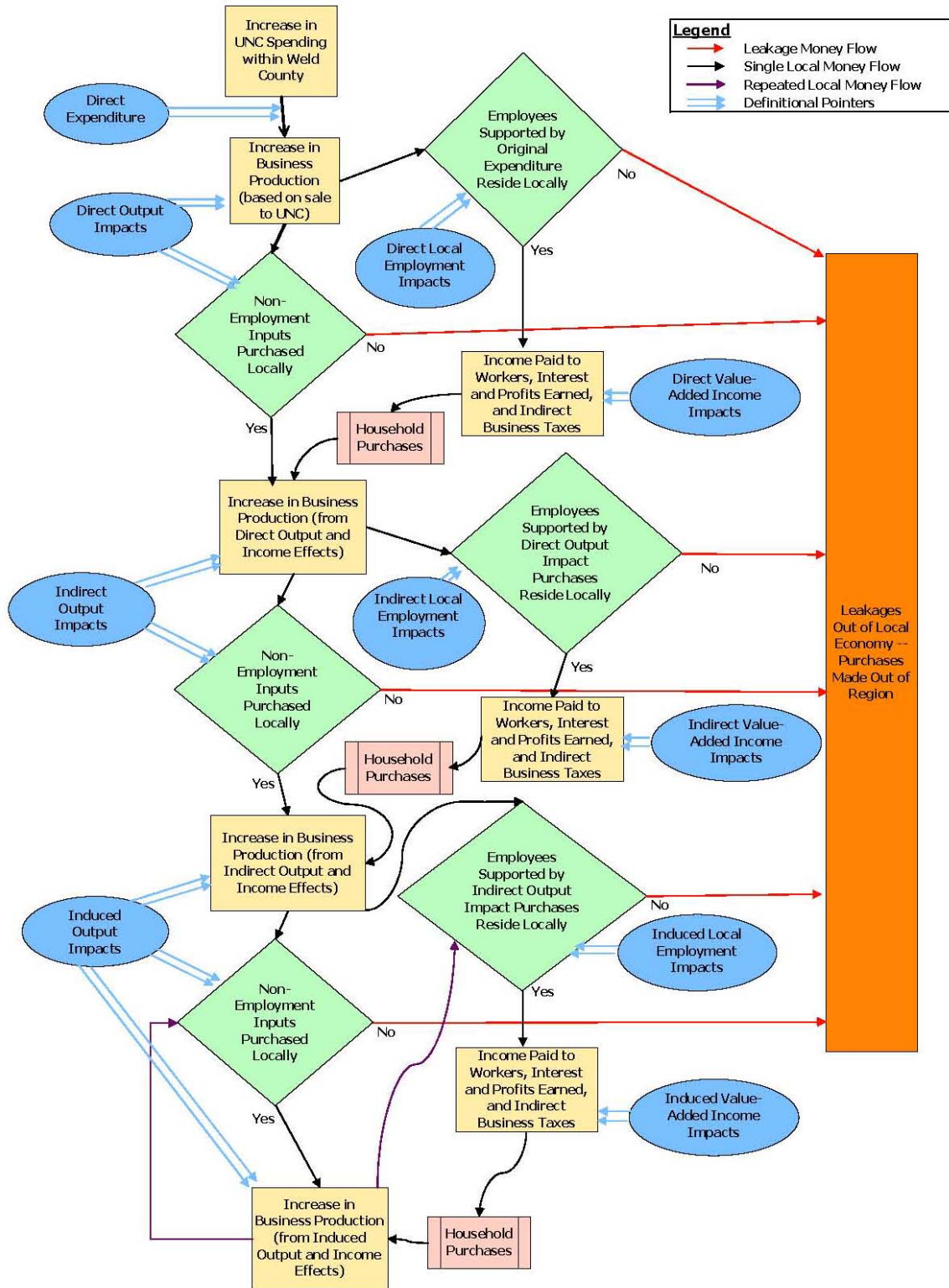
The story continues as Northern Colorado Paper's employees, proprietors, and suppliers spend their direct value-added income on additional goods and services in the Greeley area. These purchases represent the indirect output effect while the income generated from the production of this output is the indirect value-added income effect.

Even when including these indirect impacts, the economic picture remains incomplete. The income generated from those indirect effects becomes the basis for a new round of spending. The goods and services produced in this and all subsequent rounds are the induced output effects. Similarly, the income generated from this and each subsequent round of production constitutes the induced value-added income effects.

The indirect and induced effects are often referred to as "multiplier" effects because the ultimate impact is larger than the original expenditure.

See the flowchart below for a visual demonstration of the expenditure chain discussed above.

Expenditure Chain Flow Chart



Appendix C: Data and Methodology

In this appendix, we outline information about the data sources, methodology, and assumptions used to estimate the indirect and induced effects.

Analysis of University Operating Expenditures

Total university expenditures for fiscal year 2003-2004 were taken from the university's annual report. These expenditures were then adjusted for non-student payroll to isolate the amount that UNC spent on final goods and services. This adjusted figure was the basis for the expenditure analysis for Weld County, Larimer County, and the State of Colorado. In addition, University expenditure data for fiscal year 2003-2004 was provided in raw form by the UNC Accounting Office.

We analyzed this data to establish UNC's expenditure patterns within Weld and Larimer counties, as well as Colorado, the nation, and beyond. Any spending that occurs outside the geographic region of interest is a "leakage" and is not counted in the calculation of the multiplier effects.

To account for the leakages, we use measures called local (or regional) purchasing coefficients (LPCs or RPCs). A LPC is the fraction of all spending in a particular industry that is purchased from local companies. This depends of course on the industrial make-up of the regional economy. In other words, it depends on whether the local area is home to any companies within the given industries and, if so, the amount of purchases made from those companies. For example, the University spends approximately \$120,655 for cleaning and laundry services; \$3,875 of which is spent in Weld County, \$26,943 in Colorado and \$93,712 in Wyoming. This purchasing pattern produces a LPC of 3.21% for Weld County and 22.33% for Colorado. On the other hand, the Weld LPC for the cotton production industry is zero because there are no companies from this industry operating in Weld County.

After applying this methodology to the raw data, we compared our results with the parameters of the IMPLAN estimated demand function for public higher education facilities and made necessary adjustments to ensure that the demand function was more representative of UNC's actual expenditure patterns. This demand function was then used in the three regional models employed in this analysis.

Analysis of Faculty and Staff Expenditures

Net payroll was used as a proxy for UNC employees' disposable income, defined as the income that consumers have available for spending and saving. Based on the net payroll for each employee, individuals were sorted into income strata so that the data could be used with IMPLAN. The demand patterns for households across income stratifications are estimated by the IMPLAN development group using the 1992 BEA Benchmark study. The accuracy of these estimates were extremely important to the integrity of our study, and therefore we performed a pilot comparison of the IMPLAN household demand patterns with the expenditure patterns

resulting from the 2003-2004 Consumer Expenditure Survey (CES) conducted by the Bureau of Labor Statistics.

In order to approximate the average expenditures by income stratification for Weld County residents, data from BLS published tables were used to develop a regional weighting scheme. These tables were “*Table 24: Selected western metropolitan statistical area*” and “*Table 34: Western region income before taxes*”. Both tables reported average annual expenditures; however Table 24 only reported an aggregated average for the Denver-Boulder-Greeley Metropolitan Statistical Area (MSA), while Table 34 reported average expenditures by income stratification in the West region of the U.S.

Due to discrepancies between the two tables in the total number of consumer units reported in the West region, a weighted average of the total consumer units reported in western region data was computed. This was done by taking the total consumer units reported in Table 24 as a percentage of the total consumer units reported in Table 34. We then multiplied the number of consumer units reported in Table 24 by this percentage in order to reconcile the discrepancy.

The adjusted number of consumer units in the West was then used to find the percentage of consumers in the West who reside in the Denver-Boulder-Greeley MSA. This is multiplied by expenditures for each income bracket from Table 34. The result is divided by income to yield the percentage of the West expenditures occurring in the Denver-Boulder-Greeley MSA for each income category.

Further, it was necessary to identify consumer expenditure patterns within each income strata. To do this, the average percentage of income spent for a wide variety of goods and services identified in the CES. This percentage was found by dividing the average expenditures for each type of good or service by the total average annual expenditure for each income bracket. After comparing this percentage with the IMPLAN household expenditure functions, the IMPLAN system was deemed to fall within acceptable parameters.

Analysis of Student Expenditures

The data on student spending patterns was gathered via an online survey. A request to participate was sent to all students enrolled in Spring 2006 (approximately 12,000). We received 2296 responses (19% response rate).

Information was gathered on a wide range of categorical and geographic purchasing patterns. Questions addressed car ownership patterns, type of residence (rent/own/on-off campus), and use of public transportation, banking, and health care. The survey probed spending patterns for gasoline, vehicle maintenance, rent and utilities, books, computers, groceries, restaurants, alcoholic beverages, entertainment, apparel, sporting goods, and personal services. These responses were used to create the demand function parameters employed in the IMPLAN impact modeling system.

The survey also asked students to indicate their top five choices from the Greeley area amenities as discussed in Appendix A.

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Glossary of Terms*

- Direct Effects:** Initial expenditure data to be applied to the predictive impact model. Represents the response (e.g. change in employment) for a given industry per million dollars of final demand for that same industry.
- IMPLAN (IMpact Analysis for PLANning)** – Software originally developed by the USDA Forest Service to do input-output analysis; development later privatized by the formation of the Minnesota IMPLAN Group, Inc.
- Indirect Effects:** Inter-industry effects of input-output analysis; represents the response by all local industries caused by the iteration of industries purchasing from industries per million dollars of final demand for a given industry. (i.e.: Industry A buys inputs from local industries B and C. An increase in demand for goods produced by industry A will lead to \$x increased production in industries B and C in order for A to meet the added demand.)
- Induced Effects:** The impacts of household expenditures in the input-output analysis; represents the response by all local industries caused by the expenditures of new household income generated by the direct and indirect effects per million dollars of final demand for a given industry. (i.e.: Industry A buys inputs from industries B and C. An increase in demand for goods produced by industry A will lead to \$x increased production in industries B and C in order for A to meet the added demand which leads to industries B and C to hire additional employees and pay additional wages. Those additional employees will use that income to make purchases from local and regional businesses, which leads to increased production by those local merchants.)
- Input-Output Analysis:** An economic model that allows the assessment of change in overall economic activity as a result of some corresponding change in one or several activities.
- Value-added:** Income payments made by industry sectors in the form of wages, interest, rents, profits and indirect business taxes.
- Leakage:** Any spending that occurs outside the geographic region of interest.
- Employee Compensation:** The total payroll costs (including benefits) of each industry in the region.
- Proprietary Income:** Payments received by self-employed individuals as income.
- Other Property Type Income:** Payments for rents, royalties, and dividends.
- Indirect Business Taxes:** Excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses.

* As defined in the IMPLAN Professional Version 2.0 User's Guide