Jefferson County's Economic Structure:
An Input-Output Analysis

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Jefferson County's Economic Structure: An

Input-Output Analysis

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> "In 1915 (December 12, 1914) Crook County was divided, the northeastern part became
> Jefferson County…In 1915 a pump was installed at Opal Springs and a reservoir built on top
> of the canyon…Later another reservoir was built between Culver and Metolius and more
> pumps were installed, and water supplied to all that section of the county…The North Unit
> Irrigation District was formed and held its first meeting on March 27, 1916."
> —Reata Horney, 1984, in Sharon Clowers et al. (Ed.), *The History of Jefferson County, Oregon
> 1914–1983*.

Introduction

Jefferson County and district irrigation were born at the same time, and how water is utilized remains central to the county's economic future.

This report profiles the demographic and economic trends in Jefferson County, estimates the export base of the county, provides an overview of the Jefferson County Input-Output Model, uses a hypothetical economic change to demonstrate how the model can be used to estimate economic impacts, and, finally, suggests some areas that Jefferson County might consider as it works to increase the resilience of its economy.

Population and Economic Trends

Jefferson County is a nonmetropolitan (nonmetro) county (Figure 1, in yellow). In the 2000 U.S. Census, 19,009 people lived within its 1,781 square miles; hence the population density per square mile was approximately 10.7 people (U.S. Census Bureau, 2002).

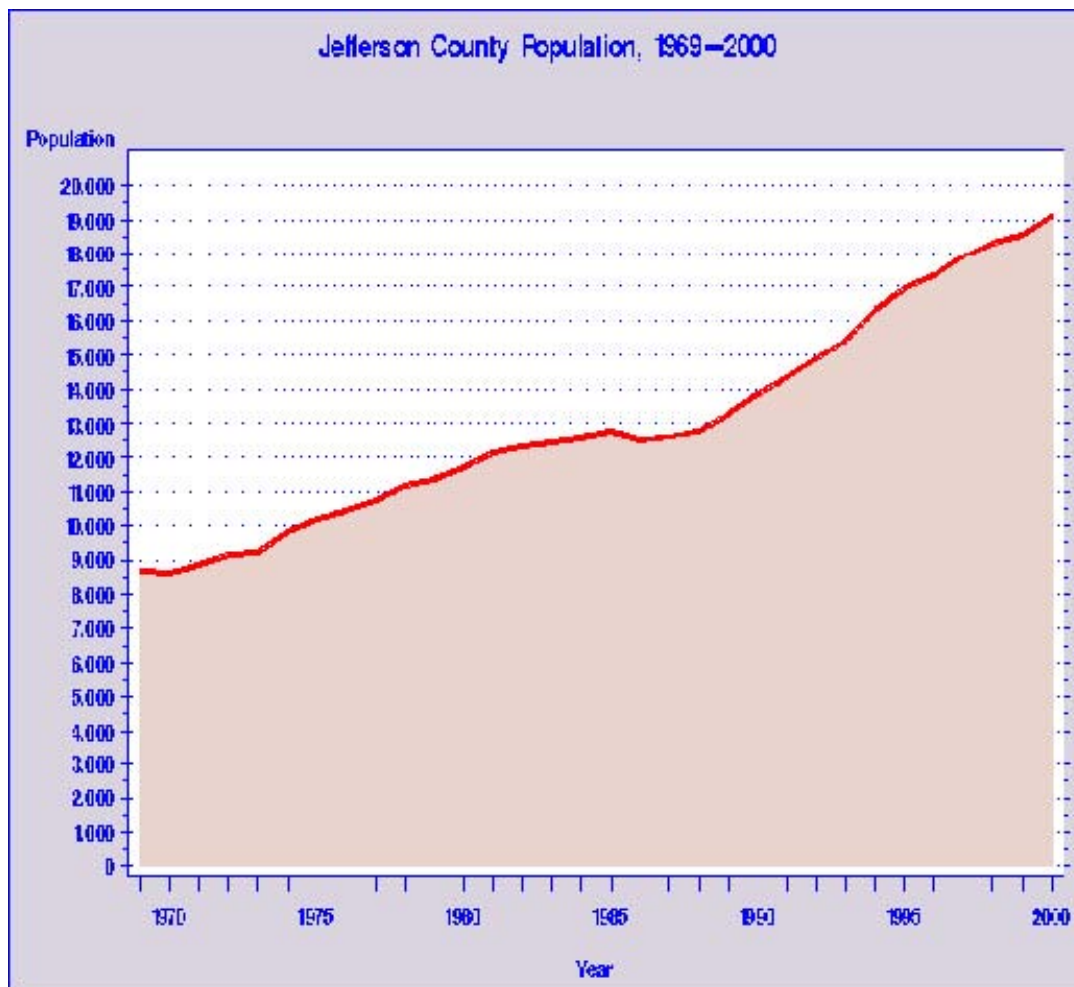**Figure 1. Jefferson County, Oregon.**
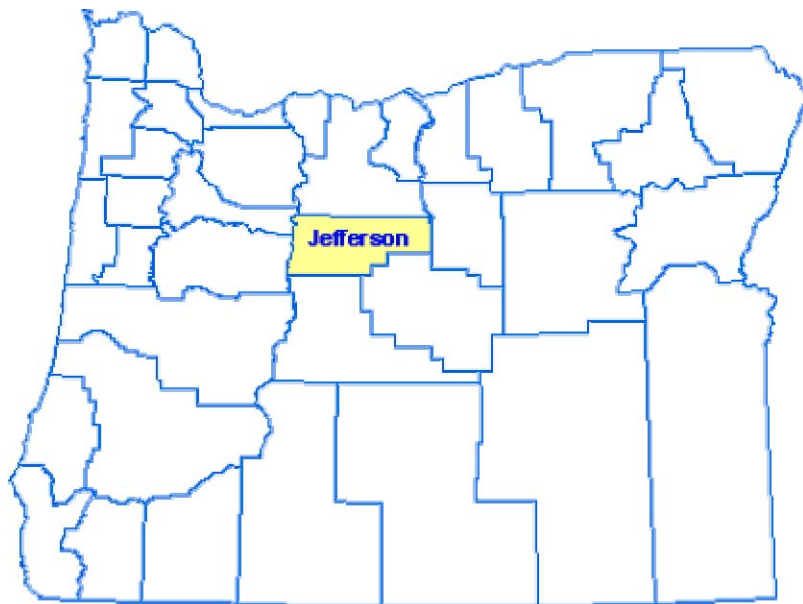
Jefferson County, while retaining a strong natural resource-based economy, has diversified more than many nonmetro counties. Highway 26 and Highway 97 run through the middle of the county and provide a direct link to the Portland and Bend metro areas.

Jefferson County's population is growing, with a 39 percent increase between 1990 and 2000 (U.S. Census Bureau). Jefferson County is also one of the more ethnically diverse counties in the state, with a non-white population that exceeds 30 percent (Ibid., and Loy 2001, 42).

"Population growth is both a cause—and a consequence—of economic growth. Patterns of population growth and change reflect differences among regions to attract and retain people both as producers and consumers in their economy" (Smith 2001, 2).

**Figure 2. Jefferson County Population, 1969–2000.**

Jefferson County Population, 1969–2000

Source: Smith, Gary W. 2003. Oregon Regional Economic Analysis Project Web page
(http://www.pnreap.org/Oregon).

As Figure 2 shows, total population growth for Jefferson County over the 3 decades more than doubled, increasing 120 percent. That growth rate, as further depicted by Figure 3, is higher than Oregon's, which was 66.3 percent, and that of the U.S., which was 40.2 percent.

For a nonmetro Oregon county like Jefferson County to exceed the U.S. population growth rate was not unusual. Nonmetro Oregon's average population growth rate, which is not depicted in these graphs, was 56.8 percent (Smith 2002). Jefferson County's neighbors, Crook and Deschutes counties, also grew faster than nonmetro Oregon generally, as many people moved to central Oregon to retire or recreate. Most of nonmetro Oregon did not outpace the average population growth rate for Oregon, as did these three central Oregon counties.

Figure 3. Population Indices (1969 = 100), Jefferson County, Oregon, and United States, 1969–2000.
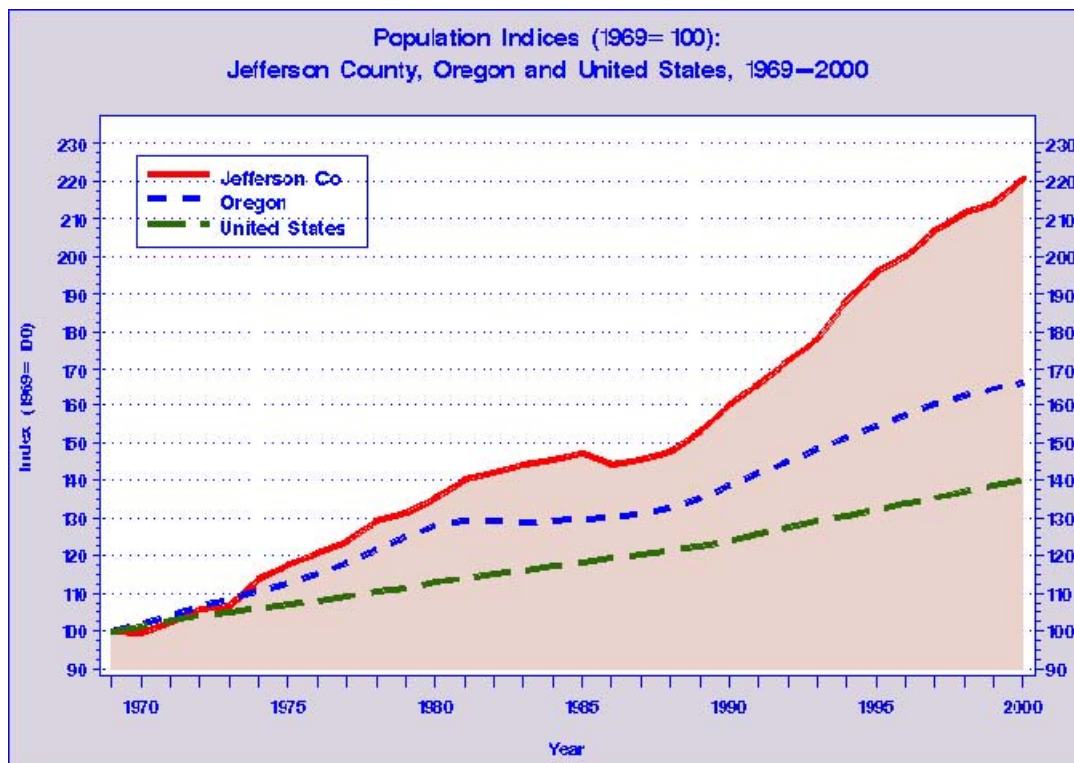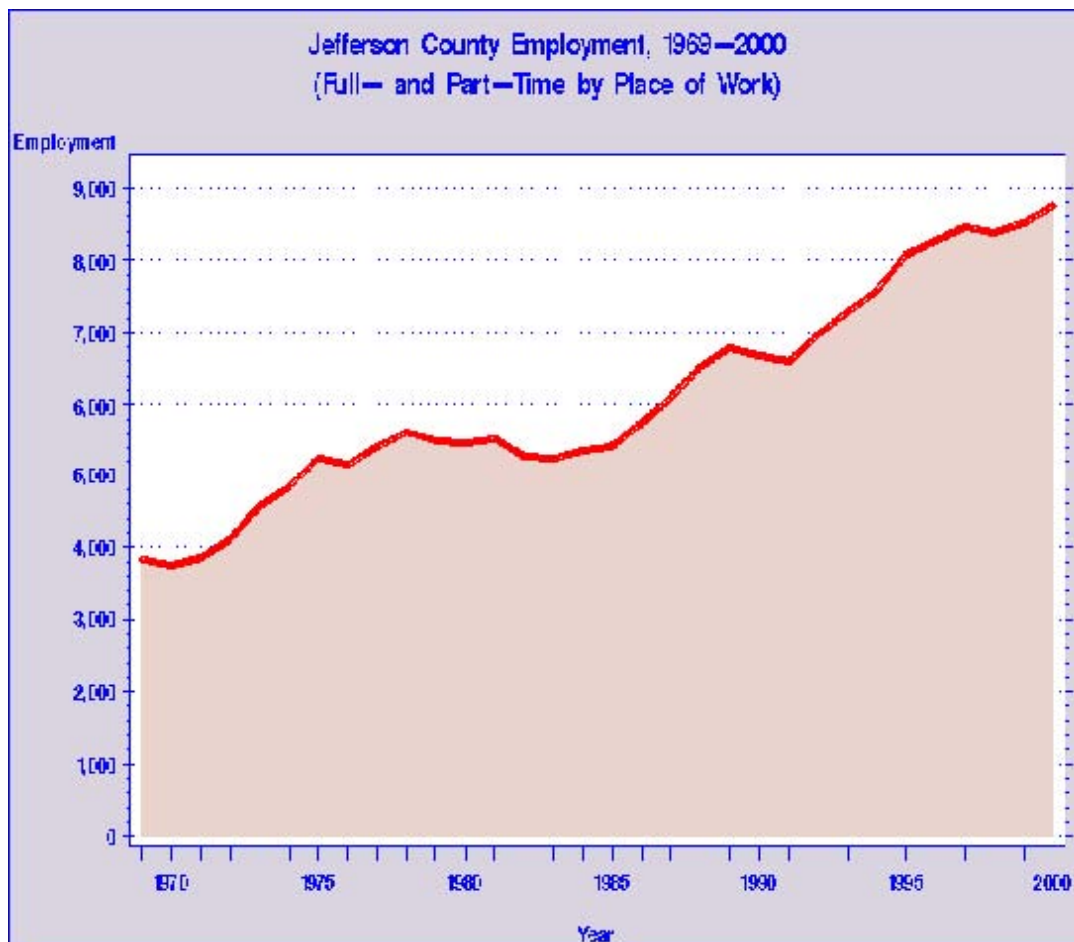
Source: Smith, Gary W. 2003. Oregon Regional Economic Analysis Project Web page
(http://www.pnreap.org/Oregon).

One goal of economic development is often to create an ability for the community to weather economic fluctuations or become more economically resilient. *An economically resilient community is one that can be economically shocked, quickly begin a rebound, and reach an equilibrium that may be very different from the pre-shock equilibrium, yet provides a similar number of jobs and preserves the community's population.* "Quickly" is measured in months rather than years. *An economic shock or event is a market change that is a surprise and affects the employment growth rates and may permanently affect the employment level* (Bartik 1991, 11). A new equilibrium is reached when the local area's attractiveness to households and firms is at least attractive enough to prevent decline (Ibid., 72).

Probably the most important variable, for many people concerned with economic resilience, is employment. "Employment numbers remain the most popular and frequently cited statistics used for tracking local area economic conditions and trends" (Smith 2001, 2). Please note that the estimates throughout this report are for full- and part-time jobs and do not necessarily represent individual people. A person may hold more than one of the jobs. Also, employment estimates in the following graphs are based on place-of-work and do not include place-of-residence considerations. In Jefferson County, employment grew by 4,913 jobs, or 127.9 percent, from 1969 to 2000 (Figure 4).

Figure 4. Jefferson County Employment, 1969–2000 (Full- and Part-Time by Place of Work).

Jefferson County Employment, 1969–2000
(Full– and Part–Time by Place of Work)

Source: Smith, Gary W. 2003. Oregon Regional Economic Analysis Project Web page
(http://www.pnreap.org/Oregon).

Jefferson County once again exceeded the U.S., which had an 83.9 percent employment increase
(Figure 5), and nonmetro Oregon, which had a 101 percent increase and is not pictured (Smith 2001, 3).
The county's employment growth was less than Oregon's, which was 130.2 percent. Much of this
employment growth was based on increased employment in the service sectors, which is discussed further
below.

**Figure 5. Employment Indices (1969 = 100), Jefferson County, Oregon, and United States, 1969–
2000.**
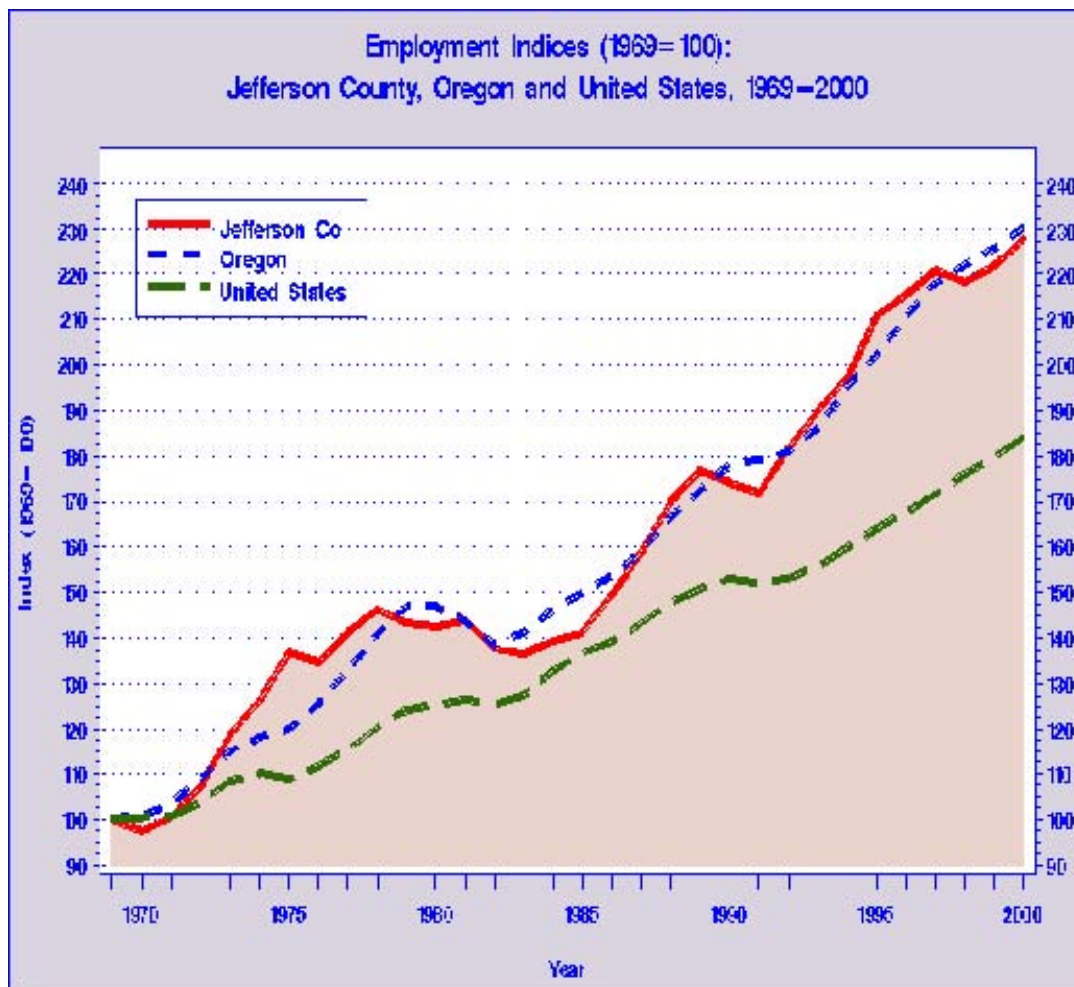
Source: Smith, Gary W. 2003. Oregon Regional Economic Analysis Project Web page (http://www.pnreap.org/Oregon).

Although Jefferson County's employment growth rate exceeded its population growth rate, the U.S., Oregon, and nonmetro Oregon had employment growth rates that were proportionately higher than Jefferson County's. To analyze changes in employment over time and determine whether a greater or lesser proportion of the population is employed, a job ratio (employment/population) can be calculated. Jefferson County's job ratio has increased from 0.44 to 0.46, although it did not keep pace with either the U.S. job ratio, which increased from 0.45 to 0.59, Oregon's job ratio, which increased from 0.44 to 0.62, or nonmetro Oregon's job ratio, which increased from 0.43 to 0.55 (Ibid., 7).

A number of factors may have contributed to these changes in job ratios and the differential rate at which they occurred for the different areas: the percentage of women participating in the formally defined workforce, changing age distributions and the percentage of retirees within the population who are not participating in the workforce, and shifts of some full-time jobs to more than one part-time job (Ibid.).

Oregon's workforce has shifted toward more service occupations, which can have a higher percentage of part-time jobs. That shift also has taken place in Jefferson County, to an even greater degree than the statewide changes (Table 1).

Table 1. Jefferson County and Oregon Employment Changes, 1970–2000.

SECTOR	Jefferson County				Oregon			
	1970	%	2000	%	1970	%	2000	%
Total full-time and part-time employment	3,740	100.0	8,753	100.0	925,914	100.0	2,118,403	100.0
By type								
Wage and salary employment	2,635	70.5	7,058	80.6	767,676	82.9	1,699,647	80.2
Proprietors' employment	1,105	29.5	1,695	19.4	158,238	17.1	418,756	19.8
Farm proprietors' employment	562	15.0	468	5.3	31,861	3.4	39,260	1.9
Nonfarm proprietors' employment	543	14.5	1,227	14.0	126,377	13.6	379,496	17.9
By industry								
Farm employment	1,074	28.7	759	8.7	51,467	5.6	64,818	3.1
Nonfarm employment	2,666	71.3	7,994	91.3	874,447	94.4	2,053,585	96.9
Private employment	1,975	52.8	6,516	74.4	714,790	77.2	1,784,373	84.2
Ag. services, forestry, fishing, & other	90	2.4	178	2.0	8,606	0.9	44,524	2.1
Mining	16	0.4	12	0.1	1,797	0.2	3,217	0.2
Construction	95	2.5	205	2.3	41,190	4.4	123,253	5.8
Manufacturing	442	11.8	2,026	23.1	179,059	19.3	258,694	12.2
Transportation and public utilities	165	4.4	213	2.4	53,441	5.8	93,432	4.4
Wholesale trade	65	1.7	345	3.9	46,089	5.0	101,506	4.8
Retail trade	678	18.1	1,194	13.6	146,314	15.8	361,367	17.1
Finance, insurance, and real estate	155	4.1	358	4.1	69,173	7.5	165,766	7.8
Services	269	7.2	1,985	22.7	169,121	18.3	632,614	29.9
Government and government enterprises	691	18.5	1,478	16.9	159,657	17.2	269,212	12.7
Federal, civilian	128	3.4	165	1.9	25,519	2.8	31,075	1.5
Military	49	1.3	57	0.7	15,252	1.6	12,914	0.6
State and local	514	13.7	1,256	14.3	118,886	12.8	225,223	10.6

Note: These sectors were nondisclosed and so estimated.

Source: U.S. Bureau of Economic Analysis.

Comparing employment changes on a sectoral basis between Jefferson County and Oregon can indicate how the county has adjusted to the different economic shocks it has experienced since 1970 and where it might be heading in relation to statewide trends.

As a percentage of total employment, the Services sector in Oregon has grown from 18.3 percent to 29.9 percent of the jobs. In Jefferson County, the Services sector has grown even faster, from 7.2 percent to 22.7 percent of the jobs. Examples of the types of services that are included in the Services sector include accommodations, food, professional (e.g., architectural, legal), health care, and repair. The Manufacturing sector in Jefferson County also has experienced significant growth. It increased from 11.8 percent to 23.1 percent of jobs. During the same time, the proportion of jobs in the Manufacturing sector in Oregon declined from 19.3 percent to 12.2 percent. The major decline in the proportion of total jobs in Jefferson County was in Farm Employment, which went from 28.7 percent to 8.7 percent. More moderate proportionate declines were experienced by the Retail and Government sectors.

Real per capita income in Jefferson County increased at about half the rates of Oregon and the U.S. (Figure 6).

Figure 6. Real Per Capita Income Indices (1969 = 100): Jefferson County, Oregon, and United States, 1969–2000.
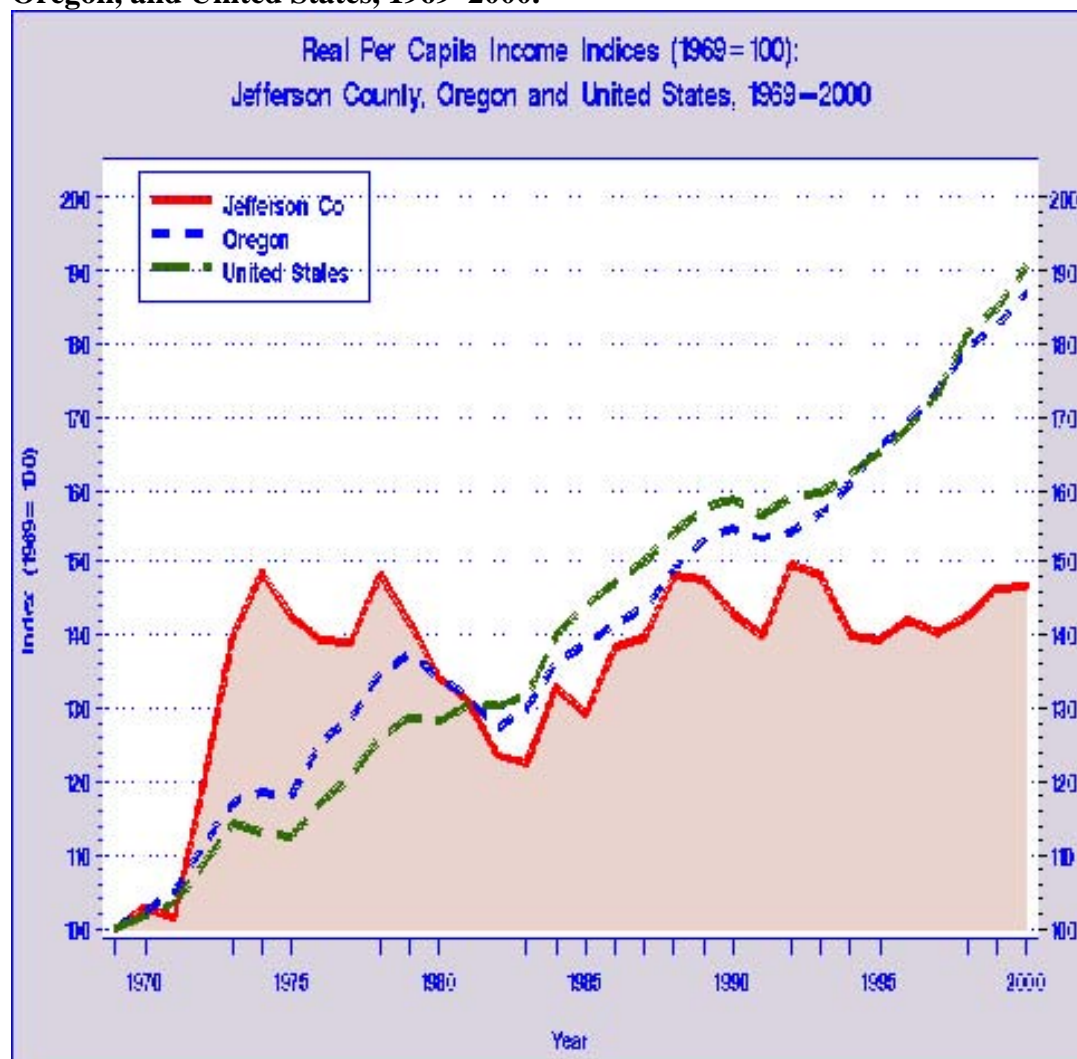
Jefferson County's average real earnings per job growth rate, 8 percent, was less than half of Oregon's 22 percent growth rate and less than one-third of the U.S.'s 30 percent growth rate (Figure 7). Still, Jefferson County's growth rate did exceed nonmetro Oregon's average real earnings per job growth rate, which was 0.5 percent.

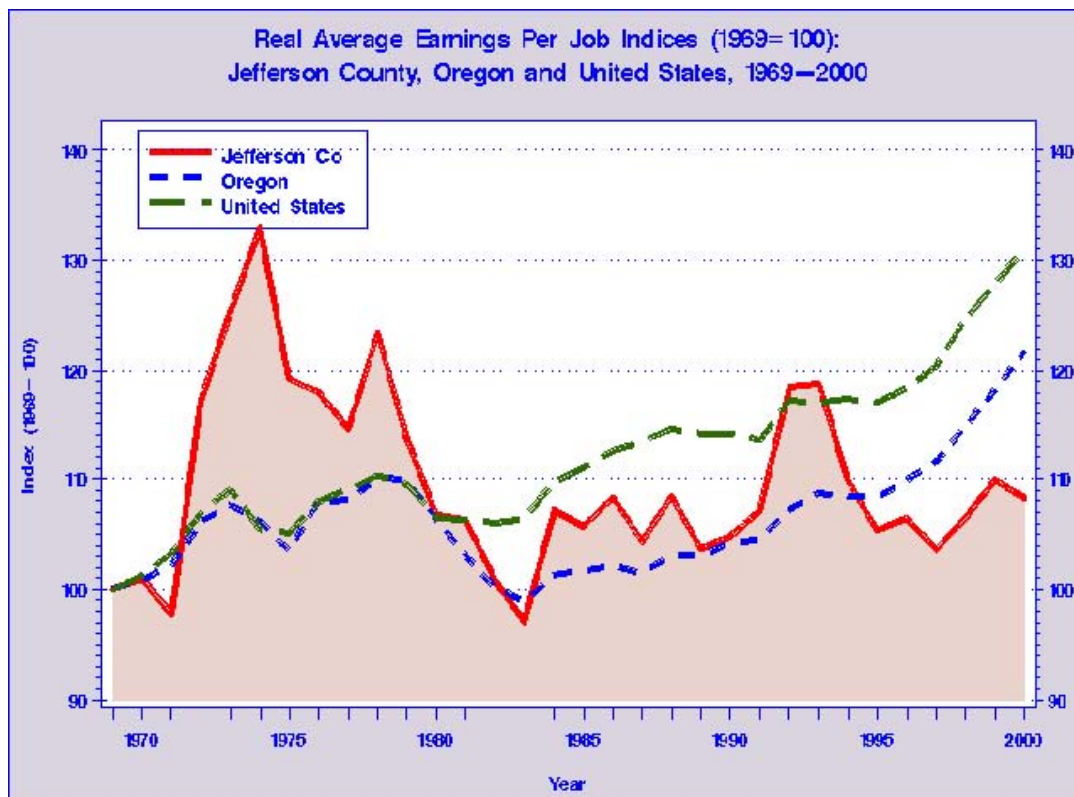**Figure 7. Real Average Earnings Per Job Indices (1969 = 100), Jefferson County, Oregon, and United States, 1969–2000.**

Source: Smith, Gary W. 2003. Oregon Regional Economic Analysis Project Web page (http://www.pnreap.org/Oregon).

Total population, employment and, to a lesser degree, job ratio, real per capita income, and average earnings per job growth rates have been positive in Jefferson County. The county has remained economically healthier than many other nonmetro Oregon counties. However, Jefferson County may be more economically vulnerable than many Oregon counties, which have diversified toward many smaller employers, albeit in many cases with lower-paying jobs. The manufacturing gains in Jefferson County were built primarily on two businesses—Brightwood Manufacturing and Seaswirl Boats. The farm economy, which provided stable small business opportunities for so many years, has suffered severe economic shocks and has declined. All jobs are important to an economy. However, a major portion of the employment growth in Jefferson County has occurred through service sector jobs that can be lower paying jobs, may provide minimal opportunity for career growth, and often are very dependent on expenditures that are discretionary for consumers (e.g., recreational) and may decline proportionately more than other expenditures during economic downturns.

Sectoral Employment and Location Quotients

A more detailed examination of the current proportion of employment in each sector in Jefferson County, compared to the proportion of those sectors in Oregon and the U.S., can supplement the previous description of the Jefferson County economy. It also may begin to focus this analysis on areas of opportunity for future development.

Location quotients (LQs) can be used to make these comparisons. LQs are calculated by taking the percentage of employment that a sector represents in Jefferson County and dividing it by the percentage of employment that sector represents in Oregon or the U.S. LQs indicate where Jefferson County is relatively more specialized and where Jefferson County may be presumed to have a comparative advantage, or at least did at some time in the past, in relation to Oregon or the U.S. If the percentages of

employment for a sector are the same for Jefferson County and Oregon or the U.S., the location quotient will be 1.0. If Jefferson County is less specialized in a sector, the LQ will be less than 1.0; if it is more specialized, the LQ will be greater than 1.0.

"LQs can be used as an indicator of economic diversity; having several sectors with LQs greater than 1.0 indicates multiple specializations that are the key to economic diversity" (Weber, Sorte, and Holland 2002, 9). "Location quotients are [also] quite useful as rough approximations of the local economic base" (Maki and Lichty 2000, 198). When a sector has an LQ greater than 1.0, it may indicate that sector is a basic industry, which exports beyond the region.

Jefferson County's economy is more similar to Oregon's economy today than it was 30 years ago, with some notable exceptions. Jefferson County's wage and salary employment moved from LQs of 0.85 and 0.82 to 1.01 and 0.97. This indicates that Jefferson County's wage and salary employment percentage is very similar to that of Oregon and the U.S.

That change was accompanied by a decline in Jefferson County's proprietor employment, which was proportionately higher than Oregon's and the U.S.'s, with 1.73 and 2.16 LQs in 1970. In 2000, it was more similar, with LQs of 0.98 and 1.16, respectively.

Jefferson County has experienced a number of areas of increase, including Private Employment, Manufacturing, Wholesale Trade, Services, and State and Local Government. In 1969, Manufacturing and Services were proportionately well behind Oregon and the U.S. Since then, they have grown much faster than the state or nation. In fact, Manufacturing now well exceeds the proportional employment of Oregon and the U.S. with LQs of 1.90 and 2.03, respectively.

Farm Employment and Agricultural Services, Forestry, Fishing, & Related have declined to become more similar in proportion to Oregon and the U.S., though they still are comparatively stronger sectors in Jefferson County.

The notable exceptions, which may not have been expected, given the increase in vacation and retirement home development in central Oregon, are industries that are directly or indirectly related to construction activity and population increases, including Construction and Finance, Insurance, and Real Estate and Transportation and Public Utilities. The additional recreational activity in central Oregon seems to have increased Services in proportion to Oregon and the U.S.; however, Retail Trade has fallen behind the state and national proportions.

The Jefferson County economy has adjusted to the percentage declines in agriculture and construction activity by shifting toward manufacturing, wholesale trade, services, and government. As noted above, though it appears the county has become more economically diverse and possibly more resilient as it has moved

away from its agricultural base, it may have actually become more dependent on fewer basic industries and less resilient. Although agriculture may be more affected by changes in large commodity markets than many industries, its strengths are that it is comprised of many small businesses, it is more adaptable from year to year than many industries, and its demand is not as income dependent or elastic as some industries.

Table 2. Jefferson County Location Quotients. $LQ_i = (County_i/County_t)/(Oregon_i/Oregon_t)$.

SECTOR	1970			2000		
	Jobs	OR LQ	US LQ	Jobs	OR LQ	US LQ
Total full-time and part-time employment	3,740	1.00	1.00	8,753	1.00	1.00
By type						
Wage and salary employment	2,635	0.85	0.82	7,058	1.01	0.97
Proprietors' employment	1,105	1.73	2.16	1,695	0.98	1.16
Farm proprietors' employment	562	4.37	5.05	468	2.89	4.05
Nonfarm proprietors' employment	543	1.06	1.36	1,227	0.78	0.91
By industry						
Farm employment	1,074	5.17	6.62	759	2.83	4.68
Nonfarm employment	2,666	0.75	0.75	7,994	0.94	0.93
Private employment	1,975	0.68	0.68	6,516	0.88	0.88
Ag. services, forestry, fishing, & other	90	2.59	4.18	178	0.97	1.57
Mining	16	2.20	0.52	12	0.90	0.29
Construction	95	0.57	0.53	205	0.40	0.41
Manufacturing	442	0.61	0.55	2,026	1.90	2.03
Transportation and public utilities	165	0.76	0.83	213	0.55	0.49
Wholesale trade	65	0.35	0.38	345	0.82	0.87
Retail trade	678	1.15	1.21	1,194	0.80	0.84
Finance, insurance, and real estate	155	0.55	0.62	358	0.52	0.51
Services	269	0.39	0.39	1,985	0.76	0.71
Government and government enterprises	691	1.07	1.05	1,478	1.33	1.24
Federal, civilian	128	1.24	1.08	165	1.29	1.09
Military	49	0.80	0.37	57	1.07	0.53
State and local	514	1.07	1.26	1,256	1.35	1.35

Note: These sectors were nondisclosed and so estimated.

Source: U.S. Bureau of Economic Analysis.

While LQs can provide some indication of the county's economic structure, "…location quotients are imperfect indicators of the economic base. The economic base of a region is better captured with an input-output model, which directly estimates exports from each industry and, using multipliers for each sector, generates estimates of the dependence of a regional economy on exports from each sector" (Cornelius et al. 2000, 14).

Input/Output Modeling and Ground-Truthing

"At the local level, thousands of decisions are made regularly by public officials and by businessmen [people]. In the aggregate, these decisions have a great impact on economic growth and the quality of living standards of the American people. Yet, such decisions are usually based on much less detailed economic information than is available at the national level. A regular flow of sound economic information about each local economy and its economic base would contribute to the quality of decisions made at the local level by public officials and business leaders" (Tiebout 1962, 11–12).

Input-output (I-O) analysis provides an effective way of organizing and using the detailed economic information, for which Tiebout was advocating. After the tables and matrices of an I-O model are constructed, an economic event can be introduced into the economy and a set of impacts projected.

When considering the estimates of impacts provided in this report, the reader needs to remember that an I-O model has limitations. It is dependent on its assumptions of how things are produced or their production functions, the price of inputs, and the percentage of purchases made within the study area. An I-O model is static and linear. It does not account for major changes in markets and technological conditions. It assumes that industries can and do continue to produce goods and services in the same

manner without regard to how much they produce.

Even with these limitations, I-O models can be very useful for estimating economic impacts and understanding how they ripple throughout an economy from the backward (supplier) and forward (customer) linkages among industries.

To develop a more detailed profile of the Jefferson County economy and conduct the economic impact analysis necessary to study the institutional and organizational structures, an input-output model of Jefferson County was constructed. First, the IMPLAN (IMpact analysis for PLANning) software I-O model and database was used to construct a basic I-O model for Jefferson County. In the past, these I-O models were very labor intensive and so very expensive to develop, because primary data needed to be gathered by interviewing a large number of individual businesses within the area being modeled. The resulting models were still not comprehensive and could become quickly outdated. Beginning in the late 1970s, the U.S. Forest Service, in cooperation with FEMA, BLM, the University of Minnesota, and eventually a private company, the Minnesota IMPLAN Group (MIG, Inc.), created and refined a computer program to synthesize more than 30 databases into an I-O modeling structure that can create individual, geographically specific I-O models. The software is now called IMPLAN Professional and comes with a number of database options (Weber et al. 2002, 16).

IMPLAN is an effective tool being used across the U.S. and is regularly tested and improved. The IMPLAN system can be used to construct an I-O model at the national, state, county, or ZIP code levels, or any combination of those study areas (e.g., multi-county). The data for the IMPLAN system is updated on a regular basis (Ibid.), although the process to do so is time consuming and data sets are released with a multi-year lag. This report used the 1998 IMPLAN database for the I-O model and 2000 data for the descriptive information provided above.

Once the IMPLAN out-of-the-box model was built, it was customized or ground-truthed to provide a more accurate representation of the Jefferson County economy. "Before any attempt is made to use IMPLAN to identify development opportunities for a community, the IMPLAN model used must accurately reflect the local economy" (Holland, Geier, and Schuster 1997, 5).

Through a number of steps, other statewide (e.g., Oregon Agricultural Information Network) and national (e.g., Regional Economic Information Service) data were compared to and used to guide changes to the IMPLAN out-of-the-box model. Next, Bruce Sorte and/or Claudia Campbell personally interviewed businesses in Jefferson County that were large employers, fast-growing businesses, representative of a major portion of the county's economic base, or ones that might be difficult for the IMPLAN data to project accurately from national databases.

Then, the results of all the ground-truthing steps were combined in a single spreadsheet, and the edits were finalized. All the edits were applied to the IMPLAN out-of-the-box model, and detailed and aggregated models were constructed.

When the I-O model was finished, a fairly detailed economic profile of Jefferson County could be produced. Jefferson County is about a $612 million economy (Table 3) in terms of output. More than half—$333 million—of that output comes from value (employee compensation, proprietor income, other property income, and indirect business taxes) that is added within the county. The remainder—$279 million—is from the intermediate goods and services that are purchased by each sector and used to produce the output.

Table 3. Jefferson County Industry Output, Employment, and Value Added, 1998.

When the percentage of the total dollar output is calculated from Table 3, the four natural resource-based production sectors, including Agriculture, Fishing, & Related—7.2 percent, Forestry & Logging—2.3 percent, Manufacturing—Food, Beverages, & Related—0.6 percent, and Manufacturing—Wood Products & Related—28.2 percent, produce almost 40 percent of the county's output. Also, many

of the Construction (4.2 percent) sector's customers are purchasing in the county to enjoy the natural resources, and many of the services in the Public Administration (5.1 percent) sector are related to managing public natural resources. So approximately half of the county's output is directly or indirectly related to its or nearby counties' natural resources. This point will be even more apparent when economic dependency is discussed. Considering output from another perspective, almost 40 percent of the county's economy is still based on manufacturing when Manufacturing—Wood Products & Related—28.2 percent and Manufacturing—Other—9.6 percent are combined. Jefferson County to date has been able to maintain a significant manufacturing base, while surrounding counties and rural Oregon generally have experienced a severe decline in manufacturing.

Industry	Industry Output*	Employment	Total Value Added*
Agriculture, Fishing & Related	44.023	1,019	21.770
Forestry & Logging	13.928	21	0.452
Mining	0.000	0	0.000
Construction	25.666	268	9.436
Manufacturing - Food, Beverages & Related	3.529	26	1.921
Manufacturing - Wood Products & Related	172.315	1,513	74.178
Manufacturing - High Tech. & Related	0.000	0	0.000
Manufacturing - Other	58.584	447	14.220
Transportation & Warehousing	14.199	148	6.190
Utilities	43.404	135	23.042
Wholesale Trade	29.429	377	20.144
Retail Trade	23.765	865	20.827
Accommodation & Food Services	14.198	436	7.825
Finance & Insurance	11.674	224	9.041
Real Estate & Rental & Leasing	27.082	142	20.017
Other Services	43.578	1,190	31.038
Information	3.411	43	1.743
Administrative and Support Services, etc.	1.197	30	0.625
Arts, Entertainment & Recreation	2.233	91	1.499
Health Care and Social Assistance	21.445	378	12.467
Professional, Scientific, & Technical Services	5.509	166	4.355
Educational Services	19.295	666	19.151
Public Administration	31.357	694	31.316
Inventory Valuation Adjustment	1.721	0	1.721
Total	611.542	8,880	332.978

*Millions of dollars

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There are better measures than output for describing an economy or an economic impact. Output estimates often include significant double counting. As an example, when a farmer grows and sells mint, the sale of that mint is added to the Agricultural sector; however, if a local distiller buys that mint and uses it to produce mint oil, the value of the mint is once again added to output—this time as an intermediate input component of the output in the Manufacturing—Food, Beverages, Textiles, & Related sector—and if a candy manufacturer buys the mint oil, the original sale of the mint is counted a third time.

Value added is a better measure because it includes only the net additions to the output that are

provided within each production process. Employment is also a useful measure of economic activity and how changes impact an area. Employment has the added benefit that it does not need to be inflated or deflated to compare it across time periods.

The way IMPLAN calculates employment is by using output per worker estimates from national surveys, which are sector specific, and dividing total industrial output by output-per-worker to approximate the number of jobs needed to produce a particular level of output. As mentioned previously, these are full- and part-time jobs.

A rural community's resilience is often measured first in terms of jobs. Throughout the rest of this report, jobs are used as the primary impact variable in the analyses. As would be expected, there can be significant differences among sectors as to the value-added dollars per job (e.g., Agriculture, etc.— $21.770M/1,019 = $21,366; Manufacturing—Wood Products, etc.—$74.178M/1,513 = $49,028; and Other Services—$31.038M/1,190 = $26,074). While the value-added or some component of value-added (e.g., employee compensation) per job calculation is easy to make, it is more difficult to estimate the non-pecuniary benefits of just having any job, even without considering the finer points or qualitative features of each job. The utility of a job to an individual will then have pecuniary and non-pecuniary components.

Jefferson County's Export Base

"Central to the study of regional economies is a region's economic base, commonly represented by its exports to markets outside the region" (Maki and Lichty 2000, 15). The term "exports" is used here to include any activities that bring dollars into the Jefferson County economy, which means items like tourism and federal transfer payments, dividends, interest and rent are considered part of the export base (Weber et al. 2002, 9).

The Jefferson County input-output model can directly estimate exports from each industry, and, using the multipliers for each sector, generate estimates of the dependence of a regional economy on exports from each sector. A sector's contribution to a regional economy is determined by the exogenous demand of that sector and the subsequent respending associated with meeting that demand. The contribution of that industry to the region's employment is the number of employees in all industries whose jobs are dependent—directly, indirectly (through interindustry linkages), and through household spending (induced effects)—on the exports of that industry (Cornelius et al. 2000, 14; Weber et al. 2002, 13).

Specifically, the procedure followed to calculate Jefferson County's export base was to individually remove each sector's exports as a separate event within the IMPLAN I-O model and note the job impact as that event ripples throughout the economy (Waters, Weber, and Holland 1999). These impacts are summarized in a spreadsheet, which shows the jobs that are dependent on the exports from each sector or the "dependency index" (Ibid.).

However, by just removing the exports from the industrial sectors, the resulting estimate of the number of jobs in the economy will be less than the total jobs in the economy. The model will not "close" (Ibid.). The key missing elements are federal and state transfer payments, dividends, interest, and rent payments to households. Using a Social Accounting Matrix (SAM), "…an extension of traditional input-output accounts…[which includes]…information on non-market financial flows" (MIG, Inc., 263), these elements can be estimated and removed to determine the jobs within the county that rely on external payments to households. In Jefferson County, those payments totaled $125.5 million. They were 45 percent federal, 18 percent state, and 37 percent private. These dollar estimates were translated into jobs by removing $125.5 million in personal consumption expenditures (PCE) and, again, by dividing the dollar impact in each sector by the average output per worker in that sector to estimate the jobs that are dependent on the payments to households.

Table 4 shows export dependency by sector and compares the sectoral employment with the export–base dependent employment for each sector. As noted above, the export-dependent jobs for each

sector include all the jobs across all sectors that are dependent on the particular sector's exported products. For example, the Agriculture, Fishing, & Related Sector has 1,009 export-dependent jobs. Included in the 1,009 jobs are 865 jobs in Agriculture, Fishing, & Related, 5 jobs in Construction, 4 jobs in Manufacturing—Wood Products, Paper, Furniture, & Related, 1 job in Manufacturing—Other, 6 jobs in Transportation & Warehousing, and 128 in all the other sectors.

Table 4. Jefferson County Sectoral and Export-Base Dependent Employment, 1998.

| Sector | Sectoral | | Export-Dependent | |
	Jobs	%	Jobs	%
Agriculture, Fishing & Related	1,019	11.5	1,009	11.4
Forestry & Logging	21	0.2	188	2.1
Construction	268	3.0	320	3.6
Manufacturing - Food, Beverages, & Related	26	0.3	46	0.5
Manufacturing - Wood Products, Paper, Furniture & Related	1,513	17.0	2,263	25.5
Manufacturing - Other (e.g. Boats)	447	5.0	709	8.0
Transportation & Warehousing	148	1.7	55	0.6
Utilities	135	1.5	166	1.9
Wholesale Trade	377	4.3	99	1.1
Retail Trade	865	9.7	62	0.7
Accommodation & Food Services	436	4.9	13	0.1
Finance & Insurance	224	2.5	15	0.2
Real Estate & Rental & Leasing	142	1.6	12	0.1
Other Services	1,190	13.4	916	10.3
Information	43	0.5	10	0.1
Administrative and Support Services, etc.	30	0.3	3	0.0
Arts, Entertainment & Recreation	91	1.0	0	0.0
Health Care and Social Assistance	378	4.3	2	0.0
Professional, Scientific, and Technical Services	166	1.9	16	0.2
Educational Services	666	7.5	593	6.7
Public Administration	694	7.8	914	10.3
Household Transfer Payments (e.g. Social Security)			1,470	16.6
Total	8,880	100.0	8,880	100.0

Reviewing this export dependency information, one can distinguish the significant basic or exporting industries, particularly those with higher positive percentages in the last column, such as Manufacturing—Wood Products, etc., and the non-basic or service industries—those with no or lower positive percentages in the last column, such as Finance & Insurance with 0.2 percent, which primarily provide services to the

export industries and whose jobs are primarily included as indirect effects in those sectors.

Comparing Jefferson County's export dependency percentages to the export dependency percentages for rural Oregon, generally there are some significant differences. Jefferson County is more dependent on agriculture (11.4 percent to 8.5 percent), wood products (25.5 percent to 12.9 percent), and other services (10.3 percent to 2.8 percent), and much less dependent on transfer payments, dividends, interest, and rent than rural Oregon overall (16.6 percent to 25.7 percent).

Analysis

Introduction

While most of rural Oregon has shifted over the past 30 years from an economy that was heavily dependent on natural resources and a few large manufacturers to rely more and more on tourism and retirees, Jefferson County has been able to slow that process. Jefferson County has maintained a more robust economy than many rural counties. However, with almost 40 percent of the county's economy directly dependent on the continued success of two manufacturing plants, it would not take much to dramatically change this picture of relative economic stability.

It may be a good time for Jefferson County to focus even more on economic development initiatives. The cost of those initiatives can be modest if they utilize the goods and services already available in the county. A few examples are discussed below.

Hypothetical Scenario

Jefferson County still has a comparative advantage in agriculture and manufacturing. The emphasis for agriculture over the past 20 years or more has been value-added, or how to utilize commodities to produce higher-value goods, following the "decommodify or die" theme. Development of value-added production can have a high multiplier, as locally produced goods and services are used to create final products rather than importing the intermediate or raw materials for the production from outside the county. A hypothetical example would be the development of an agricultural processing plant within the county. In this example, we assume a plant is built that creates 150 full- or part-time jobs. Using the Jefferson County I-O model, the impacts of that positive economic event can be estimated and the results shown throughout the affected sectors in Table 5.

Table 5. Economic Impact Scenario: Food Processing Plant Addition.

Industry	Direct*	Indirect*	Induced*	Total*
Agriculture, Fishing & Related	0	39	1	40
Forestry & Logging	0	0	0	0
Construction	0	1	0	2
Manufacturing - Food, Beverages, Textiles & Related	150	0	0	150
Manufacturing - Wood Products, Paper, Furniture & Related	0	4	0	4
Manufacturing - Other	0	1	0	1
Transportation & Warehousing	0	3	1	3
Utilities	0	1	1	1
Wholesale Trade	0	10	1	11
Retail Trade	0	1	11	11
Accommodation & Food Services	0	3	5	8
Finance & Insurance	0	1	2	4
Real Estate & Rental & Leasing	0	1	1	2
Other Services	0	15	4	19
Information	0	0	0	1
Administrative and Support Services, etc.	0	1	0	1
Arts, Entertainment & Recreation	0	0	1	1
Health Care and Social Assistance	0	0	5	5
Professional, Scientific, and Technical Services	0	2	1	3
Educational Services	0	0	2	2
Total	150	82	38	269

*Number of Jobs

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In Table 5, one can see the direct effect experienced by the Manufacturing—Food, Beverages, Textiles, and Related sector of the additional 150 jobs. An estimated 39 jobs in the Agriculture, Fishing, & Related sector would be required to supply the raw products to the plant. Also, a number of other sectors also would supply the plant or the other suppliers, for a total indirect effect of 82 jobs. The households that receive income from the plant or the suppliers would spend those dollars throughout the county, and those induced effects would create an estimated 38 jobs. So the effects of the original 150 jobs would be multiplied (269/150) = 1.8 times.

This type of expansion from within the county, or recruitment that builds on the other goods and services, know-how, and infrastructure that is already available within the county, can reinforce the economy with much less investment and disruption than attempting to recruit an entirely new type of industry.

This is a simplified example. Some of the jobs at the plant, suppliers, and service businesses could be taken by commuters, which would reduce the net impacts to the county. If the plant were newly built or required a major renovation, there could be a significant one-time construction impact. If other manufacturers begin viewing Jefferson County as a place where suppliers and the labor force are already prepared to support their operations, they may move to the county. Many different scenarios, positive and negative, may play out.

Another example of a possible economic development initiative would be to focus on increasing the extent to which people in the county spend their transfer payments (e.g., Social Security), dividends, interest, and rent within the county.

Table 6 shows the personal income sources for people in Jefferson County, Oregon, and the U.S. in 2001. While Jefferson County derives 47 percent of its income from transfer payments, dividends, interest, and rent, which is pretty typical for rural counties, it is less economically dependent, at 16.6 percent (Table 4), than most rural counties, which regularly exceed 20 percent for economic dependency on transfer payments, dividends, interest, and rent.

Table 6. Personal Income by Source in 2001.
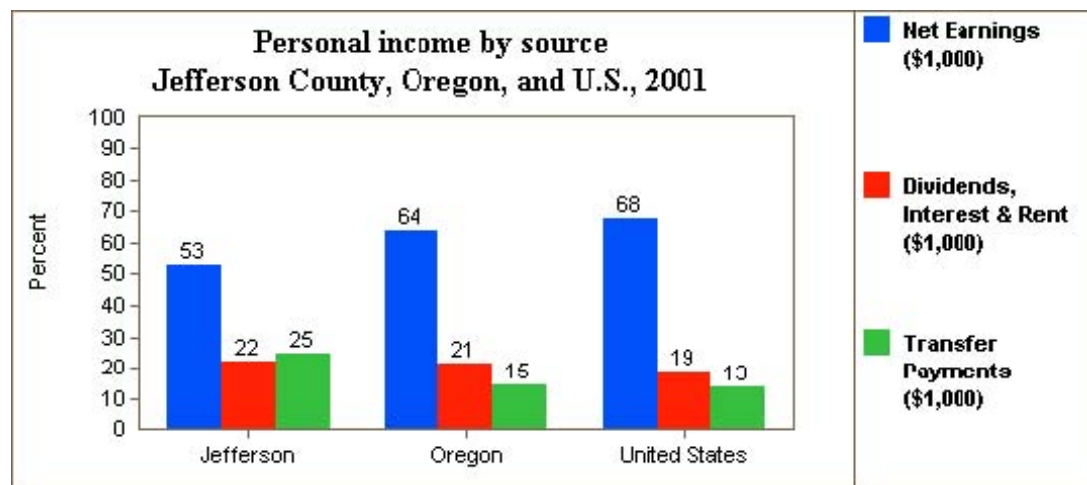
Source: Northwest Area Foundation Web site (http://www.indicators.nwaf.org/ ShowOneRegion.asp?IndicatorID=8&FIPS=41031), which references the 1969–2001: U.S. Bureau of Economic Analysis, Regional Economic Data, Local Area Personal Income, Table CA05 (http://www.bea.gov/bea/regional/reis/).

Table 7 shows the current estimated job impacts of spending from transfer payments, dividends, interest, and rent. As the table shows, the spending of transfer payments, dividends, interest, and rent extensively impacts the service sectors, even at the current level of spending.

Table 7. Transfer Payments, Dividends, Interest, and Rent —Induced Effects.

Industry	Jobs
Agriculture, Fishing & Related	23
Forestry & Logging	0
Mining	0
Construction	14
Manufacturing - Food, Beverages, Textiles & Related	0
Manufacturing - Wood Products, Paper, & Furniture	14
Manufacturing - High Tech. & Related	0
Manufacturing - Other	5
Transportation & Warehousing	22
Utilities	22
Wholesale Trade	51
Retail Trade	335
Accommodation & Food Services	181
Finance & Insurance	70
Real Estate & Rental & Leasing	61
Other Services	128
Information	13
Administrative and Support Services, etc.	7
Arts, Entertainment & Recreation	37
Health Care and Social Assistance	230
Professional, Scientific, and Technical Services	70
Educational Services	187
Noncomparable Imports	0
Public Administration	0
Total	1,470

*Number of Jobs

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There are probably two reasons why Jefferson County is less economically dependent on transfer payments, dividends, interest, and rent than many rural counties—one favorable and one more of a concern: 1) Jefferson County has retained more of its agricultural and manufacturing industries than many rural counties, so it is more dependent on those sectors and less dependent on transfer payments, dividends, interest, and rent, and 2) people from Jefferson County tend to do a great deal of purchasing outside the county, in the nearby Bend metro area or the fairly accessible Portland metro area.

By spending time visiting with individuals or groups of retirees and people who own second homes in Jefferson County, it may be possible to identify what it would take for the retirees or "weekend residents" to make more of their purchases in Jefferson County. This possible opportunity may become more important if current trends continue. In 1969, only 21 percent of Jefferson County's personal income was derived from transfer payments, dividends, interest, and rent (Northwest Area Foundation 2003), and that amount has more than doubled to the 45 percent mentioned above. The trend is likely to increase as the baby boomers retire at an increasing rate.

In a related consideration, "capturing" more of the economic opportunities that drive through Jefferson County to recreate further south or east may be possible. As the average age of retirees and people traveling to or through central Oregon increases, people may become progressively more concerned about the risks associated with travel. As businesses, particularly in the metro areas, search for ways to increase productivity, they are demanding more overtime. Hopping into the car on a Friday night and heading for

central Oregon is becoming much more difficult for workers. The more accessible communities that provide safe, enjoyable, and faster alternatives to single vehicle transportation may attract more spending from workers who are not willing to spend their only day off dealing with the stress of a long drive.

Another area in which the county may have significant economic development opportunities is taking advantage of its very diverse cultural base. Comparative advantages are built on unique attributes. Both the Native American and Hispanic populations represent a number of partnering opportunities. An example would be collaborating with the federal government to develop start-to-finish wood products manufacturing involving the Confederated Tribes of Warm Springs (Tribes) timber and initial lumber production combined with millwork and window production. Another example is developing markets for value-added agricultural products (e.g. goats and weaner pigs) that appeal to the Hispanic community both within Jefferson County and for export. Jefferson County's diversity and the Tribes' business activities and relationship to the federal government may form the basis for some fairly distinctive initiatives that could benefit all the residents of Jefferson County and the region.

Limitations

The limitations of these types of hypothetical simulations and suggestions must be recognized. They rely to a large degree on conjecture about general trends. Also, the ability to precisely project actual impacts with the I-O model is limited by the static and linear design of the I-O model. The I-O model does a fine job of showing the linkages within the Jefferson County economy. Also, the linearity weakness of the model is a strength, as well. The reader can assess whether the projected impacts are too high or too low and make a proportionate adjustment, and the results of the model will remain intact.

Summary

Economic resilience, or bending with economic shocks and then quickly bouncing back to a similar or new equilibrium, can be a useful concept for rural communities to study and pursue. A key factor determining a community's success in building economic resilience can be how the community plans and prepares for economic changes. This needs to be a coordinated public and private effort that focuses on a number of factors, including how the community manages information. Also, effective community organizations, which take responsibility for maintaining community resources and processes, may significantly improve economic resilience.

As Jefferson County considers economic development alternatives, information—both descriptive and predictive—that is unbiased, regularly monitored and analyzed, and presented in clear and concise ways will be essential to focus and evaluate the community's economic planning efforts. Understandable, credible, and timely information also is very important to present convincing ideas or recommendations to decision makers at all levels of government. Developing information of this quality often requires a specific assignment of this responsibility for the community (with accompanying resources), some technical background by the people involved, computer software and hardware sufficient to gather and work with the data, and community-wide commitment to support and rely on the responsible entity. The I-O model that was developed for this report can continue to play a role in informing policy and developing that information. Jefferson County and other rural counties are still more remote, smaller, and have less diverse economies than metropolitan areas, yet they must survive in the same global market with metropolitan areas. Jefferson County is more accessible than many rural counties, so its challenge will be to anticipate the changes that globalization will bring in the next few years and use that accessibility—and its relatively strong basic industries—to craft a resilient economy capable of retaining and recruiting people to the county, even as they age and their disposable income may decline. At the same time, Jefferson County will need to balance regional economic cooperation with maintaining its own economic identity.

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