

# **The use of job and income projections as backdrops for input-output impact assessments**

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**Abstract.** Regional input-output models are constructed for the most recent year available. Analysts use these single base year models to analyze expenditure effects that often occur years into the future. Clients and the public often find it difficult to comprehend the comparative statics of using a base year model to portray future impacts. This note shows how to retain the single base year model and report job and income changes against a backdrop of projected jobs and incomes for the region, thereby clarifying the analysis and producing a report that the public can understand more easily. The source and use of the projected backdrop are explained and illustrated with an application.

## **1. Introduction**

The analysis of regional job and income effects has become a standard element in federal project impact assessment, and regional input-output (I/O) analysis has emerged as the tool of choice for such studies. Analysts construct a regional I/O model for the most recent year available and use this model to estimate job and income changes associated with project-related expenditures. For example, IMPLAN (Minnesota IMPLAN Group 1993), the most widely used tool for regional I/O impact assessment, currently offers models for county and multicounty areas using a fixed base year. There is a problem of conceptualization associated with the comparative statics of using a single base year model to analyze expenditure effects that often occur years in the future. With the single base year model clients and the public often find it difficult to conceptualize the notion that the with/without differences hold for time periods in the future when the analysis appears to focus on a single base year. To this problem we propose a simple solution: while retaining the single base year model, we report job and income changes against a backdrop of projected jobs and incomes for the region, thereby clarifying the analysis and producing a report that the public can more easily understand.

In this note we explain how impacts can be reported against a readily available economic backdrop of job and earnings projections offered by the Regional Information System, U.S. Department of Commerce. Such a reporting practice

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assumes that base year I/O multipliers remain constant throughout the analysis and the projections correctly capture future employment and earnings levels without the activity under analysis.<sup>1</sup>

## 2. Employment and earnings projections

The Regional Economic Information System (REIS) is the standard source for employment, earnings, and personal income estimates for counties, states, MSAs, and BEA economic areas. Though lesser known, projections of employment and earnings at the SIC one digit level for 1995, 2000, 2005, 2010, and 2040 for states, metropolitan areas, and counties are also available from REIS (U.S. Department of Commerce 1995, p. 53). All states (Volume 1), MSAs (Volume 2), or BEA economic areas (Volume 3) are available on diskette at \$40 each. Projections of these aggregations will be extended to 2045. These should be available in spring 1997.

REIS county projections show observed values for 1988 and projected values for 1995, 2000, 2005, 2010, 2020, and 2040. Projections include total personal income, population, per capita personal income, employment, and earnings. County-level projections cost \$20 per state or \$260 for all states. There are no immediate plans to update county projections beyond 2040.

For the baseline values in a study one can use published REIS SIC one digit employment and earnings estimates for 1992. Accepting interperiod growth rates implicit in REIS projections, these can be applied to the 1992 base year estimates to obtain revised REIS projections through the final year of analysis.

## 3. An application

We recently completed a project for the federal government's Bonneville Power Administration (BPA) which is endeavoring to restore select portions of the salmon fishery in the Columbia River Basin. Our project considers the job and income impacts to Yakima and Kittitas counties in Washington arising from the construction and operation of a system of fish hatcheries. Hatchery construction, operations and maintenance, monitoring and evaluation, and harvest of Yakima spring chinook form alternative one, covering the years 1997 through 2010. Monitoring and evaluation of a program of coho enhancement from 1997 through 2000 are added to these activities to form alternative two.

The Yakima Fisheries Project will inject a stream of construction and other project-related expenditures into the economy of Yakima and Kittitas counties. These will start in 1997 with construction activities and continue throughout 2010. Federal

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<sup>1</sup> Although our approach portrays project impacts against a moving backdrop of projected employment change, it nonetheless entails a significant shortcut; it assumes regional coefficients and multipliers remain constant over the projection period. In contrast, Conway (1990) wedges regional I/O and an econometric model to obtain a model with endogenous (and therefore changing) I/O coefficients and model multipliers. Although this is clearly the more realistic approach, time and budget constraints prohibit the application of this and similar more expensive approaches for many analyses.

**Table 1.** Employment in Yakima and Kittitas counties, 1992 and 2010

	1992 base	2010 projected	Projected as % of base
Farm	14,456	13,751	89.0
Mining	4,228	6,141	145.2
Ag services, forestry, fisheries, other	63	76	120.3
Construction	4,057	4,424	109.0
Manufacturing, nondurable	6,001	6,321	105.3
Manufacturing, durable	4,984	5,324	106.8
Transportation and public utilities	4,007	4,626	115.4
Wholesale trade	8,261	8,851	107.1
Retail trade	18,459	20,982	113.7
Finance, insurance, real estate	4,775	5,075	106.3
Services	26,650	32,848	123.3
Federal government, civilian	1,544	1,586	102.8
Military	1,217	1,217	100.0
State and local government	14,283	15,080	105.6
Total employment	113,986	126,304	110.8

planners provided a timeline of construction and other expenditures. By 2004 salmon will be restored to a state where an annual salmon fishing season begins; fishermen and other expenditures will be drawn to the area. Our analysis considers the impact of these various expenditures and project-related activities.

We construct a 1992 IMPLAN model for the Yakima-Kittitas two county economy. Hatchery job and income effects are entered in the model in the same manner as are construction, maintenance, monitoring, fishing, and other expenditures. For the baseline values in our study we use published REIS SIC one digit employment and earnings estimates for 1992. We accept the interperiod growth rates implicit in REIS projections; we apply these to our 1992 base year estimates to obtain revised REIS projections through 2010, the end-year of our analysis for the BPA. REIS 1992 employment estimates and 2010 employment projections for combined Yakima and Kittitas counties appear in Table 1. Our full report shows companion estimates for earnings and personal income (Mack and Robison 1995, p. 45).

The timeline of Yakima Fisheries Project-related expenditures appears in our final report (Mack and Robison 1995, p. 53). Construction occurs in 1997, and a modest level of operation and maintenance begins the same year. By 1999 monitoring and evaluation begin, and expenditures associated with fishing begin in 2004.

Table 2 illustrates one example from our impact report. It shows the job impacts associated with the project in 1997. The column labeled "base" presents employment projections for 1997. Notice the change in employment from the 1992 values shown in Table 1. Base employment is interpreted as employment absent the project.

Following standard regional I/O definitions (e.g., Miller and Blair 1985), the impact of the project is measured in jobs in addition to base level and is broken down as "direct" and "indirect." We estimate that construction and other first year project expenditures will add some 386 jobs to the two county economy in 1997. New jobs

**Table 2.** Yakima and Kittitas county employment for 1997 baseline and additions from the Yakima fisheries project. Direct and total impacts are tallied as jobs and as a percentage of baseline employment

	1997 base	Direct impact	Percent	Total impact	Percent
Farm	15,023	0	0.00	3	0.02
Mining	4,983	0	0.00	0	0.00
Ag services, forestry, fisheries, other	76	1	1.72	1	1.72
Construction	4,215	143	3.38	145	3.45
Manufacturing, nondurable	6,142	0	0.00	1	0.02
Manufacturing, durable	5,159	18	0.36	26	0.51
Transportation and public utilities	4,213	0	0.00	9	0.22
Wholesale trade	8,521	0	0.00	17	0.20
Retail trade	19,496	5	0.03	59	0.30
Finance, insurance, real estate	4,907	1	0.03	14	0.29
Services	29,053	41	0.14	105	0.36
Federal government, civilian	1,586	0	0.00	3	0.16
Military	1,217	0	0.00	0	0.00
State and local government	14,654	0	0.00	0	0.00
Total employment	119,245	212	0.18	386	0.32

appear against the backdrop of a 119,245 job economy and constitute an employment increase of around 0.32 percent. Table 2 also shows impacts to particular sectors.

Our full report presents companion analyses to Table 2 in earnings and personal income terms (Mack and Robison 1995, p. 88). Similar tables appear for each year following 1997 through the end of the analysis in 2010. Ongoing impacts thus are seen against a backdrop of a changing Yakima-Kittitas economy, and new activities are viewed against the economy of the year when they come on-line.

Table 3 is a summary impact table that shows projected employment for the 1997 to 2010 life of the project for the two alternative formulations of the project. The absolute values of baseline, baseline change, and employment generated by the two alternatives are presented. For each alternative, two forms of percentage change are shown: employment change as a percentage of the baseline and employment change as a percentage of baseline change.

#### 4. Summary

I/O models portray a regional economy during a single base year. Even though project expenditures occur according to a distinct time line, job and income impacts often are reported in an abstract sense, as though they occur in the base year. The practice is confusing to both the client and the public.

In this note we offer a simple alternative of retaining the single base year regional I/O model and reporting impacts against the backdrop of job and income projections. This practice assumes base year I/O multipliers hold constant throughout the analysis period and that projections capture area jobs and income absent the project. The approach is easy to apply. Job and income projections are readily available from BEA or other sources. Reporting impacts against a moving backdrop

**Table 3.** Summary employment impacts, Yakima fisheries project, alternatives 1 and 2, 1997-2010

Year	Baseline total	Baseline change	Alternative	Percent of baseline total	Percent of baseline change
<b>Panel a: alternative 1</b>					
1996	118,285	962	0	0.00	0.00
1997	119,245	960	386	0.32	40.21
1998	120,206	961	6	0.00	0.62
1999	121,166	960	21	0.02	2.19
2000	122,128	962	36	0.03	3.74
2001	122,701	573	38	0.03	6.63
2002	123,276	575	36	0.03	6.26
2003	123,851	575	36	0.03	6.26
2004	124,426	575	76	0.06	13.22
2005	125,001	575	76	0.06	13.22
2006	125,262	261	76	0.06	29.12
2007	125,522	260	76	0.06	29.23
2008	125,783	261	76	0.06	28.12
2009	126,043	260	76	0.06	29.23
2010	126,304	261	76	0.06	29.12
<b>Panel b: alternative 2</b>					
1996	118,285	962	14	0.01	1.45
1997	119,245	960	400	0.34	41.67
1998	120,206	961	20	0.02	2.08
1999	121,166	960	35	0.03	3.65
2000	122,128	962	50	0.04	5.20
2001	122,701	573	38	0.03	6.63
2002	123,276	575	36	0.03	6.28
2003	123,851	575	36	0.03	6.28
2004	124,426	575	76	0.06	13.22
2005	125,001	575	76	0.06	13.22
2006	125,262	261	76	0.06	29.12
2007	125,522	260	76	0.06	29.23
2008	125,783	261	76	0.06	29.12
2009	126,043	260	76	0.06	29.23
2010	126,304	261	76	0.06	29.12

with a timeline identical to that of the exogenous expenditures adds clarity to the impact analysis and increases the public's understanding of impact results.

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