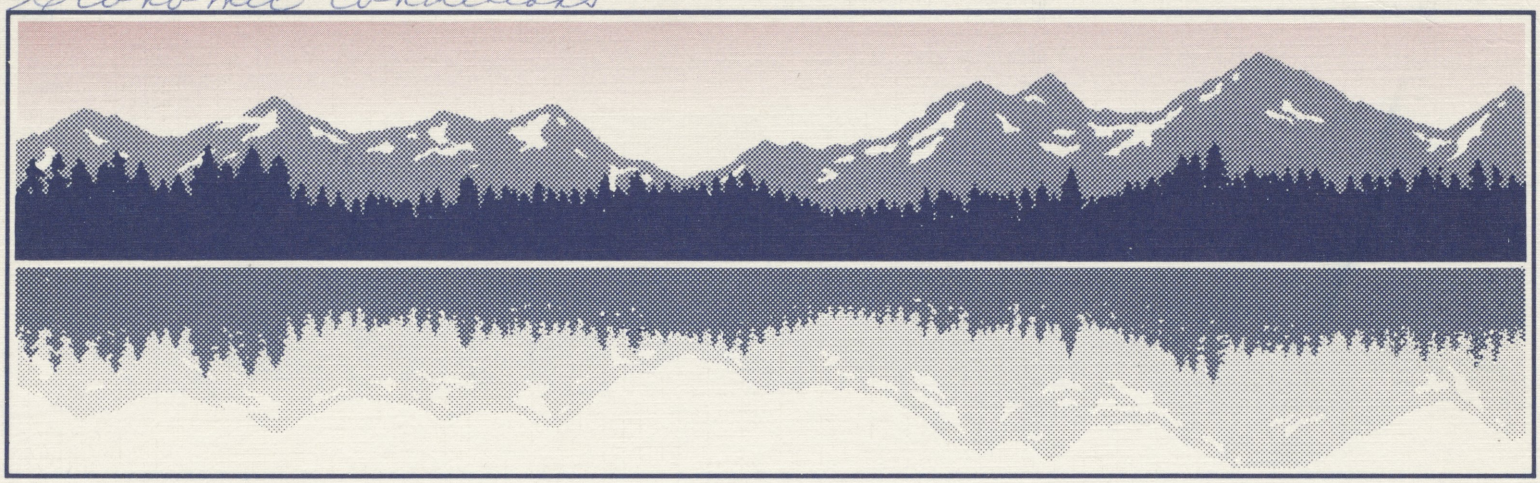
Economic conditions



PROCEEDINGS

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HOW CAREFUL MUST YOU BE

WHEN USING THE ECONOMIC BASE MODEL?

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I. THE STUDY AREAS

Four communities were chosen for analysis — two in Montana and two in Oregon. They include Missoula and Flathead counties, Montana, and Douglas and Linn-Benton counties, Oregon. These communities have a number of features in common:

A. All are relatively small and none is an MSA (Metropolitan Statistical Area). The populations range from approximately 55,000 in Flathead County, Montana, to about 160,000 in Linn-Benton counties, Oregon.

B. The export (basic) industries in each community have been identified and quantified in previous research. Each two-digit SIC category has been designated as either basic or derivative.

C. In each community, the wood products industry is a major component and it dominates the economic base with, at most, one other industry. The two largest basic industries account for at least two thirds of the economic base in each community.

II. THE DATA

Economic base models were estimated for each community using a time series of quarterly data for wages and salaries. These are income versions of the economic base model. A time series of 96 observations was available for each community, beginning with the fourth quarter of 1961 and terminating in the fourth quarter of 1984.

The measures of basic and derivative income were based on wages and salaries covered by Unemployment Insurance (UI) in Montana and Oregon plus estimates for key noncovered industries (such as the federal government and certain state government agencies) derived from other sources. Excluded were the incomes of the self-employed and other labor income. To maintain consistency, industries were excluded if data were not available for the entire period, i.e., if an industry was covered by Unemployment Insurance for only a portion of the study period. Basic and derivative wages are not seasonally adjusted and are in current dollars.

III. SPECIFICATION OF THE ECONOMIC BASE MODEL

The following specifications were estimated for each of the four communities:

(1) $DERIV = a + bBASIC$

This is the benchmark model, and BASIC includes all of the basic industries identified for each community.

(2) $DERIV = a' + b'WOODPLUS$

This is the alternative model and includes just the one or two largest basic industries as the independent variable. Specifically, WOODPLUS is defined as follows in the four communities:

Community	WOODPLUS
Missoula	Wood products plus the University of Montana
Flathead	Wood products plus primary metal refining
Linn-Benton	Wood products plus Oregon State University
Douglas	Wood products

IV. STATISTICAL ANALYSIS

Estimates of the coefficient on the independent variable in each of the models for all four communities are presented in Table 1. Values for the 1961-1973 and 1974-1984 periods are presented so that changes over time may be identified. The two estimates for each community were estimated simultaneously using additive and multiplicative dummy variables. For the sake of brevity, the estimated constant terms are not reported.

TABLE 1

Estimated Regression Coefficients
Alternative Economic Base Specifications

	1961Q1 to 1973Q4			1974Q1 to 1984Q4		
	-Specification-			-Specification-		
	BASIC	WOODPLUS	Coverage*	BASIC	WOODPLUS	Coverage*
Missoula County, MT	1.25	1.81	.69	1.41	1.77	.67
	(.11)	(.20)		(.05)	(.07)	
Flathead County, MT	.91	1.16	.78	1.00	1.41	.74
	(.09)	(.13)		(.03)	(.05)	
Douglas County, OR	.44	.58	.77	.55	.65	.74
	(.04)	(.07)		(.03)	(.47)	
Linn-Benton Counties, OR	.65	1.18	.71	.56	1.11	.61
	(.06)	(.13)		(.02)	(.04)	

NOTE: Beneath each coefficient is its standard error.

* WOODPLUS as proportion of BASIC

It takes only a quick glance at the findings reported in Table 1 to conclude that omission of basic industries does, in fact, affect the estimates. In each community and time period, the estimated coefficient on WOODPLUS was greater than the corresponding estimate for BASIC. The variations range from Linn-Benton counties in 1974-1984, where the coefficient on WOODPLUS was almost twice that of BASIC, to Douglas County in 1974-1984, where the difference was less than twenty percent.

The relationship between the two coefficients for a community appears to be relatively stable. For example, in the three communities where the coefficients on BASIC increased between 1961-1973 and 1974-1984, the coefficients on WOODPLUS also rose. Similarly, in the one community where the estimated coefficient on BASIC declined between the two periods, the coefficient on WOODPLUS did likewise.

The performance of the alternative specifications of the economic base model may also be evaluated in terms of their out-of-sample forecasting ability. Specifically, each specification was estimated for the 1961Q1 to 1973Q4 period, and then forecast from 1974Q1 to 1984Q4. A summary of the out-of-sample forecasting diagnostic statistics is presented in Table 2.

TABLE 2

Out-of-Sample Forecasting Statistics
Alternative Specifications

1974Q1 to 1984Q4

	BASIC			WOODPLUS		
Community	Mean Error (Thous.)	RSME (Thous.)	Theil's U Statistic	Mean Error (Thous.)	RSME (Thous.)	Theil's U Statistic
Missoula County	5,287	6,479	087	5,423	6,722	090
Flathead County	1,803	2,550	069	2,670	3,436	096
Douglas County	5,800	6,521	123	6,459	7,413	141
Linn-Benton Counties	-256	3,778	035	1,574	4,343	04

The out-of-sample forecasting diagnostics all tell the same story. For the statistics presented in Table 2, the smaller the absolute value, the "better" the forecast. In each community, the more complete measure of exogenous activity (BASIC) produced better forecasts than the less inclusive measure (WOODPLUS).

In order to put things into perspective, the forecasts based on the two definitions of basic activity are graphed in Figures 1 to 4, along with actual derivative wages and salaries. In each of the communities, the superiority of the WOODPLUS specification is noticeable, but not overwhelming. (The persistent underestimation in three of the four communities should not be distracting; it is mostly caused by shifts in the constant term.) Specifically, the forecasts based on the WOODPLUS model appear to be inferior to those based on the BASIC model, but they both display very similar short-term and long-term trends.

SUMMARY AND CONCLUSIONS

What does all this mean? The omission of certain basic industries does have consequences. But, these consequences may be acceptable in certain situations where complete data is not available, or can be derived only at considerable expense.

Applications requiring precise values of the income multiplier may also require complete data for all basic industries because the estimates of the income multiplier are affected by the omission of basic activities. In the four cases examined here, the amount of bias in the regression coefficients range from about 20 to approximately 90 percent. The bias in the "income multiplier," which is unity plus the estimated coefficient, would be proportionately less.

For other applications, however, the benefits of deriving complete data for all basic industries may not exceed the costs. For example, forecasts based on the restricted model are almost identical to those derived from the complete model. Also, analysis of changes in the estimated regression coefficients (as opposed to their precise value) does not appear to be seriously affected by the omissions.

Figure 1
Derivative Wages and Salaries
Actual and Projected
Missoula County
1974Q1 - 1984Q4

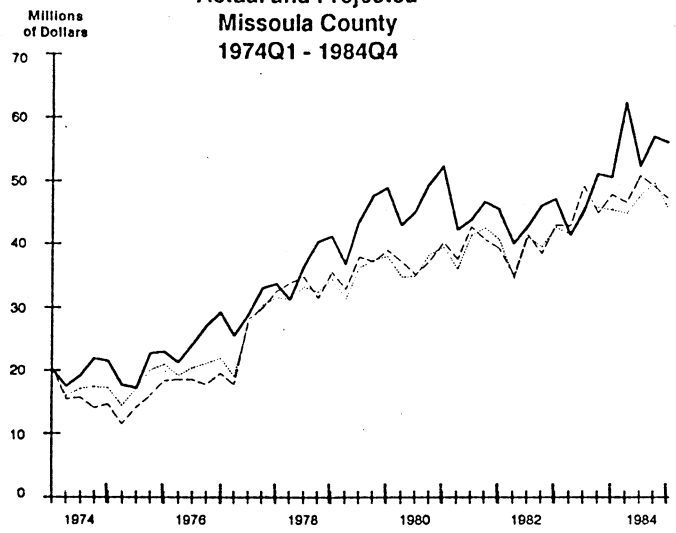

Figure 2
Derivative Wages and Salaries
Actual and Projected
Flathead County
1974Q1 - 1984Q4

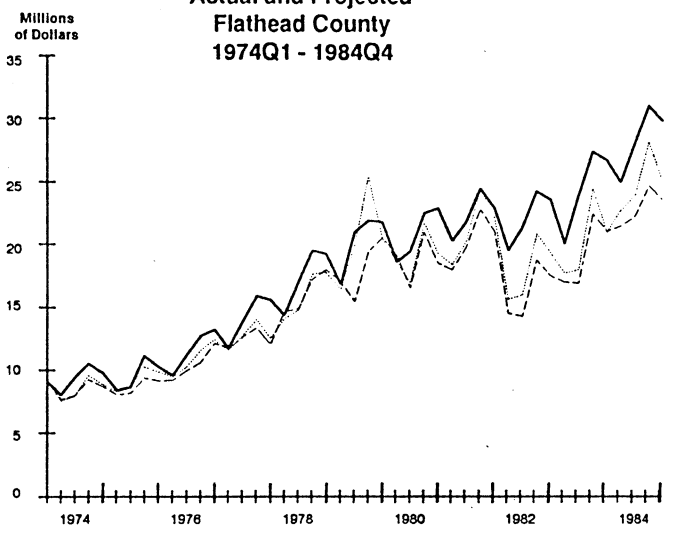

Figure 3
Derivative Wages and Salaries
Actual and Projected
Douglas County
1974Q1 - 1984Q4

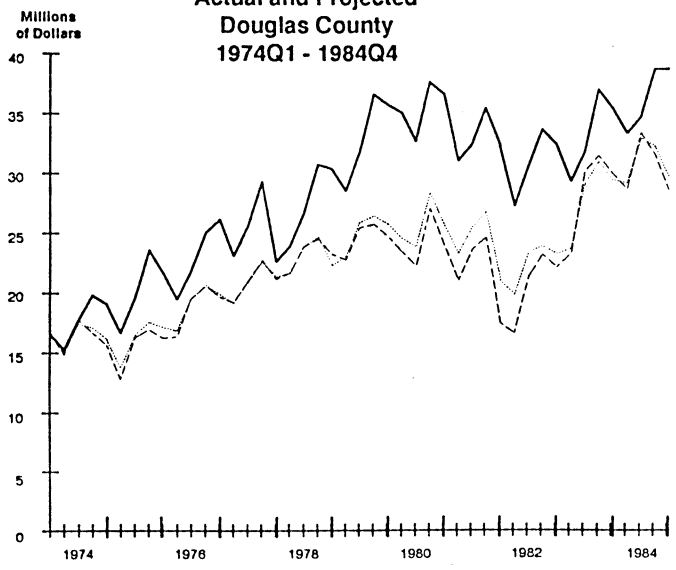

Figure 4
Derivative Wages and Salaries
Actual and Projected
Linn - Benton Counties
1974Q1 - 1984Q4