Migration and Employment Change: Some New Evidence and New Considerations

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As an explanation of regional economic growth, do "people follow jobs" or do "jobs follow people"? The current wisdom in the regional economics literature is that migration and employment change are jointly determined, but that the "jobs follow people" effect is the stronger of the two. Our evidence for selected counties in the Pacific Northwest from 1965 to 1970 does not support that argument. The problem may become increasingly difficult to model if the desire for non-market goods, rather than income gain, continues to evolve as a major reason for migration.

The desirability of economic expansion has been hotly debated in recent years, especially in environmentally-attractive communities in the West. On one hand, some people claim that new industry will attract far too many new residents. Others claim that these people will move in anyway, so they might as well be provided with a job. Elements of positive economics are obviously at issue, the central one being the relationship between migration and local employment change. That is, do people follow jobs or do jobs follow people? Our purpose here is to offer some new empirical evidence on this topic, evidence that is contrary to what appears to be evolving as received wisdom. At the same time, we point out that much existing empirical work is suspect because of data problems and because the role of expectations has not been considered. Finally, we suggest that the nature of research on this issue will need to be different in the future.

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Past Research

The evolution of the relevant literature can be rather succinctly summarized. The first stage of conventional wisdom, that people follow jobs, evolved directly from economic base theory. Changes in export demand have been seen by Lowry and Blanco, for example, to cause wage changes and thus influence migration. In 1964, however, Borts and Stein developed the jobs follow people position by emphasizing shifts in labor supply via migration as the critical causal factor in regional economic growth.

Subsequent to the Borts and Stein work, several attempts have been made to estimate systems of simultaneous equations which treat both migration and employment change (among other factors) as endogenously determined. In a frequently cited work, Muth argued that both product and labor demand functions can often be viewed as perfectly elastic, at least as faced by a city or small region:

> "... At first glance it would seem quite unlikely that a city's labor demand schedule would be perfectly elastic. Borts and Stein, though, have provided a convincing rationale for such a demand schedule.
>
> Assume that a city has firms producing and selling products for a national or even world-

> wide market. Also, let the fraction of the output coming into this market which is produced by the firms in the city in question be so small that the demand schedule for their products has an arbitrarily high elasticity. Finally, let the prices paid by these firms for all other productive inputs — call these capital — be fixed for analogous reasons and let the production functions of these firms be homogeneous of degree one. Then the capital/labor ratio for these export firms is uniquely determined by the ratio of the delivered price of capital services to the f.o.b. price of output, both of which are fixed exogenously to the city. The capital/labor ratio, in turn, determines the ratio of the wage paid labor by these export firms to their f.o.b. price of output, and, the latter being given, the wage rate itself" (p. 296).

Muth's empirical conclusions, for selected large SMSA's over the 1950-60 period, were that:

> "... in-migration appears to induce an increase in employment almost proportionate to its expected increase in the city's labor force. Just as clearly, employment growth tends to induce in-migration, though the latter effect is quantitatively smaller" (p. 295).

This conclusion is, of course, consistent with a perfectly elastic demand for labor in those SMSA's. To again cite Muth:

> "Indeed, one of the strongest bits of evidence for the Borts-Stein hypothesis is that, despite relatively large differential migration regionally, regional wage differentials have shown remarkably little change over time" (p. 297).

Further empirical support for simultaneity has come from Greenwood (1973, 1975) and Olvey, although neither went as far as Muth in arguing for perfectly elastic demand curves or for the empirical dominance of migration as a determinant of regional growth.

Despite Mazek and Chang's rather harsh criticism of the Muth article on both theoretical and empirical grounds, the latter appears to be emerging as the standard work on this topic [Edwards and Hansen]. Moreover, a subsequent article by Steinnes offered a statistical test for causality which further argued the dominance of migration, rather than export demand, as the critical factor in regional growth.

Thus, a simple answer to the "chicken and egg" question seems to be evolving, i.e., that new in-migrants can and will be absorbed by the local economy. This clearly runs counter to the export-base orientation of most readers of this Journal. Several factors (other than predisposition) would seem to augur against acceptance of the existing work. For one, only limited attention has been given the topic, and then mostly during the 1960's and early 1970's. Second, as pointed out by Steinnes, static models (even those which recognize simultaneity) of dynamic processes are often inadequate. Although the need for a time-related or recursive model is usually recognized, the lack of yearly data on key variables, especially gross and/or net migration, forces the use of cross-sectional data with variables usually defined as changes over a five or ten-year interval. Third, most of the models (including Muth's) have been inadequately specified with respect to the role of exogenous changes in export demand, a task made difficult by the use of SMSA's as units of observation.

In short, inadequate data have generally been used to fit a few incompletely specified models. We are not arguing that our results are more powerful than past research. We do contend, on the other hand, that since our results are contrary to received wisdom, the latter needs to be reexamined.

Model and Statistical Analysis

In general, our analysis incorporates the best features of existing simultaneous models and suffers from the same data constraints, but it does attempt to improve on model specification [Owen]. The primary initial modification, done to more adequately specify the role of export demand and thus reduce specification bias, was the selection of a set of counties which rely on one key source of export demand, the wood products indus-

try.[1] Thirty-seven counties in Western Oregon and Western Washington were ranked in terms of timber dependence.[2] From this group, the seventeen most dependent were selected for the initial analysis, reflecting a compromise between sample size considerations, on one hand, and degree of single-industry dependence and ability to specify an export demand variable, on the other hand.[3] Following this, an analysis was made of all thirty-seven counties, replacing the timber export variable with a zero-one proxy variable for SMSA/non-SMSA counties. This obviously sacrificed some degree of robustness in model specification, since a zero-one variable does not identify sources of export growth. The expanded analysis does, however, allow a broader range of economic circumstances to be considered.

The model itself consists of five equations with five endogenous variables — in-migration (RIM), out-migration (ROM), employment change (DEMP), wage change (DWAG) and change in the unemployment rate (DUNR).[4] Primary reliance was placed on data from the Census of Population and from Employment Divisions in the two states. The time period was 1965-1970, with variables defined either as ratios (1970 ÷ 1965) or as base year (1965) levels. Two-stage least squares was used to estimate the coefficients since all equations were over-identified. Linear estimation was made after conversion to natural logarithms; the regression coefficients can thus be interpreted as elasticities.

The five equations follow: endogenous variables are to the left of the double slash, lagged endogenous and exogenous variables are to the right. In the analysis of the thirty-seven counties, the (zero-one) SMSA proxy replaces DLOGS as an exogenous variable. (Table 1 contains variable definitions and data sources.)

$$(1) \quad RIM = f_1(DEMP, DWAG, DUNR//EMP, WAG, UNR)$$

$$(2) \quad ROM = f_2(DEMP, DWAG, DUNR//EMP, WAG, UNR, AGE, EDU)$$

$$(3) \quad DEMP = f_3(RIM, ROM, //EMP, DEDU, NATINC, DLOGS, DINT)$$

$$(4) \quad DWAG = f_4(RIM, ROM, //WAG, DEDU, NATINC, DLOGS, DINT)$$

$$(5) \quad DUNR = f_5(RIM, ROM, DEMP //DEDU, NATINC, DLOGS, DINT)$$

As to expectations of the model, local wage (DWAG), employment (DEMP), and unemployment (DUNR) levels were postulated to be partially determined by exogenous forces, especially timber harvest (DLOGS) or the zero-one (SMSA) variable, and also by changes in local educational levels (DEDU), natural increase in the population (NATINC), and by inter-governmental trans-

[1]Due to lack of superior alternatives, data on log harvest (public and private) were used as a proxy for export demand.

[2]Timber dependence was defined as wood products employment (SIC's 2411, 242, and 2432) as a percent of the total basic employment, which was defined as SIC's 1, 7-10, 12-14, 19-39, 42, 44, 55, 58, 70, 91, and 92. This list includes manufacturing, mining, some transportation, state and federal government, lodging, and selected retail services. For further detail, see Owen.

[3]The degree of dependence on timber for these seventeen counties ranged from 38 to 80 percent, with a median dependence of 51 percent. Input-output models for six Oregon counties were used to compare this measure of timber dependence with a more rigorous measure, i.e., wood product exports as a percent of all exports from the county. The mean difference between the two measures was 10.4 percent; the difference was less than 3 percent for the two most timber-dependent counties. For the two least timber-dependent counties, our measure substantially understated the role of wood products as revealed by input-output models.

[4]Both migration variables were defined in relative terms (i.e., migration totals were divided by total covered employment) in order to reduce multicollinearity.

TABLE 1. Definition of Variables and Data Sources.

Endogenous	
RIM	= in-migration, 1965 to 1970, divided by covered employment, 1965 (in-migration: number of persons residing in county on April 1, 1970, who resided in a different county on April 1, 1965. *Census of Population,* Current Population Reports, Series P-25).
ROM	= out-migration, 1965 to 1970, divided by covered employment, 1965 (see RIM).
DEMP	= change in total covered employment, April, 1965 to April, 1970 (State Employment Division).
DWAG	= change in average (deflated) wage, 1965 to 1970, computed as covered second quarter payrolls divided by covered (April) employment (see DEMP).
DUNR	= change in covered unemployment rate, April, 1965 to April, 1970 (see DEMP).
Lagged Endogenous (1965 values)	
EMP	= total covered employment (see DEMP).
WAG	= average (deflated) wage (see DWAG).
UNR	= unemployment rate (see DUNR).
AGE	= median age (average of 1960 and 1970 Census medians).
EDU	= median education (see AGE).
Exogenous	
DEDU	= change in median education, 1965 to 1970.
NATINC	= natural increase in population, births in excess of deaths, 1965 to 1970 (Census and state data).
DLOGS	= change in public and private log harvest, 1965 to 1970, as adjusted for cross-hauling of logs between counties prior to processing (U.S. Forest Service data).
DINT	= change in (deflated) inter-governmental revenues to local governments (cities, counties, school districts) from higher levels of government, 1965 to 1970 (*Census of Governments,* 1962 and 1967).
SMSA	= in standard metropolitan statistical area (yes = 1, no = 0).

fers to local units of government (DINT).[5] All of the above (except NATINC) would cause rightward shifts in the demand for labor, driving wages and employment up and lowering unemployment rates. These same endogenous variables (DWAG, DEMP, DUNR), however, should also be responsive to in- and out-migration (RIM, ROM) over the 1965-1970 period. That is, increased in-migration should lower wage rates (unless the demand for labor were perfectly elastic), increase employment, and/or decrease unemployment rates. In- and out-migration, in turn, were expected to be responsive to changes in local wages (DWAG), employment levels (DEMP), and unemployment rates (DUNR) as well as to a variety of lagged endogenous variables or base year conditions. In-migration between 1965 and 1970, for example, should have been positively related to 1965 wage levels and negatively related to 1965 unemployment levels.

[5]Two of these variables, DEDU and DINT, could be regarded as endogenous since (1) local educational expenditures may depend on local economic growth, and (2) inter-governmental revenues may depend on local population growth and economic growth. Pragmatically, however, these are less centrally endogenous than the other five, especially when degrees of freedom are limited.

Results

As shown in Table 2, the results for the seventeen timber-dependent counties clearly support the notion that employment change and in-migration are mutually determined. Moreover, the elasticity of (relative) in-migration with respect to a one percent change in employment (1.62) is considerably greater than the elasticity of employment change with respect to in-migration (.24). In these counties, it appears that the "people follow jobs" effect is much stronger than the "jobs follow people" effect. When the analysis is extended to the thirty-seven counties in the region, including SMSA's (Table 3), this differential persists and in fact becomes more

TABLE 2. Two-stage Least Squares: Timber-dependent Counties (n = 17).[a]

	Endogenous					Lagged Endogenous					Exogenous			
Equation	$\widehat{RIM}$	$\widehat{ROM}$	$\widehat{DEMP}$	$\widehat{DWAG}$	$\widehat{DUNR}$	$\widehat{EMP}$	$\widehat{WAG}$	$\widehat{UNR}$	AGE	EDU	DEDU	NATINC	DLOGS	DINT
$\widehat{RIM}$			1.619	−2.314	−.599	−.085	−1.696	−.887						
(.891)			(.799)	(.914)	(.232)	(.041)	(.430)	(.327)						
$\widehat{ROM}$			3.069	−26.493	−7.514	1.456	4.843	−10.687	14.698	−68.359				
(.983)			(1.108)	(6.309)	(1.262)	(.352)	(.877)	(2.031)	(2.551)	(13.831)				
$\widehat{DEMP}$	.243	.177				.029					−.476	.021	.050	−.338
(.660)	(.111)	(.136)				(.042)					(2.740)	(.010)	(.086)	(.160)
$\widehat{DWAG}$	.034	.142					−.192				−.803	.013	.030	−.101
(.369)	(.098)	(.090)					(.229)				(1.885)	(.009)	(.073)	(.125)
$\widehat{DUNR}$	.001	−.351	.807								−3.140	−.017	.178	−.619
(.905)	(.093)	(.076)	(.222)								(1.554)	(.008)	(.060)	(.111)

[a]Standard errors are in parentheses. Variables are defined in Table 1. Adjusted R^2 values are in left column.

TABLE 3. Two-stage Least Squares: Western Oregon and Washington (n = 37).[a]

	Endogenous					Lagged Endogenous					Exogenous			
Equation	$\widehat{RIM}$	$\widehat{ROM}$	$\widehat{DEMP}$	$\widehat{DWAG}$	$\widehat{DUNR}$	EMP	WAG	UNR	AGE	EDU	DEDU	NATINC	SMSA	DINT
$\widehat{RIM}$			2.283	−2.240	1.300	−.098	−3.834	.020						
(.952)			(.223)	(.409)	(.168)	(.015)	(.226)	(.151)						
$\widehat{ROM}$			2.248	5.340	.936	−.251	−.756	1.581	−.848	8.599				
(.988)			(.120)	(.745)	(.084)	(.013)	(.258)	(.162)	(.096)	(1.180)				
$\widehat{DEMP}$	−.081	.125				−.089					−3.451	.0043	.299	.051
(.784)	(.092)	(.102)				(.020)					(1.053)	(.0019)	(.045)	(.070)
$\widehat{DWAG}$	−.172	.170					−.367				1.577	.0023	.070	−.032
(.408)	(.075)	(.080)					(.106)				(.700)	(.0016)	(.033)	(.059)
$\widehat{DUNR}$	.053	−.175	.132								.523	.0038	.083	−.677
(.702)	(.123)	(.139)	(.190)								(1.167)	(.0026)	(.067)	(.089)

[a]Standard errors are in parentheses. Variables are defined in Table 1. Adjusted R^2 values are in left column.

pronounced. There, the elasticity of in-migration with respect to employment change is 2.28 while the reverse relationship is not significantly different from zero.

The case would be stronger, of course, if all coefficients in the ten equations were significant with expected sign. Flaws do exist; the out-migration equations, for example, have nearly singular matrices and no conclusions should be drawn. Sprinkled throughout are apparent "wrong" signs, as for example, the inhibiting effects on in-migration of high base period wages and rising wage levels. Other apparent "wrong" signs are perhaps explainable; natural increase in population can also shift the demand for (as well as the supply of) labor, for example, to serve the needs of a more youthful age structure.

Nevertheless, a majority of those coefficients which have magnitudes in excess of their standard errors do have the expected sign; thus, an argument can be made for the plausibility of the overall model. Indeed, a number of expected relationships can be observed. Wages in the thirty-seven counties fell with increased in-migration and rose with increased educational levels, out-migration and SMSA-status. Unemployment rates in the seventeen timber-dependent counties declined with out-migration, with increased intergovernmental transfers, and with increased educational levels. In these same counties, in-migration varied inversely with unemployment rates, both base period and over the 1965-1970 interval, as well as rising with local employment growth. The sets of equations, then, seem to have sufficient explanatory power to allow conclusions to be drawn about the particular interrelationships of interests, i.e., employment change and in-migration, especially given the significance of the latter coefficients.

Despite our attempt to specify an important source of export demand for the timber-dependent counties, the DLOGS variable was only weakly related to local employment change. A variety of explanations can be offered. One is poor quality data, especially with respect to cross-hauling of logs (i.e., harvested in one county, processed in another). A second is that substantial time lags can occur between logging (our data) and processing (which generates more jobs than does logging). Third and perhaps more insructive to future efforts, is the possibility that non-timber sources of employment were more important than we thought them to be and should have been measured.

Conclusions

Above, we found that the effect of employment growth on in-migration between 1965 and 1970 was substantially greater than the reverse effect in a set of counties including but not limited to timber-dependent counties in Western Oregon and Western Washington. These results, rather than being definitive, may serve primarily to cast further doubt on the argument that the "jobs follow people" effect is dominant in regional economic growth.

In reality, our results and others may be missing the mark because of data constraints and the use of static models to portray time-related processes. Pragmatically, a limit exists on the extent to which static economic models can reveal the nature of the migration-employment change phonomenon. Neither the expectations of capital suppliers nor those of labor suppliers are taken into account in existing analyses. These seem to be powerful forces which must be considered. Job-creation through investment may well occur in the expectation that an appropriate labor force will materialize. In-migration may well be triggered by parallel expectations. Much different data would be needed to explore these possibilities.

In retrospect, continued efforts to resolve the "chicken and egg" question may be less important than gaining a better understanding of the role of non-market goods in peoples' decision to migrate. Indeed, there is much evidence to indicate that the strength of the traditional income incentive to migrate weakened during the past decade (Brown and Wardwell, Stevens). In the population turnaround, first documented by Beale, non-

metro areas grew faster than metro areas even without a precipitating reduction in the wage differential between the two. One explanation is that more people have recently been migrating to seek non-market goods, even at the expense of considerably money income.[6] Although the current recession has no doubt raised the "price" of these non-market goods above that which most in-migrants are willing to pay, suspension of the turnaround may well be temporary rather than permanent.[7]

If the income incentive to migrate is in fact weakening in a long-run sense, one implication is that policies to create jobs for local people may enhance the flow of in-migrants who are often younger, better educated, and more skilled. Future research on effects of economic development policies should identify who gets the jobs as well as how many jobs are created. Similarly, policies of controlled growth may lead to a distribution of income which was neither foreseen by local decision makers nor subject to control because of freedom of population movement.

[6]In a random sample of in-migrants to non-metro southern Oregon in 1977, Stevens found that three-fourths of those households with heads in the labor market had sacrificed income in order to move. The mean sacrifice for this group was about $11,000 yearly. Self-reported income sacrifice (of unknown magnitude) was also reported by 50 percent of the households in Ploch's statewide sample in Maine and by 48.7 percent of the households in Voss and Fuguitt's sample in high-growth counties in the Upper Great Lakes Region.

[7]Net in-migration to Oregon, for example, peaked at about 55,000 in 1977; net out-migration in 1982 appears to be about 8,000.

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