HUMAN MIGRATION: THEORY, MODELS, AND EMPIRICAL STUDIES*

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1. INTRODUCTION

Since the publication 10 years ago of my previous survey of the literature on internal migration, a number of important advances have occurred in migration research.[1] Although the prior survey serves as a point of departure for this paper, earlier contributions are not completely ignored. Space limitations prevent a detailed discussion of many important advances concerning internal migration in less developed countries, as well as those dealing with international migration.[2]

During the last 15 years fundamental changes have occurred in U.S. internal migration patterns. These changes have been recognized for approximately the last 10 years and have given rise to an important, until now primarily descriptive, body of literature that warrants attention. In general, migration research has maintained its strong orientation toward the determinants as opposed to the consequences of migration, and consequently most of the recent advances have concerned the causes of migration. During this period several noteworthy theoretical contributions have been made involving both new independent and new dependent variables. New modeling perspectives have been adopted, and alternative functional forms of migration equations have been considered. Moreover, a number of significant new empirical insights have developed. Certain of these findings have been closely related to theoretical innovations, but many awaited the development of new data sets. Two types of data particularly stand out—microdata relating to migration and migration time series. These types of data have also allowed the application of several refinements in econometric methodology to migration research.

The paper begins with a discussion of the changes that have occurred during the recent past in U.S. internal migration patterns. These changes have provided a stimulus to a certain line of research. In addition to this discussion, Section 2 presents an assessment of the state of knowledge concerning these phenomena. Section 3 provides a more abstract discussion of the determinants of migration, including a treatment of both recent theoretical and empirical literature. The

empirical literature discussed here includes a consideration of the empirical findings that have followed from the application of microdata to migration research. Section 4 treats the empirical findings associated with several new time-series migration data sets. This section also includes a discussion of the application of econometric methodologies to temporal models of migration. The final section summarizes the main findings of the last 10 years and points toward potentially fruitful areas for future research.

2. MIGRATION SINCE 1970

In recent years trends in the spatial distribution of population in the United States have undergone dramatic changes. After many decades during which the West experienced the greatest volume of net in-migration, the South has, since about 1970, had a volume of net in-migration about twice that of the West. Moreover, the rate of population growth in metropolitan areas slowed considerably, in part because the central-city population of many metropolitan areas declined and the suburban growth boom of prior years moderated appreciably. Partially as a cause and partially as a consequence of these changed circumstances, the historical trend of migration out of nonmetropolitan areas and into metropolitan areas reversed such that population in nonmetropolitan America began to grow more rapidly than that in metropolitan America.[3]

The pervasive trends affecting the distribution of economic activity and population between regions and between metropolitan and nonmetropolitan areas in the U.S. have been described by many analysts. Useful summaries of these developments have been written by Alonso (1978b), Beale (1977), Berry and Dahmann (1977), Chalmers and Greenwood (1980), McCarthy and Morrison (1977), and Sternlieb and Hughes (1977). The conclusions emerging from this research have been based largely on the period from 1960 to 1975 and have emphasized both a regional shift and a turnaround in long-standing relationships between metropolitan and nonmetropolitan areas. The pattern of change between 1975 and 1980, and even into the early 1980's, remained quite similar to that observed between 1970 and 1975. Due to the relatively high levels of metropolitanization of the Northeast and North Central U.S., the regional shift and the turnaround are not easily separated.

The Regional Shift

Between 1970 and 1980 approximately 90 percent of the nation's incremental population accrued to the South and the West. This figure is sharply higher than that for any other decade in U.S. history. The previous high was during the 1930's when the South and West gained 65 percent of incremental U.S. population. Three major factors underlie this dramatic population shift: (1) international migration,

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[3]This phenomenon was apparently not unique to the U.S. Vining and Kontuly (1978) show that, during the 1970's, in 11 of 18 countries either the direction of the net population flow from less densely populated regions to core regions reversed, or a sharp reduction occurred in the level of the net flow.

TABLE 1:   In-Migration, Out-Migration, and Net Migration for Regions: 1965–1970, 1970–1975, 1975–1980, and 1980–1983 (in thousands)

Area	1965–1970	1970–1975	1975–1980	1980–1983[a]
Northeast				
In-Migrants	1,273	1,057	1,106	1,376
Out-Migrants	1,988	2,399	2,592	2,016
Net-Migrants	−715	−1,342	−1,486	−640
North Central				
In-Migrants	2,024	1,731	1,993	2,104
Out-Migrants	2,661	2,926	3,166	3,166
Net-Migrants	−637	−1,195	−1,173	−1,062
South				
In-Migrants	3,142	4,082	4,204	4,070
Out-Migrants	2,486	2,253	2,440	2,876
Net-Migrants	+656	+1,829	+1,764	+1,194
West				
In-Migrants	2,309	2,347	2,838	2,683
Out-Migrants	1,613	1,639	1,945	2,174
Net-Migrants	+696	+708	+893	+509

[a]Strictly speaking, the 1980–1983 figures are not comparable to the five-year flows reported in the other columns because they are the sums of three one-year flows.

Sources: U.S. Bureau of the Census, *Current Population Reports,* Series P-20, Nos. 368, 377, 384, and 393.

whose volume approached historically high levels during the 1970's and which predominantly crossed southern and western borders, rather than the eastern border; (2) natural increase, due partly to the populations of the South and West having greater relative concentrations in the child-bearing years, which in turn has been partly due to the age selectivity of international and internal migration; and (3) internal migration.

Table 1 reports gross in- and out-migration, as well as net migration, for the periods 1965–1970, 1970–1975, 1975–1980, and 1980–1983. If deaths among the migrants and emigration from the country are ignored, internal migration provided the South and West with almost 5.2 million persons during the 1970's.[4] Of course, child bearing among the migrants would substantially increase this figure.

Life-cycle considerations have undoubtedly been important in contributing to changes in U.S. migration patterns. Migration propensities peak during the early to mid twenties and then taper off sharply until retirement.[5] The maturing of the baby-boom generation through the age classes with the highest migration propen-

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[4]This figure would account for about 25 percent of the observed population increase of 20.9 million in the South and West between 1970 and 1980.

[5]For example, the propensity of a 25 to 29 year old person with 4 or more years of college to make an interstate move between 1975 and 1980 was 0.25, whereas that of an otherwise similar 35 to 44 year old person was 0.13.

sities caused a massive increase in the number of persons in the migration-prone group.[6] Furthermore, unemployment rates are relatively high for individuals in their early twenties and fall with age. One important reason for the dramatic shift in interregional migration is that employment opportunities in the Northeast and North Central regions had been lagging since about 1970 and were, moreover, dealt serious blows by the recessions of the mid 1970's and the early 1980's. The large and potentially highly mobile baby-boom generation that was aging into the labor force of these old industrial regions was thus finding unattractive job prospects and relatively high unemployment. On the contrary, jobs were growing rapidly in many southern and western areas. The combination of a high propensity to migrate and a strong incentive to migrate resulted in tremendous migratory flows of relatively young people to the South and West.

Although certain investigators [e.g., Steinnes (1978)] purport to show that jobs follow people, employment and population changes seem almost certain to interact simultaneously, at least when measured over intervals encompassing years.[7] Thus, the regional redistribution of population should mirror a similar redistribution of employment. Indeed, during the 1970's the South and West captured 73 percent of the nation's incremental nonagricultural employment. Part of this shift may have been due to largely exogenous forces (e.g., the strength of the dollar and severe foreign competition that almost certainly hurt regions heavily reliant on manufacturing), part may have been due to relatively low wages in the South and West, or to lack of unionization and low corporate tax rates in these regions, or to many other possible causes, but much of the employment growth seems to be due to growth of markets caused by population growth, which in turn was fueled by migration.

The Nonmetro-Metro Migration Turnaround

For many decades the urbanization of economic opportunities coupled with farm mechanization led simultaneously to an increasing concentration of population in metropolitan areas and to a decreasing relative concentration in nonmetropolitan areas. During the 1970's, however, the percentage of U.S. population residing in metropolitan areas declined for the first time this century. This population shift was partly due to a change in the direction of net migration, which began to favor nonmetropolitan areas. Based on the 1970 metropolitan boundaries, the Current Population Survey reports 1.6 million nonmetropolitan net in-

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[6]Between 1970 and 1980 the number of persons 20 to 29 years of age increased by 11.0 million nationwide, and the number 30 to 34 increased by 6.1 million. These and other national and regional trends relevant to recent population redistributions are documented and discussed in Greenwood (1984).

[7]In an effort to identify the sources of growth of 29 individual SMSA's during the early 1970's, Engle and Hutchins (1978) employ monthly data and, like Steinnes, perform causality tests. Of the SMSA's studied, 7 prove to be demand (i.e., employment) driven, 4 are supply (i.e., labor force) driven, and 13 reflect joint dependency.

migrants in 1975 and 1.3 million more in 1980.[8] Long and DeAre (1980) carefully document the newly observed phenomena.[9]

The reversal of the flow of net migration from nonmetropolitan to metropolitan areas has a number of causes and a number of consequences, and, as pointed out by McCarthy and Morrison (1977) and empirically confirmed by Mead (1982), these causes and consequences tend to be self-reinforcing and cumulative. This process of cumulative causation is the same as that described by Greenwood (1975) and Muth (1971) with respect to metropolitan growth. By coincidence, cumulative forces, some of long standing and some of more recent origin, seem to have reduced the advantages to both firms and households of locating in large metropolitan areas. These forces, which include possible diseconomies associated with dense urban locations and the declining relative importance of distance, in combination with the increased economic viability of nonmetropolitan areas, have resulted in a shift of both population and economic activity in the direction of less densely populated areas.

Following Chalmers and Greenwood (1980), the causes of the rural-to-urban migration turnaround can conveniently be grouped into five interrelated classes: (1) changing relative costs of doing business in older urban centers; (2) growth of resource-based industries in nonmetropolitan areas [e.g., Beale (1977) and McCarthy and Morrison (1977)]; (3) rising income and wealth and increasing demand for location-specific amenities [e.g., Graves (1979)]; (4) changing demographic structure of the population and the labor force [e.g., Alonso (1978b), and Greenwood (1984a, 1984b)]; and (5) government policy [e.g., Coleman (1978)]. To a large extent these same factors have been responsible, at least in part, for shifts away from the Northeast and North Central regions. The new trends in metropolitan/ nonmetropolitan growth have profound significance for the spatial organization of urban life. Sternlieb and Hughes (1977) conclude that the endpoint of industrial urbanization may have been reached. A geographic extension of the functional field of the city has occurred such that "urban" amenities are available to residents of the suburbs as well as to commuters from nonmetropolitan areas.

Conclusions Regarding Recent Migration Trends

Much remains to be learned regarding the location patterns that have unfolded since 1970. Mainstream empirical research on migration has yielded few direct insights as to why the new patterns emerged. To date, research concerning these patterns has been largely descriptive. Many hypotheses have been offered but few have been tested. A firm understanding of what has transpired, and why,

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[8]U.S. Bureau of the Census (1984, Table D). Migration flows refer to 1970–1975 and 1975–1980, respectively.

[9]As population growth proceeds in nonmetropolitan areas, certain of these areas achieve the threshold conditions that cause them to be redefined as metropolitan. Long and DeAre (1980) have shown that the percentage of U.S. population residing in metropolitan areas increased over the period 1970–1974–1978 when the contemporaneous definition of metropolitan is used. However, within the spatial area covered by the metropolitan definition in any one of these three years, the percentage of U.S. population residing in metropolitan areas declined over the same period.

will presumably begin to emerge as 1980 census data find their way into published migration research.

Hopefully, far more attention will be directed at understanding the relationship between employment and migration. This relationship, which is seemingly central to any debate concerning the causes or the consequences of migration, has been surprisingly neglected. Since the publication of Muth's (1971) well-known paper, a number of efforts have addressed the simultaneous interaction between employment and migration, but almost no attention has been paid to the consequences of migration of persons with different characteristics nor to many other important aspects of this interrelationship.[10] Frequently, migrant numbers alone conceal much that is important about migration. A good example of how numbers may hide important information is found in the South to North net migration that characteristically prevailed prior to 1970. Although the South was exporting human beings during this period, it may have been importing human capital. We know that the flow of nonnative college graduates strongly favored the South during the 1950's and 1960's.[11] The infusion of human capital due to net migration may have served as a catalyst that encouraged subsequent southern employment growth.

Another relationship that warrants serious attention is that between amenities and jobs. Evidence to be discussed below indicates that the migrant-attractive power of incremental jobs differs across regions. Other evidence suggests that location-specific amenities are important in explaining migration. To what extent does the availability of amenities affect the migrant-attractiveness of employment opportunities?

Still another relationship that may be of critical importance and has been almost completely overlooked is that between employment changes and changes in local labor force participation versus migration. The South serves well to illustrate this point. Between 1970 and 1980 the South's population grew by 12.5 million persons, whereas nonagricultural employment grew by 8.7 million jobs. This employment expansion was in part, but in small part only, accommodated by net in-migration to the South. As shown in Table 1, the South gained about 3.6 million persons through net migration during the 1970's. Migration of this magnitude was clearly insufficient to accommodate much of the observed employment expansion. In fact, the labor force response of the indigenous population was substantial. The South's employment-to-population ratio increased from well below the national average in 1970, when it stood at 0.32, to almost the national average in 1980, when it was 0.39.

These data reflect what appears to be an extremely important and overlooked point. To the extent that the responsiveness of the indigenous population to employment growth accommodates this growth, such responsiveness serves as a buffer between newly created jobs and migration. Had the South's employment-to-population ratio remained at 0.32 in 1980, the region would have needed a

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[10]Mueller (1982) provides a survey of research dealing with the simultaneous interaction between the causes and consequences of migration.

[11]This phenomenon is documented in Greenwood (1981).

population of 91.1 million (compared to an actual population of 75.3 million) to accommodate employment of 29.1 million jobs. Hence, over five times the observed amount of net in-migration would have been required. Of course, natural growth of the population of labor force age would lessen this requirement. Chalmers and Greenwood (1985) suggest that because the South now has an employment-to-population ratio close to the national average, the region's potential to accommodate a differentially high rate of employment growth from indigenous sources may be mostly exhausted, which in turn means that future employment-growth differentials that strongly favor the South will require far more migration than past differentials. In part because of the increased migration that may be required and probably will not be forthcoming due to the maturing of the baby-boom generation out of the most mobile age classes, the South's employment may not grow as rapidly in the future as it has in the past. This discussion points toward modeling migration's causes and consequences within a general equilibrium framework.

3. THE DETERMINANTS OF MIGRATION

Many factors contribute to the decision to migrate. Differential characteristics of sending and receiving regions provide a potential incentive for moving, and individual and/or family traits help condition the response to real utility differentials that may arise from these different characteristics. Given an individual's personal characteristics, including accumulated jobs skills, general labor market conditions and employment composition will help determine the probability of gaining employment during a period of job search. Prevailing conditions in land and housing markets may also be important, and state and local taxes and the associated availability of public goods may be critical for certain potential migrants. Topological, climatological, and environmental amenities—such as mountains, seashore, temperate climate, sunshine, and pollution—may enter into many decisions. Moreover, the values of such amenities may be at least partly reflected in labor and land markets.

A number of life-cycle considerations—such as marriage, divorce, completion of schooling, entry into the labor force, start of a career, birth and aging of children, and retirement—are critical in an individual's or a family's decision to migrate. Other personal circumstances include employment status, earnings, education, accumulated skills, age, sex, and health.

Studies of the determinants of migration have commonly been formulated in the context of individual utility maximization, although in recent years increasing emphasis has been placed on the family or the household as the decision-making unit. Models based upon such behavioral foundations have frequently been estimated with aggregate data relating both to migrants and to the determinants of migration. At a theoretical level, two recent developments particularly stand out concerning these determinants: (1) the emphasis on family and life-cycle aspects of the migration decision and (2) the application of equilibrium as opposed to disequilibrium notions to migration analysis. Each of these research areas has, with increasing frequency, relied on microdata that have appeared during the last 10 years for verification of associated hypotheses.

Such studies were not possible prior to the development of several microdata

bases, of which three particularly stand out for the U.S.—the Panel Study of Income Dynamics (PSID), the National Longitudinal Surveys (NLS), and the Census Public Use Microdata Samples (PUMS). Other microdata sets are available, but are not as commonly used, primarily because they are drawn from administrative records that are lacking key information. A good example of such a data set is the Social Security Administration's Longitudinal Employer-Employee Data (LEED) file. This data set is strong regarding work histories, but contains no information on education and is lacking in still other ways.[12]

The relative importance of personal versus place characteristics cannot be directly established in the absence of information from microdata. Until such data became available, the typical procedure was to include origin characteristics like median age and median numbers of years of schooling in a regression as proxies for personal characteristics of the migrants. In such regressions, variables relating to personal characteristics were frequently lacking significance and/or of unanticipated sign. Such findings are hardly surprising since the aggregate variables may be virtually uncorrelated with the migrant traits of concern.

Using 1970 PUMS data, Navratil and Doyle (1977) examine the influence of aggregation on the estimated elasticities reflecting the determinants of migration. In one model they use average values of the personal characteristics of subclasses of in-migrants, along with a number of commonly used area characteristics. In a second model they use the actual personal characteristics of the individual in-migrants and almost the same area characteristics. The empirical results suggest "that the process of aggregation camouflages some of the personal characteristics which are important determinants of an individual's decision to migrate while it had only a marginal effect on the labor market characteristics of an area" [Navratil and Doyle (1977, p. 1558)].[13] These findings underscore the importance of using available microdata.

Life-Cycle and Family Considerations

Given their pivotal importance in research concerning the determinants of migration, life-cycle forces have been given far too little attention in the past. Partly in connection with the development of microdata sets and the application of econometric techniques appropriate for their analysis (e.g., probit and logit), greater emphasis has been placed on various life-cycle and familial factors that influence the decision to migrate. Two of the earliest examples of this type of study are Graves and Linneman (1979) and Polachek and Horvath (1977). The latter specify an optimal control model of life-cycle location choice that allows them to analyze migration periodicity, locational choice, and family considerations within the same nonstochastic framework. They show that remigration can occur without exogenous stochastic changes, such as had been assumed in prior models. To test

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[12]Isserman, Plane, and McMillan (1982) provide a useful description and critique of various sources of U.S. internal migration data.

[13]Mueller (1982) also demonstrates the importance of both personal and place characteristics, but he uses CWHS (LEED file) data.

the implications of their model, they employ data from the PSID, from which they draw a subsample of 1,500 husband-wife families with intact marriages. They first seek to ascertain whether migrants realize earnings gains, and they then analyze the probability of migration within a simultaneous-equations framework. They conclude that "a ten thousand dollar expected increase in the present value of husband's earnings increases the probability of interstate migration by 6 percent, while presumably because of intermittent labor force behavior, the effect of expected increase in wife's wages are (sic) negligible" [Polachek and Horvath (1977, p. 104)]. Beyond empirical findings, the real importance of this study lies in its theoretical emphasis on life-cycle phenomena and family considerations.

The influence of family ties on migration has been specifically analyzed by Mincer (1978), who shows that such ties result in negative personal externalities that are usually internalized by the family and that thus tend to discourage migration. "Tied persons" in the family are "those whose gains from migration are (in absolute value) dominated by gains (or losses) of the spouse" [Mincer (1978, p. 753)]. Moreover, such ties tend to reduce the employment and earnings of those wives who do migrate and to increase the employment and earnings of their husbands. Mincer goes on to show that increased labor force participation rates of women cause an increase in migration ties, which results in both less migration and more marital instability. Increased marital instability in turn encourages migration as well as increased women's labor force participation. In support of Mincer, Graves and Linneman (1979) find that the probability of moving is negatively related to marital status.

Using NLS data, Sandell (1977) provides further empirical evidence in support of Mincer's position. He shows that the wife's labor market orientation is an important determinant of family migration decisions. Families with an employed wife have a significantly lower probability of migrating, as predicted by Mincer. Moreover, the wife's increased job tenure further reduces the probability of migrating. Family migration probabilities increase with the husband's education and decrease with his age. Migration tends to increase the earnings of the husband and to initially decrease those of the wife, but family earnings rise. This initial decrease in the wife's earnings is only temporary, however, and is in part due to a decrease in weeks worked.

The empirical studies noted above have an important limitation. Migration is defined over a given period of time, and consequently the importance of life-cycle variables is assessed within a cross-sectional framework. A more complete treatment of life-cycle effects requires that migration be studied as an event that occurs in continuous time. Unfortunately, few migration histories that would allow such analyses are available. One of the only such data bases referring to the U.S. was collected by the National Opinion Research Center in 1969, when retrospective life histories were gathered from a random national sample of 851 white men aged 30 to 39. Sandefur and Scott (1981) have used these data to study the effects of work careers and family life cycles on migration. They conclude that when variables relating to such factors are taken into account, the inverse relationship between age and migration disappears. More work of this sort is badly needed.

Migration in Equilibrium Versus Disequilibrium Systems

The theoretical perspective taken in almost all earlier work has been that of a disequilibrium system. In other words, the system was viewed as initially out of equilibrium and any adjustments that occurred were assumed to be equilibrating adjustments. Thus, interregional wage differentials that are assumed to be the result of disequilibrium would presumably encourage migration from low- to high-wage regions, which would, in turn, contribute to a narrowing of the differential. If, on the other hand, interregional wage differentials are assumed to be equilibrium or compensating differentials, then they would presumably not directly encourage interregional migration. Rather, migration would only occur to facilitate an adjustment to a new equilibrium. Hence, not only would changes in the relative wage structure across regions encourage migration as in the traditional models, but so too would changes in demand for nontraded goods, such as location-specific amenities, which could occur from rising real wages in all locations.

The work of, e.g., Graves (1980), and of Graves and Linneman (1979) points in the direction of a relatively recent line of thinking that essentially extends the approach of the urban economist with its emphasis on spatial equilibrium to a broader geographic setting. This line of reasoning has three particularly important dimensions: (1) the emphasis is on individual decision making at a microeconomic level; (2) the approach takes an equilibrium perspective and assumes reasonably perfect information and mobility, which is in contrast to the common practice of labor economists to view migration as resulting from individual attempts to arbitrage away utility gains that exist in a world of disequilibrium; and (3) the approach emphasizes the importance of location-specific amenities, which follows from its emphasis on equilibrium notions.

The theoretical basis for Graves's later work is provided by Graves and Linneman (1979), who distinguish two types of goods entering into individual utility functions, traded and nontraded. They argue that changes in demand for nontraded goods cause migration. The only way for a household to satisfy its changed demand for nontraded goods is relocation. As a systematic influence, changed demand could occur due to changed income, for example. Changed relative spatial prices (e.g., air conditioning in the Southwest) could also cause migration. Graves and Linneman test their model by using 1970–1971 and 1971–1972 migration data drawn from the PSID and find it to be "in strong conformity to observed behavior" [Graves and Linneman (1979, p. 403)]. Each variable expected to cause changes in nontraded demand increases the probability of movement. An important implication of the equilibrium approach concerns the selection of the variables that enter the right side of a migration equation. The probability of migrating is a function not only of levels of certain movement cost variables, but also of *changes* in the absolute values of exogenous variables that cause changed demands for nontraded goods.[14]

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[14]Some consideration has been given to the general nature of explanatory variables in migration models. Fields (1979), for example, shows that in a place-to-place model individual characteristics of

In one of the most comprehensive empirical analyses of the influence of location-specific amenities on metropolitan migration, Graves (1979) demonstrates that when income levels and unemployment rates are taken into account, climatological amenity variables are important in explaining age- and race-specific net population migration during the 1960's. Specifically, Graves studies the influence of heating degree days, cooling degree days, annual temperature variance, relative humidity, and wind speed. Each variable tends to be significant in the various equations for net white migration. Moreover, in the absence of the amenity variables, income is typically insignificant. But in the presence of the amenity variables, the income variable tends to have the expected sign, to take on statistical significance, and to exhibit a more plausible life-cycle pattern. In a later paper Graves (1983) suggests that gross contract rent may serve as a good proxy for a host of interrelated amenity variables in a net-migration equation. He interprets his positive and significant coefficients on the rent variable across various age groups as lending support to the equilibrium thesis.

In an effort to account for location-specific influences and then to relate them to regional wage differentials, Krumm (1983) employs microdata from the PSID. He finds that migrant households experience higher wage growth after migration than before, but he finds no systematic pattern of movement from or to areas with high or low nominal wages. His conclusion is consistent with the equilibrium thesis: "The analysis provides no support for arguments that nominal regional wage differentials reflect systematic ordering or real wage differentials" [Krumm (1983, p. 375)].

Following Graves, Porell (1982) attempts to ascertain the relative importance of economic versus quality-of-life (QOL) factors, as well as tradeoffs between the two, in explaining aggregate migration between 25 SMSA's over the 1965–1970 period. He concludes that "the regression results ... provide strong empirical support to the premise that both economic and QOL factors are important determinants of migration" [Porell (1982, p. 152)]. However, somewhat in contrast to Graves's findings he suggests that "migration is more responsive to marginal changes in economic factors than QOL factors" [Porell (1982, p. 153)] and "the results did not support the long-run equilibrium thesis of migration" [Porell (1982, p. 156)]. Rather, Porell sees disequilibrium job incentives as encouraging migration to SMSA's that offer attractive amenity bundles.

Porell's conclusion that job incentives are providing an important attraction in many southern and western SMSA's points toward an unresolved problem with much of the existing empirical work involving the equilibrium hypothesis. Graves's (1979, 1980) work provides a good illustration. The economic variables in his model are income and unemployment rate. No measure of job opportunities or change in job opportunities is included. If jobs are attractive to migrants, and if jobs are growing most rapidly in amenity-rich areas, then to some extent, at least, the

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origin and destination places yield better results than ratios of destination and origin characteristics. This finding is not surprising because when the ratio is employed the commonly used double-log functional form implicitly constrains the coefficients on the origin and destination characteristics to be identical except for sign.

amenity variables may be reflecting the importance of job opportunities. Of course, the amenities may also partly underlie the growth of jobs, but this entire pattern of causation between amenities, jobs, and migration remains undiscovered.[15] What is called for is a simultaneous analysis of spatial utility and profit maximization with migration of both households and firms providing the dynamic adjustment.

Other Micro Analyses

In addition to the improved understanding that microdata and their analyses have brought to migration research through the focus on life-cycle and familial factors in the decision to migrate, micro analyses have also helped resolve other problems. One of these issues has to do with the influence of unemployment rates on migration. Local unemployment rates have frequently been found to have insignificant coefficients and even unanticipated signs. One possible cause of this type of finding is that the unemployed are a relatively small percentage of the labor force and an even smaller percentage of the population. Since higher unemployment rates are likely to be of most concern to the unemployed and perhaps of little or no concern to those who have a job when they move, the effects of higher unemployment rates may well not be apparent in studies that attempt to explain population or labor force migration with aggregate data.

DaVanzo (1978) uses PSID data to address directly the findings associated with unemployment rates. She studies family migration decisions and shows that families whose heads are looking for work are more likely to move than families whose heads are not looking. Moreover, the unemployed are more likely to move than the employed. Higher area unemployment rates encourage the out-migration of those who are unemployed, but exert little influence on those who have a job. These findings are important and were dependent upon the availability of microdata. They could not have been derived with census data—not even with the census microdata files—because these data fail to report employment status before and after the move; they report only status at the time of the census.[16]

Microdata have also added greatly to understanding of repeat and return migration. A number of recent papers report considerable differences in the behavior of migrants who are moving for the first time compared to those who are returning to their place of origin or moving on to some third location. Such

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[15]For a ubiquitous public good amenity such as climate, the capitalization of its value may initially be mainly in wages. Gradually, its value may become capitalized in rents through city size effects. Because the city may expand in size partly because of the wage effect of the amenity, which increases the profitability of firms locating there, the amenity in this sense drives employment growth.

[16]Using a special tabulation of the 1970 Census PUMS that allows them to identify whether individuals were working full time or part time five years prior to the census, Herzog and Schlottmann (1984) further substantiate DaVanzo's finding. After making adjustments for labor force status, Herzog and Schlottmann are able to infer pre-move unemployment. However, since they do not know exactly when the migrant made his move between 1965 and 1970, they cannot actually infer employment status at the time of the move. Nevertheless, their findings are of interest. They conclude that when other factors are held constant "personal unemployment doubles the likelihood of interstate labor force migration," and that "a significant link exists between migration and post-move unemployment for blue-collar workers who are repeat migrants" [Herzog and Schlottmann (1984, p. 57)].

differences have previously been noted in connection with aggregate migration data [e.g., Kau and Sirmans (1977)], but microdata have allowed better control for the personal characteristics of the various types of migrants.

In the context of a model that emphasizes location-specific human capital and information costs, DaVanzo (1983) uses the 1968–1975 waves of the PSID. She draws four noteworthy conclusions: (1) the more distant the move, the higher is the probability of a repeat move, presumably because information is less reliable at a distance and (2) when unemployment motivates the initial move, return moves are more likely, presumably because financial pressures tend to impair the effectiveness of job search. This finding is similar to that of Herzog and Schlottmann (1982), which was obtained using 1970 Census PUMS data. (3) Household heads who are very young tend to return soon after their initial move, presumably because they are less experienced in making such important decisions and perhaps less informed about opportunities elsewhere. (4) The best educated are likely to move on quickly, presumably because their opportunities are more national in scope and they process information efficiently. Similarly, Herzog and Schlottmann find that a move on to a third location tends to be dictated by income opportunities across space, which seems consistent with DaVanzo's findings for the educated. On the other hand, DaVanzo concludes that less-educated individuals tend to return quickly, presumably because they are correcting earlier mistakes made due to faulty interpretation of information.

Like DaVanzo, Yezer and Thurston (1976) show that the longer the distance of the original move, the higher the rate of subsequent migration. They also show that for South-to-North movers, recent nonwhite migrants have about the same fraction above the poverty level as nonmigrant residents of northern SMSA's, but lifetime nonwhite migrants have significantly higher fractions. Moreover, recent white migrants have considerably lower incomes than lifetime white migrants. Yezer and Thurston then raise an extremely important issue: "The departure of unsuccessful migrants from a destination leaves a residual of successful lifetime migrants. Calculation of the returns to migration based on these individuals alone results in an upward bias" [Yezer and Thurston (1976, p. 702)].

The issue of selectivity bias has many opportunities to arise in migration research. The selectivity bias problem raised by Yezer and Thurston is clearly associated with the remigration phenomenon. It has an important part to play in any attempt to assess the returns to internal migration, and indeed is equally important in the context of the returns to international migration, which is a topic that has attracted much attention in recent years. Dealing with selectivity and censoring problems is rightly popular in labor economics at this time, and one hopes the techniques introduced by Heckman (1976) will soon find a number of important applications in migration research.

Rational economic agents select their chosen alternative because they have some basis for believing that it will yield a higher return than their other options. Consequently, those individuals who select a given alternative are not randomly drawn from the population as a whole. The resulting selectivity bias poses potentially serious problems in many econometric models of human behavior, including attempts to estimate the returns to migration. Nakosteen and Zimmer

(1980, 1982) use microdata on 9,223 employed persons to address directly this type of problem. The data are drawn from the CWHS and refer to workers whose migration status is defined for states and for the period 1971 to 1973. In addition to personal characteristics, including earnings, age, race, sex, industry of employment, and a dummy variable for self-employment, they incorporate two place characteristics in their model, namely, rate of employment growth and rate of growth of per capita income. In their earlier paper they employ a switching regression model that incorporates endogenous switching. The approach entails the estimation of separate earnings equations for migrants and nonmigrants, where the migration decision itself serves as the endogenous selectivity criterion. They then use the fitted values from the earnings equations to estimate the parameters of an equation for the dichotomous decision to migrate.

Nakosteen and Zimmer's reduced-form decision equation clearly indicates that the probability of migration decreases with age, for self-employed persons, and for women relative to men. In the migrant-earnings equation the selectivity variable is not significant, whereas in the nonmigrant-earnings equation it is highly significant. Nakosteen and Zimmer interpret this finding to support the "notion that nonmigrants in the population choose their status because they fail to perceive more favorable returns elsewhere" [Nakosteen and Zimmer (1980, p. 847)]. Using the fitted values from the earnings equation, they then estimate a structural equation for the decision to migrate. Self-employment and increasing age deter migration, and men have a higher probability of migrating than women. Individuals living in states with higher rates of employment growth are less likely to migrate, whereas those in states with a higher rate of growth of per capita income are more likely to out-migrate.[17] Finally and more importantly, Nakosteen and Zimmer conclude that "the most significant factor determining migrant status is the migrant-non-migrant earnings differential . . . the effect of expected monetary gains is to significantly increase the probability of migrating" [Nakosteen and Zimmer (1980, p. 849)]. Although this conclusion is not new or surprising, it is important because it is derived after account is taken of selectivity bias.

4. TEMPORAL STUDIES OF MIGRATION'S DETERMINANTS AND
    CONSEQUENCES

    To date, attempts to analyze the determinants and consequences of interregional migration have almost exclusively been conducted within a cross-sectional framework. The primary and perhaps only reason for this orientation has been lack of appropriate time-series data on migration and certain other variables. This cross-sectional focus has not only prevented research in a temporal context, including examination of lags inherent in the migration process, but has also prevented an assessment of the representativeness of cross-sectional estimates of migration's determinants and consequences. Parameters reflecting the determi-

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[17]The finding that out-migration is greater where the rate of growth of per capita income is higher is consistent with the Graves and Linneman (1979) hypothesis that rising real incomes will cause migration in response to increased demands for location-specific amenities.

nants and consequences of migration may vary both cyclically and secularly, but investigators have generally not been in a position to ascertain exactly how and why.

Certain studies have attempted to identify changes over time in the structure of a cross-sectionally estimated migration model. For example, Gallaway and Vedder (1971) use U.S. census data to estimate a model of interstate migration for each of several years and observe distinct temporal trends in certain of their estimated coefficients. Specifically, destination income elasticities rise over time, whereas distance elasticities show some tendency to fall in absolute value. A shortcoming of this study, which cannot be overcome with census data taken at 10-year intervals, is that shorter-run changes in the estimated parameters, such as may occur over the business cycle, cannot be identified. Moreover, sharp breaks in the temporal pattern of the coefficients are difficult to distinguish both because of the long intervals between observations and because of the general lack of observations for various time spans.

Many countries have little or no temporal detail concerning interregional migration. For certain countries sufficient temporal observations on migration are available, but spatial detail is limited. For example, for the U.S. a 24-year annual series running from 1948 to 1971 is available, but it refers only to migration between the four census regions. Moreover, between 1972 and 1980 the nature of the migration question asked in the Current Population Survey changed to reflect residence as much as five years earlier. Hence, the continuity of the annual series was destroyed. The recent emergence of a limited number of migration time series for the U.S. and other countries has allowed the development of a few studies within a temporal framework. These data have typically been based on administrative records. The *Journal of Regional Science* has played a key role in the publication of papers in this area of research, with the appearance of time-series studies of migration concerned with the United States [Greenwood, Hunt, and McDowell (forthcoming)], Canada [Wrage (1981)], Great Britain [Walsh (1974)], Japan [Tabuchi (1985)], and Italy [Salvatore (1977)].

Lags in Migration Processes

In part because information is costly to acquire and requires time to decipher, migration is likely to respond with a lag to changed circumstances. Moreover, households must typically overcome a high degree of inertia before they make a decision to move. This inertia may be associated with greater certainty concerning conditions in their current locality, which broadly speaking can be referred to as "local human capital." Knowledge about conditions at alternative destinations may be less certain, and thus moves involve risk. Stark and Bloom (1985) characterize this process as one of innovative adoption and diffusion. If a certain destination is judged preferable by an individual or group that subsequently moves to it, a conduit for the flow of information back to the origin is established. This conduit reduces the cost of information concerning the alternative and may reduce the uncertainty of moving to it for those who remain in it. This entire issue has been examined in several papers that leave unanswered an important question posed by Stark and Bloom (1985, p. 176): "Why are some individuals quicker to

migrate than others?" Although this question has apparently not been directly addressed at an empirical level with microdata, an increasing number of studies using aggregate time-series data are beginning to appear.[18] These studies relate to several different countries.

The Japanese Bureau of Statistics reports annual data on migration between 46 prefectures, by reason for migration. For the years 1954–1979 Tabuchi (1985) has aggregated these data into 32 regions and has estimated a simple time-series model where in- and out-migration during t are both functions of in- and out-migration during $(t - 1)$. Three types of migration are analyzed—job transfer and switching, job search and marriage, and return. Lagged in- and out-migration both prove to be important in explaining current in- and out-migration. Moreover, when he tests for dynamic stability and solves for a steady-state equilibrium, Tabuchi finds that the core regions of Japan will continue to gain population through net migration.

Furthermore, Tabuchi uses annual data drawn from the CWHS to replicate his study on the United States. These data refer to the period 1958–1975 and to states. He concludes that in the U.S. the core regions will continue to lose population due to net migration, but he fails to offer an acceptable explanation for why eventually everyone will live in the core regions of Japan, whereas no one will live in those of the U.S. His results must reflect a local rather than a global equilibrium, for wages and rents seem certain to adjust in such a way as to prevent such steady-state solutions as Tabuchi's.

Various migration processes may incorporate lags of less than one year, but the use of annual data precludes their identification. A recent paper by Molho (1984) illustrates the importance of using quarterly time-series data to study migration. In the context of a dynamic model, he employs data drawn from the National Health Services Center Register to study migration between the 10 planning regions of Great Britain. He finds that in the short run unemployment rates significantly affect employment migration, but in the long run the rate of employment growth is the single most important labor-market influence. Molho uncovers "many interesting dynamic responses, implying lengthy and important lags in the estimated relationship" and goes on to stress that "the estimation of pure cross-sectional models are (sic) unlikely to capture fully the complex nature of these relationships" [Molho (1984, p. 333)]. Although Molho's use of quarterly data constitutes an important improvement upon other time-series studies of migration and his findings are suggestive, the study is limited by the availability of only 17 observations taken during the late 1970's.

A second study that utilizes quarterly migration data is that of Drettakis

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[18]Greenwood (1975) provides a discussion of the influence that past migrants have on current migrants, but the studies discussed all use aggregate migration data. A number of micro-based studies using probit or logit are, however, suggestive. If at a point in time certain individual-specific variables increase the probability of migrating, we can infer that individuals with these characteristics would be quicker to respond to the emergence of the expectation of higher utility at some destination. Based on findings to date, increased speed of responsiveness would seem to be associated with lower age, higher education, single marital status, and unemployment.

(1976), who analyzes migration from Italy, Greece, Spain, Turkey, Portugal, and Yugoslavia to the Federal Republic of Germany during the period 1962(1)–1972(2). Drettakis identifies an average one-month lag between the migration of women and the earlier migration of men, but the length of the lag differs from country to country. Moreover, migrants respond rather rapidly to changes in German employment opportunities, with the mean lag for the six countries being less than one quarter. While these findings are suggestive, they refer to a rather special case of guestworkers in West Germany and are unlikely to generalize to broader groups of interest.[19]

Using annual data for the period 1951–1971, Walsh (1974) examines net migration from Ireland to Britain. Wages and unemployment rates are the main explanatory variables. Four alternative models are estimated using as independent variables absolute intercountry differences in wages and unemployment rates, changes in these differences, lagged net migration, or a combination of these. One model is intended to test for static expectations, one for extrapolative expectations, one for adaptive expectations, and one for information flow. All four models perform reasonably well, but the static expectations model is least satisfactory. None of the remaining three models has a clear advantage over the others.

Another temporal study worthy of note is Salvatore's (1977) analysis of migration from southern to northern Italy over the period 1958–1974. Registration is required for a variety of social benefits in Italy, and these population registers form the basis for an annual series of migration data beginning in 1952. Like Walsh, Salvatore uses wages and unemployment rates as the main explanatory variables. Although each variable generally performs well, the unemployment differential variable is statistically significant more frequently than the earnings differential variable. Furthermore, low unemployment rates in the North exerted a stronger influence on migration than high unemployment rates in the South. Perhaps more importantly, Salvatore concludes that "the time horizon in the postwar South-North labor migration is in terms of months rather than years" [Salvatore (1977, p. 407)].

Greenwood and Hunt (1984b) use annual time-series data from the CWHS to examine the role of interregional migration in redistributing incremental national employment to the U.S. South and West. The spatial unit used in this study is the Bureau of Economic Analysis Economic Area, of which 171 are defined for the coterminous U.S., and the time period is 1958–1975. Using time-series data, they estimate models that emphasize the interaction between area employment and net employment migration. Their study shows that the local employment impacts of

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[19]Previously Lianos (1972) pooled time-series ($t = 8$) and cross-section ($x = 4$) data on Greek migration to West Germany, Australia, Canada, and the United States over the period 1959–1966. His model is fairly simple, with changes over the prior year in hourly wage differences in manufacturing and lagged migration from i to j serving as the main independent variables. Lagged migration proves to be a key explanatory variable, and the wage differential variable is also statistically significant. Lianos (1972, p. 432) concludes that "potential migrants respond to monetary incentives with a lag," and he speculates that other lags may exist in the migration process that he has not specifically analyzed. His data are actually too limited to allow him to examine many other lag structures, but this is an appropriate direction for future time-series studies to take.

national employment changes are greater where the migrant-attractive power of another job is greater and/or where the number of jobs resulting from another migrant is greater. Most areas gain a direct share of incremental national employment that is roughly proportional to the area's share of national employment.

Because the large regions of the Northeast and North Central U.S. hold relatively large shares of national employment, relatively much of a given increment of national employment initially accrues to them. However, because the migrant-attractive power of another job is greater in southern and western areas, migrants are drawn to these areas and away from those of the Northeast and North Central regions. Migrant-induced employment, which amounts to about one job per employed migrant, thus tends to accrue to the regions of net in-migration at the expense of regions of net out-migration. When these employment-migration interactions are taken into account, national incremental employment accrues more equally to the South and West compared to the Northeast and North Central regions, which means that the former regions gain a disproportionate relative share of such employment.

In a second paper, using the same CWHS data, Greenwood, Hunt, and McDowell (forthcoming) take a cross-sectional perspective and estimate a model that again emphasizes the interaction between employment change and net employment migration. In this paper, however, the model is estimated for each of 17 consecutive years. Both the migrant-attractiveness of another job and of local wages prove to be closely associated with national economic conditions. The attractiveness of jobs and wages tend to be greater during periods of national economic expansion. This finding is consistent with Ogilvy's (1982, p. 65) observation that in Great Britain "the economic recession which began in 1974 was associated with a general reduction in population mobility." Moreover, Ledent (1983) shows that in Canada annual interprovincial migration varied directly with the national average weekly real wage and inversely with the national unemployment rate.

Greenwood, Hunt, and McDowell (forthcoming) also show that migrants have significantly smaller impacts on local employment during periods of national expansion, which they attribute in part to changes over the cycle in the average quality of the migrant. Direct evidence on changes over time in migrant characteristics is not reported, but such evidence would certainly be worthwhile in a study that attempts to explain the changing impacts of migration over time.

Time-Series Methodologies

As interest in modeling and forecasting migration from a temporal perspective has begun to take hold in recent years, so have methodological approaches that are better suited to the time-series focus. In a seminal paper about financial model building, Brainard and Tobin (1968, p. 99) stress the importance of explicitly considering "the essential interdependencies of markets." They argue that "failure to respect some elementary interrelationships—for example, those enforced by balance-sheet identities—can result in inadvertent but serious errors of econometric inference and policy" [Brainard and Tobin (1968, p. 99)], and they point out

that such errors are equally probable whether the models are of the equilibrium type or are dynamic models of systems in disequilibrium. Alonso (1978a) makes a similar point with respect to migration research. Although research on financial markets has been greatly influenced by this line of reasoning, migration research has only recently begun to incorporate the idea, in spite of the fact that a number of simple interregional demographic identities are evident in many migration models.

Perhaps the most obvious identity of this sort is that net interregional migration within a closed system must sum to zero. In other words, interregional migration is a zero-sum game in that those migrants gained by one region must be lost by another. Regional labor markets are thus clearly interdependent. Greenwood and Hunt (1984a) describe this interdependence in the context of a simple time-series model of migration for the four U.S. census regions. In this context, the "adding-up" constraint refers to the notion that the coefficients on each respective variable, as well as the regression constants, must sum to zero across the equations of the model, where one equation is specified for each region. This condition guarantees that for the system as a whole the predicted values of the dependent variable will sum to zero.

"Homogeneity" refers to a situation in which an equal increase in a given variable in every region results in no net national migration. The idea is that if net in-migration to a region is a function of, say, employment change in that region, it is a function of employment change not only in that region, but also in every other region of the country. "Symmetry" refers to the notion that in the equations for a given pair of regions the coefficients on a given variable for the other region are equal. Thus, for example, another job in the Northeast may deter migration to the West as much as another job in the West deters migration to the Northeast. Homogeneity and symmetry are both testable hypotheses, and if either or both cannot be rejected, corresponding restrictions can be imposed that increase the efficiency of the estimated coefficients and that preserve precious degrees of freedom that are frequently scarce because of the lack of lengthy time-series migration data.

Milne (1981) was perhaps the first to impose adding-up restrictions of the type discussed above in a net-migration model. He employs annual migration data for each of the nine U.S. census divisions for the years 1960 to 1975. His data were developed by means of survival techniques. The Milne study thus incorporates 144 (9 × 16) observations on region-specific migration. He employs variable vectors for wage rates, unemployment rates, and population density. Since he has insufficient degrees of freedom to estimate his full model, he collapses each variable vector from nine elements to two, "own" and "other." For each region other is obtained via a weighting procedure that places heavier weights on nearer regions and that sums weighted values over all other regions. The degrees-of-freedom constraint, in combination with his desire to use three vectors, has forced Milne to place these restrictions on his model in order to reduce each of his three variable vectors from nine to two elements. Moreover, without testing for their appropriateness (again due to lack of degrees of freedom) Milne imposes homogeneity restrictions on all sets of variable vectors.

When Milne estimates his model by Zellner's Seemingly Unrelated Regression method, he finds that the own wage is positive and significant for all divisions except the West South Central. The other wage rate is negative and statistically significant for only three divisions. The own unemployment rate is negative and significant for all but one division (West North Central), and the other unemployment is positive and significant for all but one division (also West North Central). Milne then links his migration model to a multiregional macroeconomic model and performs a set of simulation exercises designed to determine the behavior of the Northeast's net migration under different national growth scenarios. One of the appealing features of Milne's approach is that it guarantees local consistency in the sense that net national migration must sum to zero. His simulation experiments show that, if over the 1979–1989 period the national economy were to grow at a rate 1 percent faster than predicted, net out-migration from the Northeast would slow.

Statistics Canada publishes time-series data for the 10 Canadian provinces. These data are drawn from family allowance payment statistics and are available both annually and quarterly beginning in 1961. Foot and Milne (1984) employ an approach like that adopted by Milne (1981) earlier. The results, which are estimated for 1961–1979, are generally strong and as expected. Perhaps because the Canadian data are superior to those used by Milne for the U.S., the Canadian model performs generally somewhat better than that for the U.S. Based on their findings, Foot and Milne conclude that the multiregional approach is quite promising.

Ledent (1983), following Alonso's (1978a) earlier work, has used essentially the same Canadian data as Foot and Milne and has estimated a systems model that formally constrains the coefficients to satisfy internal consistency. In this model regional in- and out-migration are functions of economic conditions prevailing elsewhere in the system. Major focus is on the influence of wage rates and unemployment rates. Like Foot and Milne, Ledent uses a weighting procedure to develop a composite measure of the forces that affect migration. Using constrained seemingly unrelated regressions, he estimates the model for two different periods, 1961–1962 to 1982–1983 and 1961–1962 to 1977–1978. The results are generally supportive of the approach. Own wage rates are generally negative and other wage rates are positive, whereas own unemployment rates are positive and other unemployment rates are negative. In certain respects, however, the results differ appreciably for the two periods. For example, the influence of wage rates elsewhere is positive and significant for Quebec in the 17-year sample, but negative and significant in the 22-year sample. No good rationale is given for such differences.

5. SUMMARY AND CONCLUSIONS

During the last 10 years a number of important real-world issues have arisen concerning U.S. internal migration patterns. The reversals of southern net out-migration and nonmetropolitan net out-migration have many important implications, and the initial reaction to them was to subject the phenomena to descriptive scrutiny. Did the reversals really occur? If so, when? What specific areas of the country were responsible? The array of new information brought to bear on questions like these has been impressive and has certainly increased our under-

standing of what has happened. Many hypotheses have been offered regarding why these changes occurred, but we have not been as successful in providing answers. During the same period several important theoretical and empirical innovations have occurred in migration research. Certain methodological advances have also been made, but these have typically been adopted from some subdiscipline where they have been refined.

Two types of new data have been particularly helpful in allowing empirical advances in migration research—(a) microdata and longitudinal data, and (b) time-series data, which tend to be aggregate. The availability of microdata has had several important consequences. (1) Studies using microdata have allowed the influence of personal characteristics on migration behavior to be better measured and understood. Employment status is an important characteristic that has been usefully analyzed in recent years. (2) Such data have also allowed an improved focus on the decision-making unit, be it the family, household, or individual. (3) Microdata have allowed better account to be taken of prior migration experience as an influence on current migration behavior. (4) Such data, expecially those longitudinal in nature, have permitted some movement in the direction of studying important life-cycle influences on migration decisions. (5) Measurement of the returns to migration has been central to migration research, and the availability of microdata has permitted the development of far more meaningful implications than had hitherto been possible. Important work remains to be done on life-cycle influences on migration, and selectivity and censoring bias in measuring the returns to migration seem important to take into account. Moreover, to the extent that the equilibrium thesis is valid, amenity values are embedded in migrant wage changes, and measurement of the returns to migration is greatly complicated. The development of data sets with good migration histories would also contribute significantly to the study of life-cycle influences on the decision to migrate.

The endogeneity of many of the determinants of migration has been more widely recognized during the last 10 years, and simultaneous-equations models of migration's causes and consequences have found a more prominent place in the literature. Such models have now been applied to migration within many countries other than the U.S. However, certain relationships central to understanding why people migrate have not been sufficiently analyzed. Probably the most obvious of these relationships is growth of jobs. Far too many migration models completely ignore changes in job opportunities. Moreover, the manner in which local residents may respond to job opportunities through decreased unemployment and increased labor force participation, and the way in which this response may buffer the attractiveness of jobs for migrants have gone almost totally unnoticed. In general, the differential migrant attractiveness of employment opportunities in various regions of the U.S. is just now beginning to be recognized. We need to know more about this relationship, as well as why the migrant-attractive power of incremental jobs differs in the various regions. Finally, little is currently known about the differential impacts that the characteristics of migrants have on employment and earnings opportunities for others at both origin and destination localities. For example, the impacts of retirement migration and of migration of the educated are not well understood.

The importance of location-specific amenities in explaining interregional migration has received considerable attention in recent years. The idea that migration occurs within an equilibrium system has not only caused increased emphasis on new explanatory variables, but has also caused a reconsideration of the manner in which traditional explanatory variables are defined. More work remains to be done in this area. The extent to which wage differentials are compensated by location-specific amenities requires added attention.

To date, little has been done concerning the functional form of migration equations. Studies of aggregate migration continue to commonly involve linear and double-log forms. In an exploratory and suggestive study, Goss and Chang (1983) show considerable differences in the estimated coefficients of a migration model depending upon the precise nature of the functional form specified. More work along these lines is needed.

The availability of time-series data on migration has also allowed important new developments. Dynamic models of migratory behavior have begun to appear. A beginning has been made in understanding the lag structures inherent in migration flows, but much remains to be learned concerning these structures. A potentially serious problem inherent in working with lags in migration models is that, due to the selective nature of migration, places experiencing in- and out-migration change not just quantitatively, but also qualitatively. Hence, simple partial adjustment mechanisms may not adequately reflect the changes that occur from period to period. Considerably more thought needs to be directed at this problem.

Time-series data allow the application of modern techniques to migration forecasting, but little work has yet been done in this area. The recent application of econometric methodologies that account for restrictions inherent when migration occurs within a closed system have been important and promise to allow the development of migration forecasts that are at least internally consistent. One of the remaining difficulties in forecasting migration is the inability to forecast well those variables that drive migration.

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