Migration up and down the urban hierarchy and across the life course

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In this article, we begin by reviewing the concept of step migration that originated in E. G. Ravenstein's seminal papers ''The Laws of Migration'' (1885, 1889). As a result of the forces of the Industrial Revolution underway in 19th century Great Britain, migrants moved from farms to villages, from villages to towns, from towns to county seats, and thence to large cities. Throughout much of the industrialization era in the United States, net population movements similarly were upward within the urban hierarchy, and step migration today remains widespread throughout much of the still developing world. Our investigations of recent data and trends, however, suggest that the latest U.S. migration-pattern regime is a strongly contrasting one. Many of the major movements in the system of internal (or domestic) migration are flows down the urban hierarchy, although we note highly differentiated patterns for persons and households at specific stages of the life course. We make use of the newly defined metropolitan and micropolitan Core-Based Statistical Areas (CBSAs) and a seven-level size typology to tabulate origin-destination-specific migration flow data from both Census 2000 and IRS tax-return administrative records for the period 1995–2000. We discuss the causes for net movements being either upward or downward in the national urban hierarchy, including the effects of spatially focused immigration, and movement preferences at various ages, including migration in young adulthood associated with entering and leaving college and the military, as well as moves characteristic of the stages of family formation, childrearing, and retirement.

population trends | metropolitan areas | micropolitan areas

In 1885, Ravenstein (1) published the first of two seminal papers titled "The Laws of Migration." Using census data on individuals' places of birth versus their places of current residence, he identified characteristic structures in the streams of population movement underway in the British Isles during the industrial revolution. A number of his migration "laws," as well as the approach of analyzing human migration from a system-flow perspective, are still in use today. Among the enduring empirical regularities Ravenstein (ref. 1, p. 191) noted are these:

> We have already proved that the great body of our migrants only proceed a short distance, and that there takes place consequently a universal shifting or displacement of the population, which produces "currents of migration" setting in the direction of the great centres of commerce and industry which absorb the migrants. . . .
>
> It is the natural outcome of this movement of migration, that. . . [t]he inhabitants of the country immediately surrounding a town of rapid growth, flock into it; the gaps thus left in the rural population are filled up by migrants from more remote districts, until the attractive force of one of our rapidly growing cities makes its influence felt, step by step, to the most remote corner of the kingdom.

Urbanization and rural-to-urban population displacements by means of the type of "step migration" Ravenstein described were predominant aspects of the streams of population movement in the United States as the national urban system was formed during the industrialization era, from the late 1800s through *ca*. the 1950s. Rural-to-urban and step migration continue today to be the predominant flows in many of the world's developing countries.

In his "hypothesis of the mobility transition," Zelinsky (2) set forth the migration analog to the demographic transition theory (3). The demographic transition refers to the lowering first of birth rates and later death rates as economic development takes place within a society. Zelinsky suggested that patterns of internal migration in a country should also shift as different stages of economic development are attained. Rural-to-rural movement (e.g., frontier expansion and agriculturally or other resource-based settlement) should initially predominate but then give way to rural-to-urban net migration when industrialization draws workers to manufacturing jobs in cities. Subsequently, after an integrated urban system has developed, migration should become primarily urban-to-urban.

In the 1970s, empirical findings of higher rates of nonmetropolitan than metropolitan population growth within the United States (4–6) and the growth of smaller urban areas in the peripheral rather than core regions of many of the world's most developed nations (7–10) led to speculation about a possible fourth stage of the mobility transition, namely "counterurbanization" (11): In postindustrial societies, might many persons find it economically feasible as well as desirable to escape heavily congested regions of the most intense agglomerations in favor of smaller town or even rural living environments? Within the United States, the post-1970s trends in terms of metropolitan versus nonmetropolitan growth rates have oscillated, with, for instance, the largest metropolitan areas seeming to assert dominance once again in the 1980s, followed by a revival of nonmetropolitan growth rates in the early 1990s (12) and an intensification of growth within smaller, especially amenity-favored "micropolitan" areas by the late 1990s (13, 14).

In this research, we examine the most recent structure of migration flows up and down the U.S. national urban hierarchy. We present reasons why a majority of the net movement is now from more to less populated areas and why this structure of flows differs so radically from the pattern of step migration first documented by Ravenstein.

Data and Methods

Most academic research and discussion about recent shifts in growth trends have been based either on estimates of aggregate county-level population change or on overall net migration levels. Because of ongoing deficiencies in U.S. migration data resources (15), studies have generally not been able to take the

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Abbreviation: CBSA, core-based statistical area.

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Table 1. The seven hierarchical levels of metropolitan areas and their total or core population ranges

Metropolitan area	Total or core population range
Mega-metropolitan	2,500,000+ in urbanized area core
Major metropolitan	1,000,000+
AAA metropolitan	500,000–999,999
AA metropolitan	250,000–499,999
A metropolitan	50,000–249,999
Micropolitan	10,000+ in urban cluster core
Non-CBSA counties	No urban cluster ≥10,000

"currents of migration" perspective originated by Ravenstein to examine origin-destination-specific streams of movement upward and downward within the urban hierarchy.

County-to-county migration flow estimates produced at the U.S. Census Bureau permit us to examine the gross and net movements of population up and down the national urban hierarchy. These Census/IRS data (16) are fundamental inputs to the Bureau's annual population estimates program. They are derived from matching income tax returns, i.e., the social security numbers of filers and their filing addresses listed on their returns for consecutive years.[e]

We aggregated the publicly available county-to-county migration flow files for 1995–1996 through 1999–2000[f] up to the scale of the new Core-Based Statistical Areas (CBSAs) recently adopted by the Office of Management and Budget (17) as constituting the nation's official metropolitan and micropolitan statistical areas.[g] We then experimented with a variety of size-based classifications of CBSAs before selecting a seven-level hierarchy. We use five size groups of metropolitan statistical areas. Additionally, we assume all micropolitan statistical areas to constitute another group. Finally, we combine all non-CBSA counties to obtain the final and least intensively urbanized level of our hierarchy.[h] Metropolitan areas contain urbanized area cores of high density settlement containing minimum populations of 50,000. Micropolitan areas contain urban cluster cores of ≥10,000 but <50,000 people. Non-CBSA counties contain no urban cluster of 10,000 or more. The seven hierarchical levels of metropolitan areas and their total or core population ranges are shown in Table 1.

With this seven-level, size-based hierarchy, there are 42 possible directions for net migration to take between any pair of levels. In any real migration system, only half of these net flows will be present. It is possible to represent the net balance of the migration exchanges between all units of different size class with a proportional arrow graph with differing width of arrows used to show quantities pertaining to the volume or saliency of the various net exchanges. Fig. 1 shows such a graph representing the general expectation for a "Ravenstein-type" migration system,

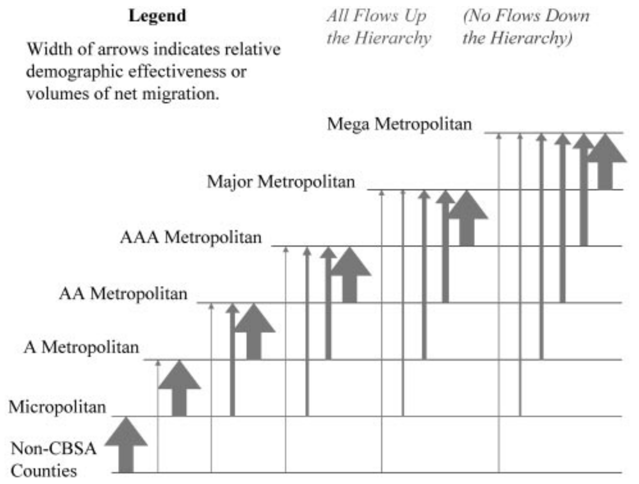

Fig. 1. A Ravenstein migration system. All net migration goes up the micropolitan/metropolitan spectrum, with the largest net flows the step migration between adjacent levels of the hierarchy.

one like that in Industrial Revolution–era Great Britain in which all net migration exchanges point up the micropolitan/metropolitan spectrum. Here, more migrants move in the direction of the larger-sized urban units than move in the opposite direction, and the biggest inflow for any level is that for its exchanges with units of the next smaller size (the "step" effect).

Results

Recent Structure of Net Exchange Up and Down the Urban Hierarchy. How have recent U.S. migration patterns actually been structured? As shown in Fig. 2, by contrast to the hypothetical Ravenstein-type system, 1999–2000 net migration in the U.S. forms a kind of "wedding cake" graph, with, on balance, more net flow down rather than up the urban hierarchy. Here, 13 of the 21 arrows point downward whereas only 8 go upward. Note that, because the data exclude persons not listed on tax returns, we choose to report the relative rather than the absolute sizes of the net migration exchanges between levels of the hierarchy. The numbers shown are percentages of the total net migration taking place between all 21 pairs of levels.

By far the largest displacement of population between urban units of these varying sizes was the substantial exodus from the mega-metropolitan areas (those with urbanized area core re-

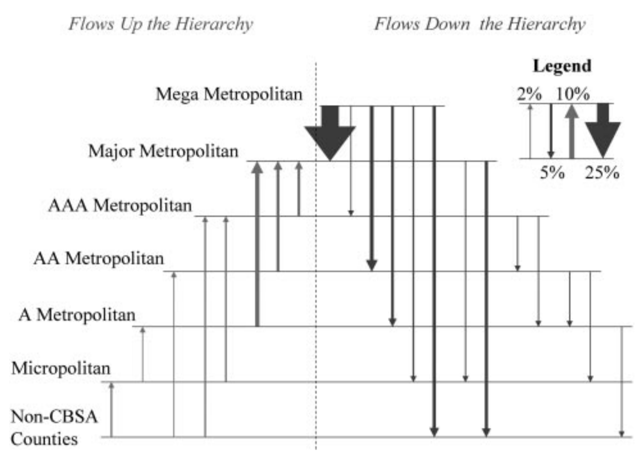

Fig. 2. Relative volumes of net migration flows up and down the micropolitan/metropolitan spectrum, 1999–2000. Percentages shown are of total net migration between all levels of the hierarchy.

[e]If a filer lists an address in a different county than on the previous year's return, the household is assumed to have migrated. The number of migrants is determined based on the number of exemptions claimed for spouse, children, and other dependents.

[f]These years were ones in which consistent methodology was employed by the Population Division staff at the Census Bureau in producing county-level migration estimates.

[g]Because our research was begun in 2001 before the final adoption of the new units and tabulation of Census 2000 commuting data and subsequent population estimates that have led to revisions of the CBSAs, our tabulations are for a first set of experimental units produced as part of the comprehensive review that led to the adoption of the new Office of Management and Budget rules. The boundaries of these units are in most cases very similar to the units that have subsequently been adopted for future official purposes. Note that the Census 2000 results were themselves all released by using older metropolitan statistical area definitions and not the new CBSA system that includes micropolitan as well as metropolitan statistical areas. See ref. 18 for details.

[h]Unlike the previous round of metropolitan area definition, no official size classes were adopted by the Office of Management and Budget.

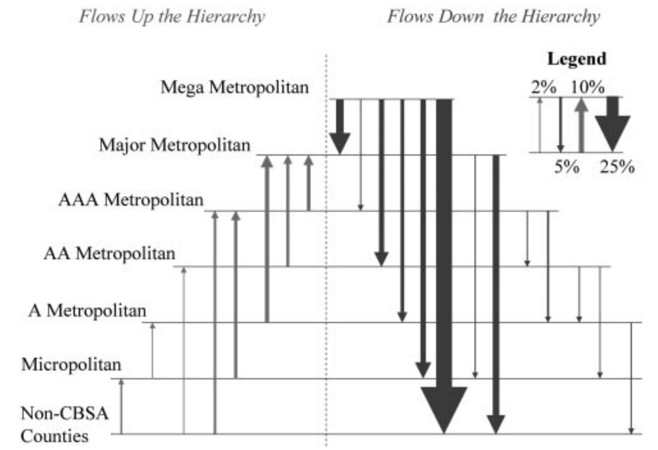

Fig. 3. Percentage demographic effectiveness of migration flows up and down the micropolitan/metropolitan spectrum, 1999–2000. A rate of 100% effectiveness means all gross flow is in one direction; 0% means gross flows upward and downward are equal in volume.

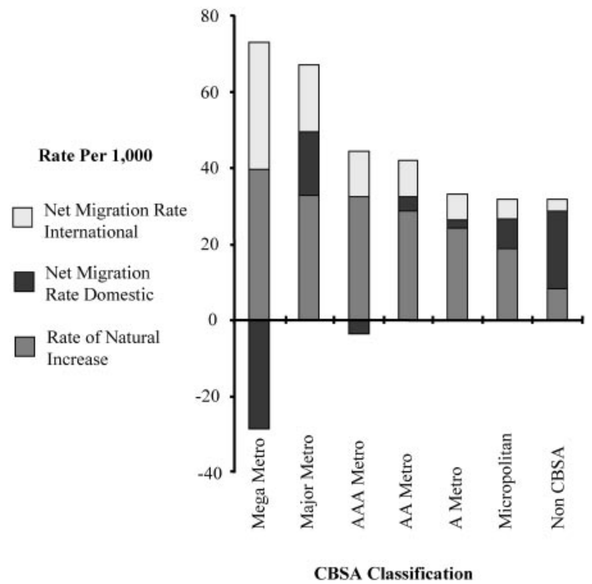

Fig. 4. Components of county population change, 1995–2000.

gions of 2,500,000 or more) down to the next biggest size class, the major metropolitan areas (those with ≥1,000,000 total population but <2,500,000 million in their densely settled cores). Such movement accounted for more than one-third of the total population shifts among the various levels of the hierarchy during 1999–2000.

Major metropolitan areas were also gaining significant population by means of upward movements from all three other metropolitan size classes (the A, AA, and AAA levels), whereas they were losing population, on balance, to the lowest levels of the hierarchy: micropolitan areas and non-CBSA counties.

A third major characteristic is that population was being gained by both micropolitan areas and non-CBSA counties from the largest metropolitan agglomerations, the mega and major categories, with the net exchanges all of the way from the top two levels down to the bottom level being particularly substantial ones.

Fig. 3 presents a somewhat different picture of the saliency of net population exchanges downward within the national urban system. Here, the widths of the arrows are proportional to the percentage demographic effectiveness (or "efficiency") of the migration streams and counterstreams. Demographic effectiveness is a widely used measure of the unidirectionality of movement within a migration system (19–22). The demographic effectiveness e_{ij} of the migration flows m_{ij} and m_{ji} between counties classified at any pairs of levels i and j of the hierarchy is calculated as

$$e_{ij} = 100 n_{ij}/t_{ij}, \quad [1]$$

where $n_{ij} \equiv m_{ij} - m_{ji}$ is the net exchange and t_{ij} is the total exchange (23). Thus, demographic effectiveness hypothetically varies from 0%, if the flows in both directions are equal in size, to 100%, if there were to be migration flow in one direction only.

Fig. 3 illustrates that the most unidirectional flows recently have been those from the very top of the hierarchy to the very bottom, those from the mega-metropolitan areas to non-CBSA counties. Although we saw in Fig. 2 that the largest absolute volume of net migration was that from the largest (mega) metropolitan areas down to the next largest (major) metropolitan areas, there was substantial movement in the opposite direction as well, making that exchange only the second most demographically effective in the system. The next two most effective interchanges were, however, also downward ones: those from major metropolitan areas to non-CBSA counties and from mega-metropolitan areas to micropolitan areas.

Although a full explanation of the myriad of economic and social factors underlying the current and recent patterns of migration in the U.S. lies outside the scope of the current article, we wish to present some demographic perspectives that help explain the patterns of net migration up and down the urban hierarchy. Specifically, we point to the roles of immigration, natural increase, and differing age compositions of the various streams of internal migration.

Population Pressure. Fig. 4 illustrates that internal migration is part of a broader demographic context of population change. An area can also gain or lose population because of net migration from abroad or because of natural increase, the difference between the number of births and deaths taking place within that area. Regional labor supply, wage rates, competition for and the affordability of housing, other costs of living, traffic congestion, and environmental quality are all affected by "population pressure," regardless of whether growth is a result of domestic migration, immigration, or natural increase.

The Disequilibrium Role of Spatially Focused Immigration. In recent decades international in-migration (immigration) has come to assume a much more significant role in influencing U.S. regional demographics and economics. As a result of high immigration rates in recent decades, the foreign-born population has risen to account for more than 1 in every 10 U.S. residents (24). The number of foreign-born has increased from just 9.6 million in 1970 to 31.1 million in 2000 (25). In part because immigrants are typically young adults and because of higher foreign-born than native-born birth rates, the percentage of the nation's population under age 25 that is foreign-born has tripled: from 7% in 1970 to 21% in 2000.

It can be seen in Fig. 4 that, just as with internal or domestic migration, rates of immigration and natural increase vary widely across our seven urban size classes. However, unlike domestic net migration (which structurally must sum to 0 for the country as a whole), rates of international migration and natural change are positive across all seven CBSA size categories. The rates of both immigration and natural increase get progressively higher as one moves up the CBSA hierarchy, and they are highest for the very largest metropolitan areas, which include all of the main "gateway" cities where most immigrants initially settle.

A comparison of domestic and international migration across our micropolitan/metropolitan spectrum is revealing. The large net outflux of domestic migrants that we noted earlier for the mega-metropolitan statistical areas is almost exactly matched by international net in-migration. A considerable literature and debate have developed recently concerning this phenomenon and whether it represents "white flight" and a demographic "balkanization" of America (26) or not (e.g., ref. 27). Much of the analysis has focused on California and, in particular, the Los Angeles region, which experienced a massive net out-movement of internal migrants in the early 1990s (28). The outflux in the 1990s from the southern portion of the West Coast was so intense that the overall net direction of internal movement in the country, perhaps for the first time in U.S. history, was eastward rather than westward (29). A depressed economy and overinflated housing markets are usually cited among the leading contributors to this exodus. Johnson (30) provides some interesting evidence that the phenomenon was not necessarily white flight. Although the proportions of whites in the out-migration streams from California were higher than in California's resident population itself, analysis of 1991–1999 Current Population Survey data shows roughly the same percentage (71%) of whites in California's domestic in- and out-migration streams. The out-migration streams, however, were substantially more heavily Latino, at 15%, than were the domestic in-migration streams, at 10% (ref. 30, p. 5).

Major metropolitan areas, in sharp contrast to the mega-metropolitan areas, have been experiencing high net in-migration in both the domestic and the international categories. Continuing down the hierarchy, the rates of net immigration fall progressively lower. There has not been the elevation in rates evidenced for domestic in-migration at the micropolitan and non-CBSA levels.

A further interesting aspect of the spatial focusing of immigration and its relationship to domestic migration trends is the marked differences in rates of net domestic and net international migration for central versus outlying counties. We calculated the relative ratios of international in-migration rates for central versus outlying counties. Moving downward in the hierarchy, these rates decline from a high of 6 for major and AAA metropolitan areas to 3.5 for A metropolitan areas. The mega-metropolitan statistical areas, however, provide a major exception to the overall trend of larger categories of metropolitan areas having greater relative concentrations of immigrants within their central as opposed to outlying counties. We used a tripartite breakdown for these largest metropolises that discloses the highest rate of net international in-migration is to the least central constituent counties. Although the intra-metropolitan patterns of immigrant location may still be clustered ones, given the large size of mega-metropolitan immigrant communities, suburban locations are proving to be viable alternatives to (perhaps costlier) central city neighborhoods.[i]

The Role of Differential Birth and Death Rates. Natural increase (at an annual average of almost 1,600,000 during 1995–2000 compared with perhaps 900,000 net immigration) is still the larger component of population growth for the country as a whole. Fig. 4 shows that natural increase is also the largest component of change for six of the seven CBSA size classes. The exception is the lowest size class, counties that lie outside of metropolitan or micropolitan areas; these non-CBSA counties have very low rates of natural increase (RNIs). There is an inverse relationship between size and rates of natural increase. The RNI for mega-metropolitan statistical areas is more than double the rate for micropolitan statistical areas and ≈5 times higher than the rate for non-CBSA counties.

The reasons for the relationship between size and natural increase can be seen when the RNI is broken into its constituent components. Crude birth rates become progressively larger as one goes up the hierarchy. By contrast, there is an inverse relationship between population size and death rates. Age structure likely plays a major role in helping explain both of these facts, with the geographies of retirement migration and immigration reinforcing these proclivities. Older populations are found in rural and some micropolitan and smaller metropolitan counties, whereas the major and particularly mega-metropolitan areas have the largest percentages of young adults and children. Note that today the pattern is the opposite of the historical link between large families and young populations and agrarian rural regions.

The Importance of Life-Course Events and Age Composition in Internal Migration Streams. The second demographic factor we highlight with respect to current patterns of net domestic migration up and down the CBSA hierarchy is the increasing importance of stage in the life course in influencing migration propensities and destination choices. An examination of age-aggregate total net migration alone misses the rich and variegated patterns of internal movements exhibited by persons within different cohorts.

Some of the overall patterns that we have noted, such as the large and demographically effective streams of net exchange all of the way down the hierarchy from mega-metropolitan areas to micropolitan or non-CBSA counties, are, in fact, being driven by a preponderance of migrants in specific age groups, in this case, retirees. At the same time, others of the net flows portrayed in Figs. 2 and 3 are derived from a more complicated blending of movers from several demographic groups. In some instances, certain groups are even moving counter to the overall net migration stream.

A case in point is the movement of the young, single, and college-educated population exposed in special tabulations of Census 2000 long-form migration data reported by Franklin (31). From those 1995–2000 figures, we calculated net migration rates by metropolitan size classes[j] for the persons included in her study (all of whom were between the ages of 25 and 39, had never married, and, at the time of the census, held bachelor's or graduate degrees). Metropolitan statistical areas of 2,000,000 or more and those between 1,000,000 and 2,000,000 are the only classes of metropolitan areas experiencing net in-migration of the young, single, and college educated (average rates of 109.9 and 35.5 per 1,000, respectively). Most of the in-movement action focused on the very largest urban areas. Going down the size hierarchy, average net migration rates are all negative, and out-migration becomes progressively more prevalent with fewer individual metropolitan statistical areas able to attract more in-migrants than they lose as out-migrants. Metropolitan areas with <100,000 population had the highest net out-migration (average rate, −231.9).

To provide a more comprehensive picture of recent movement patterns across the life course as well as up and down the national urban hierarchy, we used the Census 2000 special county-to-county migration data (32) to calculate age-specific net migration rates for all 5-year age groups and for each of our seven tiers

[i]Tables documenting the intra-metropolitan results may be obtained upon request from the corresponding author.

[j]These size classes necessarily pertain to the old metropolitan definitions used to tabulate the results of Census 2000 and for the special monograph from which the data are taken. Similar results would likely be attained were it possible to use the new CBSA definitions instead.

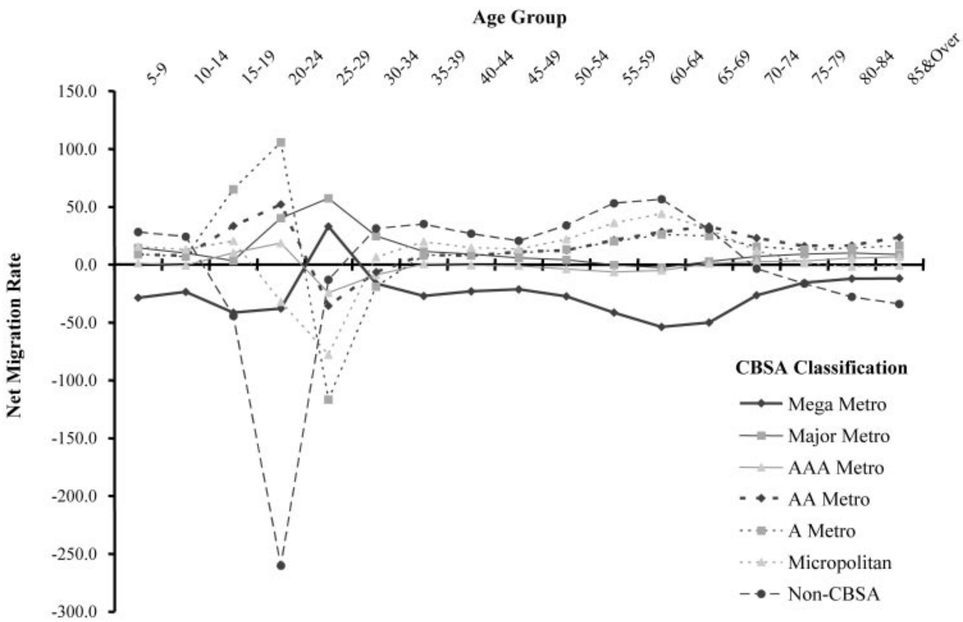

Fig. 5. Net migration rates by 5-yr age group by CBSA hierarchy level, 1995–2000. Note that the ages shown are those of respondents on the 2000 census date; moves could have taken place as much as 5 years earlier, so the average ages at time of move are roughly 2.5 yr younger than the ranges indicated.

of CBSA units.[k] Fig. 5 shows the results. The differences in the average levels of the lines of the graph reflect the differences we have previously noted in overall net migration by size class. Thus, the mega-metropolitan line shows net out-migration for 16 of the 17 total age groups,[l] and it actually lies below all of the others for 10 groups. In addition to their average levels, however, each of the lines also exhibits interestingly different characteristic undulations corresponding to key life-course events. These differing rates are evidence of very different preferences for settlement sizes at different ages.

In line with our observations about the young, single, and college-educated, the mega line reflects positive net in-migration for all young adults in the 25–29 year age group in 2000. This age group moves counter to the overall primary direction of flow, which is downward in the hierarchy.

By contrast, the mega line dips to its lowest net out-migration levels for the retirement or pre-retirement cohorts: persons in their late 50s and 60s. Many of these persons migrate to non-CBSA counties and micropolitan statistical areas; the lines for these groups display upward bulges mirror-imaging the downward dip in the mega line. Retirees, no longer tied down by jobs in the big cities, act on preferences for lower-density living environments, less congestion, higher natural amenities, and cheaper housing. The elderly provide a good deal of the current dominant downward momentum in the migration system, although they are not the only ones moving to smaller agglomerations.

The age groups for which the lines crisscross one another in a most dramatic, almost spaghetti-like fashion, are those for persons 15–19 through 25–29. Overall age-specific mobility rates are highest among these age groups, and this age span contains many of the critical life-course events that impel individuals to migrate. Although at an earlier period of history many of the young-adult life-course events might typically take place synchronously, today, departures from the parental home, career initiation, family formation, and childbearing may well be spread over a decade or more. Young people who leave their hometowns for another location to attend college or enter the military tend, like retirees, to move down the hierarchy; however, when they subsequently leave, they largely migrate back upward away from the smaller CBSAs where many universities and bases are found.

During the mid-career and childrearing years, there are also important trends in terms of net movements down the urban hierarchy. The 30–34 and 35–39 age groups exhibit a strong pattern away from the major and mega-metropolitan areas. For childrearing and mid-career-stage adults, housing costs, school quality, and suburban road congestion are all major concerns, and such persons act on a preference for less populated areas. All three of the "minor" metropolitan classes register small but positive net migration rates for these groups. The net in-migration rates, however, are higher still for micropolitan areas and highest for non-CBSA counties, a rank ordering that holds true all of the way up through the retirement ages.

Discussion

Our results confirm and extend the findings of an earlier study (33) that examined the age schedules of 1985–1990 migration streams between Bureau of Economic Analysis (BEA) economic areas (EAs, extended metropolitan regions including both urbanized cores and rural hinterlands). Age profiles of inter–BEA EA streams were found to cluster into six major types based on where in the life course the streams exhibited their most pronounced peaks and valleys compared with the U.S. average age schedule. The average populations of origin and destination areas in each "flow cluster" were found to vary widely and in accord with the interpretations we offer here.

Additionally, these results suggest that much of the recent attention paid to the importance of place amenities and quality of life (QOL) for migration decision-making misses the boat if it fails to embed considerations of stage of the life course. At different ages, the valuations of amenities and disamenities differ greatly. Differing bundles of positive and negative at-

[k]In this case, we used the official Office of Management and Budget-approved CBSA units as defined based on 2000 population counts and Census 2000 commuting data.

[l]There are no data for persons under age 5. The long-form question from which the data were derived asked for place of residence as of April 1, 1995. Persons under age 5 in 2000 had not been born on April 1, 1995.

tributes are offered by settlements in different size classes. Any overall aggregate QOL measure, such as the widely reported rankings of metropolitan areas in *Places Rated* (34), is not only somewhat nonsensical, it most assuredly will not be a good predictor of migration behavior (35).

We conclude that, unlike during the Ravenstein/industrialization era, there is no longer a "universal shifting" of population. During the current postindustrialized age, economic and social forces seem to be impelling some groups of people to move downward within the national urban hierarchy, whereas at the same time others find it desirable to move from smaller to larger agglomerations. Academic research needs to move away from modeling "the" migration decision and "the" migrant. Migration reflects qualitatively and quantitatively different determinants at the various key stages of the life course. No longer are most migrants excess laborers in rural areas flocking, by steps, into rapidly industrializing cities; today's U.S. internal migrants are people who find themselves in the wrong places at the wrong times in their lives. At some ages, large agglomerations hold key advantages; at others, sparsely settled environments are preferable. Increasingly, people make adjustments in their location reflective of their changing circumstances as they experience and anticipate the next stages of life.

The research reported herein was begun during 2001–2002 while the first two authors were, respectively, visiting contract researcher and intern, Population Distribution Branch, Population Division, U.S. Census Bureau. We thank John Long, James Fitzsimmons, and Michael Ratcliffe for making the project possible, as well as numerous other Census Bureau colleagues. This report is released to inform interested parties of ongoing research and to encourage discussion. The views expressed on methodological issues are those of the authors and not necessarily those of the U.S. Census Bureau.

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