

## INTERNAL MIGRATION IN DEVELOPED COUNTRIES

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### Contents

1. Introduction	648
2. What is migration?	650
3. Selected facts about internal migration in developed countries	651
3.1. Cross-national comparisons of migration propensities	651
3.2. Age/education and migration	655
3.3. Trends in migration	656
4. The determinants of migration	658
4.1. The importance of place characteristics: early contributions	659
4.2. Gravity and modified-gravity models	663
4.3. Distance	666
4.4. Theoretical perspectives on migration	668
4.5. Employment status and migration	681
4.6. Personal characteristics and life-cycle forces in the decision to migrate	688
5. Conclusions	707
References	712

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## **1. Introduction**

Residential mobility and migration are pervasive facts of life in most developed countries. Long and Boertlein (1976) estimate that as of 1970 the average American made almost 13 residential moves over the life course. Average residents of Britain and Japan were estimated to have made, respectively, eight and seven such moves. The US Bureau of the Census (1991) reports that between March, 1989, and March, 1990, 17.9% of the US population one year old and over changed houses and 6.6% migrated in the sense that they also changed their county of residence. In most advanced societies interregional migration is a major mechanism through which labor resources are redistributed geographically in response to changing economic and demographic forces.

As migration has become relatively commonplace, it has given rise to numerous policy concerns in both developed and developing countries. These concerns have run the gamut from too much regional in-migration (and how to control it) to too little (and how to encourage it) and from too little regional out-migration (and how to stimulate it) to too much (and how to dampen it). Not surprisingly, as these policy concerns have been raised, the migration literature has grown enormously, although few direct links have ever been drawn between policy tools, such as migrant subsidies and regional employment policies (Bartik, 1991), and internal migration.

The migration literature can be classified in a number of ways, but perhaps the most convenient classification scheme distinguishes two broad areas of research, one dealing with the determinants and one dealing with the consequences of migration. Of course, some studies treat both the determinants and consequences within the same framework. The vast majority of migration research concerns the determinants of migration. This orientation has been strengthened during the last 20 years by the availability of microdata, which at least until now have been used far more to study migration's determinants than its consequences.

The "determinants" of migration are the factors that affect migration, including characteristics both of places and of persons and their families. The term refers to the qualitative and the quantitative importance of each factor. Place characteristics are specific to a given area, such as employment and wage opportunities, the presence of family and friends, and location-specific amenities. Personal and family characteristics help shape individual and family responses to opportunities that may exist at different locations. The "consequences" of migration refer both to the performance of migrants in their new locations relative to a benchmark, such as their presumed performance in their former place of residence had they not moved, and to the impacts that migrants have on others in sending and receiving areas.

Traditionally, research on the determinants and consequences of migration has addressed several questions:

(a) Who migrates? Such characteristics as age, education, race, income, and marital status have been extensively studied for some time (Ravenstein, 1885; Thomas, 1938).

(b) Why do these people migrate? This question has led to numerous studies of the determinants of migration, where in certain cases the determinants have been inferred from largely descriptive studies (Ravenstein, 1885) and in other cases formal models of the migration decision process have been estimated (Greenwood, 1975a). A limited number of attempts have been made to analyze the determinants of migration in a laboratory experimental setting using techniques from cognitive psychology (Greenwood et al., 1994). Many determinants have been studied, such as wage differentials, job opportunities, unemployment rates, local public spending and its mix, and location-specific amenities.

(c) Where are the migrants coming from and where are they going? This question has led not only to detailed descriptions of the spatial patterns of migration flows, but also to a focus on how place characteristics have influenced the flows. Because many public agencies are concerned with future population levels, and because migration is an important mechanism through which population is redistributed geographically, the issue of where migrants are coming from and where they are going has led to substantial interest in forecasting the migration component of population change (e.g., Smith and Sincich, 1992).

(d) When do they migrate? The timing of migration flows has been studied, but not to the extent of the questions raised above. For example, as today's developed countries experienced their demographic transitions, which generally refer to changed birth and death rates, they almost certainly also experienced a migration transition of which rural-to-urban movement and perhaps international migration were major parts. Moreover, national business conditions affect different regions differently, triggering migration (Milne, 1993). Just as cohort effects have been found to be important in other areas of demographic research, they may also be important for migration, but this issue has been studied very little.<sup>1</sup>

(e) What consequences result from migration? This question has been addressed at two levels. The first deals with the migrants themselves, where the emphasis has been on the benefits to migrating, often measured in terms of earnings gains. Although migrant outcomes fit in a discussion of the consequences of migration, this literature has typically been discussed in the context of the determinants of migration, because rational individuals act on their expectations regarding various outcomes. The second deals with migration's impact on others in the origin and the destination. Do migrants depress local wages in receiving areas and displace local residents from jobs? To the extent that migrants tend to be young and well-educated, does migration deprive

<sup>1</sup> As pointed out by Greenwood et al. (1991), two aspects of the cohort effect seem particularly relevant – volume and timing. The volume of internal migration almost certainly changes as large cohorts, such as the baby boom, mature through those age classes with high migration propensities (Greenwood, 1988). However, the timing of migration may also be affected by cohort size, but this potentially important issue has been almost completely neglected.

source regions of critically needed human capital that ensures these regions of long periods of economic stagnation? This study treats the first type of consequence in some detail, but not the second, which although potentially important, has not been studied in sufficient depth regarding internal migration.

Many studies have aimed primarily at describing migration flows. Such a description of migration phenomena can provide a useful background for a discussion of the determinants and consequences of migration because if theories and empirical analyses of migration are any good, they ought to provide explanations of observed migration behavior. The present study is organized with this thought in mind.

Much literature has concerned migration in less-developed countries, as well as international migration. The literature on these topics has a decidedly different orientation than that concerned with internal migration in the US and other advanced industrial nations. For example, much of the literature concerned with less-developed countries focuses on rural-to-urban migration (Todaro, 1976; Stark, 1991). That concerned with international migration has many strands, with the so-called "brain drain" literature standing out, along with numerous studies dealing with immigrant assimilation or adaptation in the receiving country (Greenwood and McDowell, 1986). Issues concerning language abilities are much less important in the context of internal than international migration. Many noteworthy studies deal with these areas of migration research, but because they are featured elsewhere in this volume, they are not considered here. A sizable literature also concerns migration of the elderly, which because it is treated elsewhere in the volume is ignored in this paper.

## 2. What is migration?

In part because migration cannot be defined or measured as precisely as births and deaths, migration research has long been the stepchild of demographic research (Kirk, 1960). The United Nations manual, *Methods of Measuring Internal Migration* (1970), has served as the basis for several definitions of migration and migrants.<sup>2</sup> This document proposes the following definitions:

A migration is defined as a move from one migration-defining area to another (or a move of some specified minimum distance) that was made during a given migration interval and that involved a change of residence. A migrant is a person who has changed his usual place of residence from one migration-defining area to another (or who moved some specified minimum distance) at least once during the migration interval (United Nations, 1970: p. 2).

<sup>2</sup> K.C. Zackariah prepared the first draft of the U.N. manual, and H.T. Eldridge, S. Kono, H.S. Shryock, and D.S. Thomas made contributions to the manual, which does not carry the author's names on the title page.

Shryock and Siegel suggest that in defining a migrant “the minimum distance might be set at the point at which commuting to work becomes so time-consuming and expensive as to require the substitution of a change of residence” (Shryock and Siegel, 1976: p. 374).

Migration may be defined and measured in many different ways, but obviously an operational definition must be developed if migrants are to be identified and the number of migratory moves is to be measured. A committee formed by the Population Association of America and made up of a number of migration experts defined migration as follows:

Most statistical offices in the United States “define” *migration* as a relatively permanent change of residence that crosses jurisdictional boundaries (counties in particular), measured in terms of usual residence at a prior point in time, typically 1–5 years earlier. Local moves within jurisdictions are referred to as *residential mobility* (Population Association of America, 1988: p. 1).

If another word were substituted for “counties”, this definition could apply to almost any country. However, certain operational definitions of migration are not defined on the basis of usual place of residence, but rather migrants are identified as persons who change the jurisdiction of their place of work.<sup>3</sup> Migration also may be defined in terms of a change of both place of residence and place of work.

In many instances the intercounty or interjurisdictional definition of migration is problematic because moves frequently cross the relevant political boundaries but remain in the same labor market and are thus more like residential moves than migration. Consequently, the US government, as well as the central governments of other nations, provide migration data for regions that approximate labor market areas (e.g., in the US, Metropolitan Statistical Areas and Bureau of Economic Analysis Economic Areas).

### 3. Selected facts about internal migration in developed countries

#### 3.1. Cross-national comparisons of migration propensities

In most countries people migrate from one place to another in pursuit of increased utility resulting from better employment opportunities, higher wages, a preferred bundle of amenities, and many other factors discussed in more detail below (Greenwood, 1975a, 1985). Although differences between countries in internal migration rates are not extensively documented, certain developed countries, specifically

<sup>3</sup> The Social Security Continuous Work History Sample (CWHS) is an example of migration data formulated on a place-of-work basis. The US government no longer maintains the CWHS.

the US and Canada, have long been thought to have somewhat higher rates than others (Nam et al., 1990). Several problems have prevented comparisons of internal migration rates across countries and consequently have hindered efforts to explain cross-national differences in such rates.

International comparisons of internal migration rates are difficult to make for several reasons. First, various countries define migrants differently in terms of whose movement is being considered (e.g., total population versus noninstitutional population), in terms of the type of border they must cross (e.g., municipality, county, state, province), and in terms of the interval over which the movement occurs (e.g., one year, five years, since birth). Second, the method of measuring migration differs widely. In some countries censuses are the main source of information concerning migration, whereas in others population registers and other types of administrative records (e.g., tax records, family allowance records) are the major source. Third, the size and shape of the spatial areas between which migration is measured are not uniform either within or between countries. Migration is known to decline as distance increases. Thus, for larger spatial areas more internal moves will fail to cross a relevant boundary and therefore will not be reflected in the migration measure. Fourth, migration propensities are sensitive to national economic (Greenwood et al., 1986) and demographic (Greenwood, 1988) conditions, and consequently even if internal migration were measured over the same time interval in various countries, which often is not possible, interregional migration propensities could differ for behavioral reasons. These behavioral differences would be useful to study in a cross-national context if the other conditions noted above were met.

Three sources are particularly relevant for describing international differences in mobility and migration rates: (1) the work of Long at the US Bureau of the Census: Long (1988: Chapter 8), Long (1991, 1992), Long et al. (1988), and Long and Boertlein (1976); (2) a set of country studies in Nam et al. (1990); and (3) a series of country studies published under the auspices of the International Institute for Applied Systems Analysis during the late 1970s and early 1980s.<sup>4</sup> For comparative purposes, Long (1991) and Long and Boertlein (1976) are the most useful.

The most unambiguous method of making cross-national comparisons of mobility is to focus on residential moves. The obvious problem with this approach is that residential mobility includes more than what is commonly regarded as migration. Nevertheless, such measures are meaningful to compare, and based upon them rates of mobility vary widely across developed countries. Furthermore, residential mobility data for a handful of countries allow for certain distinctions that better reflect migration. These distinctions are of two types: (1) intraregional moves versus interregional

<sup>4</sup> The most relevant of these studies for developed countries are Rees (1979) concerning the United Kingdom, Termote (1980) concerning Canada, Koch and Gatzweiler (1980) concerning the Federal Republic of Germany, Sauberer (1981) concerning Austria, Nanjo et al. (1982) concerning Japan, Long and Frey (1982) concerning the US, Ledent (1982) concerning France, and Campisi et al. (1982) concerning Italy.

Table 1  
Percentage of population residentially mobile in selected developed countries, circa 1971  
and 1981

Country	Percent moving in one year		Percent moving in five years	
	1971	1981	1971	1981
Australia	NA	17.0	NA	47.1
Austria	NA	NA	NA	20.1
Belgium	NA	7.3	NA	NA
Canada	NA	NA	46.6	47.6
France	NA	9.4	NA	NA
Great Britain	11.8	9.6	NA	NA
Ireland	5.1	6.1	NA	NA
Israel	NA	NA	NA	29.8
Japan	12.0	9.5	NA	22.6
Netherlands	NA	7.7	NA	NA
New Zealand	15.3	19.4	37.5	45.3
Sweden	NA	9.5	NA	NA
Switzerland	NA	NA	NA	36.0
US	18.7	17.5	47.0	46.4

*Source:* Long (1991: Tables 1 and 4).

moves, and (2) moves that are short of some threshold distance versus moves that are at least as far as the threshold distance.

Examining 1980 or 1981 one- and five-year measures of residential mobility for 16 countries, Long (1991) shows that rates of movement are quite high for Australia, Canada, New Zealand, and the US (Table 1). A second group of developed countries that is far behind these four includes France, Great Britain, Israel, Japan, Sweden, and Switzerland. Belgium, Ireland, and the Netherlands have the lowest rates of residential mobility.<sup>5</sup> In an earlier paper, using data on mobility over a one-year interval, Long and Boertlein (1976) show that around 1970 a representative cohort would make 12.91 lifetime moves per person in the US, 8.22 in Britain, and 7.35 in Japan. They go on to argue that an average resident of Australia, Canada, and the US would probably make three to four times more moves over the life course than the average resident of Ireland.

As a means of disentangling migration from residential moves that do not involve migration, Long (1991) and Long and Boertlein (1976) distinguish between purely local moves, moves between areas within a state or province, and moves between states or provinces. Because both local areas (e.g., counties for the US, localities for Canada) and states/provinces differ in size and shape, the internal migration figures provided in Table 2 are not strictly comparable. Nevertheless, since they give a rough

<sup>5</sup> Observed differences could be due in part to differences in population age distributions. However, standardizing for age has little effect on comparative mobility rates.

Table 2  
Percentage of population moving within and between local areas<sup>a</sup> in selected developed countries, circa 1971 and 1981

Country	Total		Within local areas		Between areas	
	1971	1981	1971	1981	1971	1981
<i>One-year interval</i>						
Great Britain	11.8	9.6	NA	NA	NA	NA
Ireland	5.1	6.1	3.1	3.2	1.2	2.1
Japan	12.0	9.5	8.3	6.9	3.7	2.6
New Zealand	15.3	19.4	NA	NA	NA	NA
US	18.7	17.2	11.4	10.4	6.5	6.2
<i>Five-year interval</i>						
Canada	46.6	47.6	23.8	24.9	18.6	20.2
New Zealand	37.5	45.3	NA	NA	NA	NA
US	47.0	46.5	26.2	25.1	19.2	19.5

<sup>a</sup>Local areas are counties in Ireland and the US, prefectures in Japan, and localities in Canada.

Source: Adapted from Long (1991: Table 4).

indication of short-distance versus long-distance moves, the measures reported in Table 2 come closer to reflecting migration. Based on one-year measures, the US stands out as having high rates. Based on five-year measures, the US and Canada have high internal migration rates, but roughly comparable data for other countries are not readily available.

Another method of making international comparisons of migration rates is to focus on distance moved. Unfortunately, as shown by Long et al. (1988), the appropriate measures can be developed for very few countries and for the countries for which such measures can be developed, the time-frame of migration differs somewhat. These authors report that per thousand population, 46 persons moved 50 km or more in the US (1975–1976), 24 in Sweden (1974), and 15 in Great Britain (1980–1981).

Why do residential mobility rates and rates of internal migration differ so widely across developed countries? Many factors that influence internal migration rates are discussed below, and in addition to these international differences in the underlying data and in the responsiveness to the various forces may be responsible for observed differences.<sup>6</sup> Moreover, Long and Boertlein (1976) suggest that countries like the US,

<sup>6</sup>The “demographic transition” refers to the changes that occur in birth and death rates as a country passes from a traditional to a modern society. Such a transition almost certainly also involves changes in the volume, composition, and average distance of migration (Zelinsky, 1971; Parish, 1973). Thus, differences across countries in internal migration rates could be due broadly to differences in the stage of development of the various countries.

Canada, and Australia (and presumably New Zealand) are nations of immigrants, which they feel may cause a "long-run dynamic" to develop that encourages long-distance movement. They also argue that these countries had histories in which a frontier played an important role and in which public policy actively encouraged movement to less densely populated regions. In his later paper, Long (1991) suggests that differences in housing opportunities may distinguish the US, Canada, Australia, and New Zealand. Housing markets are not as controlled in these countries, and the availability of land and building materials at low cost have encouraged the construction of new dwelling units and home ownership, which have conditioned the populations of these countries to move more frequently.

A distinct pattern is evident among the countries for which Long (1991) has computed rates of residential mobility and migration, as reported in Tables 1 and 2. The countries demonstrate a positive rank pattern between geographic size and mobility rate. For small countries the array of alternative destinations is more limited, particularly at longer distances, which are nonexistent. As a consequence of the shorter distances to alternative destinations, residents of smaller countries may find commuting to be a more viable substitute for migration. Migration in smaller countries also may be more inhibited by cultural factors. Moreover, whatever the size of the country, the primacy of the largest urban areas could be important. Apparently no formal tests have ever been performed to determine why migration rates differ across countries, and thus the various reasons remain speculative.

### 3.2. Age/education and migration

One of the most universal mobility relationships is that between age and migration. Migration propensities peak during the early to mid-twenties and then decline steadily, with a slight upturn at retirement age in some countries (Plane, 1993). Another important relationship, less-well documented than that between age and migration but no less universal, is that migration propensities rise with education.

For US flows between 1980 and 1985, Table 3 shows migration propensities cross classified by five age classes and six education groups. Except for the group with the least education, migration propensities are highest for the 25–29-year-old group and decline steadily thereafter. Data on US migration by single year of age indicate that the peak propensity often occurs in the 18–24-year-old group, usually at 22 or 23 years of age depending upon the specific year. Similar relationships have been observed for other countries, frequently peaking in the early twenties (e.g., the Netherlands, Vergoossen (1990); Japan, Otomo (1990); Canada, Ledent (1990)).

With one exception, for each age class migration propensities rise with education (Table 3). For the group with five or more years of college relative to that with 0–8 years of elementary school, migration propensities range from 4.6 times as high (25–29 years old) to 2.0 times as high (45–64 years old). Although the precise quanti-

Table 3  
Propensities to migrate interstate in the US, 1980–1985, by age and education

Education	Age <sup>a</sup>				
	18–24	25–29	30–34	35–44	45–64
Elementary					
0–8 years	8.21	7.02	6.74	4.37	3.78
High school					
1–3 years	9.33	12.50	9.30	5.61	3.94
4 years	11.31	13.10	9.83	7.33	4.84
College					
1–3 years	10.12	15.67	11.60	10.75	6.84
4 years	24.13	25.32	16.54	12.97	7.19
5 years or more	29.04	32.24	21.67	14.06	7.71

<sup>a</sup>The base population is the relevant number of nonmovers over the 1980–85 period, plus out-migrants.  
Age is defined as of 1985.

Source: Calculated from data presented in US Bureau of the Census (1987: Table 17).

tative relationships are no doubt somewhat different for other developed countries, the qualitative relationships are almost certainly similar to those for the US.<sup>7</sup>

### 3.3. Trends in migration

In part due to the strong relationship between age and migration, trends in the spatial distribution of population in the US have undergone dramatic changes during the last 25 years. Two trends particularly stand out. First, 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. Second, during the 1970s 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. This latter phenomenon was not unique to the US. Vining and Kontuly (1978) show that, during the 1970s, in 11 of 18 countries either the direction of the net population flow from less densely populated regions to the core regions reversed, or a sharp reduction occurred in the level of the net flow.

<sup>7</sup> For Canada, Ledent (1990: Table 3.5B) provides a table similar to Table 3 that indicates generally consistent migration propensities by age and education.

In the US the maturing of the baby boom through young and highly mobile age classes almost certainly played an important role in both the regional shift and non-metropolitan to metropolitan migration turnaround (Greenwood, 1988). Due to the baby boom, the number of persons at high risk to migrate increased greatly. Moreover, lagging employment opportunities in certain regions of the US combined with rapidly rising opportunities in other regions gave the baby boom an incentive to migrate (Greenwood and Hunt, 1984). Other developed countries also experienced baby booms coincident with that of the US, but regarding these countries few efforts have been made to link internal migration to the baby-boom phenomenon.

Whereas the maturing of the baby boom greatly increased the number of persons at high risk to make interregional moves in the US, at the same time an offset occurred when propensities to migrate declined secularly for those age classes with the highest migration propensities. For example, the annual propensity of persons 20–24 years of age to make an interstate move was 0.091 during 1960–61, 0.089 during 1970–1971, 0.058 during 1980–1981, and 0.059 during 1990–1991.<sup>8</sup> Virtually no formal modeling has been done to address such declines, but the underlying reasons are almost certainly related to major societal trends. One possible cause is the steady decline in marriage rates among the young, who have a high propensity to migrate due to marriage.<sup>9</sup>

Rogerson (1987) hypothesizes that declines in age-specific migration rates in the US are due to an Easterlin phenomenon. That is, large generations such as the baby boom have low average mobility due to relatively low expectations regarding future labor force participation and unemployment of the spouse. Moreover, Long (1988) argues that increased labor force participation of wives, slow economic growth during the 1970s, and difficulties in housing markets (e.g., high mortgage rates) reduced migration rates. These assertions remain untested hypotheses.

During the last 25 years internal migration rates have also fallen in several developed countries. For example, between 1970–1971 and 1985–1986, the Canadian interprovincial migration rate declined from 18.4 to 14.3 per thousand (Ledent, 1990). Between 1970 and 1985 the interstate migration rate in the Federal Republic of Germany fell from 18.5 to 10.5 per thousand (Friedrich, 1990), and during the same period the interprefectural rate in Japan declined from 41.1 to 25.9 per thousand (Otomo,

<sup>8</sup> The annual interstate migration propensity of the 30 to 34 year-old class was 0.059 during 1950–1951, declined to 0.038 during 1960–1961, rose to 0.055 during 1970–1971, and fell again to 0.035 during 1990–1991. Comparable propensities for the 35 to 44-year-old class fell gradually between the early 1950s and the early 1980s, but rebounded during the early 1990s. Plane and Rogerson (1991) track the migration propensities of various US birth cohorts over limited time intervals.

<sup>9</sup> Of married males 16 to 24 in 1980 and living with their wife, 14.9 percent made an interstate move between 1975 and 1980, but only 9.3% of other males in the same age class made such a move. A distinction should be made between the event of marriage and the state of marriage. The event of marriage encourages migration, but the state of marriage discourages it, *ceteris paribus*. See Greenwood (1981) for a more detailed discussion.

1990). The rate at which males changed their municipality of residence in the Netherlands between 1973 and 1983 declined from 53.8 to 38.7 per thousand (Vergoossen, 1990). Again, such declines have not been addressed in a rigorous way, but cohort and period effects ought to be studied where appropriate data are available.

#### **4. 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 responses to utility differentials that may arise from these different characteristics. Given an individual's personal characteristics, including accumulated job 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 may enter into many decisions. Conceivably, the potential for natural (e.g., earthquakes in California) and technological (e.g., nuclear waste repositories) hazards could affect migration decisions. Moreover, the values of such amenities/disamenities may be reflected at least partly 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, aging, and leaving home of children, home ownership, and retirement – are critical in an individual's or a family's decision to migrate. Other personal circumstances, often related to the life cycle, are also important, such as employment status, earnings, education, accumulated skills, age, job tenure, sex, and health.

Many potentially important migration determinants have been studied very little to date. For example, the influence of health on migration barely has been touched, and the effects of institutional impediments such as employer-sponsored health insurance are only just beginning to attract attention.<sup>10</sup> The influence of natural hazards like earthquakes and the influence of man-made hazards like the presence of nuclear wastes have been addressed infrequently. Moreover, subjective beliefs about risk may

<sup>10</sup> Holtz-Eakin (1993) uses data from the Panel Study of Income Dynamics to examine the influence of nonportable health insurance on worker mobility. He finds that individuals with employer-provided health insurance are less likely to switch jobs than those without it, but he suggests that such insurance may simply reflect better jobs. When he extends his study to include spousal insurance and also accounts for skills of both spouses, he finds little evidence of "job-lock", even for those in poor health. Notwithstanding these results, certain nonqualifying illnesses almost certainly inhibit mobility due to the nonportability of health insurance. The value of the foregone fringe benefit would in many cases require a substantial compensatory offset, which would make the marginal migrant (for whom the benefits of migrating just equal the costs of doing so) require a higher wage payment.

influence migration decisions, but these types of influences rarely have been examined empirically.<sup>11</sup> The types of migration models typically estimated by economists and sociologists are not well-suited to studying the effects of risk perceptions on migration. At least one type of approach used in cognitive psychology and in some marketing studies may hold promise for analyzing such determinants of migration (Greenwood et al., 1991a, 1994).

Studies of the determinants of migration commonly have been formulated in the context of individual utility maximization, with the expected utility hypothesis at least implicitly underlying most studies. Some attention has also been given to the family or the household as the decision-making unit. Models based upon such behavioral foundations frequently have been estimated with aggregate data relating both to migrants and to the determinants of migration. Before the general availability of micro and longitudinal data, virtually all applied migration research was of necessity based on aggregate data. Although aggregate data were and are limiting in many respects, they did not prevent a boom in migration research during the 1960s and 1970s. Moreover, even in the presence of many microdata sets, aggregate data are frequently studied today. Not only are aggregate trends and tendencies of interest in their own right, but also for many countries such data are all that is available. Thus, because much still can be learned from studying aggregate data and because they will remain a major source of information concerning migration, some attention to the use of aggregate data is appropriate.

#### *4.1. The importance of place characteristics: early contributions*

Early papers dealing with the determinants of migration employed neither formal models of the migration decision process nor formal statistical techniques. Rather, these studies were mainly descriptive in style and inferential in tone; their findings were in certain instances powerful, insightful, and anticipatory of later migration research.

One of the earliest examples of a paper dealing with the determinants of migration is Ravenstein's (1885) "The Laws of Migration". Using the 1871 and 1881 census place-of-birth data, Ravenstein examined internal migration in the UK. After an exhaustive descriptive analysis, he listed seven conclusions that he called "laws". (1) Most migrants move only a short distance and then typically to major cities. (2) Rapidly growing cities are populated by migrants from nearby rural areas. In turn, the "gaps" left in the rural population are filled by migrants from more distant areas. (3) The process of dispersion is the inverse of the process of absorption and exhibits

<sup>11</sup> Risk in migration decisions has been addressed theoretically for some time (David, 1974; Stark, 1991), and search-theoretic models of migration are fairly common (Herzog et al., 1993). However, empirical studies directly addressing risk, such as Rosenzweig and Stark (1989), are unusual.

similar features. (4) Each main current of migration produces a compensating countercurrent. (5) Long-distance migrants tend to move to major cities. (6) Rural people have a higher propensity to migrate than urban people. (7) Women have a higher propensity to migrate than men. Although he did not formally or specifically adopt what was to become the “gravity law” of spatial interaction, Ravenstein clearly anticipated this law by recognizing that most migrants move only a short distance and that migrants tend to move to major cities.

Ravenstein leaves little doubt that he believed employment and wage opportunities were the major determinants of migration: “In most instances it will be found that they did so (leave their homes) in search of work of a more remunerative or attractive kind than that afforded by the places of their birth” (1885: p. 181) (parentheses are mine). Later he wrote that “the call for labour in our centres of industry and commerce is the prime cause of those currents of migration” (p. 198). He did, however, recognize that the motives for migration are “various” (p. 181). In a later paper by the same title, Ravenstein (1889) studied migration in several European countries, as well as the US and Canada. Again based on descriptive analysis, his conclusions were generally supportive of his earlier “laws”, although he recognized that the rate of internal migration in the US was relatively quite high.

During the 1920s and especially during the 1930s, considerable interest was directed at migration phenomena in both the US and the UK, and the nature of this research began to take on a decidedly more formal tone, although descriptive analysis remained the primary research methodology. For example, Makower et al. (1938, 1939, 1940) published a series of papers in *Oxford Economic Papers* that was extremely insightful. These authors used data from the Oxford Employment Exchange, which reported the number of persons who entered the unemployment insurance system in various specific places other than Oxford and who were residing in Oxford in 1936.<sup>12</sup>

Two “incentives” to migrate received particular attention in the work of Makower et al.: unemployment differentials and distance. They defined the “relative unemployment discrepancy” as “the ratio of the difference between the unemployment rate in the county (or Division) and the unemployment rate in the whole country, to the unemployment rate in the whole country” (Makower et al., 1939: p. 81). They argued further that “the greater the mean deviation of relative unemployment rates ... the greater would be the total amount of migration measured as a percentage of the population of the whole country” (1939: p. 81). Makower et al. went on to show that “there was a very clear correspondence between variations in the relative unemployment of the county and variations in the gains and losses by migration” (1939: p. 82).<sup>13</sup>

<sup>12</sup> Thomas (1934, 1937) had previously used Employment Exchange data.

<sup>13</sup> “Gains and losses” refers to net internal migration (corrected for international migration).

Although Makower et al. are not credited with the development of the gravity law of spatial interaction, they clearly laid out the same concepts: "Quite a close relationship was found between discrepancies in unemployment rates and migration of labour where allowance was made for the size of the insured population and the distance over which migrants had to travel" (Makower et al., 1938: p. 118). These authors even computed a distance elasticity of migration, which they called the "coefficient of spatial friction": "an increase of distance by 1 per cent reduces migration by from 1.6 per cent to 2.1 per cent." (1938: p. 106).<sup>14</sup>

Makower et al. (1939, 1940) also considered the time lags inherent in migration, as well as the relationship between aggregate economic activity and migration. They concluded that the lag between "incentive to move and migration" was short, certainly not more than 18 months, but more likely about six months for Great Britain as a whole, and between zero and six months for migration to Oxford. Moreover, their analysis indicates that mobility declined during slumps and rose during recoveries and that moves over short distances were less sensitive to national economic conditions than moves over long distances.

At the same time considerable attention was being directed at US internal migration. In 1924 the Social Science Research Council appointed the Committee on Scientific Aspects of Human Migration. As an outgrowth of the Council's interest in migration, C. Warren Thornthwaite published *Internal Migration in the United States* (Philadelphia: University of Pennsylvania Press) in 1934, followed by Carter Goodrich et al.'s *Migration and Economic Opportunity* (Philadelphia: University of Pennsylvania Press) in 1936, and Dorothy Swaine Thomas's *Research Memorandum on Migration Differentials* (New York: Social Science Research Council) in 1938. At the time of their publication these were extremely useful analyses of US internal migration, though the methodologies remained descriptive in style. Particularly the work of Thomas on "migration differentials" confirmed much of the earlier work of Ravenstein. However, Thomas went well beyond Ravenstein by considering "family status differentials", "physical health differentials", "mental health differentials", "intelligence differentials", "occupational differentials", and "differentials in motivation and assimilation" in what is a comprehensive review of then existing migration literature.<sup>15</sup> Goodrich's work stressed the notion that migration was a response to changing job opportunities. This work also provided a useful description of patterns of

<sup>14</sup> Interestingly, Makower et al. started with individual records that indicated sex, age within broad age class (14–15, 16–18, 18–21, 21–65), industry of employment before and after the move, and county of origin. Today such microdata no doubt would be analyzed themselves, but these investigators aggregated the data by county of origin presumably because microdata were rare, techniques for their analysis were not yet developed, and consequently the econometric analyses of microdata were also very rare.

<sup>15</sup> In two appendices, Thomas provides annotated bibliographies that contain 119 American and English contributions and 72 German contributions to the migration literature. Her entries, which may have been influenced by her discipline (sociology) suggest that prior to her writing in the 1930s, migration research was primarily in the domain of sociology, which is a valid conclusion in any case.

US internal migration, beginning with data from the 1850 census, which was the first US census to provide migration data classified by place of birth (i.e., lifetime migration data).

The premier migration study conducted during the 1950s and early 1960s was also carried out at the University of Pennsylvania. The three-volume work, *Population Redistribution and Economic Growth United States, 1870–1950*, had a number of widely-recognized participants, including C.P. Brainerd, R.A. Easterlin, H.T. Eldridge, S. Kuznets, E.S. Lee, A.R. Miller, and D.S. Thomas.<sup>16</sup> The study, which was directed by Kuznets and Thomas, is a detailed, state-level analysis that like most earlier migration research is descriptive in style and inferential in tone. The basic notion that underlies the study is that “the distribution of a country’s population at any given time may be viewed as a rough adjustment to the distribution of economic opportunities” (Kuznets and Thomas, 1957: p. 2). In this sense, the study is a logical extension of Goodrich’s earlier work, which had the same type of theme. One of the main hypotheses of the study is that technological progress critically affected the sectoral and spatial distribution of economic activity. Moreover, the rapidity with which the changes occurred allowed little room for the vital processes of births and deaths to play an important role in adjusting population to altered economic opportunities. Migration had to provide the main impetus. Another important aspect of this study was its emphasis on the selective nature of migration, especially long-distance migration and migration between dissimilar places.

Data were clearly a problem that prevented migration research from blossoming. The availability of only lifetime migration data in the US Census was especially limiting. Not until 1940 did the Census include a question on past residence at a fixed date (1935), and not until 1950 did the Census report migration cross-tabulations by age.<sup>17</sup> Spatial detail at the county level required that migration be estimated by the survival method.<sup>18</sup> The resulting net migration data caused a strong orientation during the 1930s and 1940s toward migration of the rural-farm population. Although the creation of these net-migration data required some sophistication, analyses remained descriptive (Bernert, 1944a, b).

During the late 1940s, the Current Population Survey (CPS) began asking place of residence 1 year earlier, which resulted in an annual series of US migration data that could be disaggregated to the four Census regions. In many respects, the period of descriptive migration research reached its peak in 1964 with the publication of Henry S. Shryock, Jr.’s *Population Mobility within the United States* (Chicago: University of Chicago). This book provided a truly detailed descriptive analysis of existing CPS

<sup>16</sup> The three volumes are Lee et al. (1957), Kuznets et al. (1960), and Eldridge and Thomas (1964).

<sup>17</sup> Shryock (1964) provides a useful history of the collection and reporting of US migration data.

<sup>18</sup> The survival method of measuring internal migration refers to applying survival rates to a population from  $t$  to  $t + 1$  and comparing the “expected” population, assuming zero net migration, to the “actual” population measured or estimated at  $t + 1$ . The difference is assumed to be due to net migration, but could be due to other factors as well.

data, as well as 1940 and 1950 Census data. However, even before this book was published, a new day had begun to dawn on migration research. The first survey of which this author is aware that yielded usable microdata on migration was conducted in 1960.

#### 4.2. Gravity and modified-gravity models

During the 1960s, the main thrust of migration research began to take on a decidedly more formal tone that has continued to the present. Most of the research was not formal in a theoretical sense, but rather intuitively generated hypotheses were at first tested formally in an econometric sense with aggregate data, typically but not always with place-to-place migration data. These aggregate models of migration frequently were specified in the context of modified gravity models. The models are "gravity type" in that migration is hypothesized to be directly related to the size of relevant origin and destination populations, and inversely related to distance.<sup>19</sup> The models are "modified" in the sense that the variables of the basic gravity model are given behavioral content, and additional variables that are expected to importantly influence the decision to migrate are included in the estimated relationship.

Modified gravity models that become common in the migration literature beginning during the 1960s add several additional variables to those of the basic gravity model. Thus, we now commonly find studies of place-to-place migration that take the following form:

$$\begin{aligned} \ln M_{ij} = & \ln \beta_0 + \beta_1 \ln D_{ij} + \beta_2 \ln P_i + \beta_3 \ln P_j \\ & + \beta_4 \ln Y_i + \beta_5 \ln Y_j + \sum_{n=1}^m \beta_{in} \ln X_{in} + \sum_{n=1}^m \beta_{jn} \ln X_{jn} + e_{ij}, \end{aligned} \quad (1)$$

where the  $Y$  terms refer to income. Other variables that are commonly included (as

<sup>19</sup> During the 1940s Princeton astronomer Stewart noted that the distance to his students' home towns seemed to behave like the Newtonian law of gravitation. Thus, Stewart (1941) expressed the gravity law of spatial interaction as  $f = GP_i P_j / D_{ij}^2$  where  $F$  = gravitational or demographic force,  $G$  = constant,  $P_i$  = population of origin  $i$ ,  $P_j$  = population of destination  $j$ , and  $D_{ij}$  = distance between  $i$  and  $j$ . This relationship states that "demographic" force is directly related to origin and destination population size and inversely related to the square of the distance between them. If the square on the distance term is replaced by  $\alpha$  and the relationship is placed in the migration context by substituting migration from  $i$  to  $j$ ,  $M_{ij}$ , for  $F$ , we get  $M_{ij} = GP_i P_j / D_{ij}^\alpha$ . If this model is expressed in double-log form, it suggests that the population parameters are equal to 1.0, meaning that a 1% increase in origin or in destination population results in a 1% increase in migration from  $i$  to  $j$ . This assumption is clearly restrictive, and the population elasticities are subject to empirical tests. Thus, the gravity model can be written as  $M_{ij} = GP_i^{\beta_1} P_j^{\beta_2} / D_{ij}^\alpha$ . In this form, the values of  $\beta_1$  and  $\beta_2$  can be freely estimated, and the hypothesis that they are equal to 1.0 can be tested. This basic form of the gravity model was tested rarely because little additional effort was required to specify and estimate the more appealing modified gravity model.

reflected in "X" terms above) are unemployment rates, degree of urbanization, various climatological amenity variables, various measures of public expenditures and/or taxes, and many other factors. For certain variables, some models contain only origin characteristics, such as median age or median number of years of schooling, which are meant as proxies for the characteristics of the population from which the migrants are drawn. Modified gravity models hold an important place in the migration literature because their formulators tried to incorporate behavioral content in the context of the gravity-model approach. These efforts subsequently led to formal models of the migration decision process such as those reflected in many studies that incorporate microdata. Moreover, such models included a mix of disequilibrium and equilibrium notions that anticipated the later, more rigorous development of the equilibrium hypothesis as related to migration.

The connection between modified gravity models and the migration decision process has not always been tight. The dependent variable in modified gravity models is meant to proxy the probability of moving from  $i$  to  $j$ . However, the denominator of the dependent variable frequently has been population measured at the beginning or end of the migration interval. Such a measure falls short of reflecting the population at risk to make a move from  $i$  to  $j$ .<sup>20</sup>

Modified gravity models are frequently estimated in double logarithmic form, presumably because this functional form yields reasonably good fits and the coefficients obtained from it can be directly interpreted as elasticities of migration's response to changes in the various independent variables of the estimated models.<sup>21</sup> However, common use of the double-logarithmic functional form to estimate modified gravity models has led to a criticism by T.P. Schultz (1982), who argues for the adoption of nonlinear maximum likelihood logit methods over the double-log form of the model. In part his argument hinges on the geographic size of the regions for which migration is measured. If all regions had the same population and land area, migration and nonmigration probabilities would reflect the costs and benefits of the various locational choices. However, the regions of any country differ greatly in population and land area. A larger share of all moves will tend to occur within the boundaries of larger regions. Consequently, more nonmigration will appear to exist for such regions. The result is that nonmigration is spuriously correlated with origin population size and land area.

In the polychotomous logistic model the migration probabilities are expressed as ratios, and the probability of not migrating is used in the denominator of the expres-

<sup>20</sup> For example, beginning-of-period population includes persons who die during the period over which migration is measured, as well as those who emigrate from the country, and who are thus not available to be counted as migrants. The end-of-period measure includes in-migrants who were not at risk to be out-migrants from the area and also introduces simultaneity between migration and the population measure.

<sup>21</sup> Goss and Chang (1983) show considerable differences in the estimated coefficients of a migration model depending upon the precise nature of the functional form that is specified.

sion to normalize the “flows”. That is, the dependent variable is  $\ln[m_{ij}/(1 - m_{ij})]$ , which is sometimes called the logarithm of the odds-ratio. Here  $m_{ij}$  refers to the probability of migration from  $i$  to  $j$ , and is thus measured as  $M_{ij}$ , or the actual number of movers from  $i$  to  $j$  divided by the population at risk to migrate from  $i$ . The model can be estimated in one of two ways that make sense in the migration context. First, again assuming the double-log form of the model, the log of the ratio of various destination-to-origin characteristics can be used. This approach, referred to as “uniform symmetric”, implies that coefficients on variables for corresponding origin and destination characteristics are the same except for sign. Second, a two-step decision process can be assumed in which the decision maker first decides whether to migrate based on origin characteristics and then decides where to migrate based on destination characteristics and perhaps other variables (such as distance) that link the areas. In this case, origin and destination characteristics are introduced separately. In an analogous fashion, nested decision trees could be constructed for other levels of the decision process (e.g., to move, where to move, what house to select, etc.). Some dissatisfaction has been expressed with the notion that an individual can decide whether to move independently of where he/she might move. Thus, whether to move and where to move are seen as joint decisions and not discrete and independent decisions (Linneman and Graves, 1983).

Schultz sees the standard gravity approach as inefficient because it fails to incorporate information on the relative frequency of nonmigration ( $1 - m_{ij}$ ). He argues, however, that “in the limit, as the unit of time diminishes over which migration is measured, differences between the two specifications of the migration model might be expected to diminish” (1982: p. 576). The reason is that the population at risk to migrate becomes a better measure of the nonmigrating population when the migration interval is very short. In any case, the logit approach provides a more natural transition from the gravity model to the more behaviorally-grounded modified gravity model.

Prior to 1975 virtually all migration research was based on aggregate data.<sup>22</sup> In addition to the problem noted above, modified gravity models were characterized by other problems and shortcomings frequently associated with the use of such data. Aggregate data often were used to proxy the characteristics of the population at risk to move, resulting in empirical estimates that did not reflect accurately the influence of personal characteristics on the decision to migrate. With some notable exceptions (e.g., DaVanzo, 1976b; Kau and Sirmans, 1977), studies of aggregate migration failed to account for different types of moves, such as primary (or new), return, and other repeat migration. Aggregate data also concealed differences in the underlying determinants of migration of various population subgroups, although stratification by age and race was not uncommon. Such data failed to account for the institutional population, of which the military was especially important, and they made the study of fam-

<sup>22</sup> My 1975 survey article in the *Journal of Economic Literature* reflects this orientation. Of the 251 publications cited in this paper, only three made direct use of microdata and none used longitudinal data.

ily migration decisions difficult. Another problem with modified gravity models was that the variables used to explain migration often were measured at the end of the migration interval and were thus subject to simultaneity bias (Greenwood, 1975c). During the 1970s, several simultaneous equations models were developed to explain the causes and consequences of migration within the same empirical framework, but for the most part during the last 10–15 years these models have not been further developed.<sup>23</sup>

#### 4.3. *Distance*

One of the major implications of the gravity model approach is that place-to-place migration declines with distance. Modified gravity models arrive at a similar conclusion, but provide a behavioral basis for the results. That migration decreases with increased distance from the origin has been attributed to several factors, among which the following are most prominent: (a) distance is a proxy for the out-of-pocket money costs of moving, such as gasoline and moving vans. (b) Opportunity costs rise with distance in the sense that longer moves require more time, which in turn means more foregone earnings if the individual is not involved in a job transfer. (c) Opportunity costs rise with distance in a second sense in that the greater the distance of the contemplated move, the better are likely to be the foregone alternatives within a given distance (Wadycki, 1974).<sup>24</sup> (d) Information costs rise with distance, which in turn requires greater search costs to offset the greater uncertainty associated with more distant locations. (e) Distance serves as a proxy for the psychic costs of moving, which can be offset by making more frequent trips or trips of longer duration back to the origin, where each type of return trip raises the cost of moving as a positive function of distance (Schwartz, 1973). (f) If past migrants tended to move to nearby places, and if current migrants tend to follow past migrants, then current migrants tend to move to nearby places (Nelson, 1959; Greenwood, 1969). If a “migrant stock” or lagged migration variable is not included in the model, distance reflects the importance of relatives and friends as well as other forces.

For a number of reasons the deterring effects of distance are likely to decline over time. One set of reasons is related to the fact that over time the transportation and communications systems are improved and expanded, whereas another set is related to the fact that education and income levels of the population generally rise over time. By reducing transport costs, improvements in the transportation system encourage the flow of both commodities and resources, including labor. Improvements in the com-

<sup>23</sup> For simultaneous equations approaches to migration, see Muth (1971) and Greenwood (1975b). Mueller (1982) provides an overview of this literature.

<sup>24</sup> Whereas for Wadycki (1974) alternative opportunities intervene by being geographically closer than the chosen alternative, for Denslow and Eaton (1984) alternative opportunities intervene by being economically closer.

munications system encourage the transmittal of greater quantities of information at lower cost, including information relevant to migration decisions.

The term "distance elasticity of migration" refers to the percentage change in migration from  $i$  to  $j$  that results from a 1% change in the distance between  $i$  and  $j$ , other factors held constant. These elasticities typically range between about -0.1 or -0.2 to well over -2.0, depending upon the population subgroup under study, the type of migration flow studied, the time period over which migration is measured, the size, shape, and location of the geographic area used, and the explanatory variables included in the model. Distance elasticity estimates that have been obtained for the US are similar in terms of order of magnitude to those obtained for other countries.

Because most empirical work on place-to-place migration uses census data, only a few studies provide comparable cross-sectional estimates of distance elasticities for different points in time. These studies have tended not to focus on the temporal patterns, thereby not providing any statistical tests for the significance of observed differences over time. Observed temporal patterns are mixed. For example, Gallaway and Vedder (1971), provide US elasticities of interstate out-migration for 1920 and 1960 that show the absolute value of the distance coefficients declining for many midwestern and western states, but not for most eastern states. Denslow and Eaton (1984) show roughly comparable estimates for 12 selected states, but their elasticities are for each census from 1870 to 1970. For most but not all states, the absolute values of the distance elasticities decline over time.

Using annual interprovincial migration data for Canada, Courchene (1970) estimates distance elasticities for each year from 1952 to 1967. Toward the end of the period, his elasticities taper off from about -1.35 to around -1.10. Also studying Canada, Shaw (1985) estimates metropolitan-to-metropolitan migration models for four periods (1956–1961, 1966–1971, 1971–1976, 1976–1981). He adjusts his origin and destination wage variables for inflation (because at times he pools the data) and cost of living differences, among other factors. The estimated distance elasticity falls over time for each variant of his wage measures. For example, when the wage is adjusted for cost of living differences, the distance elasticity falls in absolute value from -0.602 (1956–1961) to -0.399 (1976–1981).

Several studies that examine the movement of persons from specific states or localities find that the absolute value of the distance elasticity rises with the distance of those places from other areas. Among studies of US migration patterns, this finding entails that western states and localities generally have considerably higher distance elasticities than states and localities located elsewhere in the country (Gallaway and Vedder, 1971; Greenwood and Gormely, 1971; Greenwood and Sweetland, 1972). Fotheringham (e.g., 1981) and others argue that estimates of distance-decay parameters, in addition to being functions of behavior relating to spatial interactions, are also functions of spatial structure, where spatial structure relates to the location, geographic size, and configuration of the regions that are the units of measurement. Using US Census data on migration for three periods (1955–1960, 1965–1970, 1975–1980),

Mueser (1989) provides direct evidence of the role played by spatial structure in estimated distance elasticities. He shows that distance elasticities differ systematically by origin and destination, with distance providing a less serious obstacle to migration between highly urbanized regions and between areas with high income.

#### *4.4. Theoretical perspectives on migration*

The theoretical perspective taken in almost all migration research conducted by economists prior to the late 1970s was that of a disequilibrium system.<sup>25</sup> The perspective is called “disequilibrium” because migration is assumed to be driven by the existence of a set of non-market clearing regional wages. Moreover, spatial variations in wages or earnings or income are assumed to reflect opportunities for utility gains. During more recent years, this disequilibrium perspective has been challenged by proponents of the “equilibrium” hypothesis, which assumes that spatial variations in wages are compensating and therefore do not reflect opportunities for utility gains.

Anticipating somewhat material that is more rigorously developed below, consider an indirect utility function ( $V$ ) and a unit cost function ( $c$ ):

$$V = f(w, r; \alpha, \phi), \quad (2)$$

$$c = g(w, r; \alpha, \theta), \quad (3)$$

where  $w$  is the regional wage level,  $r$  is the regional rent level,  $\alpha$  is a vector of location-specific amenities, and  $\phi$  and  $\theta$  are shifters for exogenous disturbances. The disequilibrium approach does not rely on amenities ( $\alpha$ ) and  $w$  and  $r$  adjust slowly to exogenous disturbances. In the equilibrium approach, migration is conditional on amenities. Moreover, this approach does not rely on long adjustments of  $w$  and  $r$  to disturbances, especially in the US where institutional and other impediments to factor mobility appear to be relatively low. Systematic long-term forces, such as rising real income in some or all locations, importantly underlie consumption amenity demand growth and provide the rationale for migration (Graves and Linneman, 1979). Thus, both the disequilibrium and equilibrium approaches assume that spatial variations in utility underlie migration decisions, but the differences spring from the source and persistence of these variations.

The perspective taken by the analyst not only shapes the precise form of the model that is specified and estimated, it also contributes importantly to the interpretation placed on the estimated coefficients of wage (or related) variables. This section develops the thinking underlying the disequilibrium perspective, including a discussion of

<sup>25</sup> Molho (1986) provides a survey of various migration models that reflect the disequilibrium perspective.

related empirical findings concerning wages. It then develops the equilibrium perspective and discusses associated empirical work.

#### 4.4.1. The disequilibrium perspective

Underlying the disequilibrium perspective, at least implicitly, is the simple income-leisure model of labor economics wherein an optimizing agent maximizes a utility function with two arguments, income and leisure, subject to a full-income constraint. One implication of this model is that the individual will supply labor such that the marginal rate of substitution of consumption for leisure equals the wage rate, which in turn implies that individual labor supply is a function of the wage rate. If we abstract from mobility costs and accept many other assumptions that underlie this simple, yet powerful model, the individual is expected to offer his labor services in the market with the highest wage, which may require migration.

*The human capital approach.* The human capital approach added to the disequilibrium perspective. After the publication in 1961 of T.W. Schultz's classic paper in the *American Economic Review*, soon followed in 1962 by Becker's paper on investment in human capital and, in the same special issue of the *Journal of Political Economy*, by Sjaastad's paper on migration as an investment in human capital, migration research by economists really began to blossom. The human capital perspective provided a paradigm that caught the attention of economists and provided a convenient theoretical framework for their research.

The potential migrant will select that locality at which the real value of the expected net benefit that accrues to him from migration is greatest. The income that the individual expects to earn at each alternative destination enters importantly into his judgment concerning the benefits associated with each location. The relevant income measure for the individual to consider is the present discounted value of his expected future stream of net pecuniary returns.

Sjaastad was the first to actually apply the notion of investment in human capital to the decision to migrate. Let the present value of the earnings stream in locality  $j$  less than in  $i$  be

$$\sum_{t=1}^n (E_{jt} - E_{it}) / (1+r)^t,$$

where  $r$  is the internal rate of discount, which although written as a constant does not have to be constant. Let the present value of net costs associated with residence in this pair of localities be

$$\sum_{t=1}^n (C_{jt} - C_{it}) / (1+r)^t.$$

The summation is over the individual's remaining life. Then the present value of investment in migration from  $i$  to  $j$  ( $PV_{ij}$ ) is

$$PV_{ij} = \sum_{t=1}^n \left[ \frac{1}{(1+r)^t} \right] [(E_{jt} - C_{jt}) - (E_{it} - C_{it})]. \quad (4)$$

An individual residing in  $i$  will presumably select that destination for which  $PV_{ij}$  is maximized.

The disequilibrium perspective is clearly evident in Sjaastad's (1962) model of migration. In the human capital model, economic opportunity differentials represent potential for household utility gains that can be arbitrated by migration. For all intents and purposes, the human capital model was unrivaled for almost 20 years. Indeed, disequilibrium forces were presumed to be the primary drivers of migration long before Sjaastad provided the human capital explanation for migration. For example, the disequilibrium notion almost certainly underlies Hicks's contention that "differences in net economic advantages, chiefly differences in wages, are the main causes of migration" (1932: p. 76).<sup>26</sup>

The human capital model provided an appealing rationale for the presence of income variables in modified gravity models, as well as in other models of migration. Based on the disequilibrium perspective, in modified gravity models the origin wage or income variable is expected to take a negative sign, whereas the destination wage or income variable is expected to take a positive sign, as migrants move out of low-income areas and into high-income areas. A number of studies have tested Hicks's assertion regarding the importance of wages in explaining migration by examining the factors affecting interregional migration in the US and in many other countries. Based on aggregate data, empirical findings associated with income, earnings, and wage variables in modified gravity models have not been uniformly strong, although it is probably fair to conclude that the weight of available evidence favors Hicks's expected disequilibrium results, particularly for rural-to-urban migration that dominated movement at the time of his writing. Of course, the exact results are sensitive to many factors, such as the precise specification of the model, the country and period studied, the population subgroup under investigation, the type of functional form assumed, and

<sup>26</sup> Although both Hicks (1932) and Sjaastad (1962) recognized that disequilibrium and equilibrium forces are at work, they emphasized the disequilibrium forces (Hunt, 1993). Hicks thought that the attraction of high wages would cause a "gradual flow of labour" to these places (p. 73). He also believed that some regional differences would persist because of the "indirect attractions of living in certain localities" (p. 74). Sjaastad recognized a "non-money component ... reflecting preference" for a place of residence and even mentions such preference as reflecting "climate, smog, and congestion" (p. 86), of which at least climate is a key element of the equilibrium perspective.

the estimation technique employed. Moreover, income or wage measures have almost never been refined to reflect real consumption wages.<sup>27</sup>

Although the migration models of economists are typically formulated in the context of individual utility maximization, the data employed in estimating the models were for many years aggregate in the sense that they referred to mean income or earnings levels in sending and receiving regions. The influence of income on migration can be considered from two different perspectives, one consistent with aggregate income measures and one consistent with migrant-specific income measures. The first perspective involves the determination of whether migration occurs from low-to-high income or wage areas, and if it does, the magnitude of the relationship. The second perspective involves the determination of whether and to what extent migrants themselves benefit by moving. The latter type of study is considered in connection with the personal characteristics of migrants.

A finding common to a number of gross migration studies of both the US and Canada (Shaw, 1985) is that income (and job) opportunities provide a better explanation of in-migration than they do of out-migration. Several explanations have been offered for this finding.

(1) Perloff et al. (1960) argue that localities with attractive economic conditions draw sizable numbers of migrants from other localities, though only small numbers from any single locality. On the other hand, what is important in determining out-migration from a locality suffering from economic distress is the percentage of the labor force that is willing to leave in order to search for opportunities elsewhere. This percentage, argue Perloff et al., is sensitive to the personal characteristics of the residents of the locality. Like Perloff, Lowry (1966), in his study of (1955–1960) inter-metropolitan migration, concludes that the labor market characteristics of an origin locality make little difference to an individual who is contemplating a move to another metropolitan area. However, destination characteristics help determine the locality to which the migrant will move.

(2) O'Neill (1970) suggests that the role that consumption plays in migration may help account for the tendency for destination-income variables to provide a better explanation of migration than origin-income variables. If migration is a “normal (consumption) good”, an increase in destination income increases both the potential

<sup>27</sup> The role of taxes and public services in migration decisions is not emphasized in this paper, which is not to say that the public sector is unimportant in this respect. Day (1992) uses panel data on Canadian provinces for the period 1962–1981 to show that the composition of government expenditures affects migration, with spending for health and education attracting migrants, but spending for social services discouraging their in-movement. Helms (1985), also using panel data, but for US states for the period 1965–1979, reports findings similar to those of Day. He concludes that the manner in which taxes are used is critical in determining state economic growth. States that allocated their tax revenues toward transfer payments found their growth performance significantly reduced relative to those that emphasized spending on education, highways, and health. Charney (1993) provides a survey of the literature on migration and the public sector.

investment gain from migration and the expected level of permanent income.<sup>28</sup> Both investment and consumption effects thus would lead to increased in-migration. An increase in origin income of the same magnitude, however, would lead to an equivalent fall in the potential investment gain, but the expected level of permanent income would rise. In this instance the investment and consumption effects would oppose each other, and the direction of the impact on out-migration would depend upon the relative magnitude of the two effects. Vanderkamp (1971) makes a similar point, but he emphasizes that potential migrants from high-income regions are better able to finance a move and possible return, which also tends to offset the negative expectation on the origin-income variable.

(3) Miller (1973) denies the validity of the finding that origin characteristics are relatively unimportant in explaining migration, arguing instead that the rate of growth of employment is the primary economic determinant of out-migration rates. He claims that the findings of Perloff et al., Lowry, and others are the result of a failure to control for differences in the population's propensity to migrate. Persons who have moved at least once have higher migration rates than those who have not moved at all. Thus, areas with high in-migration rates tend to have high out-migration rates. The conditions that promote out-migration are the same as those that discourage in-migration. Areas in which such conditions prevail have relatively few recent in-migrants and the population of such places tends to be relatively immobile (since the more mobile have presumably already left). The factors that encourage out-migration do not influence those left behind as strongly as they have influenced those who have already moved. Just the opposite situation exists in areas where conditions are attractive to migrants, because where in-migration rates are high, out-migration rates also tend to be high. Hence, localities with higher income levels, lower unemployment rates, and higher rates of employment growth tend to have relatively heavy out-migration, which is contrary to expectations, because they tend to have relatively heavy in-migration.

*The income-distance trade-off.* The so-called "income-distance trade-off" in modified gravity models has been used as a rough indication of the money and non-money costs of moving a given distance farther. The trade-off is the percentage increase in destination income required to offset a 10% increase in distance and is measured by the absolute value of the ratio of the estimated distance elasticity to the esti-

<sup>28</sup> O'Neill provides no underlying rationale for migration being a "normal (consumption) good". Because migration is a process, and not a good or a service, on the surface O'Neill's statement makes little sense. However, if we consider the "migration process" to be like the "buying process", then we can make the statement more meaningful. The buying process has the goal of acquiring a good or service. The migration process has the goal of acquiring a bundle of attributes including a job, a new location with its amenities, etc. The equilibrium proponents whose work is discussed below would argue that the underlying motivation for migration is location-specific amenities, demand for which will grow with rising real income. Day (1992) makes essentially the same point as O'Neill, but more correctly emphasizes the notion that increased wages increase the price of leisure, which causes a substitution of goods for leisure, but at the same time increases full income, which causes more consumption.

mated elasticity on destination income (times 10). Trade-off values are clearly sensitive to the variables included in the empirical model from which they are derived. Nevertheless, given the mean distance between regions and mean income levels in the data underlying the estimation, the trade-off values can be transformed into absolute figures: a move  $x$  miles (or kilometers) farther away is offset by  $y$  dollars (or other unit of currency). Thus, Sjaastad states that "the typical migrant would be indifferent between two destinations, one of which was 146 miles more distant than the other, if the average annual labor earnings were \$106 (1947–1949 dollars) higher in the more distant one" (1962: p. 84).

For Canada, Courchene (1970) reports a series of annual regressions that allow the computation of the income-distance trade-off for several consecutive years. The trade-off value declines from 3.46 in 1952 to 1.46 in 1967, due both to a declining (absolute value of the) distance elasticity and to a steadily rising destination income elasticity. Mean values for distance and income are not reported, so absolute measures of the trade-off cannot be calculated. Courchene also notes that within broad age classes, the trade-off is higher for more educated migrants. For example, for persons 25–34 years of age with at least a high-school education, the value is 4.39, compared to a value of 2.88 for those with no more than an elementary school education.<sup>29</sup> The reason for this difference is that education increases the benefits of migration while it decreases the costs (by improving information about alternative destinations and decreasing the risk associated with movement over greater distances). Vanderkamp (1971) finds a distinct cyclical pattern in the trade-off (for primary migration), with the extra dollars necessary to compensate for another mile falling with low national unemployment and rising with high national unemployment. For a move of 1000 miles, an extra mile is offset by \$0.36 during periods of low unemployment, but by \$0.54 during periods of high unemployment.

#### 4.4.2. *The equilibrium perspective*<sup>30</sup>

Due in part to the fairly consistent tendency for empirical studies based on aggregate data to fail to confirm the importance of wages or income in migration decisions, the equilibrium approach has been offered as an alternative to the traditional disequilibrium perspective described above. The equilibrium theorists begin by assuming that households and firms are in proximate equilibrium at any point in time. This assumption means that the marginal household and firm, while maximizing utility and profit, respectively, are spatially arrayed so as to receive zero consumer and producer surplus from their location. Thus, any movement from the general equilibrium configuration cannot improve utility or profit.

<sup>29</sup> The income elasticity here is for the ratio of the destination to origin income variables.

<sup>30</sup> This section of the paper has benefited greatly from numerous discussions with Philip Graves and Gary Hunt concerning the equilibrium approach. The section, with considerable modification, is primarily drawn from Graves and Greenwood (1987).

Household location decisions are modeled as follows:

$$U = (X_{\text{tr}}, X_{\text{ntr}}, a, h, s) \quad (5)$$

where  $X_{\text{tr}}$  is traded goods (available at a nationally-determined price in all locations),  $X_{\text{ntr}}$  is nontraded goods (having regionally-varying prices that depend on regional wage ( $w$ ) and rent ( $r$ ) levels),  $a$  is amenities that vary in nature regionally but are unproduced (e.g., climate),  $h$  is leisure, and  $s$  is residential land. The utility function given in Eq. (5) is maximized subject to the following full-income constraint:

$$w(a)T + I_0 = P_{\text{tr}}X_{\text{tr}} + P_{\text{ntr}}(a)X_{\text{ntr}} + w(a)h + r(a)s, \quad (6)$$

where  $T$  is total time available during the period,  $I_0$  is nonlabor income (which is assumed to equal zero for simplification), and  $P_{\text{tr}}$  and  $P_{\text{ntr}}$  are the respective prices of traded and nontraded goods. Household income depends on amenities. This income is spent on the numeraire traded good (whose price does not depend on amenities) and on nontraded goods, leisure, and lot size (whose prices do depend on regional amenity levels).

Utility is made spatially invariant by migration. Any location offering extra-normal utility for whatever reason will experience in-migration until, in some combination, wages fall or rents rise sufficiently to eliminate the utility differential. Level sets in indirect utility space (e.g.,  $V_0$ ,  $V_1$ ) demonstrate the ultimate equilibrium (Fig. 1). If amenities were distributed uniformly among regions (e.g., at  $a_0$ ) the curve labeled  $V_0(w, r; a_0)$  shows various combinations of wages and rents that would give households equal satisfaction. If one region were to have differentially preferred amenities (e.g.,  $a_1$  in Fig. 1) the amenity-rich region must have, in equilibrium, some combination of lower wages and higher rents. All points on the respective indirect utility curves  $V_0(w, r; a_0)$  and  $V_1(w, r; a_1)$  yield the same level of utility ( $U$ ) in direct-goods space.

Since, with negligible transportation costs, the traded good is exchanged in national markets, the only source of variation in regional profit levels is from the cost function.<sup>31</sup> Let the production function be specified as

$$X_i = X_i(N, L, X_{\text{ntr}}, X_{\text{tr}}; a), \quad (7)$$

where  $N$  = labor,  $L$  = land, and the  $i$  subscript refers to nontraded (ntr) or traded (tr) goods.<sup>32</sup> In practice, the amenities most relevant to production (e.g., access to raw

<sup>31</sup> This is not the case for the nontraded good, whose price is not determined by national markets due to transportation costs, which provide a degree of protection for producers of this good.

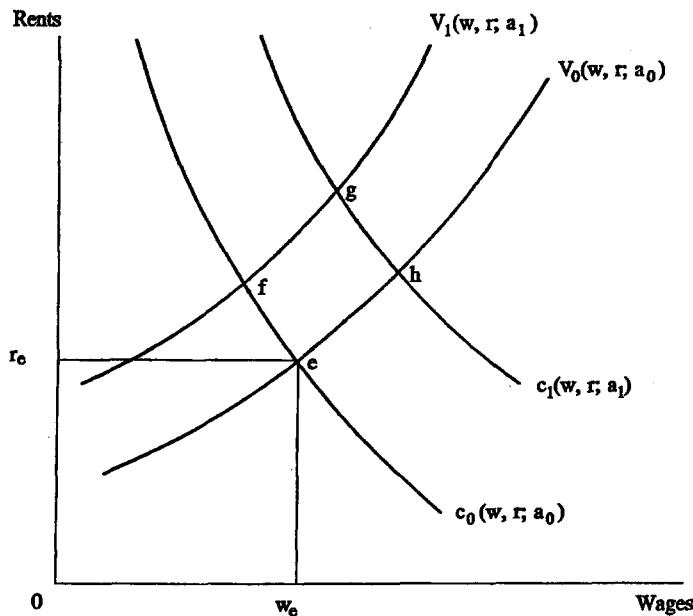


Fig. 1. Constant indirect utility levels and constant unit cost levels in a region with variable wages and rents.

materials, good harbors) may be different than those most relevant to consumption, but for convenience consumption and production amenities are included in the same vector ( $a$ ). Hence, the unit cost function (assuming a linear homogenous production function) is

$$c_i = (w, r, P_{\text{ntr}}, P_{\text{tr}}; a). \quad (8)$$

The respective prices of traded and nontraded goods in equilibrium will equal their respective unit costs of production, and will thus be functions of  $w$ ,  $r$ , and  $a$ . Taking the traded good's price to be the numeraire and solving for  $P_{\text{ntr}}$  in terms of  $w$ ,  $r$ , and  $a$ , we simplify the unit cost functions to

$$c_i = c_i(w, r; a).^{32} \quad (9)$$

In equilibrium, profits must be the same in all locations. If no spatial variation in

<sup>32</sup> Capital could be included in Eq. (7), but is left out for expositional convenience, along with its price in Eqs. (8) and (9).

<sup>33</sup> See Roback (1982) for a more detailed development of this model.

production amenities existed, locations with high wages would have compensatingly lower rents, and conversely, as illustrated by  $c_0$  in Fig. 1. The ubiquitous presence of production-enhancing amenities must result, in equilibrium, in compensation in either labor or land markets. If a production amenity were to exist in City A relative to an otherwise identical City B, the amenity would make City A more profitable. Firm expansion and relocation would increase demand for labor and industrial land in City A, whereas in City B the opposite would tend to occur. Wages and rents would rise in City A (equilibrium  $h$ ) and would fall in City B until profits equilibrate between Cities A and B ( $c_1$  compared to  $c_0$  in Fig. 1).

Fig. 1 shows the unique equilibrium rent ( $r_e$ ) and wage ( $w_e$ ) level that would exist in a world of uniform production and consumption amenities. Because the various regions of many countries offer a diversity of amenity combinations, some affecting households (positively or negatively) and some affecting firms (positively or negatively), a wide diversity of possible equilibrium rent/wage combinations is likely. One of the major points made by the equilibrium theorists is that even in simple cases, neither producer nor consumer amenities can be valued solely in either land or labor markets. Both exclusively producer and exclusively consumer amenities will be undervalued, in terms of their true economic importance, by studies assuming capitalization in only one market. This position leads proponents of the equilibrium hypothesis to deny the validity of migration studies that account for wages or income, but fail to account for rents and location-specific amenities.

According to the equilibrium approach, changes in life-cycle factors or generally rising real incomes continuously change the demand for consumer amenities. Real incomes may rise due, for example, to persistent technical progress. Because amenities are not evenly distributed spatially, migration occurs and quickly reequilibrates households. Net in-migration to amenity-rich areas tends to drive down wages and drive up the prices of locally-produced goods and services and land, *ceteris paribus*. In amenity-poor areas, opposite patterns of change occur. Wages and local prices diverge across regions until they just compensate households for the differing amenity bundles that the various regions supply.

The equilibrium approach has another important facet. Following Rosen's (1979) paper on wage-based indexes of urban quality of life, a number of studies use the level of regional wages or rents to measure regional environmental quality, including the quality of the climate. Particularly noteworthy in this respect are studies by Roback (1982, 1988), Hoehn et al. (1987), and Blomquist et al. (1988). The assumption underlying these studies is that equilibrium prevails so that wage and rent differentials are compensating differentials and thus serve as accurate proxies for differentials in environmental quality. For equilibrium to prevail, regional markets must be efficient so that regional wages and prices quickly realign to clear such markets subsequent to any disequilibrating exogenous disturbances. The equilibrium proponents believe that at any point in time, it is highly likely that regional wages and prices have adjusted to their equilibrium values. Graves and Knapp clearly state this position:

But is the world likely to be very far from an equilibrium in which utility is the same everywhere? We believe not, on the grounds that mobility in the United States is quite high and information about alternative locations is good (1988: p. 3).

In the equilibrium approach, regional differentials in wages and prices do not generally reflect utility differences that can be arbitrated through household migration. Only those noncompensating regional differentials that remain after controlling for amenity differentials across regions should represent utility differentials that would induce migration. As noted above, the implication of this view for migration analysis is that a properly specified migration equation should include both regional amenity and regional wage and rent variables. For this reason, proponents of the equilibrium hypothesis typically include a wide variety of regional amenities in their empirical models (Graves, 1979, 1980). Among the variables frequently included are climatological amenities (e.g., average temperature at some time during the year, average humidity, degree days) and topographical amenities (e.g., the presence or absence of a sea coast, variety of terrain, national forest lands).

From an economist's perspective, an equilibrium process makes great sense. Without the operation of such forces, economists would be hard pressed to develop a reasonable theory to explain interregional movements and the adjustments that result therefrom. However, for the most part until recently tests of the equilibrium hypothesis in the context of the migration literature have not been fully convincing (Hunt, 1993). Empirical models have been poorly specified and have failed to include appropriate variables that nest disequilibrium and equilibrium forces in the same model. Moreover, the variables of the model often have been crudely constructed and have therefore failed to precisely measure what was intended. Time series data have almost never been used to test the relevant equilibrium hypotheses in spite of the fact that such data are essential if adjustments toward or to equilibrium are to be addressed. Finally, the problem of the endogeneity of wages or income (because they contain the effects of amenities as compensating differentials) has been addressed rarely. The same type of endogeneity problem also characterizes studies that use a measure of rents (e.g., Graves, 1983) to reflect the combined influence of various amenities. The basic idea here is that if consumption amenities are not included in the estimated model, the error term will pick up their effects and be correlated with  $w$  and  $r$ .

Three obvious empirical questions arise with respect to the equilibrium approach (Hunt, 1993). First, does interregional equilibrium, or something close to it, prevail in the US or in other areas of the world? If the system is typically far from equilibrium, the basic assumption underlying the approach would be invalid, and empirical models based on the approach would presumably fail. Second, when the system is shocked, how rapidly does it reestablish equilibrium wages and rents? If the system is slow to adjust, the disequilibrium framework assumes more appeal (Evans, 1990). Third, in migration decisions, how important are location-specific amenities compared to traditional disequilibrium-type variables like relative wage rates?

In the sense that variables that adequately reflect the two hypotheses are rarely nested in the same empirical model, the issues of whether and to what extent equilibrium prevails are almost never directly examined. Rather, the assumption of equilibrium is made, or its existence is inferred based on empirical results. An exception is a recent study by Greenwood et al. (1991b). These investigators develop a model of net migration that encompasses both equilibrium and disequilibrium components. The model is of the following form:

$$\ln[(NLF_{i,t-1} + ECM_{i,t})/NLF_{i,t-1}] = \ln \lambda_i + \lambda_1 RY_{i,t} + e_{i,t}, \quad (10)$$

where  $NLF$  refers to natural civilian labor force (exclusive of military personnel and their dependents, persons 65 and over, and immigrants),  $ECM$  is net economic migrants (including their dependents),  $\ln \lambda_i$  represents a fixed-effect due to location-specific amenities, broadly defined (and perhaps other unmeasured and locationally invariant features, such as population characteristics), and  $RY_{i,t}$  is relative expected income, measured by the relative wage bill divided by the natural labor force.

Instrumental-variables (to account for the endogeneity of  $RY$ ) fixed-effects estimates of the model with time-series data for 51 US areas over the period 1971–1988 support the importance of both equilibrium and disequilibrium factors in migration. In the Greenwood et al. model, equilibrium is assumed to occur in an area when the measure of net economic migration equals zero. The equilibrium value of  $RY$  for each area is that value generating no net migration, which is the value that just offsets the impact of the estimated individual effect for each area. Solving their estimated model for the equilibrium condition of zero net migration, these authors demonstrate that some US states are not in equilibrium during 1980.<sup>34</sup> However, this finding can be demonstrated at a statistically significant level for only a few states. Indeed, errors generated in the estimation of compensating differentials by erroneously assuming regional equilibrium appear to be relatively minor, both quantitatively and qualitatively. Thus, the Greenwood et al. study suggests that the equilibrium approach must be taken seriously as a challenge to the disequilibrium approach.

The speed of adjustment to equilibrium is a second important issue about which little is known. The equilibrium theorists believe the adjustment is relatively rapid, but they assume this position rather than demonstrating it directly.<sup>35</sup> A recent study by

<sup>34</sup> The reason that 1980 was chosen is that Blomquist et al. (1988) assume equilibrium in 1980 and estimate compensating differentials. Thus, for 1980 the results from the two studies can be related.

<sup>35</sup> Some equilibrium theorists appear to be moderating their view on the speed of adjustment. For example, Graves and Mueser state that "the equilibrium model suggests that (a location with abundant amenities) would display gradual increases in rents and declines in wages. Observed positive migration would occur over an extended period" (1993: p. 82) (parentheses are mine).

Treyz et al. (1993) suggests that the adjustments to equilibrium in the US require considerable time. Given an exogenous shock, about 40% of the adjustment in relative employment opportunity occurs by three years and 80% by 20 years. The same type of conclusion is drawn by Eberts and Stone (1992). Pissarides and McMaster arrive at a similar position regarding Britain: "the adjustment is slow and the long run is a very long run indeed – even in the absence of exogenous shocks adjustment to it (long-run equilibrium) takes more than twenty years" (1990: p. 812) (parentheses are mine). Existing empirical studies do not suggest extremely rapid adjustments to equilibrium, even in the US, where institutional impediments appear to be lower than elsewhere, but the speed of adjustment to equilibrium remains a potentially fruitful topic for future research.

How important are regional amenities in migration decisions? In one of the most comprehensive empirical analyses of the influence of location-specific amenities on 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 1960s. 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.

Subsequent studies find amenities a less important determinant of migration. Using a data set that includes 18 annual observations on migration, employment, and earnings for each of 57 Bureau of Economic Analysis Economic Areas in the US, Greenwood and Hunt (1989) subject Graves's amenity hypotheses and his findings to further scrutiny. They show that with respect to their direct effects, at least, employment opportunities are far more important in explaining metropolitan migration than location-specific amenities. In the presence of a variable for employment change, amenity variables roughly comparable to those used by Graves are rarely significant. When the employment variable is excluded from the model, the amenity variables take on somewhat greater importance in explaining migration, but still the results are far less supportive of the amenities hypothesis than those provided by Graves.

To the extent that real income is rising over time, the importance of location-specific amenities in migration decisions should also increase over time. To test this hypothesis, Greenwood and Hunt (1989) use two alternative data sets to estimate a model of net metropolitan migration roughly comparable to that of Graves. In one

case they estimate the model for each of 17 consecutive years, and in the other they estimate it for three periods of greater length. This first approach yields no support for the idea that the importance of location-specific amenities has been rising over time, and the second yields only modest support for the hypothesis.

The results developed by Greenwood and Hunt (1989) indicate that disequilibrium forces, specifically relative wages and employment opportunities, are important determinants of migration. Moreover, they show that the direct effects of equilibrium forces such as location-specific amenities do not appear to be as strong in explaining work force migration as they have proven to be in other studies of population migration (e.g., Graves, 1979). These findings notwithstanding, location-specific amenities could still be important in explaining migration. Two possible explanations seem plausible. First, if the system is in interregional general equilibrium, no systematic migration occurs, although it did in the past in order to bring general equilibrium about. In this case, migration is not motivated by increasing utility or increasing profits. Second, if desirable places have lower wages due to the embedded values of their amenities, and if firms are attracted to areas with lower wages because of increased profitability associated with such locations, employment will grow most rapidly in amenity-rich areas. Jobs certainly attract migrants, and to the extent that these jobs are ultimately due to the amenities, amenities attract migrants in an indirect fashion.

Some empirical evidence exists in support of the first explanation. Roback (1982), for example, shows that a large fraction of observed regional wage differentials can be explained by local amenities. Moreover, following Graves, Porell (1982) has attempted to ascertain the relative importance of economic versus quality of life factors, as well as the trade-offs between the two, in explaining aggregate migration between 25 SMSAs 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” (p. 152), which is the result arrived at more recently by Clark and Cosgrove (1991). However, somewhat in contrast to Graves’s findings, Porell suggests that “migration is more responsive to marginal changes in economic factors than QOL factors” (p. 153) and “the results did not support the long-run equilibrium thesis of migration” (p. 156). Rather, Porell sees disequilibrium job incentives as encouraging migration to SMSAs that offer attractive amenity bundles.

Direct evidence concerning the second explanation mentioned above, namely that the influence of amenities is exerted through employment growth, is less plentiful. Much empirical research has focused on employment, but amenities have not received a great deal of attention as determinants of differential rates of employment growth. Some years ago Fuchs (1962) showed that manufacturing employment grew more rapidly in the South and West, and he speculated that one reason was the availability of sunshine and temperate climates. Greenwood and Hunt (1989) estimate very simple reduced-form equations for employment growth that present a generally negative

picture regarding the second possible explanation. That is, the data reflect no particularly strong pattern of differential employment growth in amenity-rich areas.<sup>36</sup>

#### *4.5. Employment status and migration*

Three “channels” have been identified through which employment status, specifically unemployment, affects migration: (1) a region’s unemployment rate relative to other regions; (2) personal unemployment; and (3) aggregate or national unemployment rates over the cycle. This order emphasizes the manner in which the literature developed rather than logic, which would place personal unemployment at the top of the list. All three channels, which reflect different hypotheses regarding unemployment’s influence on migration, are rarely nested in the same model. Pissarides and Wadsworth (1989) is a possible exception.

##### *4.5.1. Regional unemployment*

Migration has been distinguished as “speculative”, where it occurs in order for an individual to search for an acceptable employment opportunity, as opposed to “contracted”, where the individual migrates with a job in hand (Silvers, 1977). Molho (1986) correctly notes that speculative migration is an intrinsic part of the job-search process, whereas contracted migration is the outcome of the search process. Although much migration is of the contracted type, such as job transfers, many analysts fail to distinguish between types, or cannot due to data shortcomings.<sup>37</sup>

In the process of searching for a new job, an individual will be influenced by expected income at alternative locations. Consequently, the values of alternative wage rates, as well as the corresponding probabilities of getting those wage rates, will enter the potential migrant’s decision calculus. Both the unemployment rate (Todaro, 1969;

<sup>36</sup> For many years, employment has clearly grown more rapidly in the South and West. A number of studies address the issue of differential employment growth (e.g., Bartik, 1991, 1993; Crandall, 1993; Helms, 1985; Newman, 1983). Newman, for example, finds that corporate tax rate differentials, degree of unionization, and a favorable business climate (as measured by right-to-work laws) were important in attracting employment to the South.

<sup>37</sup> The US Annual Housing Survey has asked the main reason that the household head changed his/her previous residence. Sell (1983) uses the 1973–1977 surveys to determine the importance of job transfers, which averaged 600 000 per year over the period. Migration was defined as movement between metropolitan areas and metro to nonmetro, nonmetro to metro, and intrametro moves crossing a state line. Over 50% of the men aged 30–59 claimed to be involved in a job transfer (compared to taking a new job). Using the same data set, Long and Hansen (1979) show that 27.6% of the persons who migrated between states during the mid-1970s were involved in a job transfer and 23.4% moved to look for work. Whatever the shortcomings of the data, the job-transfer phenomenon appears to important and worthy of more attention than it has received.

Day, 1992) and the employment rate (Treyz et al., 1993) have been used as proxies for the probability of getting a job.

Numerous papers hypothesize that areas with high unemployment rates should have both more out-migration and less in-migration, other things being equal (Greenwood, 1975a). Somewhat surprisingly, perhaps, studies that have examined empirically the influence of unemployment rates on migration have found mixed results with some obtaining the anticipated signs and significant coefficients, whereas others obtain unanticipated signs or insignificant coefficients. Several examples of these various mixed findings are available. Gallaway et al. (1967), in their study of 1955–1960 US state-to-state migration, find that the unemployment-rate differential between the origin and destination state is positive and statistically significant, but when they examine out-migration from specific origin states to other states, they find that this differential is rarely significant. Rabianski (1971), studying US inter-SMSA migration over the same period, finds that the logarithm of the ratio of the destination to origin unemployment rate is negative, as anticipated, and statistically significant. However, also studying gross interstate migration over the 1955–1960 period, Wadyczycki (1974) finds a positive but statistically insignificant coefficient on the destination unemployment-rate variable.

For many years, one of the most perplexing problems in migration research, at least from the economist's perspective, was the consistency with which such conflicting results were uncovered in connection with the relationship between unemployment rates and migration. Several possible explanations have been offered for the failure of unemployment rates to influence migration in the expected direction and/or with the expected relative magnitude. However, until microdata were available to test certain of the hypotheses that were suggested, these explanations amounted to little more than speculation.

One of the intuitively most convincing explanations for the unanticipated results associated with unemployment rates is that they are caused by aggregating population subgroups whose motives for migration differ widely (Creedy, 1974). The unemployed are a small fraction of the labor force and an even smaller fraction of the population. Thus, studies of population migration and even those of labor force migration may not reflect the importance of unemployment because the unemployed are aggregated together with the employed and with individuals who are not members of the labor force. 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.

Fields (1976) argues that the reason for the unanticipated findings regarding unemployment-rate variables is the manner in which such rates are calculated. He suggests that variables relating to job turnover are more relevant than unemployment rates. The most important consideration, argues Fields, is that the unemployment rate

pertains to the entire stock of workers and jobs, including experienced workers who are secure in their jobs. Potential migrants are presumably more concerned about the rates at which hiring for new jobs is taking place and hence are presumably more concerned about job turnover. Field's empirical results are much stronger in connection with job-turnover variables than with unemployment-rate variables. However, his results are based on aggregate data and consequently do not distinguish the employment status of potential migrants.

#### *4.5.2. Personal unemployment*

A convincing explanation for the frequent, unanticipated signs on variables for regional unemployment rates, along with supporting empirical results, required microdata. Herzog et al. (1993) provide a review of the literature dealing with the relationship between employment status and migration, as well as that between migration and employment status, and make a number of points regarding the need for microdata in this area of research. First, they argue that microdata allow the investigator to use in multivariate analysis a binary independent variable for employment status before a move, which permits the estimation of the effect of personal unemployment on migration under *ceteris paribus* conditions. Second, with microdata, personal characteristics can be measured and consequently the investigator need not rely on mean characteristics of different groups of potential migrants. Third, the aggregation problem noted above can be avoided because microdata allow the analysis of the appropriate research sample, which in this case is the labor force.

Before microdata were generally available, the typical procedure was to use area-wide characteristics, such as age and median number of years of schooling, as proxies for the characteristics of the population at risk to out-migrate. In a regression context, this procedure was thought to allow a determination of the relative importance of personal compared to place characteristics in migration decisions. 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 (or potential migrant) traits of concern. Moreover, the lack of true data relating to the personal characteristics of migrants and potential migrants led to a literature on the determinants of migration that was strongly oriented toward the study of place characteristics.

Navratil and Doyle (1977) were perhaps the first to use microdata to study the influence of personal unemployment on migration (Herzog et al., 1993). Using 1970 US Census microdata, they also 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" (p. 1558). Moreover, 1965 personal unemployment encouraged migration of each group studied (black/white, by gender) over the 1965–1970 period. These findings underscore the importance of using available microdata. In short, the relative importance of personal compared to place characteristics (such as unemployment) cannot be directly established in the absence of information from microdata.

A major breakthrough in this area of migration research was a study by DaVanzo (1978) that provides a more direct test of Field's (1976) hypothesis that the migration response of the unemployed is likely to be more sensitive to the tightness of the labor market than the response of the employed. Her work also bears on the question of aggregation. DaVanzo's data, which are drawn from the Panel Study of Income Dynamics (PSID) and which relate to individual households, actually distinguish the employment status of the head of the household. She 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, and specifically longitudinal microdata. They could not have been derived, at least not with such great precision, 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 and five years earlier.

Since the publication of DaVanzo's paper, several other contributions using US data have confirmed or refined her basic finding (Herzog et al., 1993). Using 1970 census microdata, Herzog and Schlottmann (1984) examine the relationship between unemployment and white male migration. Census data report employment status in 1965 and subsequent migration between 1965 and 1970. Controlling for several personal characteristics (age, education, marital status, and prior mobility, in addition to 1965 employment status) and place characteristics (unemployment rate and average earnings), these authors separately analyze the migration of professional and technical persons, persons with white-collar occupations, and those with blue-collar occupations. They find that individuals who were unemployed in 1965 were more likely to migrate than those who were not. Moreover, this relationship holds for each occupational group. Higher local unemployment rates also encourage out-migration. For blue collar workers, unemployment before migration increases the probability of unemployment after migration. While these results are meaningful, some caution should be exercised in interpreting them because as noted above the Census does not report employment status at the time of the move, but rather only in 1965 and 1970. Thus, a necessarily direct link need not have existed between 1965 employment status and 1965–1970 migration.

A number of studies dealing with the influence of unemployment on European migration have failed to confirm DaVanzo's findings for the US that the unemployed are particularly sensitive to local unemployment rates. Very little work concerning Europe has been done with micro- and longitudinal data, but four noteworthy studies, one concerning the Netherlands (Van Dijk et al., 1989), two concerning Great Britain (Hughes and McCormick, 1989; Pissarides and Wadsworth, 1989), and one concerning Sweden (Harkman, 1989), have appeared recently. In contrast to DaVanzo's use of longitudinal data, these studies all use non-longitudinal microdata, but recall that using the latter type of data Herzog and Schlottmann (1984) confirm DaVanzo's finding for the US.

As pointed out by Hughes and McCormick (1989), personal unemployment raises the propensity to migrate in the US, UK, and the Netherlands, although by considerably different relative magnitudes (i.e., 34% in the US, 93% in the Netherlands, and 181% in the UK). On the basis of logit regressions, we can also conclude that many forces work to influence migration in the same direction in the US, UK, the Netherlands, and Sweden. For example, other things being equal, increased age reduces migration and increased education raises it. However, with respect to local unemployment rates, the results are different.

Van Dijk et al. (1989) compare the determinants of labor force migration in the US and the Netherlands. These researchers interact their variable for employment status at the end of the period with the local unemployment rate and conclude that "estimates for these variables were insignificant for both countries; thus, the effect of local employment conditions on interregional migration is apparently unaffected by personal unemployment" (p. 81). This conclusion holds whether the personal unemployment is measured at the beginning or the end of the migration period. Pissarides and Wadsworth (1989) arrive at a similar conclusion concerning Great Britain.

DaVanzo's results for the US and those of others for the Netherlands and Great Britain could differ for several reasons. The periods over which migration is measured in the three countries are different, and, as shown by Sandefur and Tuma (1987), this could lead to somewhat different findings even if other conditions were the same. Furthermore, comparison of migration between 10 (Great Britain) or 11 (the Netherlands) regions of a country compared to 48 regions that comprise a small part of another country could cause problems. Institutional differences, such as between unemployment insurance programs, could also lead to different findings. Nevertheless, with respect to the local unemployment variable, the findings for the two European countries are different, whereas in other respects the results are similar.

Harkman's (1989) study of Sweden is based on data drawn from March, 1988, questionnaires given to individuals who were registered at Swedish employment agencies in March, 1987, and were unemployed at that time. Only persons aged 20–29 in 1988 were included in the sample. The logit regressions estimated by Harkman include age and sex, as well as several variables relating to unemployment compensation and one relating to duration of unemployment. His variable reflecting the local

labor market situation is the ratio of job searchers to job vacancies in the region (relative to a comparable variable for Sweden). This variable proves to be insignificant in each migration equation. Thus, although Harkman's variable strictly speaking is not an unemployment rate, his findings also appear to fail to support those of DaVanzo.

In terms of understanding the relationship between personal unemployment, local unemployment rates, and the decision to migrate, DaVanzo's use of the PSID leads to the most convincing results. However, if her results do not hold for other countries, as suggested by available evidence for those countries, it would be interesting to know why.

Migration propensities of the employed and the unemployed may, among other factors, also differ due to the prior migration experience of the two groups. Schlottmann and Herzog (1981) use 1970 PUMS data to distinguish employment status in 1965 and whether potential migrants were at risk to be primary as opposed to repeat migrants. Primary migrants are defined as persons living in their state of birth in 1965, whereas repeat migrants are persons living in a state other than that of their birth in 1965. They study only white males between 19 and 70 years of age in 1965 who were in the labor force in 1970. Those attending college or in the armed forces in 1965 or 1970 are excluded from their sample. They show that the probability of interstate migration for persons unemployed in 1965 and at risk to make a primary move was 0.17, whereas those at risk to make a repeat move had a corresponding probability of 0.25. Corresponding probabilities for persons employed in 1965 are 0.06 and 0.13, respectively. Hence, previous migration experience encourages the movement of both employed and unemployed persons, and unemployed persons at risk to make either a primary or repeat move are substantially more likely to migrate than employed persons at risk to make the same type of move.<sup>38</sup>

Schlottmann and Herzog also find that for potential primary migrants, increased education encourages significantly more migration of the employed than the unemployed. For potential repeat migrants, but not for potential primary migrants, more education encourages unemployed persons to migrate. The propensity of the unemployed to migrate is not reduced by high state welfare levels, but is for states with high educational quality and access to manpower and vocational training programs. Higher area wages do not discourage the migration of unemployed persons who are potential primary migrants, but they do discourage potential repeat migrants.

The incidence of unemployment clearly declines with age. If migration propensities

<sup>38</sup> We saw previously that persons in their late teens and early twenties have a relatively high propensity to migrate and that the US population is highly mobile. Thus, a large number of the young persons in this sample who were living outside their state of birth could have moved with their parents. Consequently, some fraction of the repeat migrants could have been, for all practical purposes, primary migrants, but census data do not allow a cleaner distinction.

are higher for the unemployed, these propensities could correspondingly also decline with age. Schlottmann and Herzog find that for both the employed and unemployed, migration declines with age. They conclude that the "age selectivity of migration derives from factors other than an age-employment status phenomenon" (1981: p. 594).

To some extent, migration appears to be a function of the assets that a household has to cover the cost of moving. Lack of such assets may impede mobility. Thus, households whose head has been unemployed for some time may be less likely to move than those whose head has been recently unemployed. Not only are accumulated assets depleted during the period of unemployment, but also unemployment insurance benefits may expire. Using PSID data and analyzing the decision to migrate between 1977 and 1978, Goss and Schoening (1984) have specifically addressed this issue. In addition to a variable for the number of weeks that an unemployed worker has been searching for a job, Goss and Schoening include in their model variables for employment status, 1977 wage payments, years of education, age, prior migration, and homeownership. The empirical results suggest that the probability of migrating declines with increased duration of unemployment. With US data from the Survey of Income and Program Participation (SIPP), Herzog et al. (1993) employ event history analysis and arrive at the same conclusion.

A factor complicating the relationship between local unemployment rates and migration is that as unemployment rates rise, relatively more individuals qualify for unemployment insurance benefits. Even if higher unemployment itself encourages more out-migration, increased unemployment insurance benefits may discourage it. This is the pattern observed empirically by Courchene (1970) for Canada and confirmed with microdata for Sweden by Harkman (1989). The relationship between unemployment duration and unemployment insurance benefits may also help explain Goss and Schoening's finding that the probability of migration decreases with increased duration of unemployment. Apparently microdata have not yet been used to study how the expiration, or impending expiration, of unemployment insurance benefits affect migration. Such a study would be worthwhile.

#### *4.5.3. National unemployment*

Much of the work on the relationship between national economic conditions and migration has concerned Canada (Milne, 1993), and especially Great Britain (Makower et al., 1939; Molho, 1984; Gordon, 1985; Pissarides and Wadsworth, 1989). Lack of good time-series data on migration has prevented the development of this area of research for the US, but a limited number of studies have appeared (Greenwood et al., 1986; Haurin and Haurin, 1988). Available evidence suggests that migration declines during national slumps and rises during recoveries (Makower et al., 1939; Molho, 1984; Gordon, 1985). However, for specific regions, the importance of the regional business cycle dominates that of the national cycle (Milne, 1993).

Swings in national economic conditions also help shape the propensity to migrate. Greenwood et al. (1986) show that when national employment is growing relatively rapidly in the US, the propensity to migrate in response to both employment and earnings opportunities is enhanced. Pissarides and Wadsworth (1989) demonstrate that in Great Britain the unemployed have a lower propensity to migrate when national unemployment is high.<sup>39</sup> Moreover, the impact of employed migrants on local jobs is greater when the national economy slumps (Greenwood et al., 1986), which may be due to the fact that during slumps migration is more highly selective of the best educated. A study that tracks the characteristics of migrants over the cycle would be worthwhile.

#### *4.6. Personal characteristics and life-cycle forces in the decision to migrate*

A number of life-cycle considerations are potentially important in an individual's or a family's decision to migrate. Among these are marriage, divorce, birth and aging of children, completion of schooling, military service, and retirement. Other personal characteristics, often related to the life cycle, are also potentially important. These circumstances include employment status, earnings, education, accumulated skills and training, job tenure, age, sex, and health.

##### *4.6.1. Individual returns to migration*

Because economists view expected utility differentials as the underlying motivating force for migration, and because these differentials are closely related to expected earnings or income, the questions of whether and to what extent migrants benefit economically from moving naturally arise. To address this question, the following simplified type of earnings model has been estimated:

$$\ln w = P\alpha + M\beta + (R\gamma) + \varepsilon, \quad (11)$$

where  $w$  is the hourly wage,  $P$  represents a vector of personal characteristics, including labor market experience;  $M$  is a vector of migration characteristics indicating migrant status, years since migration, and other features of migration discussed in more detail below;  $R$  is a vector of regional characteristics (placed in parentheses because it typically has not been included); and  $\varepsilon$  is the error term. Although many of the models

<sup>39</sup> Another possibility is apparent for the differences noted above in the responsiveness of the unemployed to local unemployment in the US compared to Europe. DaVanzo's (1978) PSID sample of migrants refers to 1971 and 1972 when the US was experiencing a major recovery, which could have enhanced the responsiveness of the unemployed to opportunities elsewhere.

discussed below differ in various ways from this model, Eq. (11) provides a good starting point for the discussion because it identifies the hypotheses of interest.

A number of potential problems may arise in the estimation of a model such as that given in Eq. (11). These problems include questions regarding the appropriate group of nonmigrants to use as the reference group, as well as a number of potential sources of bias in the estimated parameters, including selectivity bias.

*Appropriate reference group.* In assessing the monetary returns to migration, investigators have several choices regarding the reference-group earnings against which to compare those of the migrants: (1) the earnings of otherwise comparable individuals who remain in the origin locality; (2) the earnings the migrants would have made if they had not moved; (3) the earnings of those who stay in the origin locality if they had moved, and (4) the earnings of otherwise comparable individuals residing in the destination locality. The "outcome" of the migration decision, as measured by the investigator, could clearly be dependent upon which reference group is selected. A move that appears to be favorable from one perspective could well be unfavorable from the other. At least with respect to internal migration, those left behind at the origin have frequently been presumed to be the appropriate reference group. However, Morrison (1977) argues that "in making this comparison ... we cannot rule out the possibility that the migrant's advantage arises primarily from his access to a broader set of opportunities" (p. 65). He points out that one advantage of comparing migrants with otherwise comparable individuals at the destination is that at least the set of available opportunities is the same. DaVanzo and Hosek (1981) argue that the appropriate method is to compare post-move earnings of migrants with the earnings these individuals would have made had they not moved. They further argue that the earnings of otherwise comparable nonmigrants are not appropriate for this comparison. In practice, the appropriate reference group is shaped by the objective of the investigator and data availability, the latter of which frequently helps determine the former.

*Some potential biases in estimation.* The studies described above and others suggest that one of the most common findings derived from the estimation of migrant/nonmigrant earnings functions with microdata is that internal migrants tend to suffer earnings losses immediately after their move. This finding seems to hold for the US, Canada, and other countries. Furthermore, it holds whether migrants are compared with nonmigrants in the origin locality or with residents of the destination. The relationship is also true for international migrants, who are almost always benchmarked against residents of the destination. Several potential problems have been raised regarding the estimation of migrant earnings equations. Certain of these problems could cause a downward bias in estimates of the returns to migration, but certain of them could also cause an upward bias. Let us next consider some of these problems.

(1) The previous discussion of equilibrium forces in migration suggests that spatial earnings differentials are at least in part compensating differentials. Thus, measured earnings losses for internal migrants do not necessarily reflect lower utility for them. Amenity controls are almost never included in the earnings functions discussed in more

detail below.<sup>40</sup> Especially with many moves in the US occurring from high-wage, presumably amenity-poor areas of the North and East to relatively low-wage, presumably amenity-rich areas of the South and West, such factors should be given more attention.

(2) One possibility is that migrants give up "local capital" when they move. Some years are required to acquire an equivalent amount of local capital in the destination. Local capital may refer to many things, such as knowing one's way around the local job market, establishing contacts and references, owning a house, etc.

(3) Closely related to the concept of local capital is the notion that to the extent that migrants embody specific training and on-the-job experience, some part of their human capital is not transferable from firm to firm. Such individuals may require a catch-up period to make up for lost experience associated with a given job. Because many microdata sets do not include information on job tenure, it is often difficult to empirically pick up such effects, but this potentially could be a key determinant of the observation that migrants frequently suffer immediate earnings losses.<sup>41</sup>

(4) Some studies are based on data that have very limited time horizons of perhaps 5 years or less. Sizable returns to migration may accrue in the more-distant future, but these are not observed. Thus, measures of lifetime returns to migration are biased downward by the use of right-censored data that are too recent relative to the time of migration.

(5) The timing of the move could affect the subsequent returns to migration. That is, those who move during periods of high national unemployment may accept occupations that are not particularly well matched with their accumulated occupational skills, and they may also accept lower entry-level wage rates than otherwise. The effects of such decisions may linger for many years. Such "period effects" have not been given careful consideration in the context of estimates of the returns to internal migration. However, they have received some attention in the literature on US immigrant assimilation.

(6) Those who migrate more than once may have different earnings profiles than those who move only once. For example, new, return, and other repeat migrants appear to be influenced differently by the various determinants of migration. Not only may the determinants of migration differ by migrant type, but also the individual consequences may differ. If a person's local human capital does indeed affect the returns to migration, other things being equal, a return move should have a greater payoff

<sup>40</sup> Roback (1982, 1988) shows that the values of regional amenities are indeed embedded in regional earnings levels. She concludes that "the data strongly support the contention that utility income broadly measured to include amenities is equalized across regions. This in turn supports the claim that utility income is the most conceptually appropriate notion of income" (1988: p. 38).

<sup>41</sup> For example, Mincer and Jovanovic argue that their estimates "provide a complete though very rough decomposition of lifetime wage growth: about 25 percent of it is due to interfirrm mobility; another 20–25 percent to firm-specific experience; and over 50 percent to general (transferable) experience" (1981: p. 43).

than an onward move. Moreover, the sooner the second move occurs, the greater this differential is likely to be.

Herzog et al. (1985) estimate separate earnings functions for primary and repeat migrants. These authors observe that repeat migrants are significantly older, better educated, and more concentrated in professional and technical occupations, and consequently have significantly higher earnings, than primary migrants, which is plausible. Moreover, using the logarithm of 1969 weekly earnings as their dependent variable, they find that repeat migrants "have significantly higher potential destination weekly earnings (\$400.06 vs. \$301.23)" (pp. 379–380) and that "among repeat migrants, potential earnings are also higher for those individuals choosing to move 'on' rather than 'back' (\$415.11 vs. \$365.79, respectively)" (p. 380).

Perhaps somewhat surprisingly, Herzog et al. find that in spite of embodying less human capital, primary migrants possess significantly more pre-move information than repeat migrants. In this study pre-move information is inferred from the error term in the earnings equation, where any shortfall of observed earnings below potential earnings is assumed to be due to incomplete information. Consequently, primary migrants have higher post-move reservation wages than otherwise comparable repeat migrants. Moreover, among repeat migrants, return migrants do not appear to have more pre-move information about post-move job search than those repeat migrants who move on. These investigators feel that their findings help explain earlier results that show return migrants to have lower expected earnings than nonreturn migrants (Kiker and Traynham, 1977).<sup>42</sup> They also claim that their results contradict the assertions of Kau and Sirmans (1977) and Miller (1973) that return migrants possess more and/or better knowledge than nonreturn migrants.

(7) Another possibility to explain the reduction in the post-move earnings of migrants relative to the benchmark group is that nonmonetary compensation plays an important role in many moves, but differences in nonpecuniary aspects of jobs in origins and destinations have not been given any attention in migrant earnings equations. Mathios (1989) shows that nonmonetary compensation is more important for more highly educated individuals. In his model, when he adds a vector of variables relating to job satisfaction (e.g., convenient hours, convenient location, job status, free time, liking for the job), for persons with 16 or more years of education, the adjusted  $R^2$  in an earnings equations rises from 0.23 to 0.32 with an  $F$ -value of 12.6. Mathios argues that this relationship is plausible because better-educated, higher-income individuals "consume" more nonpecuniary job satisfaction than individuals with lower incomes, as long as job amenities are equivalent to normal consumption goods. Moreover, because marginal tax rates are positively related to income, but not to total compensa-

<sup>42</sup> Kiker and Traynham (1977) find that "in the year of out-migration, out-migrants who later return to the Southeast enjoy relatively greater earnings increases than do those who do not return. The relative improvement in the real earnings position of nonreturn migrant cohorts occurs only after the return migrants have moved back to the Southeast" (p. 4). These conclusions are based on data for the 1960s drawn from the Social Security One Percent Continuous Work History Sample.

tion (including nonpecuniary job attributes), a tax effect reinforces this income effect.<sup>43</sup>

Another factor of potential importance is state and local taxes, as well as variables relating to local public spending and its mix (Day, 1992).<sup>44</sup> Migrant earnings functions are frequently estimated with pretax earnings as the dependent variable and no controls for state and local taxes or public spending and its mix in the new locality relative to the old. Such functions should include these types of variables so as to better control for real consumption wages.

(8) Alfred Marshall in his *Principles of Economics* states that "the large towns and especially London absorb the very best blood from all the rest of England; the most enterprising, the most highly gifted, those with the highest *physique* and strongest characters go there to find scope for their abilities" (1948: p. 199). Presumably, by examining the earnings of otherwise comparable individuals who do not migrate, we take into account what an individual would have earned had he or she not moved. However, Morrison (1977) points out that whether migrants are compared with other individuals in the destination or those left behind in the origin, ambiguity remains: "whether the act of migration, by freeing an individual's energies, leads to subsequent observed improvements in his life; or whether, as a prism separates light, the act is merely selective of certain persons who would have improved their status irrespective of the decision to migrate" (p. 65). This is the issue of sample selection bias. Because this type of bias has the potential to play an important role in efforts to estimate the returns to migration, it requires a more detailed discussion.

*Sources of sample selection problems.* Sample selection problems arise from situations in which a population subgroup is not representative of the entire population whose behavior is under study. Stated more formally, the problem is one "of estimating a regression  $E(y | x)$  when realizations of  $(y, x)$  are sampled randomly but  $y$  is observed selectively" (Manski, 1989: p. 343). Some unobservable variable may distinguish population subgroups. The natural temptation is to analyze only the subgroup for which data are available, but this procedure may result in parameter estimates tainted by "selectivity bias". Thus, if Eq. (11) were estimated by ordinary least squares with only those observations for which the dependent variable is measured, the resulting parameter estimates would be inconsistent.

Sample selection problems have many opportunities to arise in migration studies. Four sources are most likely to cause these problems: (1) sampling design/population

<sup>43</sup> Marginal tax rates are most relevant when an individual is moving up or down the income distribution. However, when the individual is moving across space and taking his/her income from one tax system to another, the average effective tax rate seems most relevant.

<sup>44</sup> Fox et al. (1989) and Herzog and Schlottmann (1986) use microdata to examine the influence of variables relating to the local public sector on migration. Several such variables prove to be significant determinants of individual migration. See Winer and Gauthier (1982) for a detailed study relating to Canada.

coverage, (2) panel attrition, (3) time-dependent disturbances, and (4) differential behavioral responses. The last of these is the typical source of sample selection bias.

(1) *Sampling design/population coverage.* The first possible problem originates in the data used to study migration. Due to sampling design or, if the data are from an administrative source, population coverage, the data may not be representative of the entire population. For example, migration data derived from US Internal Revenue Service files are selective of those with sufficiently high incomes that they are required to file an income tax return. Annual migration data for Canada derived from the Family Allowance System are selective of families with children. Many similar examples are available. This type of data shortcoming does not cause the usual sample selectivity problem, which refers to bias in the estimation of certain parameters. Rather, it leads to an inability to generalize from accurately estimated parameters.

(2) *Panel attrition.* Over time some attrition is almost certain to occur within any panel. Families move and are difficult or impossible to trace. Others do not wish to put up with the effort of being interviewed repeatedly. For others, payments to participants in the panel may become insufficient. Even though the lost panel members may be replaced with seemingly otherwise comparable individuals and families, systematic differences may well exist between those who remain in the panel and those who drop out. This will cause bias when the attrition is correlated with the dependent variables in migration studies. Some unobservable differences may distinguish the groups, such as attitudes in general or attitudes toward risk. An advantage of panel data is that fixed-effect estimates may remove this source of bias. Any investigator who uses panel data sets such as the PSID and the NLS should study what is known about panel attrition in the data set and understand how attrition problems might affect the particular study under consideration.<sup>45</sup>

(3) *Time-dependent selectivity problems.* A third potential source of sample-selection problems also arises from the data, but specifically from the time period of the sample. Time-dependent selectivity problems occur when migrants from different periods are compared. The idea is that the model applies over a span of years, but the disturbance term is time dependent (and perhaps a function of some latent, unobservable variable). Although this type of selectivity problem may occur in many contexts, two are particularly relevant to migration:

(a) *Secular problems.* The education and training received by individuals during one period may differ from the education and training received during a later period. Thus, estimates of the monetary returns to different cohorts of migrants may be tainted. This type of bias may be especially important in the study of the returns to different cohorts of immigrants, who may differ systematically not only in education, training, and other personal characteristics, but also in the self-selective nature of their decision to migrate.

<sup>45</sup> See, for example, Beckett et al. (1988).

(b) *Cyclical problems.* Little or no research has directly addressed the issue of changes in migrant quality over the business cycle, but such changes should occur. Migrants tend to be self-selected in the sense that they are typically of greater innate ability and possess greater motivation for personal achievement than otherwise comparable nonmigrants.<sup>46</sup> The self-selective nature of the migration decision should be more pronounced the greater the costs of migration, including the probability of finding a job and the costs of subsequent adjustment in the new occupational environment. During periods of relatively poor economic conditions, as indicated by slow national growth of job opportunities, the costs associated with migration are higher. These higher costs are due to more intensive job search activities, since access to entry-level jobs, as well as jobs providing specific skill training, is more difficult. On the contrary, during periods of more rapid national economic expansion, the probability of gaining access to jobs is increased and, consequently, the costs of migration are lower. Since the costs associated with migration are expected to be lower during a period of economic expansion, a lower degree of self-selection occurs in periods of relatively good economic conditions. In other words, when economic conditions are generally favorable, the average quality of the migrant flow is relatively lower. This lower quality may be manifested in labor force participation patterns or work motivation, as well as by general skill level. Virtually no research has ever addressed these issues.

(4) *Differential behavioral responses.* The fourth potential source of a selectivity problem is also behavioral and is analogous to the classic selectivity bias that motivated Heckman (1976), following Roy (1951), Lewis (1963, 1974) and Gronau (1974), to write about the problem. Heckman's concern dealt with the relationship between wage levels and female labor force participation. In the migration context at least three types of self-selection may occur:

(a) Persons who migrate may be selective of those individuals with the most favorable opportunities, as suggested by Marshall (1948). 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 fact that individual A migrates, whereas otherwise comparable B does not, suggests that an important difference exists between the individuals. These differences may be in the way they view costs. The differences may also be in the way they view future benefits, and therefore could be due to differences in discount rates. Individual A, for example, may be more highly motivated to invest in human capital formation, not only in migration, but in other forms as well. If such were the case, the earnings of the remaining cohort from which the migrant is drawn

<sup>46</sup> Chiswick (1978), for example, has shown that after several years most US immigrants catch and thereafter surpass the earnings of otherwise similar native-born Americans. Qualitatively similar results have been reported concerning US internal migration (Borjas et al., 1992a).

may not provide an accurate estimate of the earnings the migrant would have received in the absence of migration.<sup>47</sup> The resulting selectivity bias, if not properly taken into account, poses potentially serious problems in econometric attempts to estimate the returns to migration. Lewis (1974) points out that due to this type of problem the returns to nonmigrants are also biased.

- (b) Among those who migrate, some stay in the new place whereas others move back to the origin or move on to a third location. If those who move back or move on are the economically least successful migrants, then the remaining migrants will bias upward any estimate of the returns to migration. The selectivity bias problem as associated with the remigration phenomenon is raised by Yezer and Thurston: "The departure of unsuccessful migrants from a destination leaves a residual of successful lifetime migrants. Calculation of the returns to migrations based on these individuals alone results in an upward bias" (1976: p. 702).<sup>48</sup> Although remigration selectivity is potentially important in assessing the returns to internal migration, it seems especially relevant in estimating the returns to international migration because the presumably less successful immigrants who later leave are lost completely from any data collection system in the original country of immigration.
- (c) Individuals may sort themselves based on their productivity. Roy (1951) discussed such self-selection in terms of occupations (hunting and fishing), but the same argument can be made for region of residence as well as for occupation (Borjas et al., 1992b). The sorting could be based on the individual's absolute advantage in a region (and occupation) or on his comparative advantage, but the basic idea is that he would locate in the region and work in the occupation that yields the highest expected relative earnings.

*Empirically accounting for sample selection bias.* The effects of sample selection bias are similar to those caused by left-out variables. Controlling for these left-out variables yields consistent estimates. Although a number of econometric procedures are available to accomplish this control (Maddala, 1983), a frequently used approach is to estimate a first-stage (structural) probit in order to form an estimate of the missing expectations in the earnings equation. In the migration context, an exam-

<sup>47</sup> In the case stated here, the estimated returns are upward biased. However, Robinson and Tomes (1982) point out that this position implicitly assumes that one type of motivation (i.e., ability) is useful in every location. If the comparative advantage of various individuals differs for different jobs in different regions, self-selection could cause estimated returns to migration that are either biased upward or downward.

<sup>48</sup> In a comment on the Yezer and Thurston paper, DaVanzo (1977) argues that "differences between estimated returns to lifetime migration and recent migration are ... more likely to be due to unmeasured differences in the characteristics of 'lifetime' and 'recent' migrants, or to adjustments the migrants undergo after moving, than to a selectivity bias caused by the subsequent migration of disappointed migrants" (p. 391). Her reason for taking this position is that most return and repeat migration occurs relatively soon after the initial move, and therefore many such migrants will not even be picked up by census data that relate to a five-year interval.

ple of this probit would be to estimate a regression to predict migrant status (i.e., migrant/nonmigrant). A practical difficulty is identifying the earnings equation.

Empirical approaches to sample selection bias in migration studies can conveniently be grouped into two types of models: (1) two-region models, which may be models of (a) single selection, or (b) double selection; (2) multi-region models. The models are "two-region" models in the sense that the relevant regimes place the migrant in one region or somewhere else. This is the case, for example, when the regimes are "migrant" and "non-migrant" (or "mover" and "stayer"). These models sometimes are estimated separately with a number of different regions as the "base" region (Robinson and Tomes, 1982). The population is frequently disaggregate in some way, such as by labor market experience (Robinson and Tomes, 1982), age (Islam and Choudhury, 1990), or by whether the individuals made some other type change, such as an industry shift (Islam, 1985). Double-selection models distinguish those who move once (primary migrants) from those who move more than once (repeat migrants). Due to the greater econometric complexity, this type of model has been estimated rarely. Tunali's (1986) work on Turkey entails a model with double selection.

*Empirical findings.* Empirical studies aimed at assessing the monetary returns to migration can usefully be distinguished as those based on nonlongitudinal microdata and those based on longitudinal microdata (Antel, 1980). Findings based on aggregate data (Gallaway, 1969; Cox, 1971) are not discussed here.

Antel (1980) points out that studies based on nonlongitudinal microdata, which he refers to as "cross-sectional" studies, are characterized by two types of models:

$$w_i = \alpha_0 + \alpha_1 X_i + \alpha_2 M_{it} + \alpha_3 X_i \cdot M_i + (\alpha_4 + \lambda_i) + \varepsilon_i \quad (12)$$

$$w_i = \beta_0 + \beta_1 X_i + \beta_2 D_i + \beta_3 O_i + (\beta_4 \lambda'_i) + \varepsilon_i. \quad (13)$$

Here  $w_i$  is wage or earnings,  $X_i$  is a vector of personal characteristics (e.g., age, education, race),  $M_i$  is a dummy variable for migrant status,  $D_i$  is a dummy for current region of residence,  $O_i$  is a dummy for previous region of residence, perhaps region of birth, and  $\lambda_i$  and  $\lambda'_i$  are selectivity corrections, which may or may not be included in the estimated relationship. A mixed approach is also possible, where in Eq. (12) dummy variables are introduced for specific types of moves, such as rural to urban (possibly by various population sizes of the origin and destination region) and South to North.

The key difference between Eqs. (12) and (13) is that in Eq. (12) migrant status appears, whereas in Eq. (13) controls for destination and origin appear, but no migration indicator per se. In Eq. (12) migrants are benchmarked against nonmigrants. In Eq. (13) otherwise comparable persons in other regions are used as the control group. Antel points out that in Eq. (12) the economic performance of migrants and nonmigrants is in opposite directions. If migrants are gainers, nonmigrants must be losers.

However, in Eq. (13) economic performance is assessed in terms of region of current residence, where the control is the origin region. Early studies neither used the semi-log form of the model that has become standard procedure more recently, nor did they provide any corrections for selectivity bias.<sup>49</sup>

Proper estimation of individual returns to migration require microdata. One of the first studies to use this type of data to analyze such returns is Lansing and Morgan (1967), who use a model similar to Eq. (12) to compare the earnings of US migrants with those of nonmigrants in the receiving locality. They conclude that migrants in general tend to have lower earnings than nonmigrants.<sup>50</sup> Because more educated persons tend both to have higher earnings and to be migrants, these investigators hold education constant by stratifying their sample, but still conclude that the annual earnings of migrants are no higher than those of nonmigrants. The appropriate comparisons to make, argue Lansing and Morgan, are not those between migrants and nonmigrants in a given locality, but rather those between migrants from a given locality and otherwise similar individuals who have remained behind. To perform such a comparison, they estimate a regression for hourly earnings of heads of spending units who worked during 1959 as a function of a number of control variables (e.g., education, age, gender, race) and several dummy variables for different types of moves that indicate where or what type of place an individual grew up relative to where or what type of place he/she now lives. Based on their regression results and a comparison between migrants and those left behind, these investigators conclude that two of the historically dominant migration streams in the US have been profitable for the movers – movement out of the Deep South and movement off the farm.

Lansing and Morgan conjecture that the reason that persons who grew up in low-income localities may be at a permanent disadvantage relative to those who grew up in higher-income localities is that the quality of education received in the low-income localities may be correspondingly low. This view is similar to that expressed in the Coleman Report (Coleman et al., 1966: p. 41). However, Weiss and Williamson (1972), using a model like Eq. (13), conclude that inferiority of southern black schools can be discounted as a cause of poverty among black migrants to the North. Moreover, they argue that the overall effect of either northern or southern urban ghetto environments may be more harmful to blacks than a rural southern background.

<sup>49</sup> A semi-log functional form is often used to estimate wage or earnings equations, in part because earnings tend to be skewed to the right, due to the fact that earnings cannot be negative. Logging the dependent variable tends to make it normally distributed, which is usually a desirable property for estimation purposes. Moreover, as noted by Mincer (1974) and others, human capital theory implies an upward sloping and concave earnings-experience profile under the assumption that on-the-job training declines over one's working life. Concavity of the earnings profile is enhanced by the semi-log functional form.

<sup>50</sup> The data upon which this study was based were drawn from two national surveys conducted by the Survey Research Center at the University of Michigan, the first in 1960 and the second in 1965. Detailed data references are provided in Lansing and Morgan (1967).

Masters (1972) was one of the first to use the Public Use Microdata Sample (PUMS) of the US Census to study this issue. He adopts an approach similar to that of Lansing and Morgan along the lines of Eq. (12), comparing black in-migrants with black nonmigrants at the destination. He finds that lifetime male migrants from the US South to northern cities are better off than male nonmigrants residing in northern cities, although recent migrants generally fare worse than nonmigrants. Masters reports (without presenting his results) that when he compares black migrants with blacks who stayed behind, the net effect of migration, holding education constant, is to increase earnings by 15 to 20%.

A number of other studies have specifically examined migration from the South and migration off the farm. While all are not in agreement with the conclusions of Lansing and Morgan and of Masters that migrants are better off than those left behind, most are in agreement. Among the dissenters is Niemi (1973), who concludes that migration of blacks from the South offered little financial return, while migration of southern blacks to Atlanta offered potentially sizable returns. Laber (1972), on the other hand, finds that both blacks and whites benefit from migration out of the Southeast.

Along with Lansing and Morgan (1967) and Masters (1972), Wertheimer (1970) was one of the first to employ microdata to estimate an earnings function for migrants. In his study, which is similar in form to Eq. (12), he uses microdata from the Survey of Economic Opportunity to assess the returns to both South-to-North and rural-to-urban migration. He concludes that five years after moving, migrants have earnings equal to those of northern and urban nonmovers of the same education, age, race, and sex. Wertheimer estimates that most migrants who left the South earned approximately \$800 per year more than they would have earned had they remained in the South. An interesting aspect of Wertheimer's findings is that this \$800 per year earnings differential breaks down to no gain for the first five years after migrating, \$1000 per year for the next 30 years, and \$350 per year after that.<sup>51</sup> If Wertheimer is correct, migrants must have accepted immediate earnings cuts for greater growth of future earnings.<sup>52</sup> This type of finding has been common when a formal human capital approach has been employed to estimate the monetary returns to migration.

In addition to migrant earnings functions that have been estimated with microdata for the US, similar functions have been estimated for other developed and developing

<sup>51</sup> Master's (1972) results provide some confirmation of Wertheimer's in that he finds that recent black migrants from the South to northern cities fare worse than black nonmigrants in northern cities, but lifetime black migrants fare somewhat better than nonmigrants.

<sup>52</sup> Iden (1974) uses the same data set as Wertheimer to examine essentially the same issues. His conclusions are very similar, indicating "pronounced racial differences in the returns from migration. White migrants to southern metropolitan areas experienced higher earnings than their counterparts who migrated north. Nonwhites who migrated from the South earned substantially more than their counterparts who migrated to the urban South. Within the South, both white and nonwhite male migrants experienced the highest earnings in cities of intermediate size. Among migrants who left the South, whites earned more in large cities than in less urbanized areas, while the reverse was true for nonwhites" (pp. 177-178).

countries, such as Canada, Turkey (Tunali, 1986), and Venezuela (Falaris, 1987). In many respects the empirical findings for these countries are remarkably similar to those for the US.

For example, Marr and Millerd (1980) use microdata from the 1971 Canadian census to examine what they believe to be longer-term returns to migration, also using a model form like Eq. (12). Their definition of a migrant is somewhat different than that used in other studies, namely, anyone who in 1971 was living in a province different than that in which he or she received the highest level of schooling. It is this definition that Marr and Millerd feel allows them to interpret their empirical findings as reflecting long-term returns to migration. They estimate a standard earnings equation and conclude that interprovincial migrants received \$532 more in 1971 than otherwise comparable nonmigrants. The \$532 gain is statistically significant, but Marr and Millerd appropriately point out that they do not know whether the difference is due to migration or to unobservable characteristics of the migrants. Moreover, they examine migrants defined as individuals who changed provinces between 1966 and 1971 but did not return to the province where they completed their schooling. When these migrants are compared with individuals who in 1966 and 1971 lived in the same province as they finished school, Marr and Millerd find no significant return to migration. Thus, they conclude that positive returns to migration require a period of time. None of these early studies accounted for potential selectivity problems.

Nakosteen and Zimmer (1980, 1982) were among the first to provide selectivity-controlled estimates of the returns to migration. They use a switching regression model with endogenous switching. Their results provide evidence of selectivity bias in US data, but their use of the Social Security Continuous Work History Sample severely limited their ability to estimate a properly specified model. For example, they were unable to include education in their regressions.

A number of studies concerned with the US have, however, failed to uncover selectivity bias. Two examples are DaVanzo and Hosek (1981) and Borjas et al. (1992a). In certain studies selectivity bias may fail to appear because earnings are studied too soon after migration (DaVanzo and Hosek, 1981). Another potential problem is that the first-stage probit almost never contains information about alternative destinations for the potential migrant, which implicitly assumes that an individual is able to determine whether to migrate apart from where he or she might go. The failure to include such variables in the first-stage probit may make the predictions that come from it less precise, which in turn could obscure estimates in the second-stage regressions and result in a failure to reject the null of zero selection bias.

Several studies using Canadian data do, however, uncover evidence of selectivity bias. One of the most detailed studies to date of the selectivity bias issue is that by Robinson and Tomes (1982), who analyze microdata from the 1971 Canadian census. They follow the two-stage procedure suggested by Heckman (1976), where the first stage consists of estimating a reduced-form probit equation to correct their earnings equations for selectivity bias. The significance of the coefficient on the correction term is a meas-

ure of the degree of this bias. Their estimates are performed separately for each of two experience groups (5–20 years experience, 20 or more years experience) and each origin province. For the less-experienced group, their estimate of the sample selection bias term is generally negative, which suggests that “the people who actually moved out of origin b earned more, ceteris paribus, in their destination than the stayers in origin b would have done had they also moved” (1982: p. 491). For the more experienced group, no clear pattern of signs emerged. Perhaps more importantly, they argue that “the coefficient on the expected wage gain variable proved to be very sensitive to whether we correct for selection bias in estimating wage equations for movers and stayers” (1982: p. 497). That is, when these researchers ignored selectivity, they failed to measure a significant effect of potential wage gain on migration, but when they corrected for sample-selection bias, they found that potential wage gains significantly affected individual migration decisions. Islam (1985) and Islam and Choudhury (1990) also provide evidence of selectivity bias in Canadian data. The latter paper concludes that in the absence of a selectivity correction the income gains to migration are underestimated.

Models estimated with longitudinal microdata have generally taken one of the following forms:

$$w_{i,t} - w_{i,t-1} = a_0 + a_1 X_{i,t} + a_2 M_{i,t} + a_3 w_{i,t-1} + u_i, \quad (14)$$

$$w_{i,t} = b_0 + b_1 X_{i,t} + b_2 M_{i,t} + b_3 w_{i,t-1} + v_i, \quad (15)$$

$$\ln w_{i,t} = c_0 + c_1 X_{i,t} + \gamma_1 E_{i,t} + \gamma_2 E_{i,t}^2 + \delta_0 M_{i,t} + \delta_1 M_{i,t} \cdot T + \delta_2 M_{i,t} \cdot T^2 + (\sigma_1 \lambda''_i) + z_i. \quad (16)$$

Eq. (14) represents change in earnings or in the wage rate. Another form of this equation expresses  $w_{i,t}$  as a function of  $w_{i,t-1}$  and other variables, but does not difference on the left-hand side of the regression equation (Eq. (15)). Since in Eq. (14) earnings are typically differenced over a fairly short period of time, such as a year or two, the findings are best interpreted as short run. Moreover, since the emphasis of Eq. (14) is on changes from one period to another, the independent variables frequently are expressed as changes also. For example, change in marital status and change in employer are commonly used dummy variables that appear in regressions like Eq. (14).

In one sense, specifications similar to Eq. (14) have an econometric advantage. The differencing tends to eliminate (or control for, as in Eq. (15)) any individual fixed effects that are reflected in the error terms of regressions such as Eq. (12) that are based on nonlongitudinal data. These fixed effects could be correlated with various unobserved factors that affect the individual's propensity to migrate, such as ability, attitudes toward risk, and other factors that lead to selectivity problems in regressions like Eqs. (12) and (13). As a consequence, specifications (14) and (15) are not typically estimated with a selectivity correction.

Borrowing an approach that has been successfully implemented in the study of immigrant assimilation and applying it to internal US migration, Borjas et al. (1992a) set up a model like Eq. (16), where  $w$  is the hourly wage,  $X$  represents a vector of personal characteristics,  $E$  is labor market experience,  $M$  is a dummy variable distinguishing migrants from nonmigrants in the destination,  $T$  is years since migration, and  $z_i$  the error term. The basic idea underlying this model is that experience is not perfectly transferable between regions, which should result in a negative sign on  $\delta_0$ , which indicates the migrant–nonmigrant earnings differential at the time of migration. If a period of catch-up occurs during which migrant earnings approach those of otherwise comparable individuals at the destination,  $\delta_1$  will have a positive sign. If the convergence of migrant and nonmigrant earnings slows with duration of the migrant's residence in the destination,  $\delta_2$  will have a negative sign.

Grant and Vanderkamp (1980) employ longitudinal microdata for the period 1965–1971 to estimate earnings functions like that in Eq. (15) for Canada. The dependent variable refers to 1971 (log) income (or alternatively earnings). According to Grant and Vanderkamp, the returns to early migrants are slightly positive, but those to more recent migrants are negative. Early long-distance migrants do slightly better than early short-distance migrants, but recent long-distance migrants suffer greater losses than recent short-distance migrants. These investigators speculate that long-distance migration involves more uncertainty, and consequently a transition period is required to catch up with and pass those who move over short distances.

Another important finding that supports Mincer's (1978) theory, which is described below, is that among long-distance migrants single males do the best, whereas married females suffer fairly large losses. Grant and Vanderkamp conclude that "the testing process and final estimates show that it is very difficult to detect a significantly positive effect of migration on income within a five-year time horizon. Within the first few years after a move there appears to be a strong negative impact of migration on the earnings level" (1980: p. 398). They go on to conclude that "the empirical results provide only weak support for the human capital model" (p. 400). Several additional studies that employ specifications (14) and (15) and relate to the US are discussed below in connection with family migration.

A number of more recent studies concerning US migration have also appeared. Many of these have partitioned the migrant population in one way or another, such as according to whether the move was a primary (presumably first-time) move or a repeat move (which is often distinguished as being a return or an onward move), as well as by gender and race (Krieg, 1990). Moreover, as noted above, the same type of approach that has been applied to immigrant assimilation has recently been applied to the earnings of young internal migrants in the US. Using the 1970–1986 waves of the National Longitudinal Survey of Youth (NLSY), Borjas et al. (1992a) show that migrants initially earn 10% less than natives but catch up in about six years. When return migrants are eliminated from the sample, the initial disadvantage is about 11%, but the catch-up period is only three years. These authors also show that long-distance

(interregional) migrants experience an initial disadvantage about twice that of short-distance (intraregional) migrants. Moreover, among interregional migrants those who moved to states with zero employment growth between 1980 and 1986 earned 22% less than otherwise comparable natives during their first two years in the new location, but those who moved to states whose employment grew by 32% over the same period experienced no disadvantage relative to natives. The earnings disadvantage may be less for those who move over short distances and to fast-growing areas because uncertainty is less, but the exact reason for the observation is not tested.

Sample selection does not appear to have been a problem in the Borjas et al. study. These authors report that their selection variable was not significant in the various second-stage regressions in which it was included. The inclusion of variables to control for compensating differentials would be an advance in estimating models like Eq. (16), but the application of the models of immigrant assimilation to internal migration is an advance in itself.

#### *4.6.2. Family and life-cycle considerations*

Based on a survey of 3991 household heads, 723 of whom were involved in a move during the last five years prior to the survey in the early 1960s, Lansing and Mueller (1967: p. 126) report that 24% of the most recent moves entailed a family reason. For example, 12% of the moves were to be closer to other family members, 4% due to health considerations, 3% due to marriage, and 2% due to divorce or separation. Moreover, 42% of return moves included a family reason, compared to 20% of other moves.<sup>53</sup>

Given their pivotal importance in research concerning the determinants of migration, life-cycle forces have been given far too little attention. Partly in connection with the development of microdata and the application of econometric techniques appropriate for their analysis, greater emphasis has been placed on various life-cycle and familial factors.

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" (p. 753). Presuming that their joint net returns to migrating from  $i$  to  $j$  exceed their joint net costs of migrating, a husband-wife family would presumably migrate from  $i$  to  $j$ . If, for example, the wife's expected earnings in  $j$  were less than in  $i$ , but the husband's were sufficiently greater in  $j$  than in  $i$  to offset these losses, the wife would be a "tied mover". On the other hand, if the husband's earnings gain in  $j$  were to fail to offset his wife's earnings loss in  $i$ , the couple would remain in  $i$ , and the husband would be a "tied stayer". Moreover, ac-

<sup>53</sup> Using data from the Annual Housing Surveys, Long and Hansen (1979) provide more recent detail that is roughly similar to that reported by Lansing and Mueller.

cording to Mincer 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. More recently, Mont (1989) applies a search-theoretic approach to family migration decisions.

Several testable hypotheses emerge from Mincer's work. First, husband-wife families are less likely to migrate than unattached individuals. Second, when husband-wife families move, the husband's earnings will generally improve, but the wife, who is usually a tied mover, will work less and have lower earnings. Mincer's hypotheses regarding "second round" effects of increased female labor force participation on migration have apparently not been tested to date. That is, we do not know if increased female labor force participation initially results in less migration and more marital instability, with increased marital instability in turn resulting in increased female labor force participation and more migration. Long (1974) shows that much movement over both short and long distances is connected with marriage and establishment of households, but after these events married men are more residentially stable than unmarried men. Moreover, with the exception of 20–24-year-old men, those with working wives had lower rates of interstate movement than those with nonworking wives. However, those with working wives were more likely to move within a county. Long concludes that "having a wife who works may inhibit long-distance movement but appears to promote short-distance movement" (1974: p. 344). One problem with Long's findings, which he notes and addresses, is that employment status is defined at the end of the migration interval and could therefore be influenced by the movement that occurred.

Long's data indicate that a wife's labor force participation reduces the probability of family migration. If migration occurs, it reduces the wife's labor force participation. Does the wife's reduced labor force participation increase the probability of return or other repeat migration? This issue has apparently not been studied in the context of primary, return, and other repeat migration and would be interesting to address.

Some of the observed income differences between men and women could be due to career interruptions experienced by women when they move with their husbands. Wives may not be in a position to further their careers through migration in the same way that men do. Moreover, the career choices of women may be affected by the anticipation of migration. Long feels that women may choose occupations that are more easily transferable between regions, such as elementary school teaching, nursing, and secretarial work.<sup>54</sup>

<sup>54</sup> This point is similar to that made by McDowell (1982) in connection with academic women. McDowell argues that because they may anticipate a career interruption, due for example to child-bearing, academic women choose fields of specialization in which knowledge obsolescence is slow. After measuring the rate of knowledge obsolescence in different academic disciplines by observing the citation decay rate, he finds considerable empirical support for his hypothesis.

What is it about moves over longer distances that reduces the labor force participation of wives? The answer seems potentially to lie in one or more of three factors: (a) the characteristics of the wives and their families and any changes that might occur in these characteristics; (b) the characteristics of the places of origin and destination and any differences that might exist in these; and (c) information relevant to job search that is more costly to acquire at more distant locations. Some combination of these factors could also be responsible. For instance, better-educated individuals tend to move over greater distances. However, since better-educated women tend to have higher labor force participation rates, this factor should work against the observed relationship. Apparently no one has sought to determine whether better-educated wives experience less severe drops in their labor force participation as distance rises.

Factor (b) seems the least likely to provide an answer to the question posed above. Factor (c) appears to have more promise. Many of the intercounty, intrastate moves studied by Long could involve neighboring counties where job-market information is considerably cheaper to acquire than that relating to another state. If the wife tends to be a tied mover, her job search may be postponed until after the family is settled in its new location. However, we would expect that if, due to the move, fundamental changes did not occur in the underlying determinants of the wife's participation decision, eventually her participation would return to its initial level. It would be of great interest to know if wives who reduce their labor force participation immediately after a move eventually resume their participation, as well as the time and pace of the resumption.

In support of Mincer (1978), Graves and Linneman (1979) also find that the probability of moving is negatively related to marital status. However, Bartel's (1979) results do not reflect a strong marriage effect on migration. In her numerous regressions, her variable for marital status is almost always negative, but almost never significant.<sup>55</sup> Van Dijk et al. (1989) obtain a negative but insignificant effect for US couples without children, but a very strong negative effect associated with presence of children. For the Netherlands each variable is negative and significant. At least for the US, this finding demonstrates the need to include a variable for presence of children in the regression.<sup>56</sup>

<sup>55</sup> Bartel considers each individual as facing six probabilities (migrate and quit ( $P_1$ ), migrate and be laid off ( $P_2$ ), migrate and keep job ( $P_3$ ), not migrate and quit ( $P_4$ ), not migrate and be laid off ( $P_5$ ), and not migrate and keep job ( $P_6$ )). Amemiya (1981) argues that "Bartel ignored the multivariate nature (as well as the multi-response nature) of the data and estimated each of the five probabilities  $P_1$  through  $P_5$  separately by the univariate, dichotomous logit ML estimator" (p. 1526). Consequently, her procedure could result in the five estimated probabilities exceeding unity; moreover, she does not account for the correlation between the five dependent variables. Finally, Amemiya points out that if the work decision comes before the migration decision, a sequential model would be required.

<sup>56</sup> Bartel (1979) includes children in her regressions, but the variable is rarely significant in spite of the fact that she uses three data sets that pick up men at different ages that cover most of the working life. These findings may be due to her use of school-aged children only.

Sandell (1977), using a model like Eq. (15) above, 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.<sup>57</sup>

Also studying wage change with a specification like Eq. (14), Bartel (1979) stresses the importance of distinguishing between job transfers, quits, and lay-offs. Migration in connection with a job transfer benefits men in their twenties and thirties. Migration in connection with a quit benefits only young men. DaVanzo and Hosek (1981) corroborate Bartel's finding that the largest wage gains are enjoyed by those who migrate and stay with the same employer.

DaVanzo (1976a) finds that families with unemployed heads who are looking for work have a higher probability of migrating over a long distance (interdivisionally) than those with an employed head who is seeking a new job. DaVanzo (1978) also finds that families with heads who are unemployed but looking for a different job are highly responsive to the present value of wage differences. Families with heads who are employed but not looking for a different job are unresponsive to opportunities elsewhere. For families with an unemployed head, the income effect is negative, meaning that an increase in income due, for example, to a subsidy of some sort, will have the result of causing these families to stay rather than move.

Migration frequently occurs in connection with a change in life-cycle circumstances, such as at the completion of one's college education, at the time of marriage, and soon after retirement. Thus, examining the relationship between a given life-cycle characteristic and migration may obscure the relationship between changes in life-cycle characteristics and migration. Graves and Linneman (1979) and Linneman and Graves (1983), for example, provide evidence that changes in family composition, changes in family income, and changes in the family head's education all positively influence the probability of migration.<sup>58</sup>

<sup>57</sup> Antel (1980) indicates two problems with Sandell's study. First, his dependent variable is earnings change over the 1967–1971 period. The migration interval also includes 1971, which for some observations could include pre-move earnings. Second, Sandell does not distinguish his migrant groups as clearly as he might have because he fails to specifically identify moves that were both multiple and intrafirm.

<sup>58</sup> Hunt (1993) appropriately expresses caution about the findings of these studies because very few migrants are included in the sample. Of 1937 observations, only about 40 involved a move across a county line, half with a job change and half without one. Many studies based on microdata do not report the number of migratory moves, so it is difficult or impossible to determine the size of the sub-sample upon which the findings are based.

Employing the NLS panels of young men and young women, Maxwell (1988) provides direct evidence that changing marital status affects the returns to migration. She estimates an earnings function like Eq. (15), but introduces several innovative terms, such as whether an individual was married, separated, or remained married during the migration period. She also interacts these terms with migration status. She concludes that female migrants who remained married and who were presumably tied movers, suffer substantial earnings losses immediately upon migration. However, female nonmigrants who remained married and were presumably tied stayers, also suffer immediate losses, but these losses increase sharply over time, whereas the losses of the otherwise comparable migrants decline over time. Whether they migrate or not, divorce does not appear to affect the earnings of women, but for men the results are different. Three years after migrating, men who divorced earn considerably more, but after the same period those who do not migrate earn somewhat less. Maxwell speculates that nonmigrating, divorced men may be analogous to tied stayers, perhaps due to the presence of children in the area.

Time-varying household characteristics may be important determinants of migration not only in the current period, but also in the prior and following periods. Krumm and Kelly (1988) argue that focus on a single period may produce response estimates that are questionable. Their multinominal logistic parameter estimates indicate that the duration of certain household characteristics is important in the decision to migrate, and not simply their presence or absence. In the model developed by Krumm and Kelly these points are nicely illustrated by an increase in family size, which perhaps contrary to expectations results in a slight decline in migration responses. This finding appears to be due to families anticipating the need for more housing before actually realizing an increase in family size. Thus, before additional children arrive, they have moved into housing that accommodates their needs.

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. Longitudinal data allow the development of an event history for an individual or family. Although some years ago DaVanzo (1982) wrote about event history analysis of migration data, this type of analysis has been slower to gain a foothold in migration research than in other areas of economic demography.

Few migration histories that allow event history analysis have been constructed. However, one of the earliest such data bases referring to the US 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 30–39. Sandefur and Scott (1981) and Sandefur (1985) have used these data to study the effects of work careers and family life cycles on migration, concluding that when variables relating to such factors are taken into account, the inverse relationship between age and migration disappears. Herzog et al. (1993) have used event history analysis to study migra-

tion's role in the transition to employment, and Odland and Shumway (1993) have used it to examine the relationships between various life-cycle events and migration. More work of this sort is badly needed.

## 5. Conclusions

In the introduction several questions were posed regarding internal migration in developed countries. Who migrates? Why do they migrate? Where do the migrants come from and where do they go? When do they migrate? What consequences does migration have for the migrants themselves and others in origin and destination regions? During the last 30 years, firm answers have been provided to many of these questions, but at the same time new, narrower, and in certain ways more refined, interesting, and certainly more challenging questions have arisen.

Migration propensities appear to vary considerably across countries for reasons that are not always obvious. Moreover, estimated parameters that address the questions raised above, while generally in qualitative agreement, are quantitatively somewhat different across developed countries, even when the models and data are roughly comparable. With regard to internal migration, rigorous cross-national studies are virtually nonexistent, but differences in geographic size (and hence spatial distribution of economic opportunities) and culture are likely to importantly underlie observed differences.

Until about 20 years ago, aggregate data were almost exclusively used to study various migration phenomena. Such data embody a number of shortcomings that prevented the study of many important issues bearing on migration. The relatively recent availability of micro- and longitudinal data have had a major impact on four areas of migration research. First, such data have gone far toward clearing up earlier puzzles concerning the relationship between unemployment and migration. Second, these data have allowed the human capital model to be tested in the migration context by allowing the estimation of migrant earnings equations. Third, micro- and longitudinal data have permitted a clarification of the relationship between personal characteristics and the decision to migrate, and they have allowed a deeper understanding of the relationship between various life-cycle and familial factors and migration. Fourth, these data have permitted a detailed focus on different types of migrants, particularly primary, return, and other repeat migrants.

Researchers now know that local unemployment in the US has a significant influence on the migration decisions of the unemployed and those who are seeking new jobs, but has little influence on individuals who are secure in their jobs. However, they do not know why this relationship fails to hold for European countries. Moreover, they do not know with great confidence why some unemployed individuals are faster to migrate than others. To some extent, immediate migration could be discouraged if a person's spouse remains employed. What characteristics of a spouse's employment discourage migration? To what extent does it matter whether the party remaining em-

ployed is the husband or the wife? What role does the availability of unemployment insurance play in discouraging immediate migration? Institutional settings differ substantially by country, such as in the nature of unemployment insurance programs, and could cause differences in the response to personal unemployment. More cross-national work is needed in migration research.

The human capital model has provided a powerful analytical tool for the study of numerous important issues in labor economics. It is somewhat surprising that this model has not typically provided a comparably powerful explanation of migration. Whether migrants are compared to otherwise comparable individuals in the origin or the destination, they appear to suffer earnings losses for at least several years after migration. This finding has been verified repeatedly for the US and for other countries. Although several explanations have been offered for these findings, we still do not know enough about why they occur.

The most likely explanation for the apparent failure of the human capital model is that the model has not failed, but rather it has just not been properly or fully implemented. An immediate drop in earnings need not, and probably does not, mean a drop in lifetime utility. Job tenure should be an important argument in earnings equations, and yet this variable has rarely been included in migrant earnings equations. Except when job transfers are involved, migration entails a termination of job tenure and the monetary returns to that tenure. Little has been done to examine the characteristics of a migrant's job before and after a move. Consequently, little has been done to understand which specific aspects of a job are transferable to the new employment. Moreover, the nonmonetary aspects of jobs in the origin and destination have not been studied, although they have been shown to be important, at least for well-educated individuals. Although location-specific amenities have proven to be significant determinants of interregional migration, and although the values of such amenities are likely capitalized in wages and rents, controls for these factors have only recently been introduced into earnings equations. Frequently, state and local taxes, as well as state and local spending and its mix, are unaccounted for in spite of the fact that they have proven to be significant determinants of migration at both the micro level (Herzog and Schlottmann, 1986) and the macro level (Day, 1992). Furthermore, differences in leisure time (or work effort) are frequently not taken into account. Since this aspect of a job could be an important consideration in many migration decisions, especially where location-specific amenities are involved, leisure time should be taken into account specifically. Finally, depending upon the reference group's location, the absence of good price deflators (Shaw, 1985) could bias the interpretation of earnings variables in migration regressions, as well as in earnings regressions that account for migration.

Due to incomplete information and lack of perfect foresight, individuals obviously make mistakes in their choices regarding whether and where to migrate. Notwithstanding these mistakes, individuals presumably believe that their utility levels will improve through migration. The choices are frequently inherently risky, and although the

expected utility model forms the basis for the typical migration model, risk has not been studied to a significant degree in this context. It is worthy of attention.

Many questions remain to be answered regarding the adaptation of migrants to the area of destination. Do those who are more likely to stay in a new region invest in skills and training that is more specific to the region and that thus makes them less likely still to migrate out? Do the involuntarily mobile adapt less well because they have had less time to plan for their move or to have participated extensively in job search activities? Are those who move over greater distances less likely to remigrate, and if so, why? How and why do the returns to those who move over greater distances differ from those who move over shorter distances? Although certain of these issues have been addressed with micro- and panel data, an adequate understanding of the answers has yet to be developed.

Selectivity problems are potentially quite important in a wide variety of migration studies. Yet only a few studies have made any attempt to correct for selectivity bias. Certain studies that have made such attempts have demonstrated that selectivity can obscure the true direct relationship between certain variables and migration, but not all studies arrive at this conclusion. Time-dependent selectivity has been ignored almost completely. Virtually nothing is known about changes in migrant quality (i.e., human capital embodied) over the business cycle. Longitudinal data could be used to address this issue. Although they have been given some attention in the literature on US immigration, cohort effects also have been ignored almost completely with respect to internal migration. Moreover, much remains to be learned regarding the selectivity associated with remigration decisions of both the return and onward types.

The finding that persons who are unemployed prior to an initial move are much more likely to return than those who are employed is fascinating. Another interesting observation is that better educated individuals are more likely than others to quickly move on. Among the unemployed, what characteristics increase the probability of a quick return? Among the better educated, what characteristics enhance the likelihood of a quick onward move? The use of longitudinal data to further study the sequence of moves would be welcome.

Some of the most important findings based on micro- and longitudinal data have concerned the relationships between personal, family, and life-cycle forces and the decision to migrate. Yet many of the most important unanswered questions also involve these relationships. We can say with some certainty that a wife's employment discourages family migration. Family migration also seems to negatively affect a wife's labor force participation and earnings, but we do not know much about the circumstances that affect this relationship. For how long are the wife's employment and earnings affected by migration? Are the relationships different for better-educated women? Do expected career interruptions influence the occupational choices of women? These interruptions could be due to child bearing, but they could also be due to migration. Are wives with occupations that are more easily transferred from place-

to place more likely to gain quick reemployment after a move without significant loss of earnings?

The influences of life-cycle changes on migration decisions have only barely been touched by researchers. The relationships between many such changes and migration therefore have remained undiscovered. Completion of education, birth and aging of children and the anticipation of these events, changing marital status and especially divorce, death of a spouse, acquisition of a home, and retirement are only a few potentially important life-cycle changes that are likely to importantly affect migration and about which much remains to be learned. The connection between divorce and migration seems particularly relevant (Grundy, 1985). To what extent do children affect the migration response associated with divorce? The relationships between health status and its changes and migration are also important, and except for a limited amount of research concerning the health status of retired migrants, little is known about this relationship.<sup>59</sup>

The effects of a period of military service have been studied from a number of perspectives. Participation in the military is an important life-cycle event and certainly involves migration. However, apparently no one has studied the possible effects of military participation on subsequent geographic mobility. A number of potential channels of influence could operate between military service and migration. For example, military participants have migration experience and knowledge of alternative areas. They are repeat migrants. Is their responsiveness to the various determinants of migration like that of other repeat movers with otherwise similar characteristics? Do military participants have post-military migration histories that differ in any substantive way from otherwise similar individuals from their "home" communities who do not serve in the military. The military is thought to provide a bridging environment for minorities that allows them increased occupational mobility. Does a similar effect operate through increased geographic mobility, which is clearly another avenue to increased economic opportunities? Do military retirement benefits influence migration?

Surprisingly little is known about the interactions between migration and fertility in the contemporary US or in other developed countries. As discussed in Zarate and de Zarate (1975), a sizable literature on this topic began developing in the 1930s, but was mainly focused on rural-urban migration. A good deal of more recent work has also focused on rural-to-urban migrants in less developed countries, and a few studies concentrate on US immigrants. However, in spite of the availability of more and better data in recent years, little has been done to study how the act of migration affects fertility in the US. In their new settings do migrant fertility patterns reflect what they would have been in the former location? Alternatively, do migrants adapt in the sense that they assume patterns more like those of the receiving area? Do those who move

<sup>59</sup> Linneman and Graves (1983) study the relationship between changes in health status (as measured by increases or decreases in annual hours of illness experienced by the household head) and migration, but their results are inconclusive.

repeatedly have lower fertility than those who stay put or move only once? Do other changes associated with migration affect fertility? For example, if migrants really do experience earnings losses for a few years after a move, are these losses sufficient to negatively affect their fertility? In spite of lower fertility rates in the US and narrowing regional and rural–urban differentials in these rates, further study of the linkages between migration and fertility would be welcome.

Migration serves an equilibrating function in the economy, expediting the balancing of demand and supply forces within and across regions, and thus facilitating the operation of market economies. This facilitating role of migration has attracted the attention of policy makers. In a number of European countries, such as Great Britain, France, and the Netherlands, migration policy has been directly tied to regional development policy, whereas in others, such as Sweden, migration policy has been oriented toward improving the efficiency of the labor market (Klaassen and Drewe, 1973; Willis, 1974). In either case, a major objective has been to reduce unemployment. Subsidization of relocation expenses and employment information exchanges are the most common forms that migration policy has taken in Europe.

In the US, policy concerns regarding migration generally are passive, although this was not the case during the nineteenth century. These concerns have been directed toward both how various national, state, and local policies have affected in- or out-migration and how migration has affected the public sector of states and localities (Charney, 1993). During recent years, migration has been viewed as playing a role in state and local economic development efforts, but again this role has been seen as passive, where migration is regarded as a means of accommodating incremental employment. A policy concern that has arisen in this respect is whether the jobs created by economic development efforts go to previous residents or in-migrants (Bartik, 1993).

The quality of migration data has increased dramatically during the last 20 years and has allowed numerous important advances in migration research that otherwise would have been impossible. The availability of microdata and longitudinal data have been particularly noteworthy in this respect. In a certain sense, however, migration research has swung too far in the micro direction. Variables relating to the communities in which people live and to which they consider migrating have been shown to clearly affect migration, as well as the monetary returns to migration. Yet some investigators include only personal or family variables in their migration models, completely ignoring variables that are sometimes called “contextual”. This type of omission is potentially serious. Notwithstanding these comments, microdata and longitudinal data will almost certainly provide the key resources for future advances in migration research by economists.

## References

- Addison, J.T. and P. Portugal (1989), "Job displacement, relative wage changes, and duration of unemployment", *Journal of Labor Economics* 7: 281–302.
- Ameriyya, T. (1981), "Qualitative response models: a survey", *Journal of Economic Literature* 19: 1483–1536.
- Antel, J.J. (1980), "Returns to migration: literature review and critique", Rand note N-1480-NICHD (The Rand Corporation, Santa Monica, CA).
- Bartel, A.P. (1979), "The migration decision: what role does job mobility play?", *American Economic Review* 69: 775–786.
- Bartik, T.J. (1991), Who benefits from state and local economic development policies? (W.E. Upjohn Institute, Kalamazoo, MI).
- Bartik, T.J. (1993), "Who benefits from local job growth: migrants or the original residents?", *Regional Studies* 27: 297–311.
- Becker, G.S. (1962), "Investment in human capital: a theoretical analysis", *Journal of Political Economy, Supplement*, 70: 9–49.
- Becketti, S., W. Gould, L. Lillard and F. Welch (1988), "The panel study of income dynamics after fourteen years: an evaluation", *Journal of Labor Economics* 6: 472–492.
- Bernert, E.H. (1944a), "Volume and composition of net migration from the rural-farm population, 1930–40, for the United States, major geographic divisions and states" (US Department of Agriculture, Bureau of Agricultural Economics, Washington, DC).
- Bernert, E.H. (1944b), "County variation in net migration from the rural-farm population, 1930–40" (US Department of Agriculture, Bureau of Agricultural Economics, Washington, DC).
- Blomquist, G.C., M.C. Berger and J.P. Hoehn (1988), "New estimates of quality of life in urban areas", *American Economic Review* 78: 89–107.
- Borjas, G.J., S.G. Bronars and S.J. Trejo (1992a), "Assimilation and the earnings of young internal migrants", *Review of Economics and Statistics* 74: 170–175.
- Borjas, G.J., S.G. Bronars and S.J. Trejo (1992b), "Self-selection and internal migration in the United States", *Journal of Urban Economics* 32: 159–185.
- Campisi, D., A. LaBella and G. Rabino (1982), "Migration and settlement: 17. Italy", Report RR-82-33 (Institute for Applied Systems Analysis, Laxenburg, Austria).
- Charney, A.H. (1993), "Migration and the public sector: a survey", *Regional Studies* 27: 313–326.
- Chiswick, B.R. (1978), "The effects of Americanization on the earnings of foreign-born men", *Journal of Political Economy* 86: 897–921.
- Clark, D.E. and J.C. Cosgrove (1991), "Amenities versus labor market opportunities: choosing the optimal distance to move", *Journal of Regional Science* 31: 311–328.
- Coleman, J.S. et al. (1966), Equality of educational opportunity (US Government Printing Office, Washington, DC).
- Courchene, T.J. (1970), "Interprovincial migration and economic adjustment", *Canadian Journal of Economics* 1: 211–223.
- Cox, D. (1971), "The effect of geographic and industry mobility on income: a further comment", *Journal of Human Resources* 6: 525–527.
- Crandall, R.W. (1993), Manufacturing on the move (The Brookings Institution, Washington, DC).
- Creedy, J. (1974), "Inter-regional mobility: a cross-sectional analysis", *Scottish Journal of Political Economy* 21: 41–53.
- DaVanzo, J. (1976a), "Why families move: a model of the geographic mobility of married couples", Report R-1972-DOL (The Rand Corporation, Santa Monica, CA).
- DaVanzo, J. (1976b), "Differences between return and nonreturn migration: an econometric analysis", *International Migration Review* 10: 13–27.
- DaVanzo, J. (1977), "Migration patterns and income change: implications for the human capital approach to migration: comment", *Southern Economic Journal* 43: 391–393.

- DaVanzo, J. (1978), "Does unemployment affect migration? – evidence from microdata", *Review of Economics and Statistics* 60: 504–514.
- DaVanzo, J. (1982), "Techniques for analysis of migration-history data", Rand note N-1824-AID/NICHD (The Rand Corporation, Santa Monica, CA).
- DaVanzo, J. and J.R. Hosek (1981), "Does migration increase wage rates? – an analysis of alternative techniques for measuring wage gains to migration", Rand note N-1582-NICHD (The Rand Corporation, Santa Monica, CA).
- David, P.A. (1974), "Fortune, risk, and the microeconomics of migration", in: P.A. David and M.W. Reder, eds., *Nations and households in economic growth* (Academic Press, New York) pp. 21–88.
- Day, K.M. (1992), "Interprovincial migration and local public goods", *Canadian Journal of Economics* 25: 123–144.
- Denslow, D.A. and P.J. Eaton (1984), "Migration and intervening opportunities", *Southern Economic Journal* 51: 369–387.
- Eberts, R.W. and J.A. Stone (1992), *Wage and employment adjustment in local labor markets* (W.E. Upjohn Institute, Kalamazoo, MI).
- Eldridge, H.T. and D.S. Thomas (1964), *Population redistribution and economic growth in the United States, III. Demographic analysis and interrelationships* (The American Philosophical Society, Philadelphia, PA).
- Evans, A.W. (1990), "The assumption of equilibrium in the analysis of migration and interregional differences: a review of some recent research", *Journal of Regional Science* 30: 515–531.
- Falaris, E. (1987), "A nested logit migration model with selectivity", *International Economic Review* 28: 429–444.
- Fields, G.S. (1976), "Labor force migration, unemployment and job turnover", *Review of Economics and Statistics* 63: 407–415.
- Fotheringham, A.S. (1981), "Spatial structure and distance-decay parameters", *Annals of the Association of American Geographers* 71: 425–436.
- Fox, W.F., H.W. Herzog, Jr. and A.M. Schlottmann (1989), "Metropolitan fiscal structure and migration", *Journal of Regional Science* 29: 523–537.
- Friedrich, K. (1990), "Federal Republic of Germany", in: C.B. Nam, W.J. Serow and D.F. Sly, eds., *International handbook on internal migration* (Greenwood Press, New York) pp. 145–161.
- Fuchs, V.R. (1962), "Statistical explanations of the relative shift of manufacturing among regions in the United States", *Papers and Proceedings of the Regional Science Association* 8: 106–126.
- Gallaway, L. (1969), "The effect of geographic labor mobility on income: a brief comment", *Journal of Human Resources* 4: 103–109.
- Gallaway, L.E. and R.K. Vedder (1971), "Mobility of native Americans", *Journal of Economic History* 31: 613–649.
- Gallaway, L.E., R.G. Gilbert and P.E. Smith (1967), "The economics of labor mobility: an empirical analysis", *Western Economic Journal* 5: 211–223.
- Goodrich, C. (1936), *Migration and economic opportunity* (University of Pennsylvania Press, Philadelphia, PA).
- Gordon, I. (1985), "The cyclical interaction between regional migration, employment and unemployment: a time series analysis for Scotland", *Scottish Journal of Political Economy* 32: 135–158.
- Goss, E. and H.S. Chang (1983), "Changes in elasticities of interstate migration: implication of alternative functional forms", *Journal of Regional Science* 23: 223–232.
- Goss, E.P. and N.C. Schoening (1984), "Search time, unemployment and the migration decision", *Journal of Human Resources* 19: 570–579.
- Grant, E.K. and J. Vanderkamp (1980), "The effects of migration on income: a micro study with Canadian data 1965–1971", *Canadian Journal of Economics* 13: 381–406.
- Graves, P.E. (1979), "A life-cycle empirical analysis of migration and climate, by race", *Journal of Urban Economics* 6: 135–147.
- Graves, P.E. (1980), "Migration and climate", *Journal of Regional Science* 20: 227–237.

- Graves, P.E. (1983), "Migration with a composite amenity: the role of rents", *Journal of Regional Science* 23: 541–546.
- Graves, P.E. and M.J. Greenwood (1987), "Two views of recent regional location patterns in the United States: competing models with non-competing implications", paper presented at the International Conference on Migration and Labor Market Efficiency, Knoxville, TN.
- Graves, P.E. and T.A. Knapp (1988), "Mobility behavior of the elderly", *Journal of Urban Economics* 24: 1–8.
- Graves, P.E. and P.D. Linneman (1979), "Household migration: theoretical and empirical results", *Journal of Urban Economics* 6: 383–404.
- Graves, P.E. and P.R. Mueser (1993), "The role of equilibrium and disequilibrium in modeling regional growth and decline: a critical reassessment", *Journal of Regional Science* 33: 69–84.
- Greenwood, M.J. (1969), "An analysis of the determinants of geographic labor mobility in the United States", *Review of Economics and Statistics* 51: 189–194.
- Greenwood, M.J. (1975a), "Research on internal migration in the United States: a survey", *Journal of Economic Literature* 13: 397–433.
- Greenwood, M.J. (1975b), "A simultaneous-equations model of urban growth and migration", *Journal of the American Statistical Association* 70: 797–810.
- Greenwood, M.J. (1975c), "Simultaneity bias in migration models: an empirical examination", *Demography* 12: 519–536.
- Greenwood, M.J. (1981), *Migration and economic growth in the United States* (Academic Press, New York).
- Greenwood, M.J. (1985), "Human migration: theory, models, and empirical studies", *Journal of Regional Science* 25: 521–544.
- Greenwood, M.J. (1988), "Changing patterns of migration and regional economic growth in the US: a demographic perspective", *Growth and Change* 19: 68–87.
- Greenwood, M.J. and P.J. Gormely (1971), "A comparison of the determinants of white and nonwhite interstate migration", *Demography* 8: 141–155.
- Greenwood, M.J. and G.L. Hunt (1984), "Migration and interregional employment redistribution in the United States", *American Economic Review* 74: 957–969.
- Greenwood, M.J. and G.L. Hunt (1989), "Jobs versus amenities in the analysis of metropolitan migration", *Journal of Urban Economics* 25: 1–16.
- Greenwood, M.J. and J.M. McDowell (1986), "The factor-market consequences of US immigration", *Journal of Economic Literature* 24: 1738–1772.
- Greenwood, M.J. and D.P. Sweetland (1972), "The determinants of migration between Standard Metropolitan Statistical Areas", *Demography* 9: 665–681.
- Greenwood, M.J., G.L. Hunt and J.M. McDowell (1986), "Migration and employment change: empirical evidence on the spatial and temporal dimensions of the linkage", *Journal of Regional Science* 26: 223–234.
- Greenwood, M.J., J.R. Ladman and B.S. Siegel (1981), "Long-term trends in migratory behavior in a developing country: the case of Mexico", *Demography* 18: 369–388.
- Greenwood, M.J., G.H. McClelland and W.D. Schulze (1994), "The effects of perceptions of hazardous waste on migration: a laboratory experimental approach", Unpublished paper.
- Greenwood, M.J., P.R. Mueser, D.A. Plane and A.M. Schlotmann (1991a), "New directions in migration research: perspectives from regional science disciplines", *Annals of Regional Science* 25: 237–270.
- Greenwood, M.J., G.L. Hunt, D. Rickman and G.I. Treyz (1991b), "Migration, regional equilibrium, and the estimation of compensating differentials", *American Economic Review* 81: 1382–1390.
- Gronau, R. (1974), "Wage comparisons – a selectivity bias", *Journal of Political Economy* 82: 1119–1143.
- Grundy, E. (1985), "Divorce, widowhood, remarriage and geographic mobility among women", *Journal of Biosocial Science* 17: 415–435.

- Harkman, A. (1989), "Migration behavior among the unemployed and the role of unemployment benefits", *Papers of the Regional Science Association* 66: 143–150.
- Haurin, D.R. and R.J. Haurin (1988), "Net migration, unemployment, and the business cycle", *Journal of Regional Science* 28: 239–254.
- Heckman, J.J. (1976), "The common structure of statistical models of truncation, sample selection, and limited dependent variables and a simple estimator for such models", *Annals of Economic and Social Measurement* 5: 475–492.
- Helms, L.J. (1985), "The effect of state and local taxes on economic growth: a time series–cross section approach", *Review of Economics and Statistics* 67: 574–582.
- Herzog, H.W., Jr. and A.M. Schlottmann (1984), "Labor force mobility in the United States: migration, unemployment, and remigration", *International Regional Science Review* 9: 43–58.
- Herzog, H.W., Jr. and A.M. Schlottmann (1986), "State and local tax deductibility and metropolitan migration", *National Tax Journal* 39: 189–200.
- Herzog, H.W., Jr., R.A. Hofler and A.M. Schlottmann (1985), "Life on the frontier: migrant information, earnings and past mobility", *Review of Economics and Statistics* 67: 373–382.
- Herzog, H.W., Jr., A.M. Schlottmann and T.P. Boehm (1993), "Migration as spatial job search: a survey of empirical findings", *Regional Studies* 27: 327–340.
- Hicks, J.R. (1932), *The theory of wages* (Macmillan, London).
- Hoehn, J.P., M.C. Berger and G.C. Blomquist (1987), "A hedonic model of interregional wages", *Journal of Regional Science* 27: 605–620.
- Holtz-Eakin, D. (1993), "Job-lock: an impediment to labor mobility? Is health insurance crippling the labor market?", Public policy brief no. 10 (The Jerome Levy Economics Institute of Bard College, Annandale-on-Hudson, NY).
- Hughes, G.A. and B. McCormick (1984), "Migration intentions in the UK: which households want to migrate and which succeed?", *Economic Journal, Conference Papers*, 113–123.
- Hughes, G.A.K. and B. McCormick (1989), "Does migration reduce differentials in regional unemployment rates?", in: J. Van Dijk, H. Folmer, H.W. Herzog, Jr. and A.M. Schlottmann, eds., *Migration and labor market adjustment* (Kluwer, Dordrecht).
- Hunt, G.L. (1993), "Equilibrium and disequilibrium in migration modelling", *Regional Studies* 27: 341–349.
- Iden, G. (1974), "Factors affecting earnings of southern migrants", *Industrial Relations* 13: 177–189.
- Islam, M.N. (1985), "Self-selectivity problems in interregional and interindustry migration in Canada", *Environment and Planning A* 17: 1515–1532.
- Islam, M.N. and S.A. Choudhury (1990), "Self-selection and intermunicipal migration in Canada", *Regional Science and Urban Economics* 20: 459–472.
- Kau, J.B. and C.F. Sirmans (1977), "The influence of information cost and uncertainty on migration: a comparison of migrant types", *Journal of Regional Science* 17: 89–96.
- Kiker, B.F. and E.C. Traynham (1977), "Earnings differentials among nonmigrants, return migrants, and nonreturn migrants", *Growth and Change* 8: 2–7.
- Kirk, D. (1960), "Some reflections on American demography in the nineteen sixties", *Population Index* 26: 307–313.
- Klaassen, L.H. and P. Drewe (1973), *Migration policy in Europe* (Lexington Books, Lexington, MA).
- Koch, R. and H.P. Gatzweiler (1980), "Migration and settlement: 9. Federal Republic of Germany", Report RR-80-37 (Institute for Applied Systems Analysis, Laxenburg, Austria).
- Krieg, R.G. (1990), "Does migration function to reduce earnings differentials by race and gender?", *Annals of Regional Science* 24: 211–221.
- Krumm, R.J. and A. Kelly (1988), "Multiperiod migration patterns: the timing and frequency of household response", *Journal of Regional Science* 28: 255–270.
- Kuznets, S. and D.S. Thomas (1957), "Introduction", in: E.S. Lee, A.R. Miller, C.P. Brainerd and R.A. Easterlin, eds., *Population redistribution and economic growth: United States, 1870–1950*, Vol. I, Methodological considerations and reference tables (American Philosophical Society, Philadelphia, PA).

- Kuznets, S., A.R. Miller and R.A. Easterlin (1960), Population redistribution and economic growth in the United States. II. Analyses of economic change (The American Philosophical Society, Philadelphia, PA).
- Laber, G. (1972), "Returns to southern migration", *Review of Regional Studies* 3: 95–107.
- Lansing, J.B. and J.N. Morgan (1967), "The effect of geographical mobility on income", *Journal of Human Resources* 2: 449–460.
- Lansing, J.B. and E. Mueller (1967), *The geographic mobility of labor* (Survey Research Center, Ann Arbor, MI).
- Ledent, J. (1982), "Migration and settlement: 15. France", Report RR-82-28 (Institute for Applied Systems Analysis, Laxenburg, Austria).
- Ledent, J. (1990), "Canada", in: C.B. Nam, W.J. Serow and D.F. Sly, eds., *International handbook on internal migration* (Greenwood Press, New York) pp. 47–61.
- Lee, E.S., A.R. Miller, C.P. Brainerd and R.A. Easterlin (1957), Population redistribution and economic growth in the United States, 1875–1950. I. Methodological considerations and reference tables (The American Philosophical Society, Philadelphia, PA).
- Lewis, H.G. (1963), *Unionism and relative wages in the United States* (University of Chicago Press, Chicago, IL).
- Lewis, H.G. (1974), "Comments on selectivity biases in wage comparisons", *Journal of Political Economy* 82: 1145–1155.
- Linneman, P. and P.E. Graves (1983), "Migration and job change: a multinomial logit approach", *Journal of Urban Economics* 14: 263–279.
- Long, L.H. (1974), "Women's labor force participation and the residential mobility of families", *Social Forces* 52: 342–348.
- Long, L.H. (1988), *Migration and residential mobility in the United States* (Russell Sage Foundation, New York).
- Long, L.H. (1991), "Residential mobility differences among developed countries", *International Regional Science Review* 14: 133–147.
- Long, L.H. (1992), "Changing residence: comparative perspectives on its relationship to age, sex, and marital status", *Population Studies* 46: 141–158.
- Long, L.H. and C.G. Boertlein (1976), "The geographical mobility of Americans: an international comparison", *Current population reports, Special studies*, Series P-23, no. 64 (Bureau of the Census, Washington, DC).
- Long, L.H. and W.H. Frey (1982), "Migration and settlement: 14. United States", Report RR-82-15 (International Institute for Applied Systems Analysis, Laxenburg, Austria).
- Long, L.H. and K.A. Hansen (1979), "Reasons for interstate migration: jobs, retirement, climate, and other influences", *Current population reports, Series P-23*, no. 81 (US Government Printing Office, Washington, DC).
- Long, L.H., C.J. Tucker and W.L. Urton (1988), "Migration distances: an international comparison", *Demography* 25: 633–640.
- Lowry, I.S. (1966), *Migration and metropolitan growth: two analytical models* (Chandler Publishing Company, San Francisco, CA).
- Maddala, G.S. (1983), *Limited-dependent and qualitative variables in econometrics* (Cambridge University Press, Cambridge).
- Makower, H.J., J. Marschak and H.W. Robinson (1938), "Studies in mobility of labor: a tentative statistical measure", *Oxford Economic Papers* 1: 83–123.
- Makower, H.J., J. Marschak and H.W. Robinson (1939), "Studies in mobility of labor: analysis for Great Britain, Part I", *Oxford Economic Papers* 2: 70–97.
- Makower, H., J. Marschak and H.W. Robinson (1940), "Studies in mobility of labor: analysis for Great Britain, Part II", *Oxford Economic Papers* 4: 39–62.
- Manski, D.F. (1989), "Anatomy of the selection problem", *Journal of Human Resources* 24: 343–360.

- Marr, W.L. and F.W. Millerd (1980), "Employment income levels of inter-provincial migrants versus non-migrants, Canada, 1971", in: J. Simon and J. DaVanzo, eds., *Research in population economics*, Vol. 2 (JAI Press, Greenwich, CT).
- Marshall, A. (1948), *Principles of economics* (The Macmillan Company, New York).
- Masters, S.H. (1972), "Are black migrants from the South to the northern cities worse off than blacks already there?", *Journal of Human Resources* 7: 411–423.
- Mathios, A.P. (1989), "Education, variation in earnings, and nonmonetary compensation", *Journal of Human Resources* 24: 456–468.
- Maxwell, N.L. (1988), "Economic returns to migration: marital status and gender differences", *Social Science Quarterly* 69: 108–121.
- McDowell, J.M. (1982), "Obsolescence of knowledge and career publication profiles", *American Economic Review* 72: 752–768.
- Miller, E. (1973), "Return and nonreturn in-migration", *Growth and Change* 4: 3–9.
- Milne, W.J. (1993), "Macroeconomic influences on migration", *Regional Studies* 27: 365–373.
- Mincer, J. (1974), *Schooling, experience and earnings* (National Bureau of Economic Research, New York).
- Mincer, J. (1978), "Family migration decisions", *Journal of Political Economy* 86: 749–773.
- Mincer, J. and B. Jovanovic (1981), "Labor mobility and wages", in: S. Rosen, ed., *Studies in labor markets* (University of Chicago Press, Chicago, IL) pp. 21–63.
- Molho, I. (1984), "A dynamic model of interregional migration flows in Great Britain", *Journal of Regional Science* 24: 317–337.
- Molho, I. (1986), "Theories of migration: a review", *Scottish Journal of Political Economy* 33: 396–419.
- Mont, D. (1989), "Two earner family migration: a search theoretic approach", *Journal of Population Economics* 2: 55–72.
- Morrison, P.A. (1977), "The functions and dynamics of the migration process", in: A.A. Brown and E. Newberger, eds., *Internal migration: a comparative perspective* (Academic Press, New York).
- Mueller, C.F. (1982), *The economics of labor migration* (Academic Press, New York).
- Mueser, P. (1989), "The spatial structure of migration: an analysis of flows between states in the USA over three decades", *Regional Studies* 23: 185–200.
- Muth, R.F. (1971), "Migration: chicken or egg?", *Southern Economic Journal* 37: 295–306.
- Nakosteen, R.A. and M. Zimmer (1980), "Migration and income: the question of self-selection", *Southern Economic Journal* 46: 840–851.
- Nakosteen, R.A. and M. Zimmer (1982), "The effects on earnings of interregional and interindustry migration", *Journal of Regional Science* 22: 325–341.
- Nam, C.B., W.J. Serow and D.F. Sly, eds. (1990), *International handbook on internal migration* (Greenwood Press, New York).
- Nanjo, Z., T. Kawashima and T. Kuroda (1982), "Migration and settlement: 13. Japan", Report RR-82-5, (International Institute for Applied Systems Analysis, Laxenburg, Austria).
- Navratil, F.J. and J.J. Doyle (1977), "The socioeconomic determinants of migration and the level of aggregation", *Southern Economic Journal* 43: 1547–1559.
- Nelson, P. (1959), "Migration, real income and information", *Journal of Regional Science* 1: 43–74.
- Newman, R.J. (1983), "Industry migration and growth in the South", *Review of Economics and Statistics* 65: 76–86.
- Niemi, Jr., A.W. (1973), "Returns to educated blacks resulting from southern out-migration", *Southern Economic Journal* 40: 330–332.
- Odland, J. and J.M. Shumway (1993), "Interdependencies in the timing of migration and mobility events", *Papers in Regional Science* 72: 221–237.
- O'Neill, J.A. (1970), "The effect of income and education on inter-regional migration", Unpublished Ph.D. dissertation (Columbia University, New York).

- Otomo, A. (1990), "Japan", in: C.B. Nam, W.J. Serow and D.F. Sly, eds., *International handbook on internal migration* (Greenwood Press, New York) pp. 257–274.
- Parish, Jr., W.L. (1973), "Internal migration and modernization: the European case", *Economic Development and Cultural Change* 21: 591–609.
- Perloff, H.S., E.S. Dunn, Jr., E.E. Lampard and R.F. Muth (1960), *Regions, resources, and economic growth* (Johns Hopkins University Press, Baltimore MD).
- Pissarides, C.A. and I. McMaster (1990), "Regional migration, wages and unemployment: empirical evidence and implications for policy", *Oxford Economic Papers* 43: 812–831.
- Pissarides, C.A. and J. Wadsworth (1989), "Unemployment and the inter-regional mobility of labour", *Economic Journal* 99: 739–755.
- Plane, D.A. (1993), "Demographic influences on migration", *Regional Studies* 27: 375–383.
- Plane, D.A. and P.A. Rogerson (1991), "Tracking the baby boom, the baby bust, and the echo generations: how age composition regulates US migration", *Professional Geographer* 43: 416–430.
- Population Association of America (1988), *Migration statistics in the United States, Report of the sub-committee on migration statistics of the committee on population statistics*.
- Porell, F.W. (1982), "Intermetropolitan migration and quality of life", *Journal of Regional Science* 22: 137–158.
- Rabianski, J. (1971), "Real earnings and human migration", *Journal of Human Resources* 6: 185–192.
- Ravenstein, E.G. (1885), "The laws of migration", *Journal of the Royal Statistical Society* 48: 167–235.
- Ravenstein, E.G. (1889), "The laws of migration", *Journal of the Royal Statistical Society* 52: 241–305.
- Rees, P.H. (1979), "Migration and settlement: 1. United Kingdom", *Report RR-79-3* (Institute for Applied Systems Analysis, Laxenburg, Austria).
- Roback, J. (1982), "Wages, rents, and the quality of life", *Journal of Political Economy* 90: 1257–1278.
- Roback, J. (1988), "Wages, rents, and amenities: differences among workers and regions", *Economic Inquiry* 26: 23–41.
- Robinson, C. and N. Tomes (1982), "Self-selection and interprovincial migration in Canada", *Canadian Journal of Economics* 15: 474–502.
- Rogerson, P.A. (1987), "Changes in US national mobility levels", *Professional Geographer* 39: 344–351.
- Rosen, S. (1979), "Wage-based indexes of urban quality of life", in: P. Mieszkowski and M. Straszheim, eds., *Current issues in urban economics* (Johns Hopkins University Press, Baltimore, MD) pp. 74–104.
- Rosenzweig, M.R. and O. Stark (1989), "Consumption smoothing, migration, and marriage: evidence from rural India", *Journal of Political Economy* 97: 905–926.
- Roy, A.D. (1951), "Some thoughts on the distribution of earnings", *Oxford Economic Papers* 3: 135–146.
- Sandefur, G.D. (1985), "Variations in interstate migration of men across the early stages of the life cycle", *Demography* 22: 353–366.
- Sandefur, G.D. and W.J. Scott (1981), "A dynamic analysis of migration: an assessment of the effects of age, family and career variables", *Demography* 18: 355–368.
- Sandefur, G.D. and N.B. Tuma (1987), "How data type affects conclusions about individual mobility", *Social Science Research* 16: 301–328.
- Sandell, S.H. (1977), "Women and the economics of family migration", *Review of Economics and Statistics* 59: 406–414.
- Sauberer, M. (1981), "Migration and settlement: 10. Austria", *Report RR-81-16* (Institute for Applied Systems Analysis, Laxenburg, Austria).
- Schlottmann, A.M. and H.W. Herzog, Jr. (1981), "Employment status and the decision to migrate", *Review of Economics and Statistics* 63: 590–598.
- Schultz, T.P. (1982), "Lifetime migration within educational strata in Venezuela: estimates of a logistic model", *Economic Development and Cultural Change* 30: 559–593.
- Schultz, T.W. (1961), "Investment in human capital", *American Economic Review* 51: 1–17.
- Schwartz, A. (1973), "Interpreting the effect of distance on migration", *Journal of Political Economy* 81: 1153–1169.

- Sell, R.R. (1990), "Market and job transfers in the United States", in: J.H. Johnson and J. Salt, eds., *Labour migration: the internal geographical mobility of labour in the developed world* (David Fulton Publishers, London) pp. 17–31.
- Shaw, R.P. (1985), *Intermetropolitan migration in Canada: changing determinants over three decades* (NC Press Ltd., Toronto).
- Shryock, H.S. (1964), *Population mobility within the United States* (University of Chicago Press, Chicago, IL).
- Shryock, H.S., J.S. Siegel and Associates (1976), *The methods and materials of demography* (Academic Press, New York).
- Silvers, A. (1977), "Probabilistic income maximizing behaviour in regional migration", *International Regional Science Review* 2: 29–40.
- Sjaastad, L.A. (1962), "The costs and returns of human migration", *Journal of Political Economy*, Supplement 70: 80–89.
- Smith, S.K. and T. Sincich (1992), "Evaluating the forecast accuracy and bias of alternative population projections for states", *International Journal of Forecasting* 8: 495–508.
- Stark, O. (1991), *The migration of labor* (Basil Blackwell, Inc., Cambridge, MA).
- Stewart, J.Q. (1941), "An inverse distance variation for certain social influences", *Science* 93: 89–90.
- Termote, M.G. (1980), "Migration and settlement: 6. Canada", Report RR-80-29 (Institute for Applied Systems Analysis, Laxenburg, Austria).
- Thomas, B. (1934), "The movement of labour into South-East England 1920–32", *Economica* N.S. 1: 220–241.
- Thomas, B. (1937), "The influx of labour into London and the South East 1920–36", *Economica* N.S. 4: 323–336.
- Thomas, D.S. (1938), *Research memorandum on migration differentials* (Social Science Research Council, New York).
- Thornwaite, C.W. (1934), *Internal migration in the United States* (University of Pennsylvania Press, Philadelphia, PA).
- Todaro, M.P. (1969), "A model of labor migration and urban unemployment in less developed countries", *American Economic Review* 59: 138–148.
- Todaro, M.P. (1976), *Internal migration in developing countries* (International Labour Office, Geneva).
- Treyz, G.I., D.S. Rickman, G.L. Hunt and M.J. Greenwood (1993), "The dynamics of US internal migration", *Review of Economics and Statistics* 75: 209–214.
- Tunali, I. (1986), "A general structure for models of double selection and an application to a joint migration/earnings process with remigration", in: R.G. Ehrenberg, ed., *Research in labor economics* (JAI Press, Greenwich, CT) pp. 235–283.
- United Nations (1970), *Methods of measuring internal migration, Manual VI* (United Nations, New York).
- US Bureau of the Census (1991), "Geographical mobility: March 1987 to March 1990", Current population reports, Series P-20, no. 456 (US Government Printing Office, Washington, DC).
- Vanderkamp, J. (1971), "Migration flows, their determinants and the effects of return migration", *Journal of Political Economy* 79: 1012–1031.
- Van Dijk, J., H. Folmer, H.W. Herzog, Jr. and A.M. Schlottmann (1989), "Labor market institutions and the efficiency of interregional migration: a cross-nation comparison", in: J. Van Dijk, H. Folmer, H.W. Herzog, Jr. and A.M. Schlottmann, eds., *Migration and labor market efficiency* (Kluwer, Dordrecht) pp. 61–83.
- Vergoossen, D. (1990), "The Netherlands", in: C.B. Nam, W.J. Serow and D.F. Sly, eds., *International handbook on internal migration* (Greenwood Press, New York) pp. 287–304.
- Vining, Jr., D.R. and T. Kontuly (1978), "Population dispersal from major metropolitan regions: an international comparison", *International Regional Science Review* 3: 49–73.
- Wadycki, W.J. (1974), "Alternative opportunities and interstate migration: some additional results", *Review of Economics and Statistics* 56: 254–257.

- Weiss, L. and J.G. Williamson (1972), "Black education, earnings, and interregional migration: some new evidence", *American Economic Review* 62: 372–383.
- Wertheimer, R.F., III (1970), *The monetary rewards of migration within the US* (The Urban Institute, Washington, DC).
- Willis, K.G. (1974), *Problems in migration analysis* (Lexington Books, Lexington, MA).
- Winer, S.L. and D. Gauthier (1982), *Internal migration and fiscal structure* (Canadian Government Publishing Centre, Ottawa).
- Yezer, A.M.J. and L. Thurston (1976), "Migration patterns and income change: implications for the human capital approach to migration", *Southern Economic Journal* 42: 693–702.
- Zarate, A. and A.U. de Zarate (1975), "On the reconciliation of research findings of migrant–nonmigrant fertility differentials in urban areas", *International Migration Review* 9: 115–156.
- Zelinsky, W. (1971), "The hypothesis of the mobility transition", *Geographical Review* 61: 219–249.