NET MIGRATION AND MIGRATION EFFECTIVENESS: A COMPARISON BETWEEN AUSTRALIA AND THE UNITED KINGDOM, 1976-96

PART 2: AGE-RELATED MIGRATION PATTERNS

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This paper explores the impact of net migration in Australia and the United Kingdom using measures of migration effectiveness computed from period-age migration data for four consecutive five-year periods. Results reported in Part 1 of this paper (Stillwell *et al.* 2000) suggest that while the overall effectiveness of net migration at the scale of city regions has declined over the twenty-year period in both countries, important geographical variations are evident. Part 2 considers how patterns of migration effectiveness vary by age and presents a single classification of all the city regions on the basis of age-specific effectiveness. More detailed analysis includes spatial patterns for particular age groups and net migration profiles of selected regions. Cohort effects are shown to be important for explaining changes between time periods in these regions.

With the steady decline of spatial variations in fertility and mortality within developed countries, internal migration now plays a pre-eminent role in redistributing a nation's population. Understanding the forces underpinning such redistribution is greatly facilitated by adding a temporal dimension that reveals the way that patterns of redistribution have shifted and changed over time. Equally valuable is the addition of a cross-national perspective to highlight commonalities and differences in the dynamics of movements within individual nations.

This paper compares internal migration in Australia and the United Kingdom (UK) in 1976-96 using data for four five-year periods and a matched set of city regions. One of the major problems confronted in this research is the lack of comparable migration data. In Australia, the data originate from consecutive censuses and are available in the form of period-cohort migration flows whereas the UK data are register-based and are in the form of period-age movements. The conceptual differences between the two types of data necessitated the construction of a harmonized database that has enabled the same age, period and cohort classifications to be used for both countries. Details of the data sources and the procedures for harmonizing the database are given in Bell *et al.* (1999).

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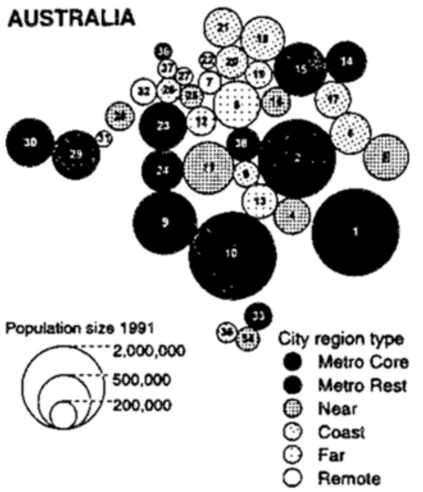
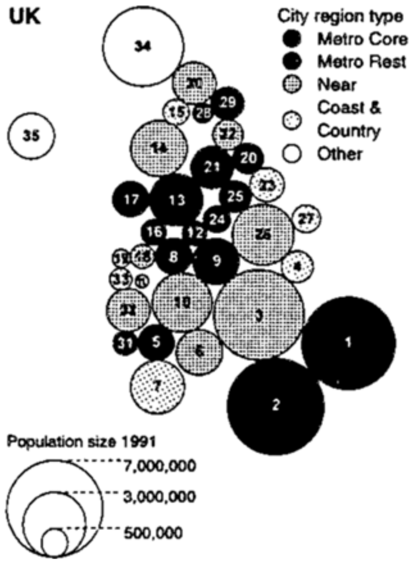
Figure 1 City regions and 1991 population cartograms



Code	Region	Code	Region
1	Sydney Metro Core	23	Adelaide Metro Core
2	Sydney Metro Rest	24	Adelaide Metro Rest
3	Sydney Near Hunter	25	Adelaide Near
4	Sydney Near Illawarra	26	Adelaide Far
5	Sydney Coast North	27	Adelaide Remote
6	Sydney Far	28	Perth Near
7	Sydney Remote	29	Perth Metro Rest
8	Sydney Coast South	30	Perth Metro Core
9	Melbourne Metro Core	31	Perth Far
10	Melbourne Metro Rest	32	Perth Remote
11	Melbourne Near	33	Hobart Metro Core
12	Melbourne Far West	34	Hobart Near
13	Melbourne Far East	35	Hobart Far
14	Brisbane Metro Core	36	Darwin Metro Core
15	Brisbane Metro Rest	37	Darwin Remote
16	Brisbane Near	38	Australian Capital Territory
17	Brisbane Coast GC		
18	Brisbane Coast SC		
19	Brisbane Far		
20	Brisbane Coast Centre		
21	Brisbane Coast North		
22	Brisbane Remote		



Code	Region	Code	Region
1	London Metro Core	18	Liverpool Near
2	London Metro Rest	19	Liverpool Coast & Country
3	London Near	20	Leeds Metro Core
4	London Coast & Country	21	Leeds Metro Rest
5	Bristol Metro Core	22	Leeds Near
6	Bristol Near	23	Leeds Coast & Country
7	Bristol Coast & Country	24	Sheffield Metro Core
8	Birmingham Metro Core	25	Sheffield Metro Rest
9	Birmingham Metro Rest	26	Sheffield Near
10	Birmingham Near	27	Sheffield Coast & Country
11	Birmingham Coast & Country	28	Newcastle Metro Core
12	Manchester Metro Core	29	Newcastle Metro Rest
13	Manchester Metro Rest	30	Newcastle Near
14	Manchester Near	31	Cardiff Metro Core
15	Manchester Coast & Country	32	Cardiff Near
16	Liverpool Metro Core	33	Cardiff Coast & Country
17	Liverpool Metro Rest	34	Scotland
		35	Northern Ireland

The systems of spatial units selected (represented as cartograms in Figure 1) enable us to compare regions with similar functions in the two countries and also to identify where there are no equivalents. Both Australia and the UK contain metropolitan core regions, metropolitan rest regions, nearby non-metropolitan regions and regions with attractive coast and countryside not far from metropolitan cores. The UK metropolitan rest regions consist of older industrial towns, whereas those in Australia are mainly made up of suburban municipalities. Australia contains far (or interior) regions, without close parallels in the UK, which are dominated by farming and mineral industries and suffer from inaccessibility to metropolitan centres. Large areas of Australia are classified as remote (the outback), with no equivalents in the UK. The UK has two 'residual' regions (Scotland

and Northern Ireland) that ideally should have been divided into metro core, metro rest and near regions, but appropriate data were unavailable.

Part 1 of this paper (Stillwell *et al.* 2000) focused on total or aggregate migration flows and showed that, in general terms over the 1976-96 period, metro cores experienced net migration losses or only very small gains, and that metro rest zones experienced net gains in Australia but net losses in the UK. Near regions and coast and country regions gained migrants in both countries. Australian far and remote regions and UK other regions experienced net migration losses, with increasing losses in Australia but decreasing losses in the UK. The analysis made extensive use of migration effectiveness indices that control for the influence of gross outflows and inflows on net migration.[1] Migration or demographic effectiveness indicators have been used widely for analysis of population redistribution in the USA (Plane 1984) and more recently in a European context by Kontuly *et al.* (1997) and Bonifazi and Heins (2000). It was shown that over the twenty-year period migration effectiveness in Australia was much higher in absolute terms than in the UK, that is, migration in Australia resulted in greater population redistribution relative to migration turnover. Both countries experienced a decline in aggregate migration effectiveness between 1976-81 and 1991-96. However, at the regional level, declines occurred consistently in the UK, whereas in Australia core regions experienced large declines whilst certain remote and far regions experienced substantial increases in effectiveness. There were, of course, exceptions to these generalizations. However, it was possible to demonstrate clear links between each country's city-organized regional structure and the patterns and trends in the redistributive effects of migration over the twenty-year period.

Research on internal migration and regional population change has shown that it is invariably unwise to rely entirely on an analysis that bundles together persons and households at all stages of their life course (Rogers, Raquillet and Castro 1978). More recent studies emphasize the importance of separating migration into subcomponent flows likely to be determined by different motivations (Rees *et al.* 1996; Champion *et al.* 1998; Rees and Kupiszewski 1999). In this second part of the paper, the analysis concentrates on how patterns of internal net migration vary by stage of life course, using age as an indicator. The analysis does not differentiate on the basis of sex since the differences in migration propensities and patterns between males and females on this spatial scale are small relative to age differentials.

We begin by examining variation in migration effectiveness by age at the national level. The variation in effectiveness over space is examined using cartogram presentations of migration effectiveness for three age groups identified as being of particular interest, spaced through the life course. The paper develops a general classification of regional age profiles of migration effectiveness, which has strong links to the functional settlement and economic roles embedded in the city-region schema used here. Four key regions are then identified for further consideration; these include one core and one 'coast and country' region in each country. These regions are used to focus on the way migration effectiveness

1 Migration effectiveness measures the degree of imbalance in the flows of migration between a pair, set or system of origins and destinations. The migration effectiveness for one area is defined as the absolute value of net migration for that area expressed as a proportion of the sum of the gross inmigration flows to and outmigration flows from that area. See Stillwell *et al.* (2000).

and net migration vary by age. Particular attention is paid to changes in net migration flows over the twenty-year period and, in order to gain insight into the changes that have taken place, populations at risk and birth cohorts are identified for selected ages. Since this analysis requires some recognition of the influence on migration of cohort size, the following section provides a short review of the concepts involved.

Demographic influences on migration flows

There are a number of demographic influences on migration propensities that derive from the age, sex, social and ethnic composition of geographic regions. The effects of changes in regional age structure have received particular attention following recognition of the regularities observed in age-specific migration rates. Plane (1993) has reviewed the literature and suggested that migration potential is related to the size of the population at risk and that a cohort perspective is required to trace migration behaviour through the life course. Research in the USA has demonstrated the existence of cohort or generational effects where persons in large birth cohorts have been found to have lower migration rates than persons in small birth cohorts (Rogerson 1987; Pandit 1997). Plane (1993) has posited a long-term cycle of migration rates for young adults aged 20-24 that is a function of their representation in the total population. The argument is that migration propensities are dampened when cohorts are large because conditions in labour and housing markets are more competitive.

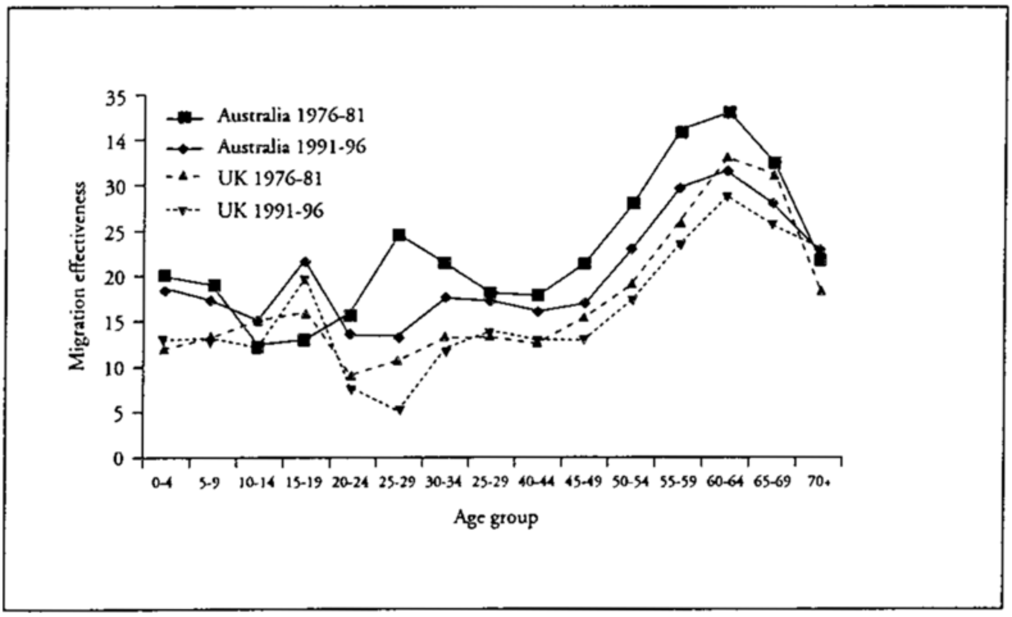
Cohort effects were identified by Easterlin (1980) whose argument indicated that, confronted with stiffer competition, individuals in larger cohorts were more likely to postpone marriage and childbearing and delay entry into markets with fewer job opportunities and rising house prices. Members of smaller cohorts, on the other hand, were likely to marry earlier, to divorce less, to have more children and to find jobs more easily. The concept of cohort effects was extended to migration by Rogerson (1987), and subsequently elaborated by Plane and Rogerson (1991) who argued that when cohorts reaching adulthood are large, not only do their migration rates decrease but migration effectiveness increases as migrants favour particular destinations.

In addition to cohort effects, it is also necessary to consider period effects, that is the conditions during any one period of time that will influence migration behaviour and the economic cycles that may affect migration intensity over time. There is a large number of empirical and model-based studies on the relationship between migration and explanatory variables in both cross-sectional and time-series contexts. Evidence from the US (Greenwood 1988; Milne 1993), for example, suggests that migration rates tend to be lower in times of recession when fewer jobs are available, and higher in times of economic prosperity when unemployment rates are relatively low. More recent work in the US at the national level (Pandit 1997) has attempted to separate cohort from period effects, suggesting that cohort size has a greater effect than unemployment rates on migration intensity. This raises interesting questions about how cohort size and economic circumstances might affect migration in different regions and on migration taking place over different distances.

National age patterns of effectiveness

The system-wide migration effectiveness index declined by 34 per cent in Australia and by 28 per cent in the UK between 1976-81 and 1991-96. It is seen in Figure 2 that effectiveness varies by age with index scores being higher in the older age groups and highest for those aged 60-64 at the time of migration. Migration operates more efficiently in redistributing the population in Australia than in the UK in most age groups. However, in 1976-81, net migration was more effective in the UK than in Australia at ages 10 to 19. The changes occurring between the two time periods were not consistent across the age range. In both countries, the overall trend was one of decline, but the effectiveness of net migration for those aged 15-19 increased, particularly in Australia. For those aged 25-29, migration effectiveness fell by more than 20 per cent in Australia compared with less than 10 per cent in the UK. In fact, the 15-19 age group in Australia sustained continuing increases in effectiveness over each of the four five-year periods whilst those aged 25-29 experienced continuous declines.

Figure 2 Migration effectiveness by age group, 1976-81 and 1991-96

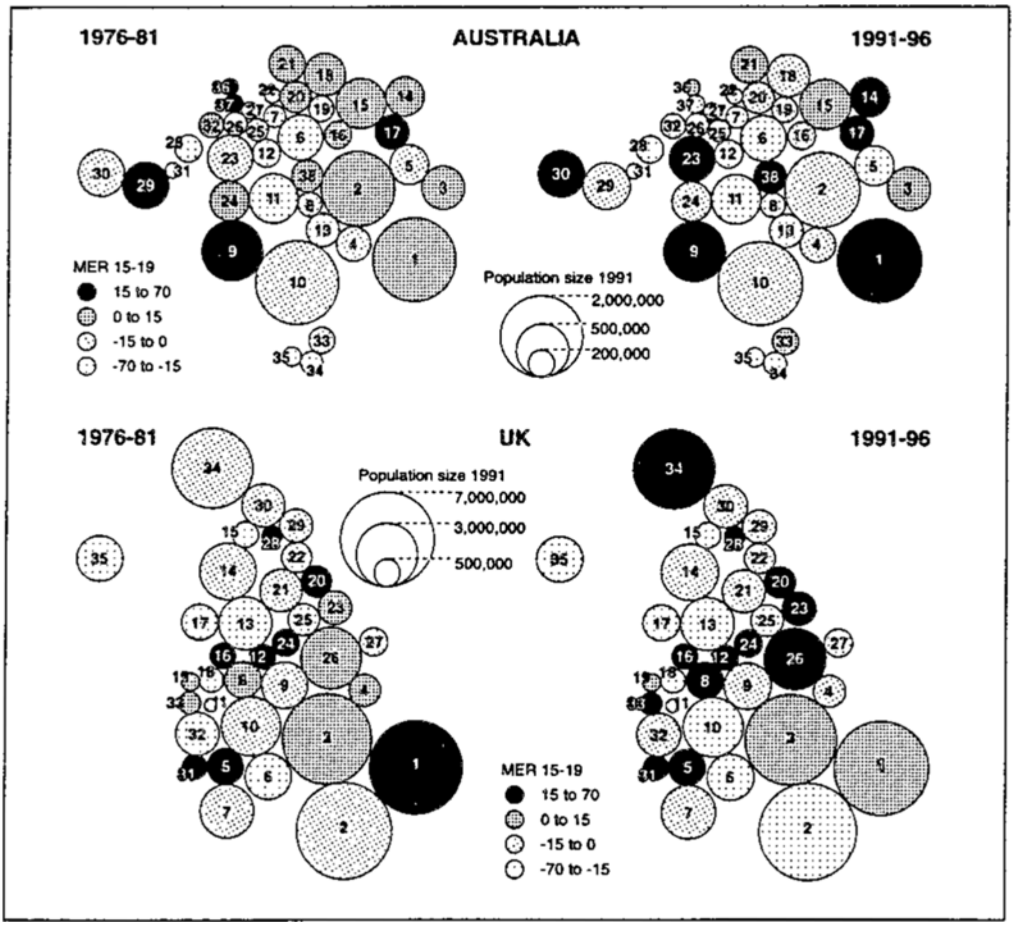


At all other ages, migration effectiveness in Australia declined appreciably between 1976-81 and 1981-86, climbed back in 1986-91 and then declined again in 1991-96, most dramatically in the older age groups. In the UK, the change between 1976-81 and 1981-86 was much less emphatic and the greatest changes occurred between 1986-91 and 1991-96, with increases for the 15-19 age group and the largest declines for ages 60 to 69. In the UK, migration at ages 10-14 and 25-29 became progressively less effective over each period, whereas the effectiveness for ages 70 and over continuously increased.

Spatial variation in effectiveness

Since a comprehensive presentation of all age groups is not feasible, three age groups were selected to examine spatial variations in effectiveness. Age groups 15-19 and 25-29 are chosen because they both show substantial and consistent changes over the four periods while age group 60-64 demands consideration because it has the highest migration effectiveness of all age groups. Regional variations in migration effectiveness for these age groups are presented as cartograms in Figures 3-5 and the ten regions with the most extreme effectiveness scores in 1991-96 are presented in Table 1.

Figure 3 Migration effectiveness for age 15-19 in 1976-81 and 1991-96

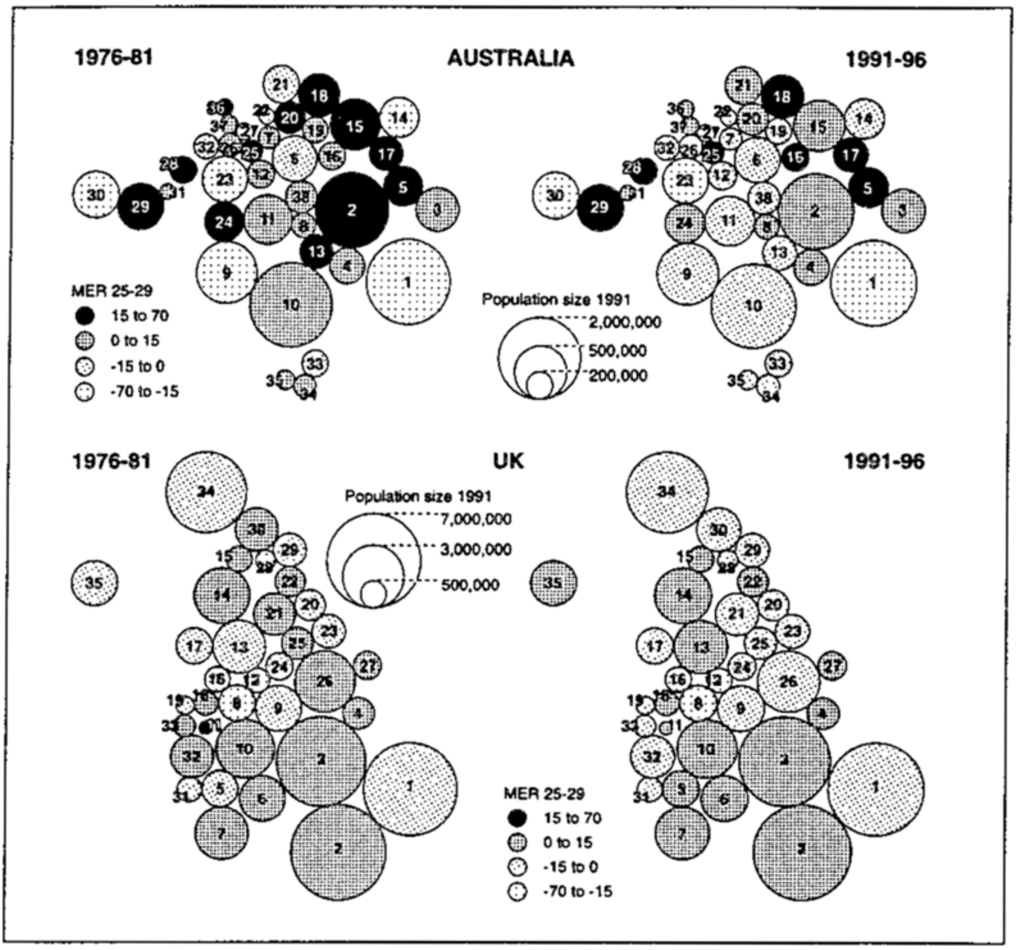


At age 15-19 (Figure 3), the range of migration effectiveness scores across regions increased in Australia over time as the net redistribution of this age group from country to city intensified. Positive effectiveness scores were highest in the metro core regions (Table 1), reflecting the greater range of opportunities for higher education and training, jobs and the magnet of the 'bright lights' of these regions. Sydney, Melbourne, Brisbane, Adelaide, Perth, Hobart and Canberra Metro Cores all registered sharply increased effectiveness scores between the first and last periods. Conversely, the metro rest, near, far and remote regions universally recorded larger negative or smaller positive effectiveness scores, as did all coastal regions with the notable exceptions of Brisbane Coast GC (Gold Coast) and Brisbane Coast North, where gains of 15-19-year-olds increased. In 1991-96, Brisbane Coast GC was amongst the top five regions for positive migration effectiveness.

Table 1 Migration effectiveness for 1976-81 and 1991-96 for city regions with high positive and negative effectiveness for 1991-96, selected age groups

Australia	Effectiveness		United Kingdom	Effectiveness	
City region	1976-81	1991-96	City region	1976-81	1991-96
		Main gaining regions: age 15-19			
Brisbane Metro Core	9.2	39.6	Newcastle Metro Core	38.7	51.8
Brisbane Coast GC	25.8	36.9	Sheffield Metro Core	37.1	50.3
Melbourne Metro Core	15.2	34.3	Manchester Metro Core	31.1	48.7
Adelaide Metro Core	-5.1	26.9	Liverpool Metro Core	19.7	45.4
Perth Metro Core	-1.1	24.8	Leeds Metro Core	25.6	37.8
		Main losing regions: age 15-19			
Adelaide Remote	-17.9	-41.7	Sheffield Metro Rest	-19.7	-31.7
Melbourne Far East	-16.5	-41.7	Liverpool Near	-23.0	-31.8
Adelaide Far	-24.3	-43.8	Birmingham Far	-24.1	-33.6
Melbourne Far West	-37.2	-45.4	Liverpool Metro Rest	-27.3	-43.1
Hobart Far	-23.6	-56.6	Northern Ireland	-47.4	-62.7
		Main gaining regions: age 25-29			
Brisbane Coast SC	34.4	37.0	Northern Ireland	-8.2	9.9
Brisbane Coast GC	22.2	26.5	Sheffield Far	6.7	7.7
Sydney Coast N	40.8	22.6	Birmingham Far	22.0	7.1
Perth Near	15.0	22.1	Birmingham Near	11.7	6.6
Perth Metro Rest	36.8	22.0	Bristol Near	10.2	5.7
		Main losing regions: age 25-29			
Perth Metro Core	-25.5	-15.5	Sheffield Metro Core	-11.3	-14.2
Sydney Metro Core	-39.6	-16.1	Newcastle Metro Core	-18.1	-14.9
Adelaide Remote	-15.5	-19.1	Birmingham Metro Core	-21.4	-15.0
Adelaide Metro Core	-28.2	-20.3	Manchester Metro Core	-23.8	-15.8
Brisbane Remote	-18.9	-24.7	Liverpool Metro Core	-26.6	-17.3
		Main gaining regions: age 60-64			
Brisbane Coast SC	54.7	54.6	London Far	43.4	48.5
Sydney Coast N	62.9	48.0	Bristol Far	47.2	47.2
Brisbane Coast GC	57.3	37.9	Sheffield Far	36.0	42.4
Perth Near	17.3	36.3	Northern Ireland	-24.4	36.7
Sydney Near Illawarra	38.4	35.4	Birmingham Far	36.0	35.7
		Main losing regions: age 60-64			
Perth Remote	-38.3	-42.5	Manchester Metro Core	-39.3	-30.7
Melbourne Metro Core	-54.0	-42.7	Sheffield Metro Core	-18.2	-33.3
Brisbane Metro Core	-37.5	-43.3	Liverpool Metro Core	-45.2	-34.1
Brisbane Remote	-61.0	-55.9	Birmingham Metro Core	-51.7	-34.7
Sydney Metro Core	-63.1	-61.4	London Metro Core	-68.1	-58.4

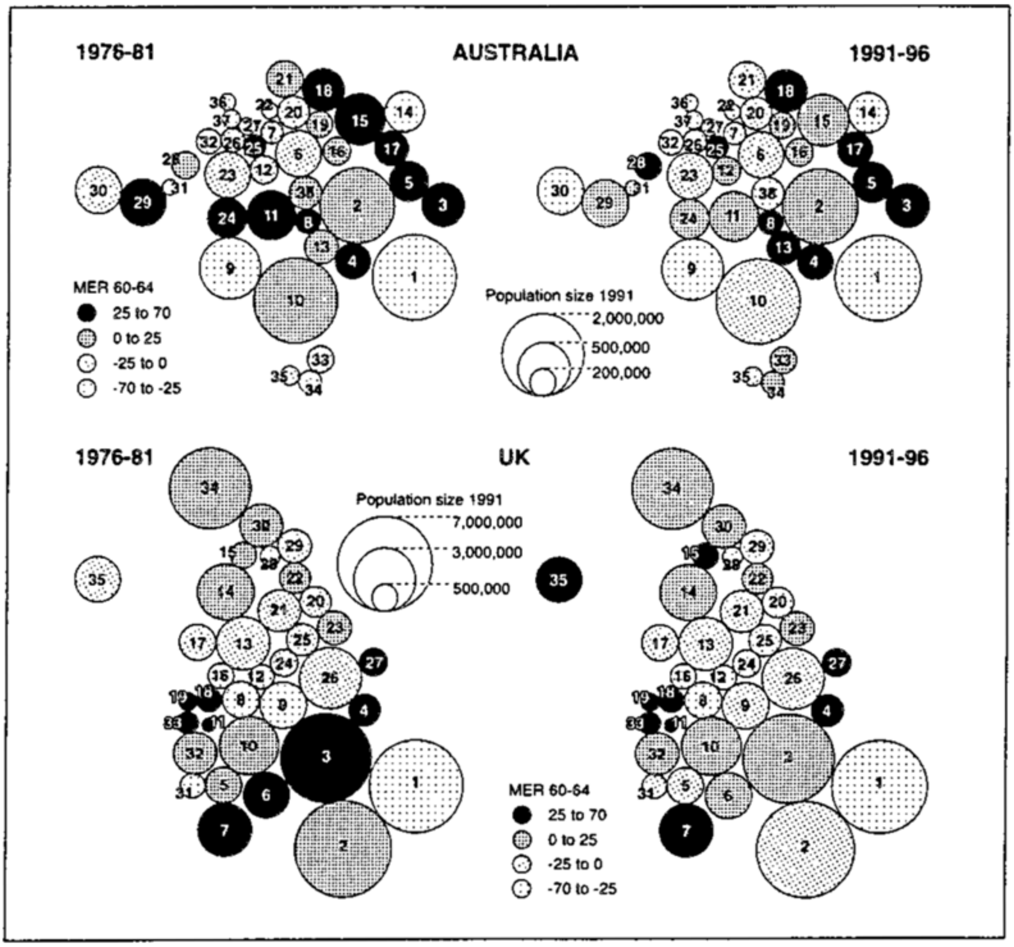
Figure 4 Migration effectiveness for age 25-29 in 1976-81 and 1991-96



In the UK, the metro core regions in the north (Newcastle, Sheffield, Leeds, Liverpool and Manchester) had the highest positive effectiveness scores in both periods. These five metropolitan core regions are the locations for the north of England's largest higher education institutions, which compete well in the national market for attracting 18-21 year olds. The supply of places in higher education exceeds demand within core regions in the north, and so there is a net inflow from other regions. In contrast, Northern Ireland and Liverpool Metro Rest had the highest negative effectiveness scores.

The pattern of migration effectiveness for age 25-29 (Figure 4) is in marked contrast to that for 15-19. This contrast is emphasized by those city regions having the most extreme effectiveness scores (Table 1). In Australia, there is a consistent pattern of negative effectiveness in the metropolitan core regions, but the scores were much smaller in 1991-96 than two decades earlier. New housing opportunities created through land infill and urban renewal appear to have wrought a remarkable, if temporary, transformation of the inner-city migration profile. The corollary of smaller losses from the core regions has been smaller (positive and negative) effectiveness scores in the adjoining suburban fringes (metro rest and near regions). Most far and remote regions, on the other hand, registered

Figure 5 Migration effectiveness for age 60-64 in 1976-81 and 1991-96



larger negative effectiveness scores in response to the exigencies of successive rural crises, but gains in coastal regions also declined, except in Queensland.

In the UK, effectiveness scores are generally lower for age 25-29 than for 15-19. The pattern of migration effectiveness in the metro core regions is the reverse of that at 15-19. The high negative scores conform to the same decreasing negative pattern evident in Australian metro core regions for this age group. Birmingham Far had the largest positive score in 1976-81 and attracted migrants efficiently from a range of different metro core, metro rest and far regions. By 1991-96, Sheffield Far, Bristol Near, Birmingham Near, and Northern Ireland were also among the most efficient regions for attracting net migrants.

Net migration has been distributed more efficiently for age 60-64 than for any other age, as shown in Figure 2. Freedom from the constraints of access to a fixed place of employment, coupled with reductions in family commitments and, for many, relative financial independence significantly widen locational choice, leading to strongly asymmetric migration streams. In Australia, the pattern of regional attraction is dominated in both periods by flows to Brisbane's Sunshine and Gold Coasts and Sydney Coast North whereas very effective net losses from the metropolitan cores and certain remote regions are evident (Figure 5 and Table 1). In the UK, the effectiveness of net migration losses from London Metro Core, as well as from Liverpool and Birmingham Metro Cores, is evident in 1976-81, with movements to their associated far regions being important in terms of net flows.

A classification of regional effectiveness profiles

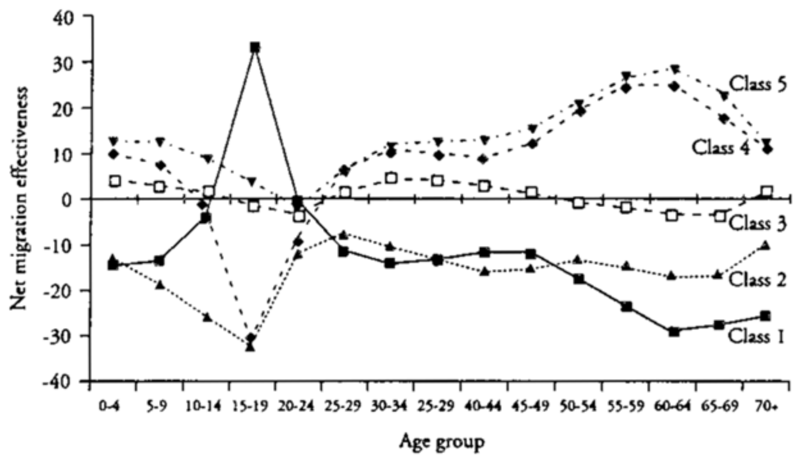
Given the similarities and differences between Australia and the UK in migration effectiveness by age, effectiveness age profiles for 1991-96 can be used to determine a single classification of regions in both countries. Five classes were distinguished. Regions with largely negative profiles were divided into those with a minority of positive values centred on ages 15-19 or 20-24 (Class 1) and those with virtually no significant exceptions (Class 2). Regions with profiles showing a mixture of positive and negative values were placed in Class 3. Regions with largely positive profiles were divided into those with losses centred on the 15-19 age group (Class 4) and those with virtually no negative values (Class 5). The membership of each class is shown in Table 2. Summary profiles for each class, calculated as the means of the age-specific scores, are shown in Figure 6. These demonstrate the patterns of effectiveness by age that characterize the regions of Australia and the UK. Descriptions of each class follow.

1. Class 1 regions, or *Exporter Regions Importing Young Adults*, are characterized by a sharp peak of positive migration effectiveness at age 15-19 or 20-24 with some regions also gaining younger teenagers and people in their twenties, but an otherwise consistent pattern of negative effectiveness at childhood and prime working ages, with the largest score at age 60-64. All the core regions (except Hobart) are members of this class. The big city core regions are unattractive to family migrants, older workers, and the retired and elderly, but offer attractive opportunities to young adults.
2. Class 2 regions, or *Exporter Regions*, display negative effectiveness for most age groups but the age at which the effectiveness score is greatest varies widely among class members. On average the negative effectiveness scores for ages 50 and over are significantly smaller than those for Class 1. This class includes some of the far and remote regions of Australia but also the metro rest regions of Liverpool, Manchester, Sheffield and Melbourne. Economic opportunities in these regions are poor, and the infrastructure is inadequate, either because of remoteness and low population density in Australia or because of industrial obsolescence in the UK.
3. Class 3 regions, or *Balanced Regions*, are characterized by relatively flat effectiveness profiles with absolute scores of less than five per cent at all ages and small net inflows and outflows. This class includes five Brisbane regions (Metro Rest, Near, Coast North, Coast Centre and Far), together with Hobart Metro Core and Sydney Metro Rest. In the UK, this class includes near and metro rest regions associated with northern city regions. These regions are middle achievers in economic performance in a variety of positions in the Australian and UK space economies.
4. Class 4 regions, or *Importer Regions Exporting Young Adults*, present a mirror image of Class 1, and are characterized by large negative effectiveness for age 15-19 but positive effectiveness at other ages with most regions registering increasing effectiveness as age increases to 60-64. Class 4 comprises far and near areas with some coast or coast and country regions included. These are relatively successful regions, positioned to benefit

Table 2 Classification of Australian and UK city regions according to migration effectiveness profiles by age for 1991-96

Class No.	Class Description	Australia Region (Code)	United Kingdom Region (Code)
1	Exporter Regions Importing Young Adults Student or young adult ages: inmigration gains Other ages: outmigration losses	Adelaide Core (23) Australian Capital Territory (38) Brisbane Core (14) Darwin Core (36) Darwin Remote (37) Melbourne Core (9) Perth Core (30) Sydney Core (1)	Birmingham Core (8) Bristol Core (5) Cardiff Core (31) Leeds Core (20) Liverpool Core (16) London Core (1) Manchester Core (12) Newcastle Core (28) Sheffield Core (24)
2	Exporter Regions All ages: outmigration losses	Adelaide Far (26) Adelaide Remote (27) Brisbane Remote (22) Hobart Far (35) Melbourne Rest (10) Perth Remote (32) Sydney Far (6) Sydney Remote (7)	Liverpool Rest (17) Manchester Rest (13) Sheffield Rest (25)
3	Balanced Regions All ages: balanced exchanges	Brisbane Coast Centre (20) Brisbane Coast North (21) Brisbane Near (16) Brisbane Far (19) Brisbane Rest (15) Hobart Core (33) Sydney Rest (2)	Birmingham Rest (9) Cardiff Near (32) Leeds Rest (2) Manchester Near (14) Newcastle Near (30) Newcastle Rest (29) Sheffield Near (26)
4	Importer Regions Exporting Young Adults Young adults: outmigration losses Other ages: inmigration gains	Adelaide Near (25) Melbourne Near (1) Melbourne Far East (13) Melbourne Far West (12) Perth Near (28) Perth Far (31) Sydney Coast North (5) Sydney Coast South (8)	Birmingham Coast and Country (11) Birmingham Near (10) Bristol Near (6) Liverpool Near (18) London Rest (2) Manchester Coast and Country (15) Northern Ireland (35) Sheffield Coast and Country (27)
5	Importer Regions All ages: inmigration gains	Adelaide Rest (24) Brisbane Coast GC (17) Brisbane Coast SC (18) Hobart Near (34) Perth Rest (29) Sydney Near Hunter (3) Sydney Near Illawarra (4)	Bristol Coast and Country (7) Cardiff Coast and Country (33) Leeds Coast and Country (23) Leeds Near (22) Liverpool Coast and Country (19) London Near (3) London Coast and Country (4) Scotland (34)

Figure 6 Summary migration effectiveness profiles for five classes of region, 1991-96



from metropolitan deconcentration, with relatively attractive environments for pre-retirement and retirement migrants.

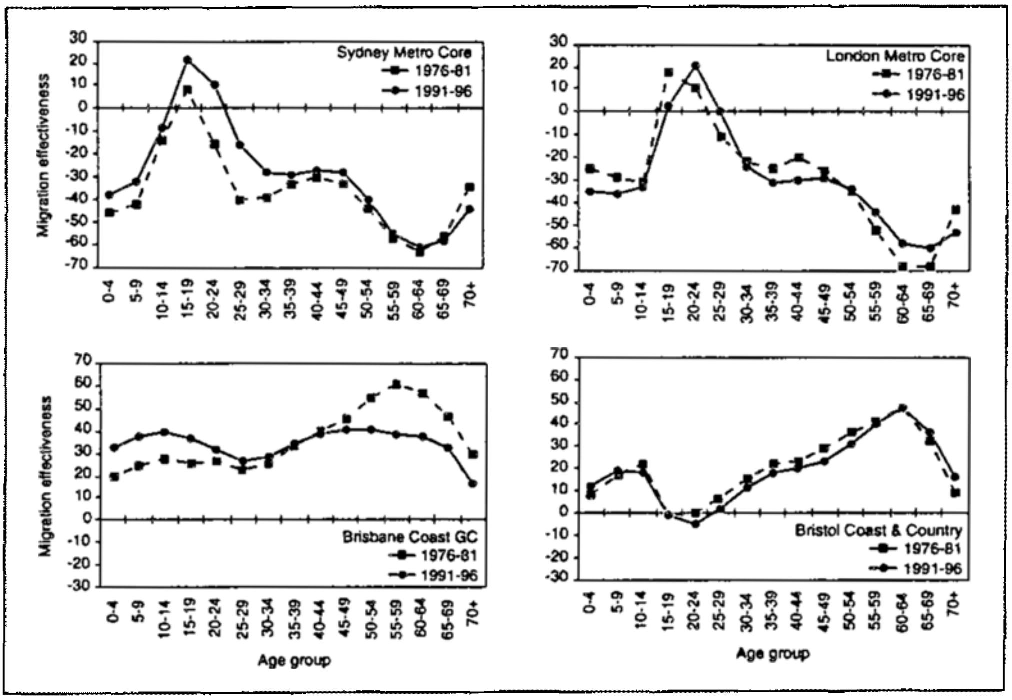
5. Class 5 regions, or *Importer Regions*, are characterized by relatively low positive effectiveness for younger age groups and high positive effectiveness for older adults. The regions in this class are the major migrant destinations including Brisbane's Sunshine and Gold Coasts, Sydney Near, Illawarra and Hunter, Hobart Near, Perth Metro Rest and Adelaide Metro Rest in Australia together with the predominantly rural coast and country regions of London, Bristol, Liverpool, Leeds and Cardiff in Britain. Leeds Near, London Near and Scotland are also included. These are among the economically successful regions, with attractive environments for new migrants, whose inflow leads to further growth in service industries to support the newcomers.

Effectiveness variation by age: four key regions

Four key regions were selected for closer scrutiny of how age-specific effectiveness changed between 1976-81 and 1991-96. These regions comprise the Metro Core regions of the two leading cities in each country, Sydney and London, and the two most attractive coastal regions, Brisbane Gold Coast and Bristol Coast and Country, where growth is greatest.

The migration effectiveness profiles for Sydney Metro Core and London Metro Core show strong similarities as shown in Figure 7. In 1991-96, levels of negative effectiveness for the childhood ages 0-4 and 5-9 are between 30 and 40 per cent, similar to those for the childrearing ages. At ages 15 to 24, effectiveness is positive reflecting the attraction of the major cities for young adults, but effectiveness scores are small. Net outflows occur for about age 30 and above, and levels of effectiveness reach 60 per cent for the older age groups. In Sydney, negative effectiveness declined between 1976-81 and 1991-96 in all age groups except ages 65 and over. In London, temporal change is less uniform with age. Negative effectiveness increased for childhood and the mid-working age ranges and for age 70+, but decreased for ages 55 to 69. Positive effectiveness decreased for age 15-19 but increased for age 20-24.

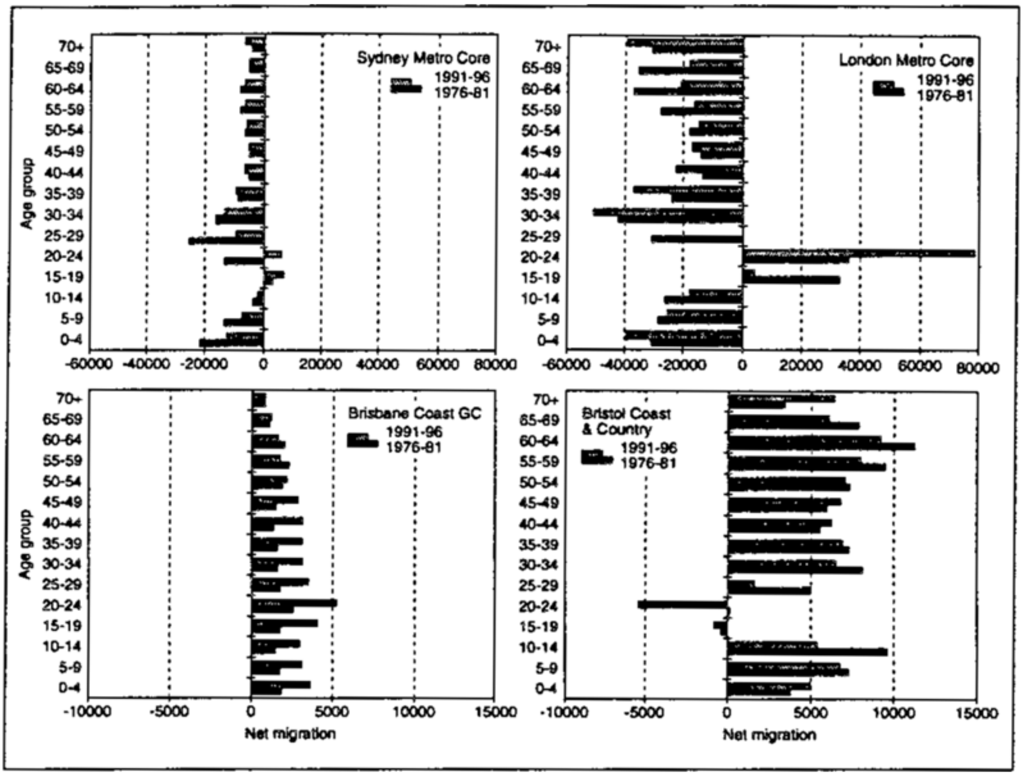
Figure 7 Migration effectiveness by age group, key regions, 1976-81 and 1991-96



Effectiveness profiles for the two selected coastal regions are also shown in Figure 7. Brisbane Gold Coast and Bristol Coast and Country had similar migration effectiveness profiles for the first period, 1976-81; but a radical decrease in effectiveness at older ages in Brisbane Coast GC, due primarily to increased return migration (Bell and Hugo 2000), creates a profile different from that of Bristol Coast and Country in 1991-96. The age variation for Brisbane Gold Coast has decreased over time as the effectiveness of net migration of younger people has increased and of older people has diminished. Consequently, most effectiveness scores for 1991-96 fall between 30 and 40 per cent and only the oldest age group has a score below 20 per cent. By way of contrast, 1991-96 age differences in Bristol Coast and Country have remained as they were in 1976-81, though with only small reductions in effectiveness for people aged from 10-14 to 50-54.

The main difference in migration effectiveness between the Gold Coast and Bristol Coast and Country regions occurs at ages 15 to 29. Young people remain in and are attracted to the beach-sun-leisure-service industry environment of coastal southeast Queensland where the Gold Coast is situated. They flock there as teenagers, for example, to enjoy the mass celebrations at the close of the NSW school year (an event known locally as 'schoolies week'). There is little chance of similar festivals along the coast of the UK's South West peninsula, which caters for families and older people. English school leavers inherit a strong cultural drive to migrate from the parental home region as part of the traditional move away to university, a rite of passage in the drive for young adult independence, even from such relatively attractive regions as the South West peninsula. In 1983, only 11 per cent of accepted university candidates domiciled in the South West region started studies at a university in the same region (Stillwell and Rees 1985).

Figure 8 Net migration by age group, key regions, 1976-81 and 1991-96



Nationally, the 'self-containment' level was approximately 30 per cent of accepted candidates, due to much higher levels in Scotland (85%) and Northern Ireland (71%). By 1996, levels of self-containment had risen, but the South West still exported 67 per cent of its students accepted for university (UCAS 1997:Table E1.1).

Net migration by age: four key regions

Age-specific migration flows between regions generate very different patterns of net migration from those captured by the aggregate balances. Even in regions that experience the highest volumes of net migration, the direction of the flows varies and the gains and losses are not uniform across age groups. Variation by age in net migration for the four key regions is shown in Figure 8 for 1976-81 and 1991-96. In Sydney Metro Core and London Metro Core, net migration was negative for all age groups apart from 15-19 and 20-24. Conversely, Brisbane Gold Coast has positive net migration at all ages as does Bristol Coast and Country except for ages 15-19 and 20-24. This section focuses on patterns of change in net migration. We attempt to provide some plausible explanations of the changes that have occurred, focusing in particular on cohort effects. What constitutes opportunities, and how the attractiveness of regions is assessed, vary by life-course stage.

Migration at childhood and parental ages in the core regions

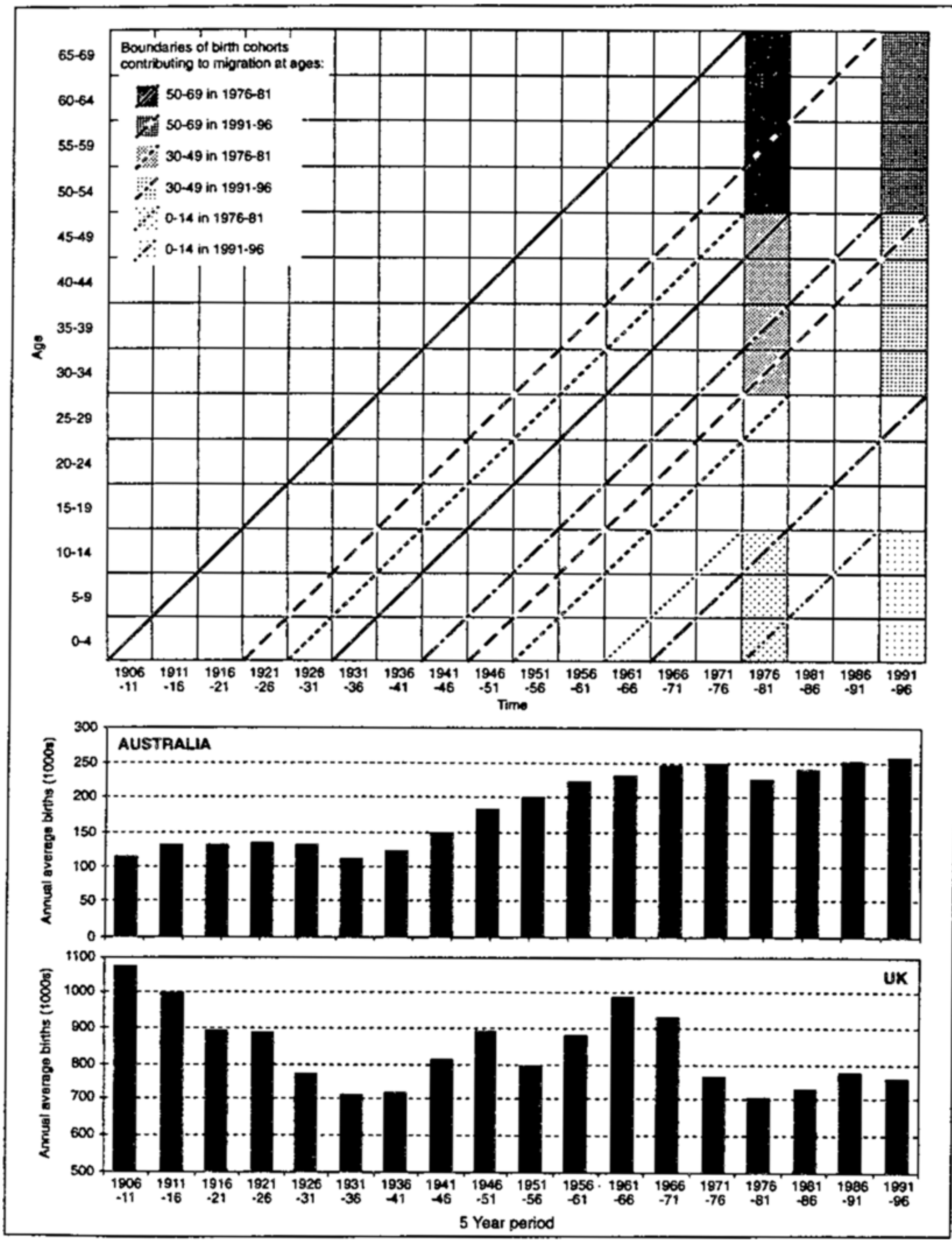
When net migration balances in the childhood and parental ages (0-14 and 30-49) are examined, it is found that behind the general and obvious pattern described above lie subtler changes that vary by five-year age group. Period effects in the economic and social domains explain the net migration balances (net outflows from large metropolitan core regions, net inflows to coastal and country regions). However, they do not account for variation between five-year age groups within these two stages of the life course nor for the counter-intuitive decreases in net migration of children from these core regions when parental net outmigration increases. In this context, it is necessary to consider cohort effects, particularly variation in the population at risk by five-year age group. The analysis of cohort effects presented here is inevitably limited because the harmonized data cover only the period 1976-96. Construction of a full history of cohort change in city-region populations before the 1970s is beyond the scope of data readily available in either the UK or Australia.

Figure 9 shows a Lexis diagram that links migrants aged 0-14, 30-49 and 50-69 in 1976-81 and 1991-96 to their birth cohorts. For example, persons experiencing a migration at ages 50-69 in 1976-81 were members of the birth cohorts of 1906 to 1931, although most will have been born between 1911 and 1926. Beneath the Lexis diagram are presented the time series of annual average births from 1906-11 to 1991-96 for each country.

The parental ages (30-49) for London Metro Core are dominated by large net outflows in 1976-81 and 1991-96, with larger outflows in the later period. Figure 9 shows that persons aged 30-49 in 1976-81 were born in 1926 to 1951, which includes the small birth cohorts of 1931 to 1941. Persons aged 30-49 in 1991-96 were born in 1941 to 1966, which includes the large birth cohorts of 1946 to 1966. Thus, the increases in net migration (as well as gross migration) at these ages between the two periods are attributable, to some extent, to past changes in the size of birth cohorts. It is noted that the changes between the two periods at the childhood ages 5-14 do not mirror those at the parental ages. There are larger net outflows in the first period for ages 5-14 than in the second. The 1961 to 1976 birth cohorts, which contributed to the child migrants in 1976-81, were considerably larger than the 1976 to 1991 birth cohorts that contributed to the 1991-96 flows. In contrast, at age 0-4, net outflows increased between 1976-81 and 1991-96. The 1971-81 birth cohorts that principally contribute to the 1976-81 migrants were smaller than their 1986-91 successors: the 1976-81 period saw the smallest cohorts of the post-war era, while the cohorts of the late 1980s and early 1990s were higher in number. Again, changes between the two periods are partly attributable to cohort size.

At ages 35-49, the changes in net migration for Sydney Metro Core are all in the same direction as for London Metro Core. This is also true for ages 5-9 and 10-14. However, the scale of the changes (apart from 5-9) is much reduced compared with London. The relatively small changes appear inconsistent with the data in Figure 9 which reveal a massive difference in size between the 1946 to 1966 birth cohorts (which include the 'baby boomers'), who were aged 30-49 in 1991-96, and the deficit cohorts born predominantly in the 1930s (who made up those aged 30-49 in 1976-81). In practice, however, numbers in the pre-war birth cohorts were supplemented by massive immigration with most arriving as young adults in the early post-war years, thereby

Figure 9 Lexis diagram relating agemigration groups in 1976-81 and 1991-96 to birth cohorts and average annual births for Australia and the United Kingdom



Sources for UK births data: Estimated from: Population Trends, 1975-98; OPCS and ONS Fertility and Marriage Statistics, Series FM1, 1975-98; Registrar General for Scotland, Annual Report, 1979-98; Registrar General for Northern Ireland, Annual Report, 1962, 1975-98.

Sources for Australian births data: ABS (various years) Births, Australia, catalogue No. 3301.0, ABS, Canberra.

sharply reducing the disparity in cohort size. At age 0-4, the net migration loss from Sydney Metro Core decreased between the two periods, whereas for London Metro Core the net loss increased. A reduced loss at this age is consistent with the substantial reduction in family size in Australia between the 1970s and the 1990s, reflected in the fact that the 1986-91 and 1991-96 birth cohorts were only marginally larger than their counterparts born two decades earlier, despite a 32 per cent rise in population size over the intervening period.

Migration of adolescents and young adults in the core regions

Adolescents and young adults, many of whom are single, move primarily to seek further education and training, higher education or a first job, and are also drawn with their peers to new social activities and the chance of new relationships. Sydney and London supply these types of opportunity. However, there are major differences in migration at ages 15-19 and 20-24 in the two metro core regions. The net migration gains at age 15-19 for London Metro Core fell substantially between 1976-81 and 1991-96. The fact that the annual number of births decreased between 1961-66 and 1976-81 may explain part of this decline. However, as far as migration for higher education is concerned, the number of young people attending universities in the UK expanded considerably during this period. One possible explanation for the reduced net gain for London Metro Core, despite increasing student admittances, is the declining attractiveness of London as a destination for higher education entrants from the rest of the country due to the high costs of living in the capital. In contrast, for Sydney Metro Core, the change between periods at age 15-19 involved a marginal increase in the net gain. In Australia, the birth cohorts of those aged 15-19 in the two periods were very similar in size.

For both London and Sydney, the change between periods was in the direction of greater net migration gains at age 20-24, and of substantially smaller losses at age 25-29. The gain at 20-24 in London more than doubled, while Sydney experienced a change from loss to gain at this age. It is likely that these changes were due to the period effects of the expansion of these higher-level service economies, particularly the finance and corporate headquarters sectors. The City of London financial markets were one of the UK's post-1979 success stories, although the ride upwards was not always smooth. In some boom years (mid-1980s, mid-1990s), banks, insurance companies, pension funds, stock markets and their ancillary information technology support services were recruiting a very substantial slice of the graduate output of the country's universities. At the same time, urban regeneration, both public and private, was under way in London (see, for example, DETR 1998), which encouraged the booming property market fuelled by the expansion of financial and business services. The same factors were at play, though on a smaller scale, in Sydney, as it improved its position as Australia's global city on the Pacific Rim, attracted an increasing share of national corporate head offices and captured the growing high-level functions and associated employment in information technology, research and development, finance and producer services (O'Connor and Stimson 1996). Allied to this in Sydney, as in other major Australian cities, was a substantial rise in both the rate and volume of inmigration from non-metropolitan areas. Impelled by deteriorating job opportunities, the progressive withdrawal of services from country towns, and a succession of rural crises since the 1980s, young adults leaving country areas have provided ready occupants for the surge of medium density housing emerging through urban renewal programs in the inner cities. These net gains of well-paid, high-flying singles (Vipond, Castle and Cardew 1998) form a marked contrast to the traditional pattern of radial suburbanization associated with family formation among those in their twenties, which predominated in the 1970s.

Migration at pre-retirement and retirement ages in the core regions

At ages 50 to 69, the pre-retirement and retirement ages, there were substantial decreases in net migration losses from London Metro Core between 1976-81 and 1991-96. This can partly be explained by the fact that those who retired in 1991-96 were from the small birth cohorts of 1921 to 1946, whereas those in 1976-81 were from the much larger birth cohorts of 1906-26. For Sydney Metro Core, the same pattern of decreases in net losses is evident but of much less magnitude, reflecting the fact that the relevant birth cohorts were of much the same size. Moreover, both groups were heavily supplemented by immigration.

Migration patterns for the growth regions

The pattern of change in net migration for Bristol Coast and Country is essentially the reverse of that for London Metro Core. This is partly because the South West peninsula is attractive to migrants, and partly because the flows between London and the South West constitute the largest interregional stream in the 1976-96 period. Subtle differences between ages lend support to the view that size of birth cohort, adjusted by subsequent inmigration, is a key influence on populations at risk and hence on net migration balances.

The effect of cohort size on migration is also reflected in the changing age structure of the net gain in Brisbane's Gold Coast. Although it is widely seen as a retirement destination, gains at older ages have made up a diminishing proportion of the Gold Coast's total net gain over the past two decades. Indeed, at ages 55-64, the size of the gain in 1991-96 was actually smaller than 15 years previously. As Figure 8 shows, it was young adults and family groups who registered the largest increases between the two periods. This is partly a product of maturation of the local economy. As the region increases in population size and complexity, inward migration of retired people causes growth of the local economy that in turn attracts labour migrants in the parental ages and young adult age groups. A principal factor in this movement has been the restructuring from a manufacturing to a service economy and the associated loss of jobs in the staple industries in South Australia, Victoria and New South Wales (Bell and Hugo 2000); but past trends in fertility have also been crucial. Between 1976 and 1996, it was the 30-54 age groups that grew most rapidly, as the baby boom cohorts came to replace their predecessors born in the low-fertility years of the 1930s and early 1940s, and provided the demographic impetus for the northwards drift. In contrast, the 55-64 age group registered the smallest relative increase of all age groups over the twenty-year period (24% compared with 80% among those aged 35-44), reflecting the much smaller change in birth cohort size between 1916-26 and 1926-36. Actual falls in the size of the net gain at older ages are also a product of return migration by earlier migrants responding to their emerging health care needs, or retracing their steps to be closer to family on the death of a spouse. This phenomenon is readily apparent in the decline in migration effectiveness at ages 50 and over between 1976-81 and 1991-96, seen in Figure 7. In the Bristol Coast and Country region, this does not appear to be happening as yet.

Conclusions

The above analysis has extended the comparison of interregional migration in the UK and Australia by examination of age-specific migration. The results further underline the commonalities to be found in the dynamics of internal migration within each system of city regions adopted for analysis in the two countries. At the same time, it is apparent that the conclusions of an aggregate (all ages) analysis must be reconsidered when internal migration and derived net migration flow and effectiveness indices are disaggregated by age.

The analysis has shown that, at the national level, the age profiles of migration effectiveness in the UK and Australia are broadly similar, although Australian effectiveness scores are significantly higher than those in the UK. The one exception is the greater effectiveness of migration at age 15-19 in the UK, which can be linked to the greater propensity in the UK for school-leavers to move to another region for higher education. Long-distance moves for education are much less common in Australia. Effectiveness for this age group increased considerably between 1976-81 and 1991-96, against the general trend, reflecting the expansion of higher education in both countries.

Downward shifts in effectiveness occurred in both countries over the study period but were more pronounced in Australia, and most prominent at later working ages. These falls parallel the trend reported in other parts of the world, including such markedly different countries as the USA (Plane 1984) and Slovakia (Podolak 1995), but the consistency of the decline across age groups is nevertheless interesting. Previous comment has generally attributed reduced effectiveness to the evening out of spatial disparities in economic growth, as expected under classical economic equilibrium models. Certainly, there are trends in both countries, such as industrial restructuring and the shift towards tertiarization, that lead to greater homogeneity in the distribution of stimulants for migration. However, as suggested in Part 1 of this paper, there are also a number of forces acting to disrupt steady-state flows and increase the asymmetry of interregional movements in the late twentieth century. These include an increase in consumption-led migration (partly due to ageing and earlier retirement) and a range of shocks to the system such as, in the Australian case, drought and state financial crises. Perhaps the inertia inherent in the regional space economy simply dwarfs these latter effects. The consistency of the decline across age clearly suggests that broad-based forces are at play; but more systematic work, perhaps to identify whether specific interregional exchanges account for a large part of the observed changes in effectiveness, is needed to fully understand this remarkably pervasive trend.

Migration from core regions to other regions occurs mainly at parental and later workforce ages and among the retired. Young persons leaving home make up counter-flows into the core region, drawn widely from other parts of the space economy including both gaining and losing regions. At ages 15-19 and 20-24 (earlier in the UK, later in Australia), the dominant movement is towards cities with large universities and growing international business and service sectors. The largest cities, London and Sydney, are particularly important as attractors of young labour. At ages 25 to 34, the net balance is in favour of outmigration from the city core regions. The level of migration effectiveness then increases to a peak at ages 60-64 in both countries.

The general classification of all the regions in both countries in 1991-96 identifies five classes of region with distinctive profiles of age-specific migration effectiveness. The roles that regions in both Australia and the UK play within their space economies have strong effects on the patterns of migration, both overall and for individual life-course groups.

The analysis of migration effectiveness and net migration flows for the four selected key regions shows that place-specific and time-specific factors play a role in explaining deviations from the general trend. An attempt was made to relate changes in net migration for particular age groups to changes in the population at risk at those ages. These changes were linked to the size of relevant birth cohorts. Cohort effects were also evident in the analysis of regions of net inmigration, in the form of changes in the populations at risk in the regions supplying migrants. Though the approach used in this paper has been partial and preliminary (owing to data limitations), the results add considerable weight to the proposal for a systematic and comprehensive analysis of the relationship between time series migration and cohort size in each of the two countries.

This paper has established and exploited a robust framework for the comparative analysis of internal migration effects on population redistribution by age. Without development of a rigorous time-invariant spatial and event/transition linking age-period-cohort framework (Bell *et al.* 1999; Blake, Bell and Rees 2000), none of the comparisons presented here could have been made. This framework lends itself to a wealth of further analyses of internal migration and population distribution and to use as a model for further comparisons between countries.

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