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Martin Bell is Professor at the Queensland Centre for Population Research, School of Geography, Planning and Environmental Management, at the University of Queensland.
E-mail: martin.bell@uq.edu.au.

Salut Muhidin is Postdoctoral Fellow in the Queensland Centre for Population Research, School of Geography, Planning and Environmental Management, at the University of Queensland.
E-mail: martin.bell@uq.edu.au.

Comments should be addressed by email to the author(s).

Abstract

Internal migration is the most significant process driving changes in the pattern of human settlement across much of the world, yet remarkably few attempts have been made to compare internal migration between countries. Differences in data collection, in geography and in measurement intervals seriously hinder rigorous cross-national comparisons. We supplement data from the University of Minnesota IPUMS collection to make comparisons between 28 countries using both five year and lifetime measures of migration, and focusing particularly on migration intensity and spatial impacts. We demonstrate that Courgeau's k (Courgeau 1973) provides a powerful mechanism to transcend differences in statistical geography. Our results reveal widespread differences in the intensity of migration, and in the ages at which it occurs, with Asia generally displaying low mobility and sharp, early peaks, whereas Latin America and the Developed Countries show higher mobility and flatter age profiles usually peaking at older ages. High mobility is commonly offset by corresponding counter-flows but redistribution through internal migration is substantial in some countries, especially when computed as a lifetime measure. Time series comparisons show five year migration intensities falling in most countries (China being a notable exception), although lifetime data show more widespread rises due to age structure effects. Globally, we estimate that 740 million people, one in eight, were living within their home country but outside their region of birth, substantially above the commonly cited figure of 200 million international migrants.

Keywords: Internal migration, comparative analysis, migration intensity, redistribution, age, geography, lifetime, IPUMS

1. Introduction

It is now widely acknowledged that human mobility is integral to the process of human development. For communities, regions and nations, human movement brings knowledge, skills and labour to the locations where it is needed to enhance economic productivity and social well-being. For individuals, families and households, mobility provides a mechanism to pursue aspirations and respond to opportunities. Mobility, in its diverse forms, thus represents 'a means to ends in space' (Hooimeijer & Van der Knaap 1994). At the local level, diurnal and other short-term movements enable individuals to connect nodes in their various life domains and adjust housing circumstances. Longer distance moves, whether seasonal or 'permanent', forced or discretionary, are more likely to sever local ties, but rarely involve a complete break from the place of origin. Individual life-spaces expand with age and repetitive moves form an integral thread that weaves spatial patterns across the life course.

It is the multi-dimensional nature of human mobility that underlines at once its significance in the process of human development, and its complexity for analysis. Unlike other demographic events, such as birth and death, migration is a repetitive process involving varying distance and duration. Human mobility extends in the spatial domain from local travel to international migration, and in the temporal dimension from short-term stays to permanent relocations. Classification and measurement of such phenomena is inevitably complex. Nevertheless, given the significance of mobility, it is surprising that such little progress has been made in codification. In other fields of demography, such as fertility and mortality, common standards for data collection and computation of key measures have been developed - for example, the international classification of diseases was developed to ensure comparability in the collection of deaths data and there are universally agreed measures for analysis and reporting. Calls have also been made for international comparability in measuring migration (eg United Nations, 1970) but widespread variations in data collection practice continue to exist, and proposals for clearly defined statistical indicators are only just emerging (Rees *et al.* 2000).

At least five arguments can be advanced for a rigorous approach to the measurement and analysis of migration data (Bell *et al.* 2002). First, measures for individual countries become

more meaningful when placed in a comparative context. Second, by drawing attention to similarities and differences, cross-national comparisons provide a more rigorous test-bed for migration theory. Third, such analyses have the potential to provide new insights into the dynamics of migration. Fourth, much can be learnt from such comparisons about the link between migration and public policy. Finally, it is arguable that a more structured approach to migration will lead to greater rigour and consistency in research on individual countries. With rising interest in the patterns and processes underpinning mobility at a variety of scales, the need for a rigorous approach to comparisons is increasingly pressing. Indeed, without common standards and a clear understanding of the measurement issues involved, there is a very real danger that simplistic comparisons will generate misleading results and trigger inappropriate policy interventions.

This paper aims to place such comparisons on a more reliable footing by applying selected measures from the battery of migration indicators recently proposed by Bell *et al.* (2002) to compare internal migration across a number of countries drawn widely from across the world. Using data from the latest round of Censuses, we focus on 22 developing countries and five countries from the developed world. Data are drawn primarily from the IPUMS database, maintained and kindly made available by the University of Minnesota, supplemented by selected datasets drawn from other sources (see acknowledgments).

In terms of substantive analysis, we seek to compare countries with respect to four main questions:

- How does the intensity of internal migration vary between countries? Several previous studies have assembled ‘league tables’ comparing the proportions of people moving within selected countries, as reported in Censuses and surveys. However, these comparisons are often prejudiced by differences in the time period (interval) over which migration is recorded, and in the spatial framework (zonal system) against which it is measured. Here we address these limitations by careful attention to the migration interval, and by coupling conventional measures of intensity with a more powerful statistic originally proposed by the French demographer Daniel Courgeau in 1973, but rarely used to date.

- How selective is migration of different age groups? It is well established that the propensity to move is selective of young adults, and we know that the age profile of migration is remarkably consistent at different levels of spatial scale within individual countries. To date, however, few attempts have been made to examine how migration age schedules differ from one country to the next. We chart age schedules for selected countries at a variety of spatial scales and compare the age and height at the peak.
- How much impact does migration exert on the pattern of human settlement? Migration is ultimately a spatial process and its most tangible effect is in transforming the distribution of population. In the development literature, much attention has focused on the role of migration in urbanisation, but this is difficult to measure using Census data. Here we concentrate instead on more general measures of spatial redistribution.
- Is the propensity to change residence within countries rising or falling? It is widely asserted that mobility has risen strongly over the course of the twentieth century, but the evidence is sparse, fragmented and inconclusive. We present time series data for a number of selected countries to explore this proposition.

The organising framework for our analyses is based around two general classifications: the first of these is spatial, distinguishing broad world regions; the second distinguishes countries based on the level of human development, divided into four main classes – low, medium, high and very high.

To set the scene for these analyses, we first review the obstacles to comparative analysis of migration data, summarise previous comparative work, define the measures to be used and introduce the IPUMS data (sections 2-5). Sections 6-9 set out the results of our work. Explanations for the differences we find are set out in the conclusions (section 10).

2. Impediments to Rigorous Cross-National Comparison of Internal Migration

Four broad groups of problems can be identified that hinder rigorous comparisons between internal migration in different countries (Bell *et al.* 2002). These derive from differences in (a)

the way migration is measured, (b) temporal comparability, (c) the division of space and the measurement of distance, and (d) population coverage and data quality. We review each in turn.

2.1 Differences in How Migration is Measured

Migration can be measured in a number of ways but the two most common methods capture migration as an *event*, or detect it as a *transition* between two points in time. Migration events are generally associated with population registers and administrative datasets which record discrete changes of address. Population censuses, on the other hand, generally record transitions, measuring migration by comparison of a change in residence at the time of the census, compared with place of residence at some point in the past. Over short observation spans (eg one year) counts of events will broadly approximate recorded transitions, but as the observation interval lengthens, the two measures diverge at an increasing rate as the transition data fail to capture a growing incidence of repeat and return moves. The analyses presented here sidestep these issues by focusing exclusively on census data, but as a growing number of countries dispense with formal censuses (Langevin *et al.* 1992) the problems of comparability are set to increase. Careful harmonisation will be needed to minimise errors in comparisons (see Bell & Rees 2006).

2.2 Differences in Migration Intervals

National Censuses vary in terms of the interval over which migration is observed. Three basic approaches can be identified, distinguishing countries which compare place of residence at the time of the census with:

- place of birth
- place of residence at some fixed point in the past (typically one or five years ago) and
- place of previous residence, irrespective of when the move occurred.

In a survey of the 191 UN member states, Bell (1995) found that 141 countries collected some form of migration data at the census. Of these place of birth data were the most common, being collected by 115 nations; 94 measured data over some fixed interval while 34 collected data on previous residence without a reference date. In many cases, more than one form of data was collected. Table 1 provides a summary, indicating that among those measuring migration over a fixed interval, 5 years was the most common interval, especially prominent in Asia and Latin

America. Place of birth data featured strongly in Censuses across all continents but were least ubiquitous in Europe and Asia.

Table 1: Countries collecting transition data at the Census by continent and data type

Continent	Place of birth	Defined interval			No reference date	Total countries
		One year	Five years	Other defined interval		
Africa	32	6	7	10	10	38
Asia	22	3	16	4	12	35
Europe	23	14	5	11	4	26
Latin America	23	1	17	3	6	27
North America	2	1	2	0	0	2
Oceania	13	3	9	1	2	13
TOTAL	115	28	56	29	34	141

Source: adapted from Bell 2005

Each of the above measures has their advantages. Transitions measured over a fixed interval are most straightforward to analyse and interpret, and are most readily comparable from one country to the next. Within this category, data measured over a single year best reflect respondent characteristics at the time of migration, and hence are most effective in capturing migrant selectivity; five year data best reflect contemporary spatial patterns of redistribution, free from the influence of short term period effects which tend to distort patterns over a single year; ten year data risk greater errors in recall and suffer greater data loss – lacking data on movements of the under 10 age group, and depleted by mortality at older ages. Birthplace data capture lifetime migration by comparing place of birth (eg province) with current place of residence; such a measure reflects long-run patterns of redistribution, but misses a large volume of intermediate moves, especially for people at older ages, and may not reflect contemporary patterns. Place of

previous residence data feature less commonly in national collections and are arguably the most difficult type of data on which to compare countries. Xu-Doewe (2006) posits that data on place of previous residence, when coupled with information on duration of residence, offer a highly flexible framework, allowing the researcher to specify the migration interval analytically. This approach is attracting attention (see eg Amaral 2008) but its utility depends on careful harmonisation and coding of the relevant questions: to be useful, the question on duration of residence needs to refer to the same geographic framework as the question on place of previous residence. The available evidence from a range of countries indicates that this is often not the case.

These distinctions are important because comparing migration measures having different observation intervals can produce misleading results. Multiplying the number of migrants captured in a 1-year transition interval by 5 does not provide a reliable estimate of the number of migrants during a five year transition interval, because an increasing proportion of moves is made by 'chronic migrants'; the apparent volume of migration therefore grows at a steadily declining rate as the observation interval lengthens (Long and Boertlein 1990, Courgeau 1973a, Kitsul and Philipov, 1981). Rogerson (1990) demonstrates that there is no straightforward algebraic solution to comparing 1-year and 5-year migration probabilities. In a similar way, lifetime migration represents the cumulative effect of multiple moves and lifetime intensities will generally be higher than fixed interval measures, but not by a fixed ratio. Intensities based on place of previous residence present similar problems, though in this case the magnitude of the intensities in relation to other measures is less clear. It is important to recognise, too, that the width of the interval over which migration is measured influences not only the apparent intensity of migration but also the spatial pattern of migration flows. Differing migration intervals reveal differing patterns of population redistribution (Rees 1977).

Which of these migration intervals is to be preferred for cross-national comparisons? Often the choice is made for us because most countries collect migration data for a single specified time period. As in so much migration research, cross-national comparisons become the art of the possible. On first principles, though, there is a case to prefer fixed interval data measured over a five year interval, where these are available. As argued earlier, fixed interval data best reflect

contemporary patterns of movement and the five year interval minimises annual fluctuations. They also better capture temporal trends, and limit the influence of age composition effects. By comparison, lifetime migration data are more strongly affected by differences in the age composition of the population. This is because they encompass cumulative movement over the full lifespan – 50 years or more for older members of the population. This accumulation effect, coupled with progressive shifts in age structure, also seriously hinders temporal comparisons within individual countries, because the observed change in migration intensity, and in spatial patterns, from one Census to the next is the net effect resulting from *addition* of new migrations among the existing population, plus the migration of the latest birth cohorts, and *subtraction* of prior migrations by those who have died or emigrated in the intervening period. Interpretation is inevitably somewhat difficult.

2.3 Differences in Spatial Frameworks

In the spatial domain it is differences in statistical geography that prejudice comparisons, because the number of migrants recorded in any form of data collection is fundamentally dependent on the number and shape of the units into which a territory is divided. These issues are commonly grouped under the heading of the Modifiable Areal Unit Problem (Wrigley *et al.* 1996). As noted earlier, census data on migration are generally collected by reference to place of residence at two points in time, with the response then coded to some zonal system based on administrative or statistical divisions of a country. However, nations vary widely in size and shape, and in the geography of the zonation (Law 1999). In some countries, previous residence is coded to an individual village or town, while in others only state or province of prior residence is recorded. Comparisons which set migration intensities for country *x* calculated between 100 zones, against country *y* which is divided into just 10 zones, are invalid and potentially very misleading. Even within individual countries changes in zonal boundaries are often made from one Census to the next, zones are amalgamated, or new zones created, all of which distort time series comparisons.

While acknowledging that differences in zonation are important, analysts generally have taken few steps to address the issue. Thus, the 1999 World Population Monitoring Report (United

Nations 2000) juxtaposes census-based internal migration data for some 22 developing countries collected on a variety of zonal systems. In a similar way, the 2009 World Development Report (World Bank 2009) ranks some 35 countries on the proportion of the labour force that have changed their 'district' of residence. These reports provide intriguing statistics, but are impossible to interpret meaningfully without accompanying data on the number of zones against which migration is measured in each country, Vignoli (2004) offers one valuable refinement, in an analysis for countries in Latin America and the Caribbean, by distinguishing migration according two levels of geographic scale - 'major' regions and 'minor' regions (see also CEPAL 2007). This mirrors a distinction incorporated in many of the IPUMS datasets, but goes only a small way to addressing the MAUP problem since the number of zones in each category still varies widely from one country to the next. For example, at the major region level, there are just nine provinces in South Africa, compared with 22 in Ecuador and 61 in Vietnam. Similarly the number of minor regions varies from 81 cantons in Costa Rica to 1540 municipalities in Brazil. Indeed, there are more 'major' regions in Vietnam (61) than there are 'minor' regions in South Africa (52). Thus, analyses focusing on migration between major regions, or between minor regions, still provide no basis for confidence in cross-national comparison.

Elsewhere, analysts have proposed a number of possible solutions to this problem. One approach is to only compare countries with respect to *all* moves, rather than confining attention to only that subset of moves which cross selected zonal boundaries (see for example Long, 1988). In practice, however, relatively few countries collect such data. Bell (2005) identified just 37 countries for which it was possible to compute a migration intensity figure which included all moves, irrespective of distance. Another approach is to develop a broadly comparable set of regions in each country, based around some form of functional classification. For example, Stillwell *et al.* (2000) used a framework of some 35-40 city regions to compare migration effectiveness in Britain and Australia, based around a functional classification of space that distinguished a set of metropolitan cores and their 'tributary' hinterland areas (rest, near, coast, far and remote), which organize the spatial economic systems in the two countries. While this proved an effective strategy for examining similarities and differences in two countries, it is more difficult to apply, and less suited, to making aggregate (nation-wide) comparisons across multiple countries.

For the purposes of this report we adopt a different strategy, drawing on the ideas proposed by Courgeau (1973b), to create a synthetic indicator for each country by coupling migration intensities at a range of spatial scales. The rationale and methodology is described in more detail below.

2.4 Differences in Population Coverage and Data Quality

Even for countries reliant on the census, differences occur in how migration is measured and how particular sub-groups of the population are treated. For example, migration should ideally be measured as a change of usual residence, but definitions of usual residence differ widely and some countries make comparisons on place of enumeration. Censuses also vary in population coverage, with under-enumeration typically highest among the most mobile members of the community. In the 1991 Australian census, for example, the rate of under-enumeration at 1.9% was comparatively low, but reached a high of 16:1% among people who were enumerated away from home (Australian Bureau of Statistics 1995). At the same time, countries differ in the way they deal with groups such as the armed forces, diplomats, guest workers, overseas visitors, domestic and foreign students, the homeless and those with no fixed abode - all of whom typically display high mobility. Such differences largely depend on census processing and may be difficult to detect in practice.

3. Previous Comparisons of Internal Migration Intensity

Apart from the considerable technical challenges involved, one of the fundamental impediments to cross-national comparisons of internal migration has been the dearth of available data. Indeed, not only is there no central repository for such data, no comprehensive source exists identifying what migration statistics are collected by countries around the world. Few nations make internal migration statistics readily available in standard reports, and none of the major trans-national agencies include population mobility among their list of statistical indicators.

Only two attempts appear to have been made to establish a global inventory of internal migration data collections. The first derived from a United Nations survey published in 1978 (United

Nations 1978), identifying 121 countries that collected internal migration data. As well as documenting how migration was defined and the type of data collected, the report also attempted to establish the geography of the 'migration defining regions', and identify the uses to which the data were put. Some three decades later Bell (2005) prepared a new inventory based around the then 191 member states of the United Nations. Both collections underline the immense diversity in data collection practice worldwide.

Despite the lack of readily available data, interest in cross-national comparisons of internal migration has been widely apparent and has taken a number of forms. There are several collections which describe sources of migration data or compare the patterns and processes in different countries. A prominent example is the 'Handbook' assembled by Nam *et al.* (1990), which methodically described the sources of migration data, patterns of movement, selectivity, causes and consequences of migration in 21 countries dispersed widely around the world. Rees and Kupiszewski (1999a, 1999b) presented a similar analysis focusing on 28 European countries. There are also specialized studies that compare particular aspects of internal migration, such as counter-urbanization (e.g. Champion, 1989), return migration (Newbold & Bell 2001) and the leaving home process among young adults (Holdsworth 2000).

Attempts have also been made to draw direct comparisons between countries with regard to overall levels of mobility (Long, 1991), migration distance (Long *et al.* 1988), age structures (Rogers *et al.* 1978) and other demographic characteristics (Long 1992). An early pioneer in the field was Long (1991) who published what appears to be the first international 'league table' comparing countries with respect to mobility. Drawing on data from the 1980 round of Censuses, Long (1991) analysed crude migration intensities across fifteen nations, revealing wide variations in the propensity to move, with high mobility in four new world countries (Australia, New Zealand, United States and Canada) and relatively low mobility prevalent across Europe. Earlier work by Rogers and Castro (1981) demonstrated that behind these variations lies remarkable similarity in the age profiles of migration, irrespective of the aggregate level of mobility.

More recently, the 1999 United Nations World Monitoring Report (United Nations 2000) drew directly on country-level documents to compare internal migration propensities and trends across 15 countries in Asia, Africa and Latin America. The assembled data included both lifetime and fixed interval measures with data for individual countries at widely differing levels of spatial resolution. Moreover, reporting was confined primarily to aggregate counts of migrants and sex ratios. Despite these limitations, the authors concluded that the propensity to migrate was higher in Latin America and the Caribbean than in Asia, and that women were more prominent in LAC migration streams than in other developing areas (United Nations 2000:57). The report also sets out estimates of rural-urban migration, with findings indicating that the rate of rural out-migration rose strongly in Asia from the 1960s to the 1980s, fell in Africa, and rose then fell in LAC, accounting respectively for two-thirds, one quarter and one third of urban growth in the three developing regions in the 1980s. According to United Nations (2008), China and Indonesia stand out as the two large countries where rural urban migration now makes the most significant contribution to urbanisation.

The World Bank 2009 Development Report maintains a similar focus on the role of migration in agglomeration, arguing forcefully that mobility, especially migration to cities, is a crucial concomitant of economic prosperity (World Bank 2009). In this case, estimates of migration intensity are drawn from household surveys for 35 countries for a range of dates between 1992 and 2005. Two sets of estimates are provided, representing migration among people of working age measured (a) as lifetime migration and (b) as recent migrations (less than 5 years). The results point to substantial variations between countries, with lifetime labour mobility varying from 1.2% in Micronesia to 52.5% in Bosnia & Herzegovina. In five year mobility rates, it is ranging from zero in Madagascar and Mozambique to 19.4 per cent in Azerbaijan and 22.4 per cent in Armenia. However, details of the zonal geography on which the data were collected are extremely sparse: migrants are defined simply as individuals who were not living in the same ‘district’ in which they were born (or previously resided). More detail of the how ‘district’ is defined in each country would facilitate interpretation of this unique dataset.

For the 23 countries in Latin America and the Caribbean, another recent set of cross-national comparisons of internal migration is included in the *Panorama Social de America Latina,*

published by CEPAL (2007), extending a range of data assembled previously by Vignoli (2004). As with the World Bank report, the CEPAL documents encompass both five year and lifetime migration estimates, but in this instance data are drawn from the Census, and utilise the distinction between major and minor regions to provide two sets of migration intensities. As elsewhere, the results reveal remarkable variation, with lifetime migration intensities between major regions ranging from lows of 10-15 per cent in Guatemala, Nicaragua and Bolivia to highs of 25-30 per cent in Barbados, Antigua and Paraguay. For minor regions, the figures are substantially higher – peaking around 50 per cent in the case of Chile. Intensities for five year migration intervals are correspondingly lower, but tend to display a similar rank order with Antigua (13 per cent) and Paraguay (11 per cent) emerging as the most mobile countries, and Cuba, Nicaragua and Guatemala (all less than 3 per cent) registering the lowest movement between major regions.

For many countries the CEPAL data include figures for two censuses; and in some cases for three, which provides valuable insights into the trend in population mobility. For Latin America and the Caribbean as a whole, the figures indicate a rise in the incidence of lifetime migration between the 1990 and the 2000 round of Censuses, whether measured at the major or minor region level. Exceptions to this trend were found only in Columbia, Costa Rica, Honduras, Nicaragua and Uruguay. Surprisingly however, five year migration intensities revealed much more widespread decline; of the 17 countries for which time series data were provided, only five – Antigua, Bolivia, Ecuador and Panama – displayed rising mobility. Among the most populous countries in the region - Brazil, Mexico, Venezuela and Chile – lifetime migration was up over the decade, but five year intensities were consistently down. The relationship between lifetime and fixed interval migration intensities is not straightforward but, *ceteris paribus,* these differences suggest that lifetime migration in these countries is increasing at a decreasing rate.

Consistency between the migration intensities calculated by CEPAL and those cited in the World Bank Development Report would lend credibility to both sets of figures. Unfortunately, however, comparison across the ten countries which appear on both listings reveals marked differences. Simple product-moment correlation coefficients between the two data sets generate r-squared values close to zero, both for lifetime migration and for five year migration intensities.

While the two reports differ both in data sources and population coverage, it is differences in the geography on which the migration data were collected that is the most likely source of these variations. We endeavour to resolve this issue in what follows.

4. Towards More Rigorous Comparative Measures

While the work cited above has contributed valuable insights into cross-national differences in migration, its utility has been diminished by the lack of a rigorous comparative framework. In the endeavour to address this deficiency, Bell *et al*. (2002) put forward proposals for a battery of clearly defined statistical indicators that would enable cross-national comparisons of migration to be made across four main dimensions, each of which, it was argued, provides a different insight into the process or character of migration. These were:

1. measures of the intensity of migration, which aim simply to capture the overall level, or incidence, of mobility within a country
2. measures of migration distance which capture the frictional effects of distance on movement and the way these vary across space
3. measures of migration connectivity which indicate the strength of linkages between each pair of zones that make up the national system of regions
4. measures of migration impact to demonstrate the extent to which migration operates to transform the pattern of human settlement.

Seventeen separate measures were identified and evaluated using data for Britain and Australia (Table 2), but for the analysis reported here, we confine attention to just 5 of these which together focus on the first and last of the dimensions described above – the intensity of migration, and its spatial impacts. The five selected measures are:

- The Crude Migration Intensity *(CMI)*, calculated for a number of levels of spatial disaggregation, and computed by expressing the total number of internal migrants (*M*) in a given time period as a percentage of the population at risk (*P*) such that CMI = 100M/P
- The age at peak migration intensity, as determined from the profile of age-specific migration intensities, in association with the graphical form of the profile.

- Courgeau's Index *k*, originally proposed in 1973 as a means of comparing migration among countries with different territorial divisions, such that CMI = *k* log n^2 , where n represents the number of regions in the zonal system, and *k* is the slope of a regression line for various n and CMI, that reflects the overall intensity of migration at various spatial scales.
- The Migration Effectiveness Index (MEI), which measures the degree of (a)symmetry or (dis)equilibrium in the network of interregional migration flows, and hence the overall efficiency of migration as a mechanism for population redistribution. The MEI can assume values between 0 and 100, high values indicating that migration is an efficient mechanism of population redistribution, generating a large net effect for the given volume of movement, while low values denote that inter-zonal flows are more closely balanced, leading to comparatively little redistribution. Computationally, $MEI = 100\{\sum_i |D_i - O_i| / \sum_i (D_i + O_i)\}$ where D_i is the total inflows to zone *i* and O_i is the total outflows from zone *i*.
- the Aggregate Net Migration Rate (ANMR) which indicates more directly the overall impact of the net migration balances in changing the population distribution of the country. The ANMR represents a logical extension of net migration rate commonly used for specific regions and is computed as
  $ANMR = 100(\sum_i |D_i - O_i| / \sum_i P_i)$ where P_i is the PAR in region *i*.

The precise definition of the terms used in each of the above measures is set out in Bell *et al.* (2002).

Table 2: Measures for cross-national comparison of internal migration

No.	Indicator Name	Shorthand	Description
Measures of migration intensity			
1	Crude Migration Intensity	CMI	Total moves over population at risk
2	Standardized Migration Intensity	SMI	Age-standardised intensity
3	Gross Migraproduction Rate	GMR	Sum of age-specific migration intensities
4	Migration Expectancy	ME	Total moves over a hypothetical lifetime
5	Peak Migration Intensity	PMI	Peak intensity on the age schedule
6	Age at Peak Intensity	API	Age at which the peak occurs
Measures of migration distance			
7	Median Distance	MD	Distance moved at the 50^{th} percentile
8	Distance Decay Parameter	B	Exponent from a spatial interaction model
9	Courgeau's Index	K	Regression slope of CMIs at various scales
Measures of migration connectivity			
10	Index of Migration Connectivity	I_{MC}	Proportion of non-zero flows in a matrix
11	Index of Migration Inequality	I_{MI}	Departure from a hypothetical flow matrix
12	Migration Weighted Gini	MWG	System-wide index of spatial concentration
13	Coefficient of Variation	ACV	SD divided by the mean of a flow matrix
Measures of migration impact			
14	Migration Effectiveness Index	MEI	Asymmetry of inter-zonal migration flows
15	Aggregate Net Migration Rate	ANMR	Extent of redistribution through migration

Source: Modified after Bell *et al*. (2002)

5. Data from IPUMS

While the UN has recently established a comprehensive data base of international mobility, there is no comparable, central repository of internal migration statistics. However, one source which provides at least partial access to information on internal migration for more than one country is the IPUMS database, maintained and made publicly available by the University of Minnesota. Only 35 countries are currently represented in the IPUMS database, and not all of these collect data on internal migration. Moreover, because the IPUMS data are public use sample files, the available datasets exclude some census variables, or have limited classificatory detail. In the endeavour to preserve confidentiality, geographic attributes are often abbreviated, or limited to the regional level. Despite these constraints, the IPUMS database represents a unique resource which provided the major source of information analysed in the sections which follow.

We draw on IPUMS data for 25 countries. Information for two additional countries, Australia, and Indonesia, was held separately by the authors, while data for India and for the 2000 Census of China was kindly made available by colleagues via the UN Development Program. Our dataset therefore encompasses 28 countries in all, 22 of which are located in the developing world. Of these, there are five from Africa, eight from Asia and nine from Latin America and the Caribbean.

Table 3 sets out the date of the most recent Census for which we have information, together with the time interval over which migration was measured. It is readily apparent that a large number of countries collect more than one type of data, but the most common intervals over which migration is measured are lifetime (place of residence compared with place of birth – 25 countries) and 5 years (place of residence at the Census compared with 5 years ago – 19 countries). Six countries collect data for a one year interval and two collect data for a ten year interval. Nine countries also collect data on place of previous residence, irrespective of the time of the last move, and ten collect information on duration of residence. As argued earlier, however, data on previous residence and current duration can only be used effectively to measure migration if both questions refer to the same spatial scale, which is difficult to establish for the countries listed here. For the purposes of this analysis, we therefore confine attention to

just two of the categories in Table 3, the 5 year fixed interval and lifetime migration. Together, these two intervals cover 27 of the 28 countries in Table 3; we omit the UK from further analysis.

Table 3: Measures of Internal Migration from the Census, Selected Countries

Country	Census year	Internal Migration Interval					Duration of residence
		1 year	5 years	10 years	No reference date	Lifetime	
Africa							
Ghana	2000		x			x	
Kenya	1999	x				x	x
Rwanda	2001				x	x	x
South Africa	2002		x			x	
Uganda	2001				x	x	x
Asia							
Belarus	1999				x	x	x
Cambodia	1998				x	x	x
China*	2000		x			x	
India*	2001				x	x	x
Indonesia*	2000		x		x	x	x
Malaysia	2000		x			x	
Philippines	2000		x	x		x[1]	
Vietnam	1999		x				
Latin America and Caribbean							
Argentina	2001		x			x	
Brazil	2000		x			x	x
Chile	2002		x			x	
Colombia	2005		x		x	x	
Costa Rica	2000		x			x	
Ecuador	2001		x			x	
Mexico	2005		x			x[2]	
Panama	2000				x	x	
Venezuela	2001		x			x	
Developed countries							
Australia*	2006	x	x				
Canada	2001	x	x			x[3]	

Portugal	2001	x	x			x	
Spain	2001			x	x	x	x
UK	2001	x					
USA	2005	x	x[2]			x	x

*Data are provided from other sources

1. Only available from the 1990 Census

2. Only available from the 2000 Census

3. Incomplete and not useable in the IPUMS datasets for 1991 or 2001

6. Migration Intensities

6.1 Overall Intensities

Tables 4 and 5 set out internal migration intensities for the various countries for which data are available. In some cases (eg Mexico and Venezuela) data are only available for a single level of geography, or zonal system, such as state or province, whereas for other countries, Brazil and Chile for example, movement data are coded to several geographic levels. There are some cases, too, where migration data are available for alternative aggregations of the same type of zonal units. In the case of Colombia, for example, the IPUMS dataset includes a 'migration status' variable that indicates the proportion of people who changed residence between the country's 1104 municipalities over the 5 year transition interval. This variable captures the aggregate migration intensity, but provides no information on spatial patterns. However, the IPUMS data set also provides an origin-destination matrix showing flows between 532 zones which are similarly named (i.e. as municipalities), but involve aggregations of zones with smaller populations in order to eliminate very small flows and protect individual confidentiality. Because they involve different levels of spatial breakdown, the two variables deliver quite different estimates of migration intensity. In principle, the migration status variable delivers a more valid picture of the true scale of movement between municipalities. However, a flow matrix is needed to measure migration effectiveness and the ANMR, so is to be preferred on the grounds. In practice, it turns out there is considerable value in being able to calculate migration intensities at both levels of aggregation, as will be demonstrated below.

The results reveal wide-ranging variation in the level of migration intensity between countries. In the case of fixed interval data, Table 4 reveals a low of less than 0.8 per cent of people moving between the 8 regions of Indonesia over the previous five years, to a high of 16.7 per cent (one in six) relocating between the 178 municipalities of Chile over the same period. High movement intensities, around 10 per cent or more, were also recorded between municipalities in South Africa, Canada and Brazil, between parishes of Portugal, cantons of Costa Rica, and statistical divisions of Australia. In contrast, movements between regions of Vietnam and Portugal registered intensities of less than 2 per cent. In terms of absolute numbers, China, the USA, Brazil, Indonesia and South Africa stand out, each with more than 5 million people relocating between geographic zones over the five year interval.

The figures for lifetime migration intensity (Table 5) are consistently higher than for the five year period and in several cases reveal a remarkable level of lifetime mobility. Thus, in Chile, an astonishing 50 percent of the population were living outside their municipality of birth by the time of the 2002 census. The same was true for two fifths of Brazilians and Spaniards, and for a third of Colombians, Panamanians (Districts) and Costa Ricans (Cantons). Lifetime migration was much less common between the States of India, or between provinces in China and Indonesia, with intensities of less than 10 per cent. Nevertheless, the absolute numbers living outside their district, province or region of birth in the more populous countries was substantial: 78 million in the USA (states), 73 million in China (provinces), 63 million in Brazil (municipalities) and 42 million in India (states) and implies a substantial historical shift in the pattern of human settlement.

There is a strong linear correlation between the levels of migration intensity measured over 5 years with that measured over the entire lifetime. Comparing tables 4 and 5, there are 30 cases in which we have estimates of migration intensity for the same countries and geographic levels. The product moment correlation (Pearson r) between these two indicators generates a coefficient of determination (r^2) of 0.87. Thus, fixed interval intensities represent a reasonably reliable surrogate for lifetime moves.

Table 4: Five Year Migration Intensity by Country and Zonal System

Country	Zonal system	No. of zones	Migrants	Intensity (%)	Source type*
Africa					
Ghana	Region	10	567,590	3.52	A
	District	110	961,270	5.96	A
South Africa	Province	9	1,704,363	4.26	A
	Municipality	52	5,275,618	13.18	B
Asia					
China	Province	31	32,347,800	2.74	A
	County	2901	79,052,151	6.70	B
Indonesia	Region	7	1,507,406	0.83	A
	Province	26	3,954,104	2.19	A
	Municipality	280	6,917,713	3.90	A
	Municipality	314	7,089,722	3.98	B
Malaysia	State	15	840,800	4.75	A
	District	133	1,395,950	8.00	A
	District	136	1,432,700	8.10	B
Philippines	Region	16	1,559,511	2.51	A
	Province	83	2,038,365	3.28	A
	Municipality	1610	2,823,789	4.55	B
Vietnam	Region	8	1,337,724	1.94	A
	Province	61	1,999,215	2.90	A
	District	663	3,139,252	4.55	B
	Commune	1203	4,481,825	6.50	B
Latin America and Caribbean					
Argentina	Province	24	1,161,800	3.55	A
	Department	511	2,358,080	7.21	B
Brazil	Region	5	3,372,124	2.20	A
	State	27	5,204,886	3.40	A
	Municipality	1520	15,314,989	9.99	B
Chile	Region	13	853,960	6.32	A
	Province	44	1,295,150	9.59	A
	Municipality	178	2,253,170	16.68	A
Colombia	Department	33	1,520,980	4.21	A
	Municipality	532		6.42	A

			2,302,190		
	Municipality	1105	2,676,375	7.39	B
Costa Rica	Province	7	184,260	5.53	A
	Canton	60	353,010	10.60	A
	Canton	81	355,220	10.67	b
Ecuador	Province	22	595,020	5.55	a
	Canton	128	885,170	8.25	a
Mexico	State	32	2,470,960	2.70	a
Venezuela	State	24	1,022,660	5.07	a
Developed Countries					
Australia	State/Territory	8	779,951	4.76	a
	Stat. Division	61	1,689,879	10.39	a
Canada	Province	11	908,962	3.37	a
	Census.Division	288	3,359,319	12.46	b
	Municipality	5600	4,466,827	16.57	b
Portugal	Region	7	183,340	1.92	a
	Sub Region	22	307,940	3.23	a
	Municipality	308	677,380	7.10	b
	Parish	4000	1,374,960	14.42	b
USA-2000	Region	4	12,243,724	4.80	a
	Division	9	16,740,835	6.57	a
	State	51	22,794,783	8.94	a

Notes: a – calculated from matrix; b – calculated from migration status variable

Table 5: Lifetime Migration Intensity by Country and Zonal System

Country	Zonal system	No. of zones	Migrants	Intensity (%)	Source type*
Africa					
Ghana	Region	10	3,329,320	17.75	a
	District	110	5,206,990	27.75	b
Kenya	Province	8	3,496,560	12.64	a
	District	69	5,622,520	20.32	a
Rwanda	Province	12	801,890	10.41	a
South Africa	Province	9	6,717,270	15.36	a
Uganda	Region	4	1,288,730	5.24	a
	District	56	3,577,610	14.56	a
Asia					
Belarus	Region	6	944,270	10.78	a
	District	172	5,484,810	62.62	b
Cambodia	Province	24	1,308,780	11.65	a
	District	149	2,024,170	18.02	a
China	Province	31	73,087,300	6.19	a
India	State	35	42,341,703	4.14	a
	District	593	76,841,466	7.52	b
Indonesia	Region	7	8,104,818	4.07	a
	Province	26	16,729,095	8.39	a
Malaysia	State	15	4,156,500	20.71	a
Philippines-1990	Region	16	6,879,231	11.72	a
	Province	77	8,722,805	14.86	a
Latin America and Caribbean					
Argentina	Province	24	6,691,210	19.90	a
Brazil	Region	5		10.07	a

			17,025,306		
	State	27	26,059,033	15.41	a
	Municipality	1520	63,461,867	37.52	b
Chile	Region	13	3,097,070	21.27	a
	Province	44	4,324,420	29.71	a
	Municipality	338	7,258,850	49.61	b
Colombia	Department	33	8,108,168	20.25	a
	Municipality	532	12,452,428	32.51	a
	Municipality	1105	14,589,440	36.23	b
Costa Rica	Province	7	704,020	20.02	a
	Canton	60	1,195,490	33.99	a
	Canton	81	1,203,560	34.22	b
Ecuador	Province	22	2,431,310	20.23	a
	Canton	128	3,641,200	30.30	a
Mexico-2000	State	32	17,791,208	18.52	a
Panama	Province	11	566,940	20.56	a
	District	75	950,050	34.46	a
Venezuela	State	24	5,184,850	23.79	a
Developed Countries					
Portugal	Region	7	1,240,580	12.80	a
	Sub Region	22	1,817,780	18.76	a
Spain	Province	52	8,641,300	22.36	a
	Municipality	366	17,288,760	44.75	a
USA	Region	4	44,423,142	17.84	a
	Division	9		23.25	a

			57,909,783		
	State	51	78,583,779	31.55	a

Notes: a – calculated from matrix; b – calculated from migration status variable

For the nine countries in South America, the intensities set out in Tables 4 and 5 closely match those calculated by CEPAL (2007) for the matching years and levels of geography. Validating our estimates for other countries is more difficult because there are few readily available sources which clearly specify the way in which cited estimates have been computed. However, the figures for Canada, the USA and Australia are all consistent with widely published figures.

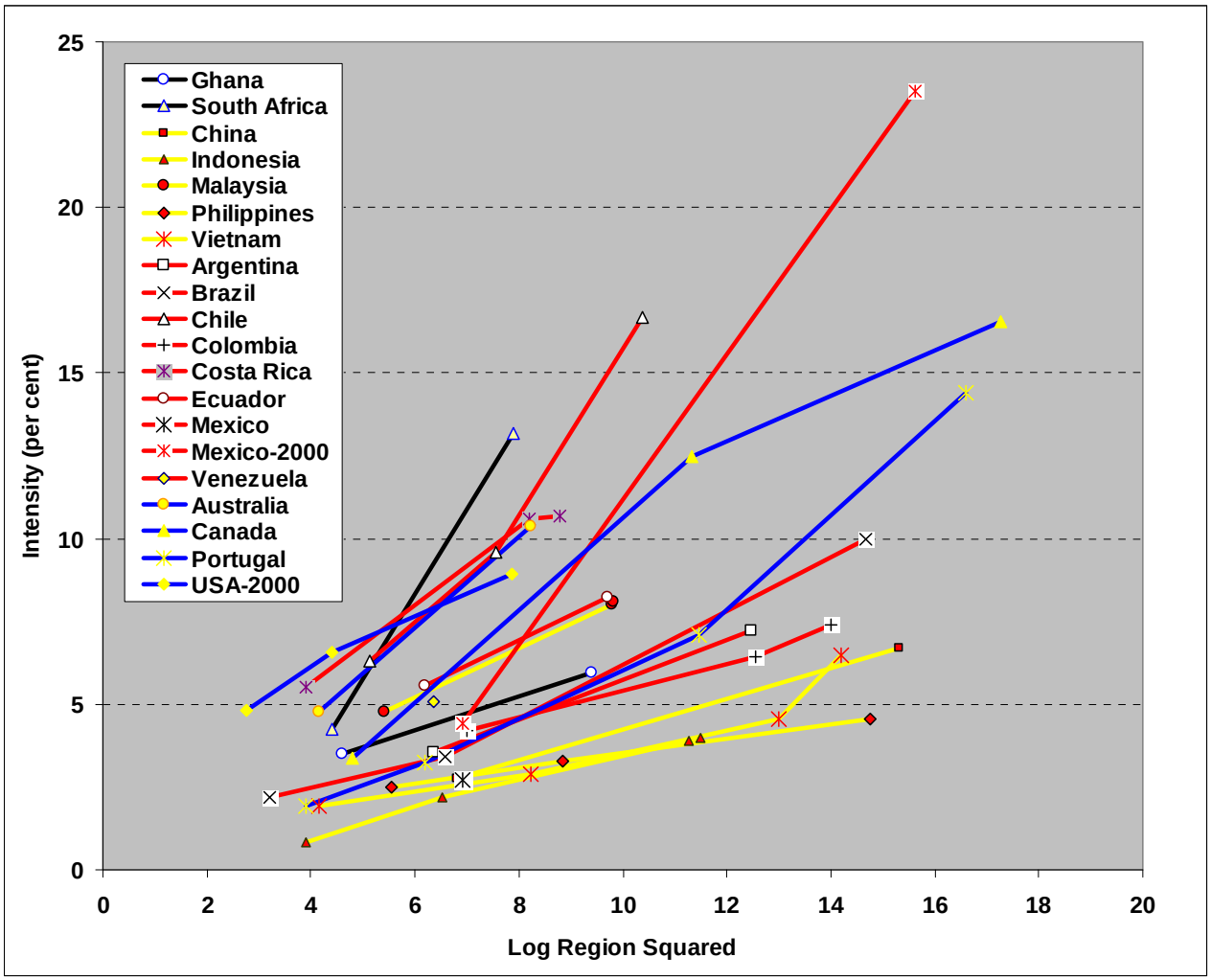
Together, the data assembled in Tables 4 and 5 represent probably the most comprehensive multi-national inventory of migration intensities assembled to date. What is most striking from these tables is the extent to which the magnitude of the computed intensities is dependant upon the level of spatial disaggregation at which migration is measured. This in turn fundamentally undermines any attempt to compare countries using migration intensities alone, still less to construct a simple league table of high and low mobility nations. For example, South Africa appears to be a middle ranking nation if migration intensity is measured between provinces (4.26 per cent over five years), but ranks near the top of the list if the intensity is computed between municipalities (13.18 per cent). Distinguishing between two levels of geography (major regions and minor regions) as in CEPAL (2007) only goes partway to addressing the problem. For movements between States, Malaysia recorded a higher five year intensity than South Africa (4.75 per cent compared with 4.26 per cent), but Malaysia has 15 States compared with South Africa's nine provinces, so it is unclear whether the higher intensity reflects greater underlying population mobility or if it is simply an artefact of the more disaggregated zonal system. Ecuador's migration intensity of 5.5 per cent between 22 provinces raises a similar conundrum, while for minor regions, it is unclear whether movement between municipalities is greater in Chile (16.7 per cent) than in South Africa (13.2 percent) because of higher underlying mobility, or because of the larger number of zones over which it is measured (178 compared with 52). The following section offers a solution to this dilemma by harnessing measures of intensity at a range of geographic scales to effectively standardise for these differences.

6.2 Towards a more rigorous basis for comparison - Courgeau's 'k'

While the statistics in Tables 4 and 5 are intriguing, our ability to draw comparisons between countries is fundamentally undermined by differences in the number of zones against which the migrants are being recorded. Of course, the shape of the zones, and of the country, together with the pattern of human settlement, also affect the propensity to move. In the case of lifetime migration, differences in age structure matter too, because age regulates cumulative movement opportunities. However, these latter effects are less tractable than the level of zonation. As Courgeau (1973b) observed, if, as we know to be true, there is a relationship between the propensity to move and distance, there must also be a relationship between the level of mobility and the number of zones into which a space is divided. The finer the spatial mesh, the larger number of migrations that will be recorded, and hence the greater the apparent migration intensity. Courgeau's (1973b) formula CMI = $k \log n^2$ endeavours to capture this link in a simple linear equation which connects migration intensity to the log of the square of the number of regions.

Figure 1 charts the results of this analysis for the 19 countries with 5 year migration transition data. The results reveal a remarkable picture. For 10 of the 19 countries, we have data for three or more zonal systems and in all these cases the graph reveals a strong relationship in which migration intensity is a linear function of $\log n^2$. Moreover, in the seven countries with just two data points, the slope of the line closely matches those of the former countries. In each case, the intercept is closely oriented towards the origin. These results provide good support for Courgeau's hypothesised relationship. They also suggest that the linear equations for each country can be read as a continuous function, thereby allowing comparisons to be drawn at any chosen level of spatial disaggregation (certainly by interpolation, if not by extension). Thus, disregarding the differences in the original zonal systems against which the data were collected, calculations could be made to compare the implied level of migration intensity for each country on a system of, say, 10 regions, or 20 by reading off the intensity on the y-axis for any chosen point on the x axis, or substituting n=x in the appropriate equation..

Figure 1: Five Year Migration Intensity by Zonal System, Selected Countries



An alternative approach to Figure 1, is to simply compare the slope of the line for each country – that is the value of *k* in the Courgeau equation. Courgeau (1973b) is not definitive as to the interpretation of *k*, but the foregoing suggests that the higher the *k* (the steeper the line graph), the greater the intensity of migration. Table 6 sets out the results of this analysis, with the regression line forced through the origin and the coefficient of determination reported as a measure of goodness of fit. The results indicate a remarkably close fit in all except two cases - the Philippines and the USA, where r^2 falls below 0.8. For both countries, the slope and position of the line suggests a positive intercept on the y axis, which implies a greater tendency towards

long distance migration than might otherwise be expected. In contrast, negative intercepts tend to suggest that long distance migration is less prevalent than might be expected, given the level of mobility over shorter distances. In figure 1, South Africa reveals this tendency.

Table 6: Courgeau's *'k'* and r^2 for Selected Countries, Five Year Migration Interval

Country	*k*	r^2
Africa		
Ghana	0.660	0.903
South Africa	1.503	0.819
Asia		
China	0.432	0.994
Indonesia	0.338	0.963
Malaysia	0.828	0.988
Philippines	0.337	0.674
Vietnam	0.403	0.890
Latin America and Caribbean		
Argentina	0.574	0.998
Brazil	0.654	0.972
Chile	1.455	0.895
Colombia	0.530	0.942
Costa Rica	1.268	0.964
Ecuador	0.864	0.984
Mexico-2000[1]	1.364	0.835
Developed Countries		
Australia	1.239	0.988
Canada	0.987	0.959
Portugal	0.757	0.904
USA	1.267	0.570

Note 1: For the Mexico 2005 Census only for inter-state migration.

The results of this analysis greatly clarify the mass of individual intensities set out in Table 4. South Africa, Chile, Mexico and Costa Rica emerge as the most mobile countries, followed by three developed nations, Australia, the USA and Canada. A second grouping of Ecuador, Malaysia and Portugal display moderate mobility, while a third cluster comprising Ghana,

Brazil, Argentina and Colombia register a distinctly lower level of mobility. Vietnam, the Philippines, Indonesia and China are clearly separated in the lower reaches of Figure 1, with the lowest levels of migration intensity.

Graphing the underlying values, as in Figure 1, also enables us to locate those countries for which we have only a single data point, corresponding to an intensity computed for a single zonal system. For the countries in our sample, this is the case only for Venezuela, with its position on the chart suggesting a moderate level of mobility, similar to Ecuador and Malaysia.

Table 6 makes it clear that there is no discrete ordering of internal migration propensity by world region or level of development; nevertheless, some clustering is apparent. Led by Australia and the USA, the four developed countries all display relatively high values of *k*, but they are eclipsed by several developing countries, particularly South Africa, Chile and Mexico. Latin American countries also feature prominently in the upper reaches of the chart, but there are stark contrasts between high mobility in Chile and Costa Rica, and comparatively subdued rates of movement in Brazil, Argentina and Colombia. Ecuador and Venezuela assume intermediate positions. Asian countries generally display lower mobility, but Malaysia is a noticeable exception, with a *k* value double that of its fellow countries, roughly equivalent to the mean of the Latin American cluster. African countries are poorly represented in this sample, but South Africa and Ghana also display radically different profiles, suggesting a diverse migratory environment. These broad regional differences are readily apparent from inspection of Figure 1, where the three continents, and the more developed countries, are each assigned a unique colour on the line graph.

Table 7: Courgeau's '*k*' and r^2 for Selected Countries, Lifetime Migration

	Country	*k*	r^2
Africa			
	Ghana	3.127	0.723
	Kenya	2.524	0.807
	Uganda	1.817	0.999
Asia			
	Belarus	5.751	0.919
	Cambodia	1.553	0.999
	India	0.587	0.999
	Indonesia	1.318	0.995
	Philippines 1990[1]	1.827	0.280
Latin America and Caribbean			
	Brazil	2.543	0.987
	Chile	4.159	0.989
	Colombia	2.625	0.971
	Costa Rica	4.121	0.850
	Ecuador	3.153	0.994
	Panama	4.071	0.985
Developed Countries			
	Portugal	3.107	0.960
	Spain	3.493	0.841
	USA	4.500	0.418

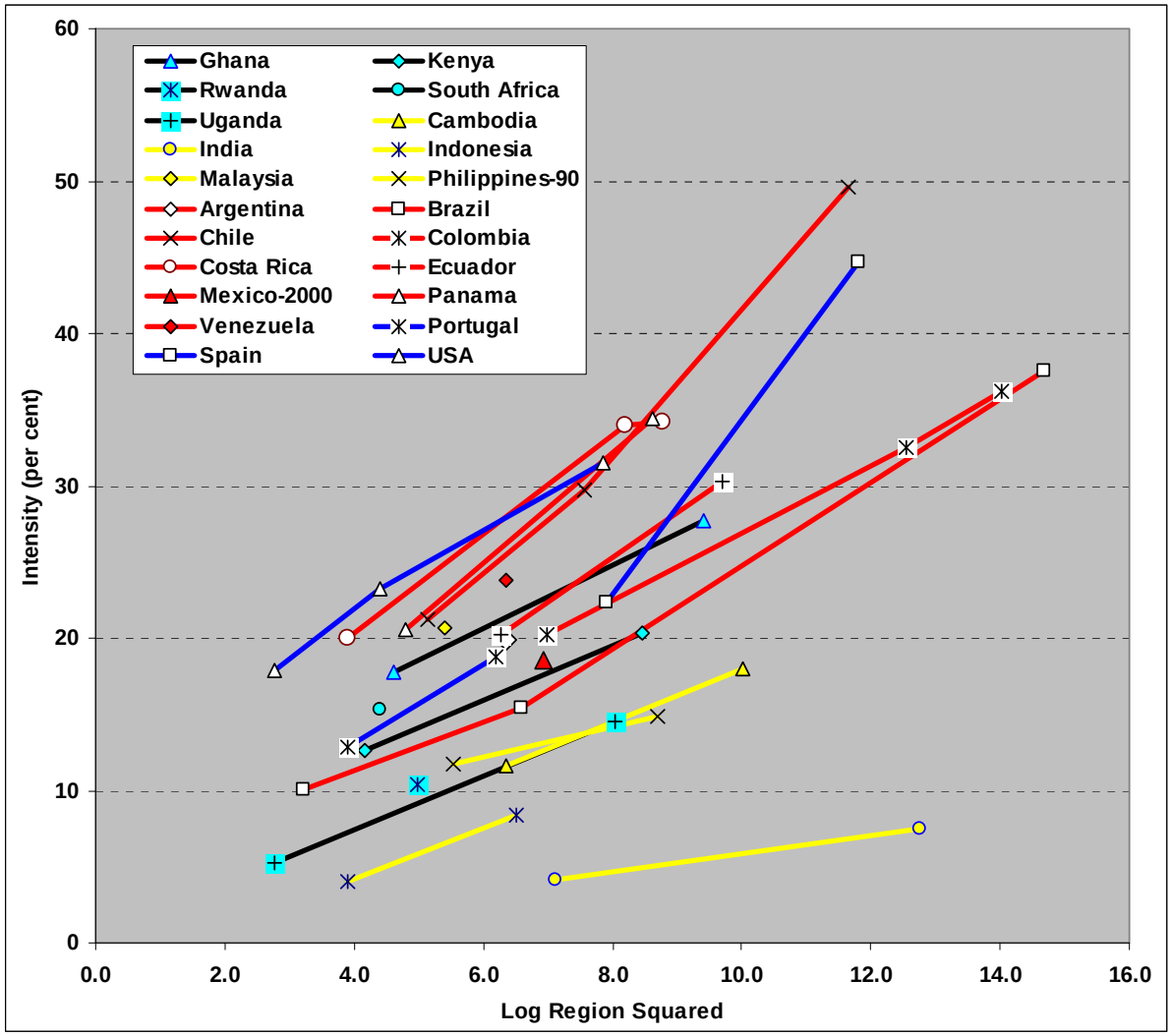
Note 1 For the Philippines 2000 Census data were only available for inter-provincial migration.

This diversity between and within regions is reinforced by Figure 2 and Table 7, which set out similar results calculated using lifetime migration. As expected, there was a strong positive correlation with the five year data (r^2=0.895 calculated across the 10 countries with *k* values for both lifetime and five year data). Again the r^2 statistic is strong for most countries, with only the USA and Philippines delivering results that suggest a poor fit.

Among the developed nations, the USA stands out with the second highest *k* value, but Portugal and Spain both feature well down the chart with intermediate levels of mobility. Latin America again displays a diverse profile, with high mobility in Chile, Costa Rica and Panama, but substantially lower levels in Brazil and Colombia. For the most part, however, these values are

well above the figures for the Asian and African representatives. Thus, it is India, Indonesia, Cambodia, the Philippines, Uganda and Kenya that appear at the foot of the league table. As elsewhere, each region generates exceptions to the common pattern. In this instance it is Ghana with a mid-ranking position, and Belarus topping the table, that stress variability in the migration experience within individual world regions.

Figure 2: Lifetime Migration Intensity by Zonal System, Selected Countries



6.3 Internal Migration and the HDI

Contemporary thinking envisages a strong relationship between migration and development, with forceful assertions that restrictions on movement impede economic development. To the extent that human development is linked to economic development, it would therefore be expected that the HDI would be closely correlated with migration intensity. Table 8 provides little support for this hypothesis. Measured across the countries for which we have data, there is a low positive association between the HDI and the values of Courgeau's *k* , both for the five year migration interval (r^2 = 0.16) and for lifetime migration (r^2 = 0.36). Figure 3 illustrates the pattern of association.

Taking group averages across the four categories of HDI identified by the UN, coupled with simple arithmetic means of Courgeau's *k*, provides somewhat greater support for the hypothesised association (Table 8). The mean HDI across the various countries for which we have migration data falls from 0.946 for the very high HDI group, to 0.834 for the High group and 0.666 for the Medium group of countries. The mean value of Courgeau's *k* likewise is substantially higher for countries in the High HDI cluster than for those in the Medium cluster, and this holds whether *k* is measured over 5 years or as lifetime migration. However, this association does not extend to the Very High HDI group. This may simply be a product of the limited number of countries for which we have data, or it may reflect the influence of a small number of extreme values. For example, the mean *k* for lifetime migration in the High HDI group would drop to 3.6 if the remarkable *k* value for Belarus were excluded. Similarly, Portugal is one of the least mobile of the developed countries, and its exclusion from the calculations would raise the mean *k* for 5 year migration in the Very high HDI group to 1.16.

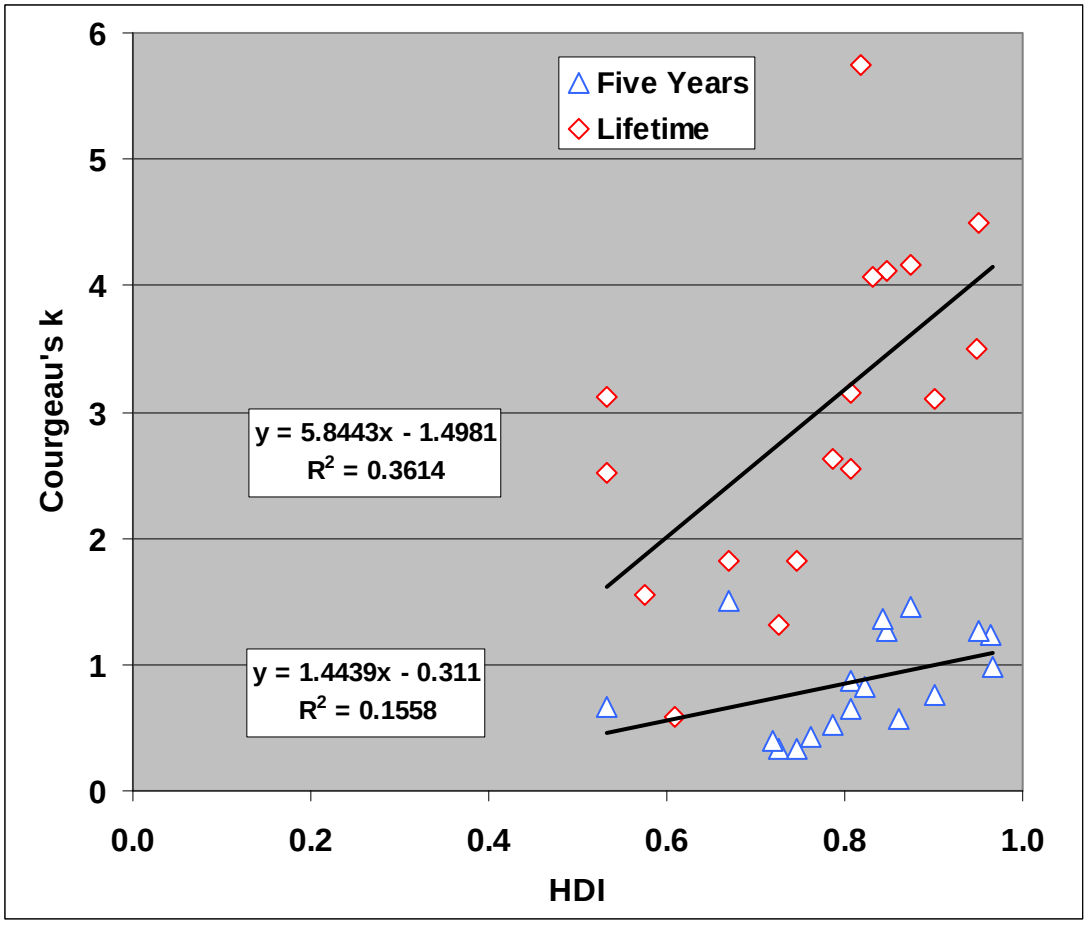
Table 8: Courgeau's *'k'* for Five Year and Lifetime Migration, and the HDI, Selected Countries

HDI Group	Country	HDI - Rank	HDI	Courgeau's *k* 5 year	Courgeau' s *k* Lifetime
Very High					
	Australia	4	0.965	1.239	na
	Canada	3	0.967	0.987	na
	Spain	16	0.949	na	3.493
	Portugal	33	0.900	0.757	3.107
	USA	15	0.950	1.267	4.500
	Group Mean		**0.946**	**1.062**	**3.700**
High					
	Argentina	46	0.860	0.574	na
	Belarus	67	0.817	na	5.751
	Brazil	70	0.807	0.654	2.543
	Chile	40	0.874	1.455	4.159
	Costa Rica	50	0.847	1.268	4.121
	Ecuador	72	0.807	0.864	3.153
	Malaysia	63	0.823	0.828	na
	Mexico	51	0.842	1.364	na
	Panama	58	0.832	na	4.071
	Group Mean		**0.834**	**1.001**	**3.966**
Medium					
	Cambodia	136	0.575	na	1.553
	Colombia	80	0.787	0.530	2.625
	Ghana	142	0.533	0.660	3.127
	Indonesia	109	0.726	0.338	1.318
	Kenya	144	0.532	na	2.524
	Philippines	102	0.745	0.337	1.827
	South Africa	125	0.670	1.503	1.817
	Vietnam	114	0.718	0.403	na
	China	94	0.762	0.432	na
	India	132	0.609	n.a	0.587
	Group Mean		**0.666**	**0.600**	**1.922**
Low					
	Uganda	156	0.493	na	na
	Rwanda	165	0.435	na	na
	Group Mean		**0.464**	n.a	n.a

Note: na = data not available

Refinement would clearly be needed for a rigorous test of the migration-HDI link. However, it is also possible that the association between migration intensity and human development breaks down at the high end of the development continuum. This is certainly envisaged in key theoretical contributions on migration, including Zelinsky's influential work from the 1970s. In Zelinsky's formulation, movement intensities were transformed not only in magnitude, but also in type as part of the development process, a key part of which was seen to be the substitution of circular and temporary moves for permanent migration in what Zelinsky termed 'advanced' societies.

Figure 3: Migration and the HDI, Five Year and Lifetime Measures, Selected Countries



7. Migration Selection

It is well established that migration is a highly selective process (Thomas 1938, 1958). The propensity to move is highest among the young, the well-educated, the highly skilled and those in particular occupations and industries. It also varies according to income, household type, housing tenure, and a range of other variables (Bell 2002). It is age, however, that emerges as by far the most consistent predictor of migratory potential. Rogers and Castro (1981) found that despite the variation in overall levels of migration intensity around the world, the age profile of migration followed a shape that was remarkably similar from one country to another, and from one level of spatial scale to another. The propensity to move is highest among young adults and falls steadily with increasing age, reaching a low typically around retirement age, then rising again among the very old. Sometimes a secondary peak occurs on retirement, while at younger ages migration is low in the teenage years but higher among the very young, as children move with their parents.

Figure 4 demonstrates that this general pattern is repeated across all the countries for which we have data on five year migration transitions. However, there is considerable variation between countries, not only in the height of the graph (reflecting differences in the overall intensity of migration), but also in the shape of the peak, the age at which peak migration occurs, and the rate of descent of the labour force curve. The IPUMS data are Census sample files, so even at the level of major regions (generally the states and provinces from Table 4) the profiles display some irregularities when disaggregated by single years of age, so the data in Figure 4 have been smoothed to eliminate the major distortions. Table 9 summarises the key features.

Table 9: Age and Intensity at Peak Migration, Major and Minor Regions, Five Year Transition, Selected Countries

	Major regions			Minor regions	
Country	Age at peak	Intensity at peak (%)	Sharpness of peak[1]	Age at peak	Intensity at peak (%)
Africa					
Ghana	23	6.05	Sharp	26	8.91
South Africa	24	8.84	Moderate	27	21.47
Asia					
China-1990	21	2.91	Sharp	21	9.59
Indonesia	22	4.80	Sharp	23	9.27
Malaysia	21	12.02	Sharp	23	17.95
Philippines	24	5.67	Moderate	24	7.61
Vietnam	21	8.49	Sharp	21	11.33
Latin America & Caribbean					
Argentina	27	6.08	Broad	26	11.36
Brazil	24	5.31	Broad	23	14.12
Chile	23	15.63	Broad	27	26.54
Colombia	21	6.84	Broad	20	11.19
Costa Rica	26	8.24	Broad	28	15.82
Ecuador	20	10.27	Broad	20	13.24
Mexico	25	4.08	Broad	n.a	n.a
Venezuela	20	7.42	Broad	n.a	n.a
Developed Countries					
Australia	27	9.01	Moderate	27	18.27
Canada	26	8.21	Sharp	26	28.05
Portugal	28	6.91	Sharp	28	16.09
USA-2000	25	18.28	Moderate	n.a	n.a

Notes: 1. Computed as the percentage of single year of age migration intensities (summed across all age groups) accounted for within + or -5 years from the age at the peak: >30%=sharp, 25-29.9%=moderate, <25%=broad. na-no data available.

As in the case of aggregate migration intensities, there is some evidence of systematic regularities in the way profile shape varies between countries and regions, but the picture is mixed. In some countries migration peaks in the late teens and early twenties and intensities fall

sharply at older ages. Malaysia and Vietnam are prominent examples. Elsewhere, high mobility tends to peak later, as in Argentina or Costa Rica, or is sustained across a broader range of age groups, as in Chile, the Philippines or Ghana.

Figure 4a: Age Profiles of Five Year Migration Intensity for 'Major Regions', Selected Countries in Asia

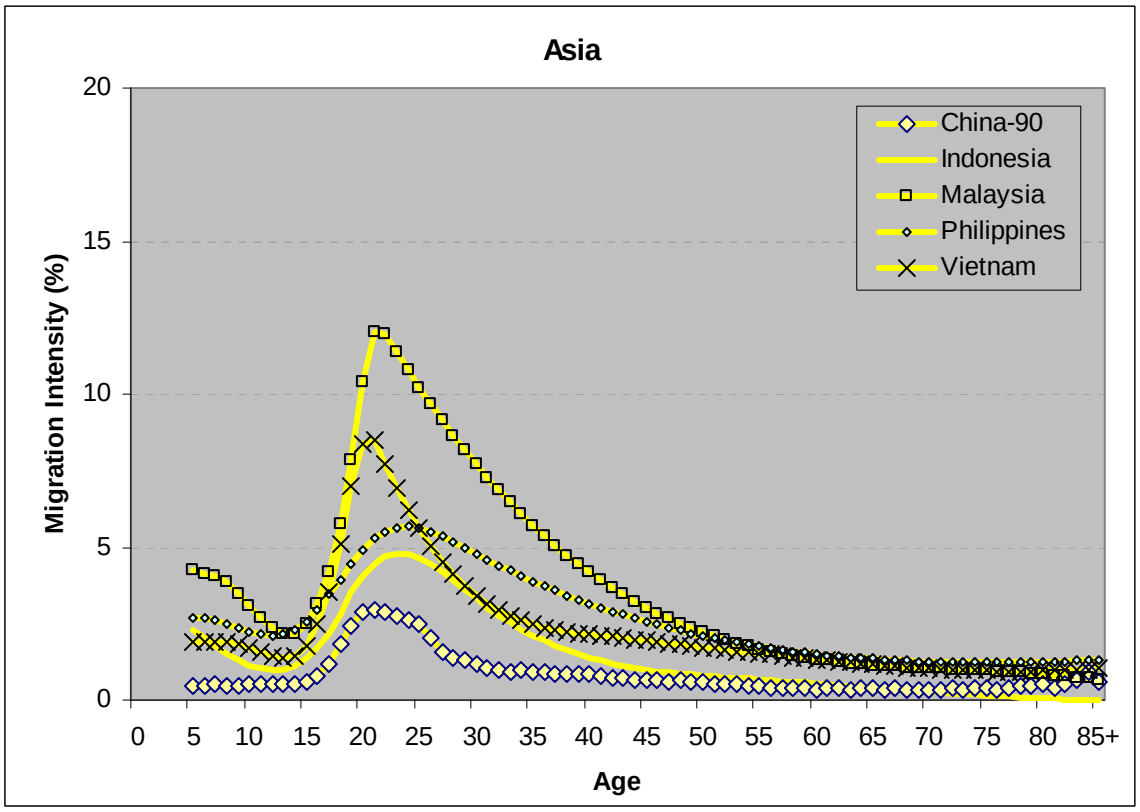


Figure 4b: Age Profiles of Five Year Migration Intensity for 'Major Regions', Selected Countries in Latin America

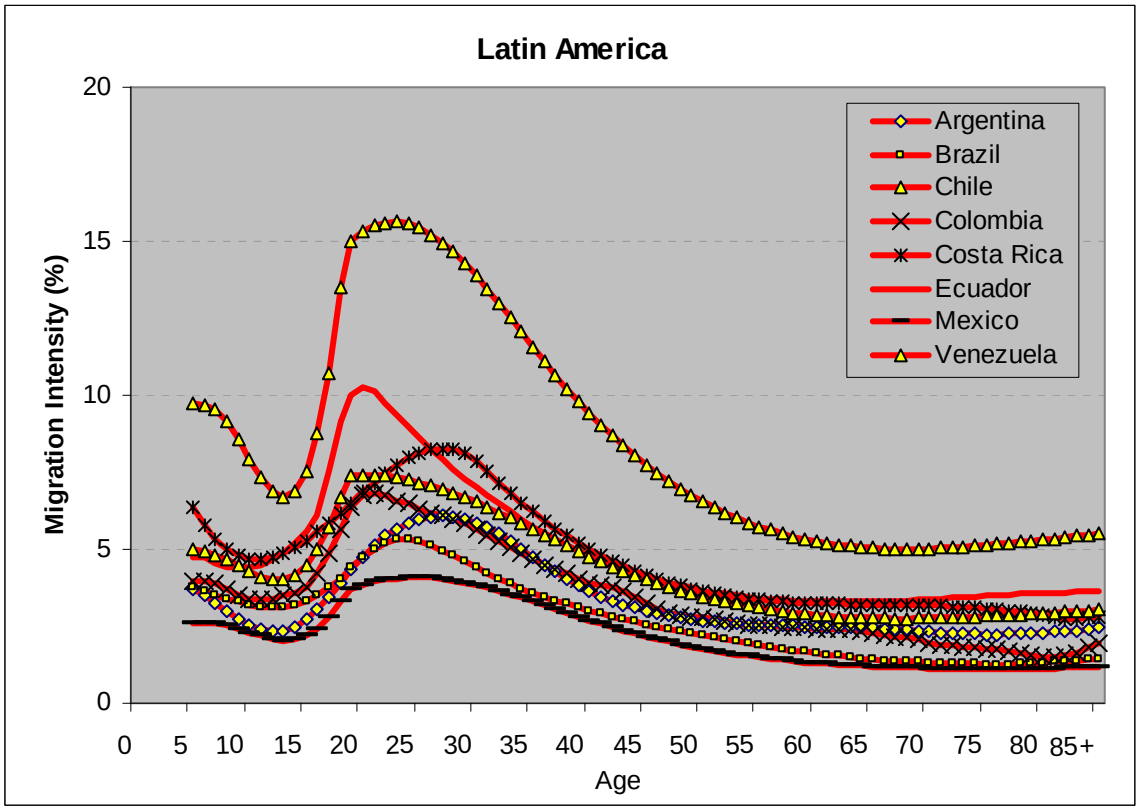


Figure 4c: Age Profiles of Five Year Migration Intensity for 'Major Regions', Selected Countries in Africa

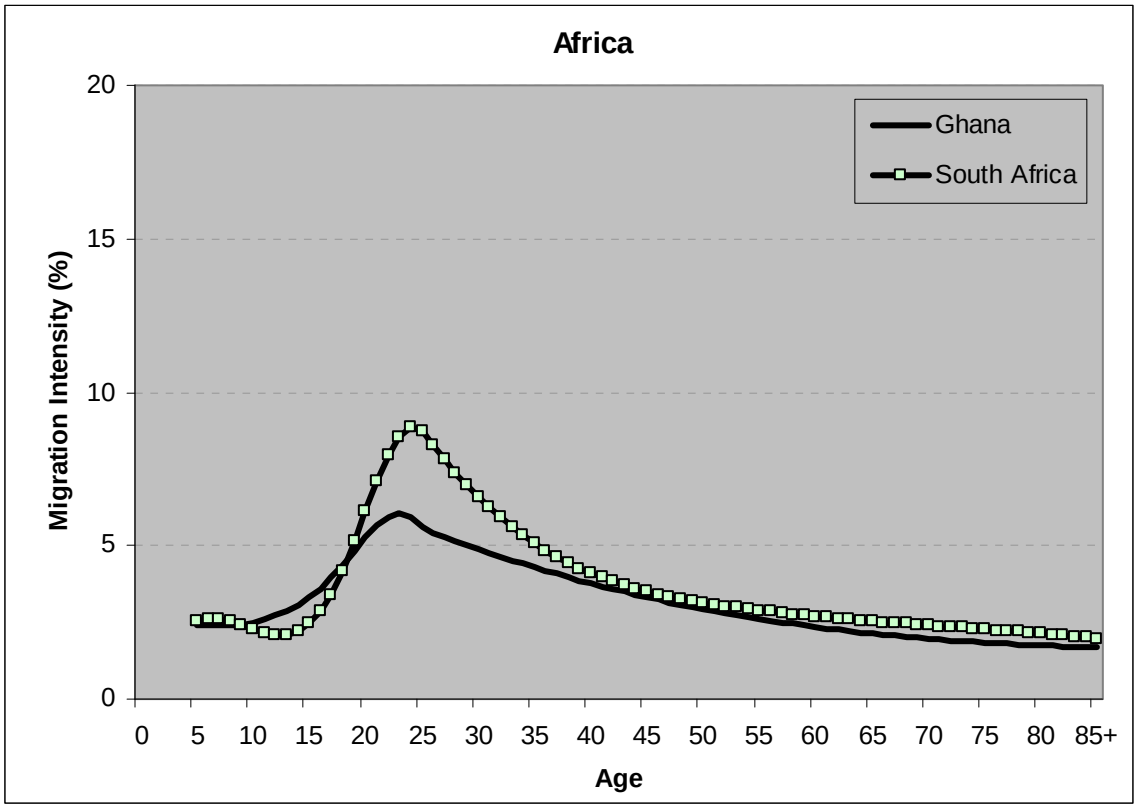
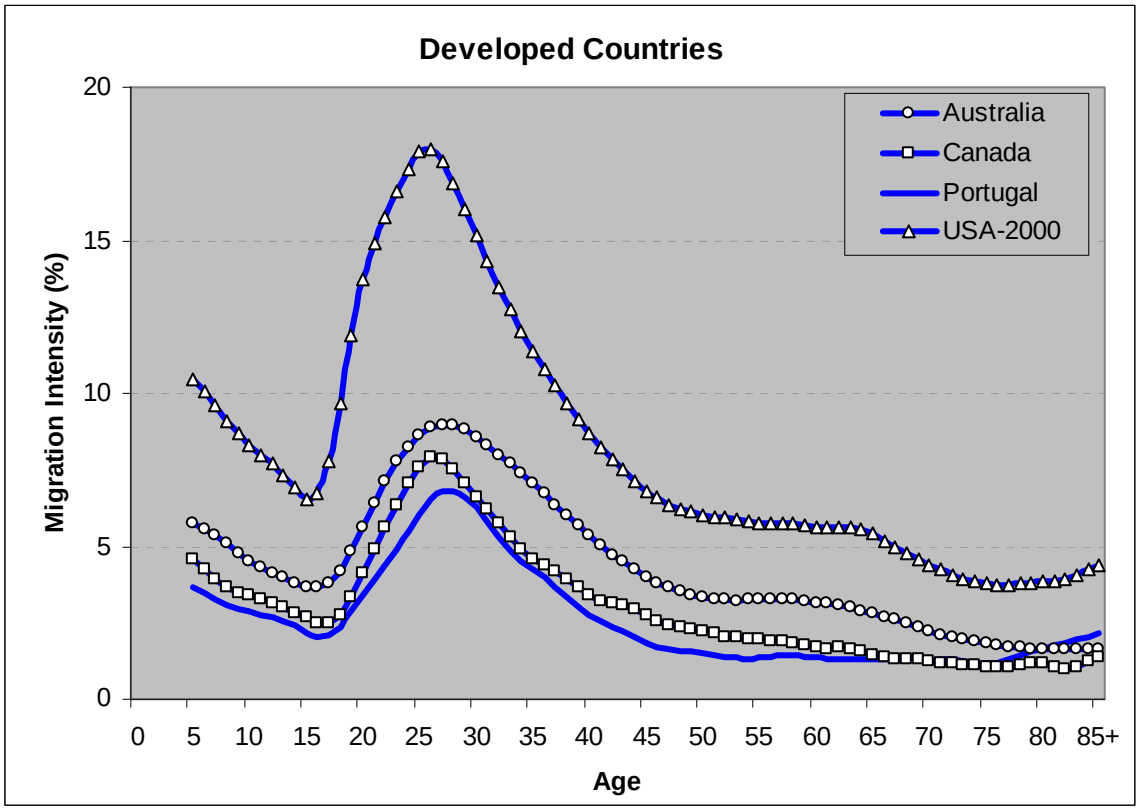


Figure 4d: Age Profiles of Five Year Migration Intensity for 'Major Regions', Selected Developed Countries



Broad flat peaks tend to be characteristic of Latin American countries but the age and intensity at the peaks vary. In Ecuador, Columbia and Venezuela, migration intensities peak early but are sustained at a relatively high level to the mid twenties. In Chile and Brazil, by contrast, peak mobility occurs two to three years later, while in Argentina, Costa Rica and Mexico, broad flat peaks are evident with the highest intensities occurring around the mid to late 20s. The Asian countries in our sample display a quite different profile shape, with migration concentrated more tightly into the early twenties age range, and comparatively low mobility beyond age 40. This is especially pronounced in Indonesia, Malaysia and Vietnam, whereas in the Philippines, the peak is broader and occurs at a later age, closer to the South American model than to its Asian counterparts. Turning to Africa, Ghana displays an even flatter profile with modest levels of migration extending throughout the twenties, whereas South Africa occupies a position between the Asian and Latin American models, with a moderate peak at age 24. The developed countries

exhibit much greater similarities, characterised by a late, sharp to moderate peak, but also showing some evidence of retirement related-migration.

These differences in the age profiles of migration almost certainly reflect the combined effect of cultural influences, norms and traditions, coupled with the differences in economic opportunities between countries. Further work is needed to explain these differences, but it is intriguing to note that among the Asian countries in our sample, which tend to exhibit relatively low overall levels of migration intensity, mobility peaks tends to peak sharply and is concentrated most strongly in the early twenties. The developed countries also display a sharp to moderate peak but at a later age, whereas in Latin America migration is dispersed more widely across the age spectrum.

Table 9 also provides support for Rogers and Castro's (1981) observation with regard to the fact that migration profiles tend to be scale-independent. The age at peak migration intensity for movement between 'minor regions' is identical in most cases to that for movement between the 'major regions'. Only in the case of Chile and South Africa is there an appreciable difference, with movements between minor regions peaking at a later age and profiles (not shown) being markedly less peaked. More detailed comparisons reveal a common pattern of flatter profile shapes for movement between minor regions, suggesting a general tendency for longer distance migration (between major regions) to be especially selective of younger adults. In reviewing these age profiles it is important also to bear in mind that migration is being measured here over a five year interval. Since age is recorded at the end of the period, movements will have occurred, on average, about 2.5 years earlier, and hence at an age 2.5 years younger, than indicated in the charts or table.

8. Migration and Settlement Patterns

Mobility itself is an indicator of flexibility, responsiveness and the ability to adapt to emerging opportunities, aspirations and changing circumstances. Perhaps the most immediate and tangible effect of migration, however, is through its effect as an agent of spatial change, altering the pattern of human settlement. The literature on migration in developing countries is preoccupied almost exclusively with rural to urban migration and its role as a source of urbanisation (see eg

United Nations 2000, 2008, World Bank 2008). In practice, however, rural to urban migration is notoriously difficult to measure because of shifts and variations in boundaries and in the definition of what is urban. Estimates of the role of migration in urbanisation are generally made using indirect methods and none of the Census data available for this study provide information on the nature of previous residence (urban or rural) in a form that could contribute to understanding of this process.

For this report, we confine attention to measuring the overall effect of migration in redistributing population between the various systems of regions against which the patterns of migration are recorded. The aggregate measure suggested by Bell *et al.* (2000) to capture this effect is the Aggregate Net Migration Rate (ANMR), as defined earlier. However, it is also important to recognise that a great deal of migration between regions is balanced by reciprocal movements in the reverse direction. Migration streams from *a* to *b* are commonly offset, sometimes entirely, by counter-streams from *b* to *a*. The ratio of these reciprocal movements, captured in the Migration Effectiveness Index (MEI), is commonly referred to as a measure of migration efficiency. Care is needed in interpretation, because efficiency in this case should not be taken in the economic sense, except in so far as it refers to efficiency as a means of redistributing population. High migration intensity with low migration efficiency may well underpin a closely integrated, functional space- economy in which individuals at different stages of their life course are moving in different directions within the country, according to their specific wants and needs.

Table 10 sets out measures of the MEI and ANMR together with the associated migration intensity for the 14 countries for which we have data for the five year migration interval, at various levels of spatial scale. Focusing first on migration efficiency, the results reveal substantial variation between countries. Ecuador, China and Vietnam emerge as the countries in which migration exerts the greatest efficiency as an agent of spatial change. In Ecuador, for every 100 migrants crossing a provincial boundary, there was a net redistribution of 63.3 people from one province to another. The figures were only slightly lower for China and Vietnam with MEIs of 62.4% and 59.7% respectively at the province and regional level. The figures in other parts of the world are substantially lower, with most countries registering MEIs in the high teens or twenties. For our sample of countries in Asia, migration efficiencies are generally at the upper

end of this range, while for Latin America they are at the lower end. The developed countries, too, display relatively low levels of migration efficiency.

MEIs calculated on the basis of lifetime migration are substantially higher than their five year counterparts, demonstrating that, cumulatively, migration is more efficient as a process of redistribution than the data for a single interval would suggest. The numbers for many countries are striking with efficiencies near 50 per cent or more in half our sample countries at some geographic level. Cumulatively, this implies that fully half of all lifetime migrations generated a net relocation from one province to another. Even in those countries which registered relatively low MEIs, the figures are still remarkably high, nowhere falling below 25%

Values of the ANMR are systematically lower than the MEI, because the total population of the country (the population at risk) replaces gross migration flows as the denominator in the calculation (see section 4). Thus, when measured over the five year period, the ANMR ranged from a high of just 3.51% for the 22 Provinces of Ecuador to a low of 0.08 per cent for the seven broad regions of Indonesia. At the level of Major Regions, only seven of the 18 countries in Table 10 registered ANMRs above 10 per cent.

Shifting to lifetime measures reveals a very different picture, with ANMRs above 10 per cent in 5 of the 24 countries, and exceeding five per cent in all but four others. Thus, when measured over the cumulative lifetime experience of the population, migration exerts a substantial impact on the pattern of human settlement. In Ecuador, for example, the net movement of population has effectively generated a 13.1 per cent shift in the distribution of people between the country's 128 Cantons, compared with the outcome had they remained in their Canton of birth. From Table 11, Latin America emerges as the world region displaying the highest ANMRs, with figures consistently around 7-12 per cent. The figures tend to be somewhat lower across Africa, in the order of 4-9 per cent, but the lowest values are found in Asia, with values falling to below 3 per cent in India, Indonesia and China. As always, exceptions can be found, with Cambodia, Malaysia and the Philippines displaying somewhat higher levels of redistribution. The developed countries, too, registered ANMRs at the mid to high end of the range.

Table 10: Migration Intensity, Effectiveness and Aggregate Net Migration Rate, Five Year Interval, Selected Countries

Country	Type of Zone	No. of Zones	Migrants	Intensity (%)	MEI[1]	ANMR[2]
Africa						
Ghana	Region	10	567,590	3.52	15.69	0.55
	District	110	961,270	5.96	22.73	1.36
South Africa	Province	9	1,704,363	4.26	33.92	1.44
Asia						
China 2000	Province	31	32,347,800	2.74	62.41	1.71
Indonesia	Region	7	1,507,406	0.83	9.41	0.08
	Province	26	3,954,104	2.19	19.75	0.43
	Municipality	280	6,917,713	3.90	23.81	0.93
Malaysia	State	15	840,800	4.75	28.62	1.36
	District	133	1,395,950	7.99	33.30	2.66
Philippines	Region	16	1,559,511	2.51	26.16	0.66
	Province	83	2,038,365	3.28	23.97	0.79
Vietnam	Region	8	1,337,724	1.94	59.74	1.16
	Province	61	1,999,215	2.90	49.88	1.45
Latin America and Caribbean						
Argentina	Province	24	1,161,800	3.55	15.01	0.53
Brazil	Region	5	3,372,124	2.20	23.30	0.51
	State	27	5,204,886	3.40	17.73	0.60
Chile	Region	13		6.32	7.18	0.45

			853,960			
	Province	44	1,295,150	9.59	17.09	1.64
	Municipality	178	2,253,170	16.68	18.12	3.02
Colombia	Department	33	1,520,980	4.21	17.82	0.75
	Municipality	532	2,302,190	6.42	24.32	1.56
Costa Rica	Province	7	184,260	5.53	14.60	0.81
	Canton	60	353,010	10.60	16.64	1.76
Ecuador	Province	22	595,020	5.55	63.30	3.51
	Canton	128	885,170	8.25	28.95	2.39
Mexico	State	32	2,470,960	2.70	28.38	0.77
Venezuela	State	24	1,022,660	5.07	26.33	1.33
Developed Countries						
Australia	State/Territory	8	779,951	4.76	16.50	0.79
	Stat. Division	61	1,689,879	10.39	12.06	1.25
Canada	Province	11	908,962	3.37	18.89	0.64
Portugal	Region	7	183,340	1.92	10.00	0.19
	Sub Region	22	307,940	3.23	16.26	0.53
USA-2000	Region	4	12,243,724	4.80	14.84	0.71
	Division	9	16,740,835	6.57	15.07	0.99
	State	51	22,794,783	8.94	13.09	1.17

1. Migration Effectiveness Index – see text

2. Aggregate Net Migration rate – see text

Table 11: Migration Intensity, Effectiveness and Aggregate Net Migration Rate, Lifetime Migration, Selected Countries

Country	Type of Zone	No. of Zones	Migrants	Intensity (%)	MEI[1]	ANMR[2]
Africa						
Ghana	Region	10	3,329,320	17.75	45.18	8.02
Kenya	Province	8	3,496,560	12.64	57.67	7.29
	District	69	5,622,520	20.32	45.89	9.33
Rwanda	Province	12	801,890	10.41	50.31	5.24
South Africa	Province	9	6,717,270	15.36	45.66	7.01
Uganda	Region	4	1,288,730	5.24	57.77	3.03
	District	56	3,577,610	14.56	44.74	6.52
Asia						
Belarus	Region	6	944,270	10.78	36.83	3.97
Cambodia	Province	24	1,308,780	11.65	50.79	5.92
	District	149	2,024,170	18.02	48.93	8.81
China	Province	31	73,087,300	6.193	44.88	2.78
India	State	35	42,341,703	4.141	35.38	1.47
Indonesia	Region	7	8,104,818	4.07	36.65	1.49
	Province	26	16,729,095	8.39	48.46	4.07
Malaysia	State	15	4,156,500	20.71	39.72	8.22
Philippines-1990	Region	16	6,879,231	11.72	47.29	5.54
	Province	77	8,722,805	14.86	48.35	7.19
Latin America and Caribbean						
Argentina	Province	24	6,691,210	19.90	40.04	7.97
Brazil	Region	5	17,025,306	10.07	57.07	5.74

	State	27	26,059,033	15.41	48.54	7.48
Chile	Region	13	3,097,070	21.27	35.73	7.60
	Province	44	4,324,420	29.71	28.95	8.60
Colombia	Department	33	8,108,168	20.25	34.19	6.93
	Municipality	532	12,452,428	32.51	39.54	12.85
Costa Rica	Province	7	704,020	20.02	22.68	4.54
	Canton	60	1,195,490	33.99	29.82	10.14
Ecuador	Province	22	2,431,310	20.23	53.78	10.88
	Canton	128	3,641,200	30.30	43.25	13.11
Mexico - 2000	State	32	17,791,208	18.52	46.46	8.60
Panama	Province	11	566,940	20.56	59.44	12.22
	District	75	950,050	34.46	39.49	13.61
Venezuela	State	24	5,184,850	23.79	39.80	9.47
Developed Countries						
Portugal	Region	7	1,240,580	12.80	55.87	7.15
	Sub Region	22	1,817,780	18.76	47.60	8.93
Spain	Province	52	8,641,300	22.37	45.57	10.19
	Municipality	366	17,288,760	44.75	39.05	17.47
USA	Region	4	44,423,142	17.84	35.58	6.35
	Division	9	57,909,783	23.25	28.89	6.72
	State	51	78,583,779	31.55	26.06	8.22

1. Migration Effectiveness Index – see text; 2. Aggregate Net Migration rate – see text

The impact of migration on the settlement pattern is clearly affected by the way zonal boundaries are drawn, and the values in Table 11 vary widely between geographic level within countries.

However, the value of the ANMR is not simply a product of region size, but is integrally connected to the other two indicators in Table 11: migration intensity and migration effectiveness (Bell *et al*. 2002), via the formula:

$$ANMR = (CMI \cdot MEI) / 100$$

Thus, the impact of migration on the settlement pattern is a product of the interaction between migration intensity and migration efficiency. Where both variables are high, the result is a substantial redistribution of population through migration. Most commonly, however, high levels of intensity tend to be coupled with modest efficiency, or vice versa. Thus, in Table 11, the very high migration efficiencies across provinces in countries as diverse as Kenya, Brazil (regions) and Cambodia (exceeding 50 per cent) were offset by modest levels of migration intensity (around 10 per cent), generating aggregate net migration rates of just 5-7 per cent. In contrast, Ecuador, Panama and Spain coupled similar modest levels of MEI with much intensities to generate more significant spatial ANMRs. For lifetime migration there is comparatively little variation between countries in the level of migration efficiency, so it is differences in the underlying level of migration intensity that account for the variation in migration impacts, as measured by the ANMR. This comes to the fore particularly in three of the most populous countries in Table 11, India, China and Indonesia, all of which registered high migration efficiencies but low intensities, which reduced the overall impact of migration on settlement distribution. Only in three cases – the USA, Costa Rica and Chile – was a low MEI sufficient to largely offset comparatively high migration intensities.

9. Temporal Trends

This section extends the analysis to draw upon data sets from earlier Censuses for our countries of interest. Changes in the type of data collected in particular countries, and limitations in the data available from IPUMS, mean that we can only assemble trend data for a subset of our sample countries. However, since the zonal systems in most countries are relatively stable over time, and we are interested primarily in within-country trends, rather than cross-national comparisons, there is less need to resort to complex measures such as Courgeau's *k*. We

therefore focus here on simple migration intensities at the level of Major Regions, drawing on data for both the five year interval and for lifetime migration.

Figures 5 and 6 illustrate the trends for our sub-set of countries, with 15 datasets for the 5 year interval and 18 covering lifetime migration. Table 12 summarises the key features, linking trends apparent from the two migration measures. Turning first to the five year interval, it is clear that in most countries the trend was one of a decline in migration intensity. The most striking exception is China, where policy shifts coupled with rapid economic growth saw a tripling of inter-provincial migration, from 11 million to 31 million, between the 1980s and the 1990s. Portugal registered a more modest rise, and Chile likewise experienced rising migration intensities from 1970 to 1990, but this too had flattened by the turn of the century. In most countries the latest intercensal period saw a clear drop in inter-regional migration intensities, and in some cases, such as Indonesia, Argentina, Columbia and Mexico, the fall was precipitate.

The graph for lifetime migration presents a strikingly different picture, characterised not by declines, but by increases in migration intensity for a majority of countries. Twelve of the eighteen countries in our sample recorded rising lifetime migration over the period, whereas this was the case for just three of 15 on the five year measure. Indonesia, Malaysia, Brazil, Costa Rica, Mexico, Canada and the USA, which recorded falls or fluctuating trends on the five year measure, all displayed rising lifetime intensities. In a similar way, Vietnam, Argentina and Ecuador all registered more positive trends in lifetime movement compared with five year trends. Of all the countries in Table 12, only Portugal recorded the reverse pattern, with a modest decline in lifetime migration between its seven major regions running counter to an increasing five year intensity.

Table 12: Trends in Migration Intensity, Major Regions, Selected Countries

		Trends in	
Region	**Country**	**5 year intensity**	**Lifetime intensity**
Africa			
	Kenya		Rise
	Rwanda		Rise
Asia			
	China	Rise	
	India		Rise
	Indonesia	Fluctuate	Rise
	Malaysia	Fall	Rise
	Vietnam	Fall	
Latin America			
	Argentina	Fall	Fluctuate
	Brazil	Fall	Rise
	Chile	Rise	Rise
	Colombia	Fluctuate	Fluctuate
	Costa Rica	Fall	Rise
	Ecuador	Fall	Fluctuate
	Mexico	Fall	Rise
	Panama		Rise
	Venezuela		Fluctuate
Developed Countries			
	Australia	Fluctuate	
	Canada	Fluctuate	Rise
	Portugal	Rise	Fall
	Spain		Fall
	USA	Fluctuate	Rise

As noted in section 3, the data assembled by CEPAL (2009) for countries in Latin America and the Caribbean, point to the same effect observed here for this broader sample. Our interpretation is that contemporary trends in inter-regional migration are continuing to generate displacements in the pattern of human settlement throughout the world, as captured in the lifetime measure, but that these increases are occurring at a decreasing rate. Contrary to conventional wisdom, and widespread assertion, there is no evidence that the incidence of mobility in the world is undergoing an inexorable rise, at least not so far as it is captured in measures of permanent migration at the inter-regional level. What is equally apparent from the analysis presented here is

that there are no clear regional differences in the underlying trends in migration intensity. Of the countries considered here, only China displays a stark rise in underlying population mobility, and that rise, as in many other countries, is clearly explicable by reference to policy settings and economic conditions (Fang *et al*. 2009).

Figure 5: Trends in Five Year Migration Intensity for 'Major Regions', Selected Countries

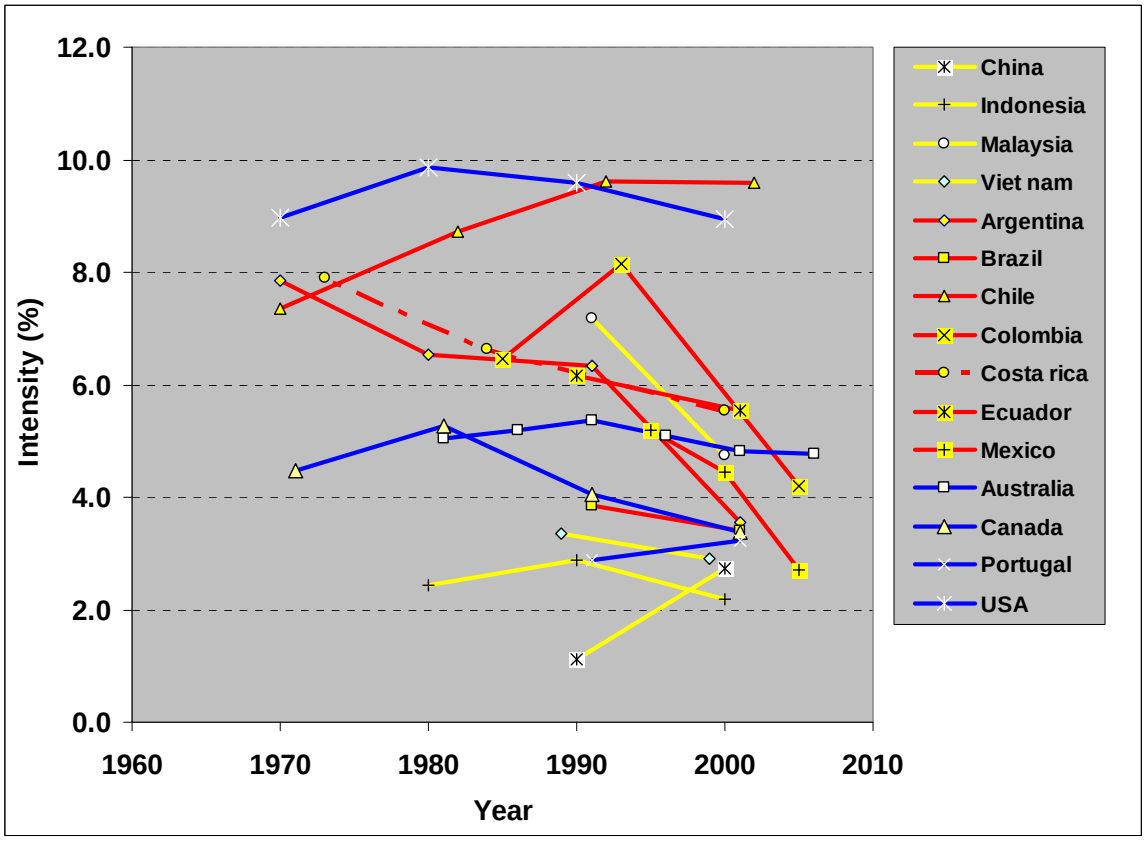
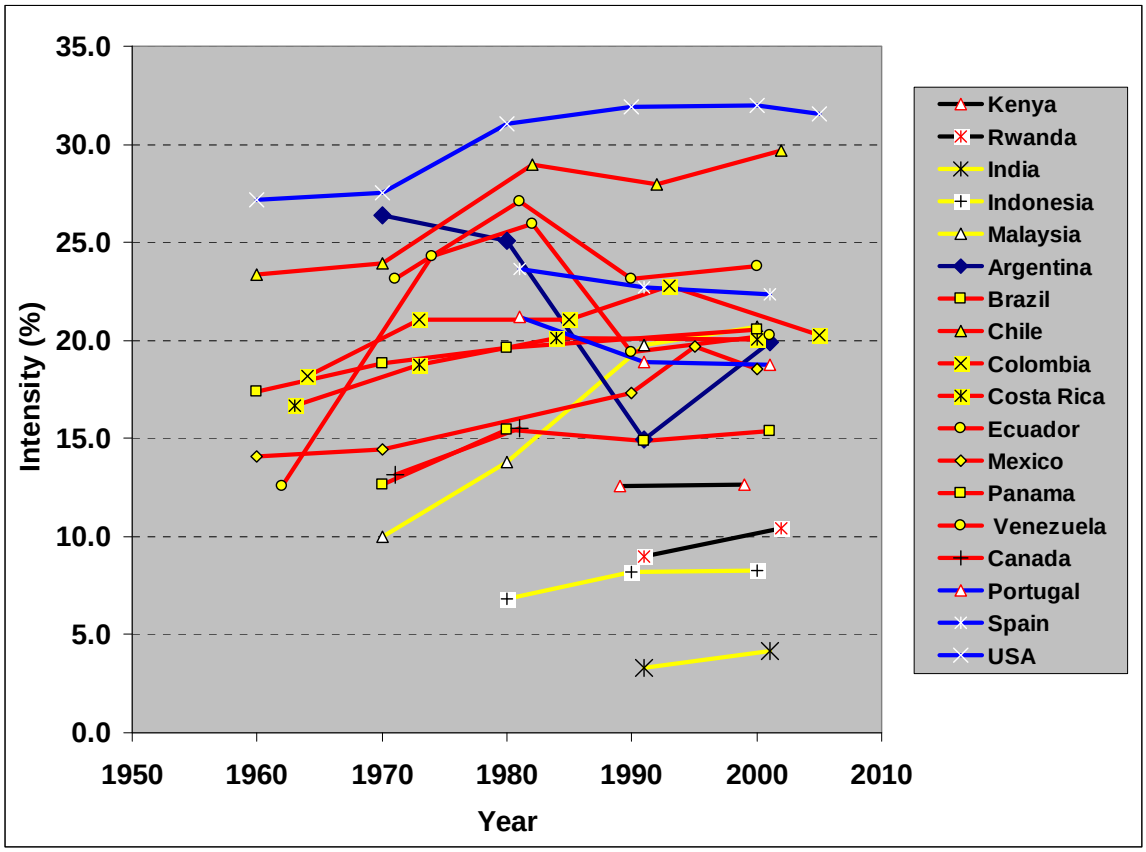


Figure 6: Trends in Lifetime Migration Intensity for 'Major Regions', Selected Countries



10. Conclusions

Long (1991) argued that the high migration intensities he observed in the four New World countries (Canada, USA, New Zealand and Australia) were inherited from the peripatetic traditions of immigrant forebears. High mobility in these countries has also been ascribed to the open nature of labour and housing markets, and the relatively low transaction costs involved in changing residence and employment. Institutional factors influence mobility in a variety of ways. In China, for example, successive policy regimes massively restricted rural to urban migration until the early 1990s (Fang *et al*. 2009) while in Indonesia, government-sponsored transmigration programs stimulated migration, directing large numbers to the outer Islands during the early 1980s. In the Netherlands, the impact of centralised control on housing allocation represents a more subtle influence on population mobility, while across southern Africa commercial

enterprises, through the medium of labour recruitment firms, act as an institutional conduit for labour migration. Institutional frameworks and cultural norms play a pivotal role in shaping the intensity, patterns and timing of internal migration, thereby giving rise to differences in mobility regimes and outcomes between countries. It is the economic framework, however, that represents the fundamental determinant of migration dynamics, particularly at the regional level (Skeldon 1997).

Zelinsky (1971) argued that migration is integral to the process of modernisation, and that the nature of mobility changes in systematic ways as economic development unfolds, transportation improves and nations become progressively more urbanised. Zelinsky envisaged that this transition involved not simply a change in the overall level of mobility, but in the types of population movement that occur as nations advance through the 'stages' of development: a rise then fall in rural out-migration as urbanisation proceeds; substantial growth in inter-urban movements; a closer balance between migration streams and counter-streams as the settlement pattern matures; and the eventual substitution of circular mobility and telecommunications for some forms of permanent migration. Zelinsky's (1971) hypothesis was a creature of its times, a stage theory, largely Eurocentric in focus. In practice, the mobility profile of countries around the world varies widely (Skeldon 1990). Circular mobility, for example, far from emerging as the final stage of a universal transition, has been strongly entrenched as an integral part of the economies and individual livelihoods of people in many countries from an early stage of economic development (Chapman and Prothero 1983). Nevertheless, Zelinsky's model does have the singular benefit of directing attention beyond a simple pre-occupation with rural to urban migration.

In this paper we have sought to take a broader view of internal mobility by examining migration intensities, as well as spatial outcomes, in a way which encompasses migration streams at a range of geographic scales. Our focus has been confined to 'permanent relocations'. While we acknowledge that temporary and circular forms of movement are an integral component of the mobility spectrum, few countries collect reliable data on these forms of movement, and measures to capture their scale and dynamics are as yet poorly developed (Bell and Ward 2000; Bell 2004). Within this domain of permanent migration, we have sought to place cross-national

comparisons on a more reliable footing by systematic application of measures drawn from a suite of standard migration indicators. Drawing on earlier work, we reviewed the major impediments to rigorous cross-national comparisons, focusing particularly on the time frame and zonal systems against which migration was measured. Differences in both domains are principally a product of uniqueness in national data collection systems. In terms of time frame, we stressed the need for harmonisation, but argued that fixed interval (5 year) data were to be preferred, especially for temporal and cross-national comparisons, while recognising that lifetime data were more common. Differences in zonal systems have generally been viewed as a more intractable problem, but in this paper we proposed an innovative solution, drawing on the ideas proposed by Courgeau (1973).

Our primary goal was to advance understanding of the way in which internal migration varies among countries around the world. Drawing on data from recent and historical censuses for 27 countries, we sought to answer four key questions:

- How does the intensity of internal migration vary between countries?
- How selective is migration in terms of age, and how does this differ across the world?
- How much impact does migration exert on the pattern of human settlement?
- Is the propensity to change residence within countries rising or falling?

The evidence assembled here reveals widespread differences among countries and world regions on all these dimensions. In terms of migration intensity, estimates for the five year interval range from a high of one in six people relocating between the 178 municipalities of Chile over the previous five years (16.7 per cent) to a low of fewer than one in one hundred moving between the 8 regions of Indonesia over the same period (0.8 per cent). The figures for lifetime migration correlate closely with the five year data but are consistently higher, such that in Chile one in two people were living outside their municipality of birth by the time of the 2002 census, while in India, China and Indonesia, the figure was less than one in ten. These variations are partly a product of differences in the number of zones into which each country is divided, so where the data permitted, we used Courgeau's *k* as a means to standardise for differences in statistical geography. Our analysis demonstrates that this simple measure offers a robust and powerful tool that provides an excellent synthetic index of migration intensity.

The results using Courgeau's *k* make it clear that, while there is no clearly delineated sequence of internal migration intensity by world region, some clustering is apparent. The developed countries all display high mobility, but Latin America too emerges as a region of high migration intensities, only marginally below the developed nations. Asian countries, on the other hand, generally display the lowest levels of mobility, while the small number of African countries in our sample span between the Asian and Latin American clusters. Similar patterns appear whether migration is measured over five years, or as a lifetime intensity, but these divisions are most clearly apparent in the lifetime data. In both datasets, however, this broad sequencing disguises considerable overlap between regional clusters. Thus, within Latin America there are stark contrasts between the high mobility evident in Chile and Costa Rica on the one hand, and the more subdued intensities apparent in Brazil, Argentina and Colombia on the other. Malaysia, with a *k* value double that of its fellow countries, is a notable exception to the relatively low intensities apparent elsewhere in Asia, and in Africa, high mobility in South Africa stands in marked contrast to the relatively low intensities registered in Uganda.

Regional groupings go some way towards capturing cultural differences, which may partly explain these variations in mobility, but they are a poor surrogate for the economic development that underpins migration, according to leading theorists. We have not attempted to correlate mobility against economic development, but we have identified a weak association between migration intensities and the HDI. Whether measured on the five year or lifetime scale, our sample countries which fall within the High HDI group display substantially greater levels of migration intensity than those categorised as Medium. If certain 'outliers' are removed, the relationship persists at the Very High HDI level.

The need for understanding of these variations in migration intensity is underlined by the sheer scale of the phenomenon. On the data presented here, the number of people living outside their region of birth in the more populous countries was substantial: 78 million in the USA (states), 77 million in India (districts), 73 million in China (provinces) and 63 million in Brazil (municipalities), representing a substantial historical shift in the pattern of human settlement. Extrapolating the continental averages from our sample to all countries in their regions provides

a very crude first approximation of the global scale of internal migration. This suggests that, at the turn of the millennium, in the world as a whole, some 740 million people were living within their home country but outside their region of birth[1]. This represents one in eight of the global population, and dwarfs the much cited figure of some 200 million international migrants. Of course, the figure would be even greater if measured over more detailed levels of geography.

Turning to the second major question posed above, our results show that regional variations in migration intensity were associated with marked differences in the age profile of internal migration. The Asian countries in our sample are distinctive in displaying migration profile which peak sharply at an early age: migration is highly concentrated in the late teens and early twenties. Relatively sharp peaks are also characteristic of the more developed countries, but for this group peak migration is found instead in the mid to late twenties, and for some there is also a small but distinctive hump around retirement. Latin America encompasses countries with both early (eg Ecuador) and late (eg Argentina) peaks, but all sample countries in the LAC are uniformly characterised by much broader, flatter age profiles than those found elsewhere in the world. Our small sample of two African countries tend towards the Asian model, though with less distinctive peaks at a slightly later age. Explanation for these differences almost certainly lies in a combination of cultural, institutional and economic forces that combine in distinctive ways to shape the opportunities and constraints on population mobility in different parts of the world. In particular, we would attribute these variations to differences in key life course transitions or events, such as age at marriage or partnership formation, entry and exit from further education, and entry to the labour force.

The third of the questions addressed in this paper was concerned with the spatial impacts of internal migration. Previous comparative research has been pre-occupied with rural-urban movements. While such moves play an important role in urbanisation, they are notoriously difficult to measure and represent only a fraction of the total volume of movement occurring

[1] Estimated by computing a mean lifetime intensity across the sample countries in each of our four regional groupings (Africa, Asia, Latin America and Developed Countries), and applying this to the total population of each region derived from the UN 2005 World Population Data Sheet, discounted by 10 per cent to allow for non-response, infants and other factors. The estimate clearly assumes that our sample countries are representative of the regions of which they form a part, which is likely to be least tenable in those regions where our samples are small, particularly Africa (15%) and the Developed Countries (27%) but more reliable in Asia (70.9%) and Latin America (77.9%).

within a country. For this paper we sought to provide a more comprehensive assessment of the impact of migration in changing the overall pattern of human settlement using the Aggregate Net Migration Rate. We demonstrated that the ANMR was a product of the interaction between migration intensity on the one hand, and migration efficiency on the other, with the latter captured by the migration effectiveness index (MEI). Measured over a five year period, migration effectiveness proved to be relatively low in the developed countries, higher in Latin America, and highest in Asia. For a given volume of movement, migration therefore generated a larger shift in the settlement pattern within Asian countries than elsewhere. However, this higher effectiveness was partly offset by comparatively subdued levels of migration intensity. In terms of contemporary migration patterns, it was therefore in Latin America that internal migration was bringing about the greatest change in settlement geography, well ahead of most Asian nations.

The picture alters, however, when measured using lifetime migration data, because lifetime migration efficiencies show much less variation between countries. Lifetime intensities in Asia and Africa, though, are still well below those in Latin America or in countries of the developed world. As a result, when viewed using lifetime data (which reflect longer term trends), migration appears to have exerted a cumulatively greater impact on the settlement pattern in the developed countries and in Latin America, than in Asia or Africa. If high intensities continue to be coupled with high efficiency in the latter regions of the world, this deficit will progressively be diminished. Of course, these broad regional differentials mask significant variations between countries, and explanation for the observed results remains to be explored. The results presented here nevertheless underline the significance of migration as a mechanism for population redistribution, with aggregate net migration rates exceeding 10 per cent in a number of countries.

We assessed trends in internal migration, the fourth of our key questions, by comparing migration intensities from successive Censuses. The results for our sample of 21 countries run counter to the conventional wisdom of a sustained rise in global population mobility over the last several decades (see eg World Bank 2009). Measured using lifetime intensities, the trend is certainly upwards, with a majority of countries registering increases over time in the proportion of their populations living outside their region of birth. Several countries experienced fluctuating trends, probably due to particular economic circumstances or events, but only two registered

clear declines and both of these were in the developed world. However, lifetime migration is a cumulative measure which inherits the effects of high period mobility and upwards pressure from the ageing of high mobility cohorts. These effects are minimised, and a more realistic picture of trends is provided, by examining intensities measured over a succession of fixed intervals. Our results demonstrated that, when this is done, the global picture is one of declining, rather than rising, mobility. Of the countries in our sample, only three, China, Chile and Portugal, recorded a rise in the proportions moving between major regions of their respective countries. For the intervals covered by the 2000 round of Censuses, the picture elsewhere is generally one of accelerated decline in migration intensities. This discrepancy in the trend revealed by the two measures is most easily reconciled as a progressively diminishing addition to the cumulative indicator (lifetime migration) from contemporary migration processes (the five year figure). Lifetime moves reveal the net effects of internal migration but have a high degree of intrinsic momentum. Moves measured over a fixed five-year interval offer a more sensitive gauge as to contemporary and evolving trends.

Beyond the four substantive questions addressed above, this paper has been fundamentally concerned with the methodological issues involved in cross-national comparisons. We have sought to stress the need for rigorous statistical measures and demonstrated how crude comparisons can generate misleading results. In particular, we have stressed the need for harmonising data sets between countries with respect to the temporal and spatial frameworks against which migration is measured. We demonstrated that fixed interval and lifetime measures provide somewhat different insights into migration, but argued that if one measure was to be preferred, five year interval data offered greater advantages. Spatial issues have generally been seen as more intractable, but we demonstrated that Courgeau's *k* offers a robust and highly effective solution to the problem of differing zonal systems.

Compared with other indicators of social change, progress in understanding of cross-national differences in mobility remains at an early stage of development. Access to suitable, reliable data and agreement among the international statistical community as to a standard set of indicators are essential pre-requisites to the more challenging agenda of understanding why mobility behaviour

differs between countries. It is hoped that the present paper contributes one building block towards this goal.

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