Towards Rigorous Cross-National Comparison of Internal Migration: Who Collects What?

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Abstract

Cross-national comparisons of internal migration can contribute significantly to understanding of mobility, but are hampered by differences in measurement and definition. Recent work (Bell et al 2002) examined the obstacles to such comparisons and proposed a battery of 15 migration indicators which were tested using British and Australian data. This paper provides the foundation for wider comparisons by assembling, for the first time, a comprehensive inventory of the internal migration data collected by UN member countries worldwide. Results are based on mining of web-based resources, published papers on migration and a global survey of national statistical agencies. The paper reports key findings including the types of data sources used to collect mobility data, the intervals over which migration is measured and the zonal systems employed, identifies commonalities and differences in practice between broad regions of the world, and assesses the implications for rigorous cross-national comparisons of mobility and internal migration.

1. Introduction

This paper reports results from a program of research which aims to facilitate cross-national comparisons of internal migration, the ultimate goal being to develop a robust set of measures that can be used by researchers and adopted by national statistical agencies. The stimulus to this work derives from the fact that, compared with fertility and mortality, surprisingly little attention has been given to understanding the way internal migration varies between nations. This is not to suggest that cross-national comparisons have never been made: a large and valuable literature can be found. However, comparative indicators are conspicuous by their absence from international statistical collections, such as the UN Demographic Yearbook, and there exists no comprehensive 'league table' of mobility akin to those ranking countries according to rates of birth and death. This lack of development can be traced partly to the multifaceted nature of migration and the absence of internationally agreed measures but it also reflects a dearth of information on what migration data are collected and their availability to the research community.

The first of these issues was addressed by Bell et al (2002) who identified the obstacles to cross-national comparisons and reviewed the strengths and limitations of alternative measures for comparative work. This culminated in proposals for a battery of 15 migration indicators designed to capture four broad dimensions of population movement (Rees *et al.,* 2000a; Bell *et al.,* 2002). These were illustrated using internal migration data for Britain and Australia, but much wider testing is needed to assess their relevance in other countries.

One fundamental constraint to such testing is the lack of any central repository for such data. Few nations make internal migration statistics readily available in standard reports, and none of the major transnational agencies include population mobility among their list of statistical indicators. Indeed, despite its acknowledged significance as a fundamental component of population change, there appears to be no current, complete inventory of the types of internal migration that are collected by agencies around the world. This paper reports the results of a project designed to redress this omission.

The next section provides a concise summary of prior work involving cross-national comparisons of migration. This is followed (section three) by discussion of the way in which differences in definition, measurement and data collection impede rigorous cross-national comparison. Section four builds on these findings to establish parameters for a global inventory of internal migration data collections and describes the data collection strategy. The results are set out in section five, revealing substantial diversity in data collection practice. Section six examines the implications of these differences for the generation of comparable indicators and proposes a strategy for further development of the work.

2. Comparative Studies of Migration

Previous interest in cross national studies of migration has taken a number of forms. Several collections can be found comprising case studies of various countries organised around a particular theme. 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. More recently Rees and Kupiszewski (1999a, 1999b) completed a systematic analysis of internal migration in 28 countries of Europe (see also Rees *et al.* 1996). As well as being more spatially focused, the European study takes the additional step of formally contrasting the types of migration data available across the range of countries studied. Other collections have compared particular aspects of internal migration, the most obvious example being that concerned with counter-urbanization (e.g. Champion, 1989).

Complementing these multi-country studies are numerous bilateral comparisons, often exploiting uncommon similarities between particular country datasets to investigate specific aspects of migration behaviour. Examples here are the work of Newbold and Bell (2001) on return migration in Canada and Australia using fixed interval data, and Holdsworth (2000) examining the dynamics of leaving home in Britain and Spain.

Another body of literature has focused more directly on establishing how countries differ according to particular measures of mobility. One pioneering line of work here is due to Long (1991) who published what appears to be the first international 'league table' comparing countries with respect to mobility. Drawing on data from the 1980s round of Censuses, Long (1991) analysed crude migration intensities across fifteen nations, revealing wide variations in the propensity to move,

with high mobility in the four new world countries[1] and relatively low mobility prevalent in Europe. Rogers and Castro (1981), showed that behind these variations there is remarkable similarity between countries in the shape of the migration age schedule, irrespective of aggregate mobility levels. Attempts have also been made to compare countries with regard to migration distance. Long *et al.* (1988) reported results based on simple comparison of median migration distance while Courgeau (1973a) proposed a more complex approach using regression coefficients derived by relating migration intensity to number of regions at a range of spatial scales.

Building on this work, Bell *et al.* (2002) identified four dimensions of population mobility, each of which, it was argued, provided a perspective on the dynamics of population movement. These distinguished the two facets of migration recognised above, namely migration intensity and migration distance, but added two other aspects that have attracted increasing attention among within-country studies but are less commonly found in cross national comparisons: migration connectivity and migration impacts. Connectivity, also variously termed *spatial concentration, spatial inequality* or *spatial focusing* (Plane and Mulligan 1997, Rogers and Raymer 1998), refers to the way migration flows act to link together zones in a spatial system. Measurement of migration impacts aims to capture the effects of migration in transforming the pattern of human settlement through redistribution of population across the spatial system.

If cross-national comparisons are to be made, it was argued, consideration should be given to all four of these dimensions of mobility. To these ends, Bell *et al.* (2002) examined a battery of 15 migration indicators. Table 1 provides a brief summary. Six indicators were identified under migration intensity, four of which aim to measure the overall amount of mobility in the system, with varying degrees of analytical sophistication, while the remaining two capture key facets of the migration age profile. For migration distance, three indicators were identified, including the median distance moved and the distance decay parameter from spatial interaction models. Another four measures were identified to assess connectivity, including the coefficient of variation (Rogers and Raymer 1998), and the gini index (Plane and Mulligan 1987). Two measures were proposed to capture the spatial impact of migration. These were the migration effectiveness index, derived from the familiar migration effectiveness ratio (Shryock, Siegel and Associates 1975) and the aggregate net migration rate, a system-wide equivalent of the net migration rate. Of the 15 measures, five were identified as a minimum set that combined analytical rigour with relative ease of computation.

Table 1 about here

The data required to implement these measures are relatively few and ostensibly straightforward. They are:

- Aggregate number of moves over a given interval
- A matrix of inter-regional movement
- The population at risk of moving
- A measure of inter-regional distances

Most intensity indicators require these data by age; computation of migration expectancy also call for movements measured over a one year interval.

3. Impediments to Cross-National Comparison

In practice, there are a number of issues in regard to the definition, measurement and collection of data which impose obstacles to implementation of these measures (Bell *et al.* 2002) These derive from:

[1] Australia, Canada, New Zealand and the United States.

- *The types of data that are collected.* Migration can be measured in a number of ways with the two most common forms of data being *events* and *transitions*. The former are normally associated with population registers which record individual moves while the latter generally derive from Censuses which compare place of residence at two points in time. Because one source counts *migrations* while the other counts *migrants*, data from these two sources are not directly comparable (Boden *et al*. 1992) either in aggregate or in terms of age-time plans (Bell and Rees forthcoming). They also call for slightly different calculations.
- *The intervals over which migration is measured.* Another set of difficulties arise when migration is measured as a transition over intervals of differing length, commonly one year or five years. Despite sustained attention to the issue (commonly termed the one year-five year problem), no algebraic solution has been found by which to translate from one reference period to another (Courgeau 1973b; Kitsul and Philipov 1981; Long and Boertlein 1990; Rogerson 1990a; Schmertmann 1999). This is problematic because, as shown below, countries vary widely in the transition intervals over which migration is measured. Variations in interval length pose particular difficulties for age-related measures.
- *Issues of temporal comparability.* If reliable comparisons are to be made, migration data should refer to the same intervals of time. The UN mandates Censuses at the start of the decade but, in practice, countries differ in Census timing and frequency. Moreover, even coincident timing does not imply identical contexts since national economic cycles may not be in phase.
- *Population coverage and migrant definition.* Countries may also differ in the way particular groups are treated with respect to migration. For example, the British Census of 1981 recorded students at their home address whereas the 1986 Australian Census registered the college as the usual residence for this group. The net effect is to inflate the Australian data relative to their British counterparts. Similarly, population registers often exclude some population groups.
- *The division of space and the measurement of distance.* Comparisons are also affected by the modifiable areal unit problem (Wrigley *et al.* 1996). Differences in the number of regions into which the nation is divided will inevitably affect the results obtained, particularly for measures such as connectivity and migration impact, but in ways that are unpredictable. One solution is to compare migration at a range of spatial scales; another is to develop a broadly comparable set of regions in each country based around some common, functional division of space (eg Blake *et al.* 2000, Stillwell *et al.* 2000). Differences in the size and shape of countries and the pattern of human settlement also affect comparisons, and a number of approaches can be taken to the measurement of distance (Boyle and Flowerdew 1997, Rogerson 1990b).
- *Data quality, processing and availability.* Under-enumeration is common to all population data sources but the problem is compounded for migration analysis because the most mobile groups are those most likely to be overlooked. Comparisons will also be affected by the procedures used for coding of migration data, especially the geographic level to which current and previous place of residence are assigned. Interaction matrices are complex to construct and the full flow matrix may not be available in machine readable form, even if the requisite data were collected (Rees and Kupiszewski 1999b).

These differences in the definition, measurement and processing of internal migration present formidable problems for comparative analysis. Even at the level of just two countries, substantial effort may be needed to harmonize key dimensions of the data to a point where reliable comparisons can be made (see eg Rees *et al.* 2000b; Blake *et al.* 2000; Bell and Rees 2000 and forthcoming). For multilateral comparisons, it is clear that an understanding of the nature, scope and limitations of the data in each country is an indispensable pre-requisite to informed analysis.

4. Towards a Global Inventory of Internal Migration Data

There appears to have been only one previous attempt to establish a global inventory of internal migration data collections. That endeavour derives from a 1972 proposal by the UN Statistical Commission, with a final report from the worldwide survey published in 1978 (United Nations 1978). For the student of migration, the report makes fascinating reading. While the original aim was to develop guidelines for collection of migration data, the Commission decided that 'the need for, and possibilities of, international comparability were not as great in the case of internal migration statistics as in that of international migration statistics….and the desired statistics would necessarily vary significantly from one country to another'. After reviewing the provisional study results, the Commission firmed on this view, concluding that 'although internal migration was an extremely important phenomenon for most countries…the wide diversity of national needs and practices made it difficult to formulate recommendations on migration statistics currently' (United Nations 1978, iii). Despite these reservations, the Commission determined that a report summarising contemporary practise would provide useful background for national statistical agencies, supplementing the earlier guide to methods of estimating migration (United Nations 1970). The ensuing document identified 121 countries that collected migration data and reported on a range of features including the sources of migration information, the type of data collected, and the uses to which it was put. It also attempted to identify how migration was defined and establish the geography of the 'migration defining regions', but with less success.

The survey of migration data conducted by Rees and Kupiszewski (1996, 1999b) was less ambitious in spatial coverage but somewhat more definitive with respect to the data collected. For the 28 European countries included, the study established not only the types of data available but also the temporal intervals over which migration was measured, the time span for which the data were held and the statistical geography against which migration was recorded. One variable apparently excluded from the analysis was place of birth, so the study provides no information on the availability of lifetime migration data.

The UN and European studies offered valuable guidance as to the type of information which should be sought in a new, global inventory, but we also took into account the data needed to implement the comparative measures listed in Table 1. The study design divided the information required into four broad categories:

- the type of vehicle used to collect the migration data (Census, Register or Survey)
- the nature of the data sought (transitions, events, duration of residence, number of moves), and the way the data item was measured (eg transition interval)
- the zonal system against which migration was recorded (number of zones and nomenclature), and
- the population characteristics available for migrants (age and sex only identified).

A complete list of data items collected is given in Table 2. No attempt was made to elicit a formal definition of migration for each country (as in the UN study), nor did we attempt to assess the availability of flow matrices (as in the European study). The project did, however, build on the methodologies used by its predecessors.

Table 2 about here

Both the UN and European studies were based on questionnaire surveys of national statistical offices. Survey work formed part of the research strategy for this project too, but the inventory reported here also draws on other sources of information. Four main research tools were used:

- A comprehensive review of prior inventories and published papers
- Systematic mining of international statistical organisation websites
- A questionnaire survey of national statistics agencies, and

- Collection and analysis of individual country Census forms

There are numerous ways in which to define the number of countries in the world (see Haub 1995) but for the purposes of this study it was decided to adopt the listing of United Nations member countries generating a total of 191 target nations (http://www.un.org/members/index.html). A formal database structure was established to provide a framework for the inventory. We then sought to populate the cells in the database from the above sources, cross-checking for consistency as additional data items came to hand. A logical first step was to draw on prior work, such as the European project (Rees and Kupiszewski 1999b), other multinational collections (eg Nam *et al.* 1990) and individual country studies. The three volume set of national population Census handbooks, though now somewhat dated, provided valuable insights into the development of Census questions around the world, including those on migration (Domschke and Goyer 1986; Goyer and Domschke 1983; Goyer and Draaijer 1992). They also underlined the low priority accorded to migration issues in early Census-taking. Not until the 1980 round of Censuses was place of residence in a specified year recommended as a priority topic by the UN World Population Census Programs, although place of birth received this rating consistently from 1950 (Goyer and Draaijer 1992, 10). Two other published volumes of considerable value were the Statistical Yearbook of the Commonwealth of Independent States (CIS 2002) and Law's (1999) guide to administrative regions of countries around the world.

Printed publications were supplemented with electronic sources. Development of the internet has of course revolutionised access to information, and statistical organisations have been among those at the forefront in using this technology. Several directories to national statistical agency websites can be found and while the scope of information available varies widely, many provide valuable guides to the demographic information that is available. As often is the case, however, internal migration tends to be less comprehensively treated than other demographic processes. Few countries formally report migration statistics on the web and fewer still describe in any detail the type of data collected. Statistical agency web sites do, however, often document their geographical classifications which aids in understanding of the flow data likely to be available, and some (though less than might be expected) also provide on-line access to their Census forms.

The same want of interest in internal migration is also apparent in the growing number of international agency websites providing demographic data, but several organisations did provide invaluable leads for this study. Among the most useful were the UN Statistics Division listing of national Census dates, the US Census Bureau links to statistical agency websites and the University of Minnesota IPUMS website which provided a first port of call for copies of individual Census forms. The International Monetary Fund General Data Dissemination Site also provided useful data. In regard to national statistical offices, Mongolia is particularly noteworthy, not only for the shortest url (http://nso.mn), but also for being the only agency to provide on its website sufficient information to complete all of the data items required in the database.

While secondary sources can provide valuable information, data accuracy is ultimately best served by first hand contact with individual countries. To these ends, a questionnaire survey was sent to national statistical offices in all 191 UN members. To streamline the process, the invitation to participate in the survey was sent via email, with an embedded hyperlink to a password-protected, online survey form. Once submitted, data from the form were automatically transferred to a slave database on a secure server, then manually validated against existing information before integration with the master database. Reliable email address could not be found for 41 countries so the survey was converted to a standard recording schedule and sent by regular mail.

The response rate to the survey (15%) was modest but, fortuitously, it tended to be the smaller nations that are least integrated into the global economic and statistical system, for which the

requisite data were typically lacking in secondary sources, that were most likely to respond. Following the survey cut-off, we initiated one-to-one communications with those agencies for which information was still lacking and pursued the less demanding strategy of requesting copies of their latest Census schedules. So successful was this approach that it was subsequently extended to other national offices and regional statistical organisations. The result is an extensive collection of Census forms covering 117 countries. While the forms do not uncover important aspects of coverage, coding and processing of the data, they do reveal the nature of the migration-related questions that were asked and the level of detail that was sought. This goes a considerable way to establishing the dimensions of contemporary global data collection practice.

5. Internal Migration Data at a Global Scale: Who Collects What?

Scope and Completeness of the Inventory

Of the 191 countries in the study, complete or partial information has been assembled for 165 (86%). Coverage is complete for Oceania and North America, and data have been assembled for all but three European countries and for all but four in Latin America and the Caribbean (Table 3)[2]. Information for Africa and Asia is less complete, with 11 countries in Africa[3] and nine in Asia[4] missing any usable data. In Africa, the principal voids are in the Middle and Northern parts of the continent while in Asia the biggest gap is in the Middle-East, with more isolated data deficiencies dotted across South, Southeast and East Asia. Many of the countries for which it has not been possible to obtain data are either geographically small (and may not collect internal migration data at all), are currently disrupted by war or civil strife, or have politically repressive regimes that may collect but not release data on population movements.

Table 3 about here

All but three of the 165 countries collected internal migration statistics in some form. The three countries which do not appear to collect such data are: Andorra, Malawi and Nauru. The remaining 162 nations employ a mix of data sources but the most common was the census, with 141 countries (85%) drawing data from this source. Thirty-five countries (21%) utilised data from some form of population register while 31 (19%) employed a survey (Table 4). Forty-four countries (27%) drew on more than one information source. Table 4 reveals considerable geographical variation in the types of data sources used. Population registers are common across Europe, as Rees and Kupiszewski (1999b) have shown, almost rivalling the Census across the 39 countries for which we have data[5]. Registers also feature strongly in Asia, with just under one fifth (7) of the 38 nations drawing migration data from some form of registration[6]. Sources of this type appear to be much less common in other parts of the World, although at least some form of registration data appears to be available in parts of North and Latin America. This project identified comparatively few regular, large scale surveys of migration but there were scattered occurrences, particularly in Africa and Asia. The 14 countries in Oceania stand out for their apparently exclusive reliance on Censuses for data on population movements.

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[2] In Europe we lack data for Moldova, Bosnia-Herzegovina and Liechtenstein. In Latin America the knowledge gaps are for Antigua-Barbuda, Saint Kitts and Nevis and Guyana.

[3] African countries for which data are missing are Algeria, Angola, Burundi, Congo, Democratic Republic of the Congo, Equatorial Guinea, Guinea-Bissau, Libya, Sao Tome and Principe, Somalia and Tunisia.

[4] In Asia data are missing for Bhutan, Cyprus, Kuwait, Lao People's Democratic Republic, Lebanon, Qatar, Saudi Arabia, Turkmenistan and United Arab Emirates.

[5] Laihonen (1999,2000) provides an excellent overview of the development of administrative systems as a replacement for the traditional Census in the countries of Western and Northern Europe.

[6] The seven are Armenia, Azerbaijan, China, Israel, Japan, Kazakhstan, Republic of Korea

Table 4 about here

It is important to stress that this picture reflects the information assembled in the database and may not capture the full scope of data collections. In the absence of first-hand responses from informed sources in each individual country, there is a strong likelihood that some population registers and surveys have been overlooked. Occasional surveys, such as the 80 or so Demographic and Health Surveys conducted around the world over the past two decades (Schmertmann 1999) have been deliberately omitted but other national survey collections which may provide migration data are hard to track down. Coverage of Censuses is probably more complete since international agencies more thoroughly document these collections. The remainder of this analysis therefore focuses mainly on the types of data sought in those 141 countries which collect migration data via a Census. In proceeding, however, it is useful also to note that 19 countries have been identified in which Censuses are conducted but which do not appear to collect data on migration[7] (see also Figure 1).

Despite the best endeavours of the UN to encourage regular Census-taking and common timing among member nations, there is substantial variation between countries in contemporary practice. While some countries undertake Censuses on a systematic five or ten yearly basis, others are much more sporadic and, in some cases, the latest Census is now quite dated. For the purposes of this project information has been assembled the latest Census in each country, irrespective of its timing. Table 5 reports the details. For over 90% of countries the data are drawn from a Census taken after 1990. Just ten datasets come from Censuses taken prior to this date and only 8 of these predate 1987. Most of the older Censuses are from Asian or African countries, the oldest observation being the Afghan Census of 1979.

Table 5 about here

Types of Data Collected

Three main forms of migration data are commonly collected in Population Censuses:

- migration transitions, derived by comparing place of residence at the Census with place of residence at some previous date
- duration of residence, and
- number of moves that occurred within a defined interval.

Table 6 sets out the frequency with which each of these types appear in the 141 country dataset. Transitions may be recorded for any interval but analysts often distinguish 'place of birth' so these data, which generate statistics on lifetime migration, are identified separately in the table. The results indicate that 115 nations collect data on place of birth (within the country) and 126 collect place of residence at some other prior date. There is also a large number of countries (82) that ask for information on duration of residence, but only one, Japan, collected data on the number of moves made over a defined interval. Duration of residence data were widely sought in Asia and Africa but less commonly elsewhere. Place of birth data featured strongly in Censuses across all continents but were least ubiquitous in Europe and Asia.

Table 6 about here

[7] The nineteen are: Andorra, Austria, Bahamas, Bangladesh, Belgium, Denmark, Finland, Germany, Iceland, Democratic People's Republic of Korea, Kuwait, Malawi, Myanmar, Nauru, Netherlands, Nigeria, Norway, San Marino, Sweden.

Transition Intervals

Although place of previous residence at some prior date appears to be the most common data type, Table 7 shows there was little commonality between countries in the choice of reference date. Among those countries collecting transition data (other than since birth), the most popular interval was five years (56 countries), with a further 28 countries specifying a one year interval. Another 34 countries did not to specify an interval at all, electing instead simply to capture the last transition, irrespective of when it occurred. Finally, there were 29 countries which employed some other length of interval. Common choices included 2, 7, 9, 10, 11 and 13 years, but a number of countries used less traditional points of reference. For example, the 1994 Census of Morocco asked for place of residence "during the second to last Eid Al-Adh'ha", the Islamic Feast of Sacrifice which concludes the traditional Hajj, or Pilgrimmage to Mecca. Since the 1994 Moroccan Census was held in September, and the Eid Al-Adh'ha normally falls in February, this suggests an interval of about 19 months. In a similar vein, the 1999 Census of the Solomon Islands asked respondents where they were living "before the 1997 National Election", the 1983 Census of Djibouti sought information on place of residence "at the time of Independence", while the 1997 Census of Mozambique requested data on where people were living "at the end of the war in 1992". The 1995 Census of the Philippines stands alone in asking for an anticipated residence five years in the future.

Table 7 about here

Some geographic variation is apparent in choice of transition intervals. One year intervals appear to be most common in Europe (principally parts of Southern and Eastern Europe plus the UK and Ireland), but also feature in a number of African and Asian countries, together with Australia and Canada. Five year intervals are more popular across Latin America, Asia and Oceania. It is in Africa and Asia that the practice of measuring transitions without a fixed interval appears to be most widespread. However, non-standard intervals appear in Censuses across all continents and, perhaps surprisingly, are especially prominent in Europe.

Duration of Residence and Number of Moves

Although transition data are the most common form of migration data, collection of data on duration of residence is also very common (Table 8). Twenty-seven of the 38 African countries collecting migration data at the Census sought information on duration of residence and the same was true of 26 of 35 Asian nations. Around two-fifths of countries in Europe, Latin America and Oceania did likewise. Countries differed, however, in the spatial framework against which duration was measured. In 22 of the 82 countries, the question sought to establish duration of residence in the dwelling currently occupied. In 47 other countries, however, it was length of residence in the same 'locality' that was requested, while the remaining 13 census forms appear to leave interpretation in the hands of the respondents. These differences are important because changes of residence clearly occur more often than shifts between localities. Moreover, given sufficiently detailed coding, duration of residence in the same dwelling can provide a surrogate measure of numbers moving over the previous one year interval, thereby parallelling the single year interval statistic.

Table 8 about here

Mobility Indicator

Data on place of previous residence capture migrations for those who have shifted across regional boundaries, but moves to another address within the same region will be missed unless a specific

question is asked. Determining whether an overall mobility indicator can be derived from a census is not always straightforward and often depends on subsequent coding. For example, the 2001 Croatian Census asks for he respondent's place of usual at the time of 1999 Census. The responses are coded as ' in the place of the Census' and 'outside the place of the Census', making it difficult to determine whether the question refers to dwelling or locality. However, Table 9 indicates that comparatively few nations collect data on all residential moves. Of the 90 countries for which the picture is clear, only 37 collect data on all moves. In Africa, Asia and Latin America, place of previous residence data generally capture only that portion of moves which cross regional boundaries, however defined in the local context.

Table 9 about here

Multiple Measures

Many countries collect more than one type of migration data at the Census. The combination of place of birth with place of previous residence is most common (103 countries), and more than half of these counties also assemble data on residence duration. Figure 2 shows that other blends of data also occur and there were just 18 countries which confined their efforts to a single data type. Of these, 12 concentrated exclusively on place of previous residence, two (Cote d'Ivoire and Granada) collected data only on place of birth and two (Singapore and Uzbekistan) confined their attention to duration of residence. On the other hand there was just one country (Japan) that rated mobility so highly as to collect all four types of data at the Census.

Figure 2 about here

Where countries collected transition data (other than place of birth), the overwhelming majority (102 of 126) focused on a single transition interval (Figure 3). Just four countries (Afghanistan, Oman, Spain and Trinidad and Tobago) sought information on place of residence at three different points in the past, but another 20 assembled data for two intervals. Of these, eight countries asked both one year and five year transition questions (Australia, Botswana, Canada, Greece, Malta, Mozambique, Namibia and Samoa) while another twelve combined either one year (Albania, Croatia, Hungary , Macedonia) or five year (Brazil, China, Ghana, Guatemala, Maldives, Micronesia, Philippines, Timor Leste) data with information for some other interval.

Figure 3 about here

Other Dimensions of Census Data on Migration

Space precludes presentation of data on the geographies for which migration data were collected worldwide. The assembly of reliable data on the zonal systems employed for migration data collection is a daunting task and reliable results cannot be derived from Census forms alone. Careful scrutiny of documentation describing Census coding procedures is needed. Initial analysis of the data assembled to date indicates that the scope of the zonal systems employed varies markedly between countries, ranging from more than 10,000 zones in the UK to less than 10 in Belarus, Tajikistan, Swaziland and Tuvalu.

A final feature of the data which merits brief mention is the inclusion of other questions of interest in Censuses of the various world's nations. Two groups of questions stand out. The first are the questions on reasons for moving which are found in the Censuses of eleven countries. Most countries asking this question pose it in a relatively general form, but others are more specific. For example, the 1999 Solomon Islands Census asked people away from home 'Did you flee because of

ethnic tension?'. Similarly the 2001 Census of Armenia and the 1999 Census of Kazakhstan both asked whether migration had been involuntary or forced. Another interesting group are the countries which endeavour to capture aspects of temporary migration. While many Censuses seek to identify people who are away from home, thirteen countries show more formal recognition of non-permanent mobility. This number includes a surprisingly large contingent of European nations (Albania, Croatia, Czech Republic, Italy, Lithuania, Macedonia and Switzerland) as well as African countries such as Morocco, Madagascar and Chad, the last of these being the only Census that formally seeks to distinguish between 'sedentary' and 'nomadic' populations.

6. Computing Comparative Measures

In terms of migration indicators proposed earlier, the results assembled here show that even computation of the simplest comparative measure, the crude migration intensity, is not readily accomplished for a majority of countries of the world. Of the 141 nations which collect information at the Census, only 28 measure migration as a transition over a single year interval while 56 measure it over five years. In many cases, however, these data are confined to inter-regional moves and only 37 countries in total have been identified which collect information on all moves, irrespective of distance. Duration of residence data might also be used to separate movers from stayers, but only 22 countries asked for duration of residence in the same dwelling, and for several of these overall mobility was also available from transition questions.

Focusing on a five year transition period would increase the number of countries for which migration intensities could be compared, but the five year data do not enable computation of that most elegant of indicators, migration expectancy (Rees *et al.* 2000). The prospects for assembling a league table of nations based on even the most elementary measure of aggregate migration intensity, is therefore less than encouraging. If such comparisons are to be made beyond the relatively small group of countries that collect comprehensive data on single year transitions, considerable attention will be needed to the problem of harmonising migration data measured using different approaches (events/transitions) and over intervals of differing lengths (Rogerson 1990, Schmertmann 1999).

For the other three dimensions of migration, the issues of comparability are compounded by differences in migration space. It is here that the various aspects of the MAUP, discussed earlier, take on their greatest significance because of the huge diversity that exists in the size, shape, settlement pattern and administrative geography of the world's nations. Space prevents a detailed analysis of the data on zonal systems collected to date, but it is clear that countries differ widely in the spatial structures used to record migration and in the level of spatial disaggregation employed. What adds to the complexity is that even where fine grained zonal structures are apparently captured by Census forms, information may be lost in Census coding, or unavailable in the format required for analysis. Considerable further work is needed to establish the precise form of spatial data available in many countries.

7. Conclusions

Bell and Rees (forthcoming) argue that placing migration in a comparative framework offers a number of benefits: results for individual countries become more meaningful when viewed in an international context; commonalities and differences help to distinguish unusual findings from those that have more general applicability; cross-national contexts provide a more rigorous test-bed for migration theory; they also encourage greater analytical rigour in empirical research in individual country settings. As the material assembled in this paper makes clear, however, the goal of

assembling an international league table of comparative migration indicators faces a daunting obstacle course. Countries differ widely in regard to the types of migration data they collect, the sources used, the way migration is measured, the time intervals employed, the periodicity of collection, the scope of the questions, and the spatial frameworks involved. Harmonisation between countries on any of these dimensions is a major undertaking (Rees *et al.* 2000b).

Despite the manifest problems, recent work has shown that it is possible to make productive comparisons of migration dynamics between countries which differ radically in their physical and human geography, as well as in the types of migration data they collect (Bell 2002, Stillwell *et al.* 2000, 2001). Cross-national comparisons have the potential to provide valuable analytical insights into a range of outstanding migration problems and a comprehensive understanding of the data which are available worldwide would lay the foundation for a raft of empirical research. It would also help to identify which countries offer the best testbed for analysis of particular issues, such as cohort effects in migration, and chronic mobility. From the data assembled in this paper, Japan appears to offer a particularly rich source of migration information.

The project reported here has taken some first steps in support of such work by assembling the first comprehensive inventory of migration data collections implemented and maintained by nations around the world. The overarching goal is to help advance migration analysis towards the same rigorous foundation already long established in the fields of fertility and mortality (Rees *et al.* 2000). However, considerable work remains to be done. There are a number of nations for which data are still lacking, and others for which the information is not entirely reliable. Data on migration from registers and surveys is especially deficient.

If the nascent inventory is to reach its full potential, the most significant task now requiring attention is the validation of the current content of the database, and its extension to those nations and data items which remain as yet undefined. This is a task which calls for input from the global community of statisticians and migration scholars who have first hand knowledge of the data in individual countries and regions, and we welcome corrections, comment and advice on the data for individual countries. To assist in this task, open access is available to key fields of the database via an on-line query facility. For any selected country this returns a table setting out the current understanding of the migration data that are collected, including their source, currency, temporal and spatial coverage. A facsimile of the query table is illustrated in Figure 4 together with the internet address. We welcome your scrutiny and input.

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Table 1: 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*	*Assymmetry of inter-zonal migration flows*
15	*Aggregate Net Migration Rate*	*ANMR*	*Extent of redistribution through migration*

Source: Modified after Bell et al. (2002)
Note: Measures in italics were identified as the most appropriate for cross-national comparison

Table 2: Principal data items collected in the migration data inventory

	Panel A: General Data		
1	Country	5	Are internal migration data collected?
2	Region	6	Census is a source of data
3	Continent	7	Register is a source of data
4	Statistical Bureau	8	Survey is a source of data

	Panel B: Population Census		Panel C: Population Survey		Panel D:Population Register
1	Date of last Census	1	Name of survey	1	Name of register
2	Date of next Census	2	Purpose of survey	2	Purpose of register
		3	Population coverage	3	Population coverage
		4	Frequency	4	How long operating
3	Place of birth within country	5	As for Census		
4	Place of usual residence at Census	6	As for Census		
5	Place of residence 1 year ago	7	As for Census		
6	Place of residence 5 years ago	8	As for Census		
7	Place of residence other interval	9	As for Census		
8	Specify other interval	10	As for Census		
9	Duration of residence (DoR)	11	As for Census		
10	DoR = same dwelling or locality	12	As for Census		
11	N of moves in last n years	13	As for Census		
12	Specify n	14	As for Census		
13	Name of smallest zone for which data collected	15	As for Census	5	As for Census
14	Number of such zones	16	As for Census	6	As for Census
15	Name of smallest zone for which data available	17	As for Census	7	As for Census
16	Number of such zones	18	As for Census	8	As for Census
17	Data available by age	19	As for Census	9	As for Census
18	Data available by sex	20	As for Census	10	As for Census
19	Comments	21	As for Census	11	As for Census

Source: University of Queensland Survey

Table 3: Coverage of internal migration database by continent (number of countries)

Continent	Information available	Information not yet available	Total
Africa	42	11	53
Asia	38	9	47
Europe	39	3	42
Latin America	30	3	33
North America	2	0	2
Oceania	14	0	14
TOTAL	165	26	191

Source: University of Queensland Survey

Table 4: Countries collecting internal migration data by continent and source

Continent	Total countries	Data sources			
		Census	Register	Survey	Multiple sources
Africa	42	38	0	14	11
Asia	38	35	7	9	14
Europe	39	26	23	5	14
Latin America	30	27	3	2	3
North America	2	2	2	1	2
Oceania	14	13	0	0	0
TOTAL	165	141	35	31	44

Source: University of Queensland Survey

Table 5: Countries collecting internal migration: year of Census from which information was drawn

Continent	Year of Census					Total countries
	pre 1986	1986-1990	1991-1995	1996-2000	post 2000	
Africa	5	2	5	12	14	38
Asia	1	1	4	19	10	35
Europe	0	1	1	4	20	26
Latin America	0	0	3	9	15	27
North America	0	0	0	1	1	2
Oceania	0	0	0	9	4	13
TOTAL	6	4	13	54	64	141

Source: University of Queensland Survey

Table 6: Countries collecting internal migration data at the Census by continent and data type

Continent	Place of birth	Other transition interval	Duration of residence	Number of moves	Total countries
Africa	32	31	27	0	38
Asia	22	32	26	1	35
Europe	23	26	13	0	26
Latin America	23	24	10	0	27
North America	2	2	0	0	2
Oceania	13	11	6	0	13
TOTAL	115	126	82	1	141

Source: University of Queensland Survey

Table 7: Countries collecting transition data at the Census by continent and data type

Continent	One year	Five years	Other defined date	No reference date	Total countries
Africa	6	7	10	10	31
Asia	3	16	4	12	32
Europe	14	5	11	4	26
Latin America	1	17	3	6	24
North America	1	2	0	0	2
Oceania	3	9	1	2	11
TOTAL	28	56	29	34	126

Source: University of Queensland Survey

Table 8: Countries collecting duration of residence data at the Census by continent

Continent	Space to which data refer			Total countries collecting duration data	Total countries collecting data via a Census
	Same dwelling	Same locality	Not specified		
Africa	6	15	6	27	38
Asia	8	14	4	26	36
Europe	6	5	2	13	26
Latin America	1	9	0	10	27
North America	0	0	0	0	2
Oceania	1	4	1	6	13
TOTAL	22	47	13	82	141

Source: University of Queensland Survey

Table 9: Countries for which a mobility indicator can be derived from census data by continent

Continent	Mobility Indicator			Total countries
	Yes	No	Data not yet available	
Africa	8	17	13	38
Asia	7	10	19	35
Europe	11	7	8	26
Latin America	4	12	11	27
North America	2	0	0	2
Oceania	5	7	1	13
TOTAL	37	53	52	141

Source: University of Queensland Survey

Figure 1:

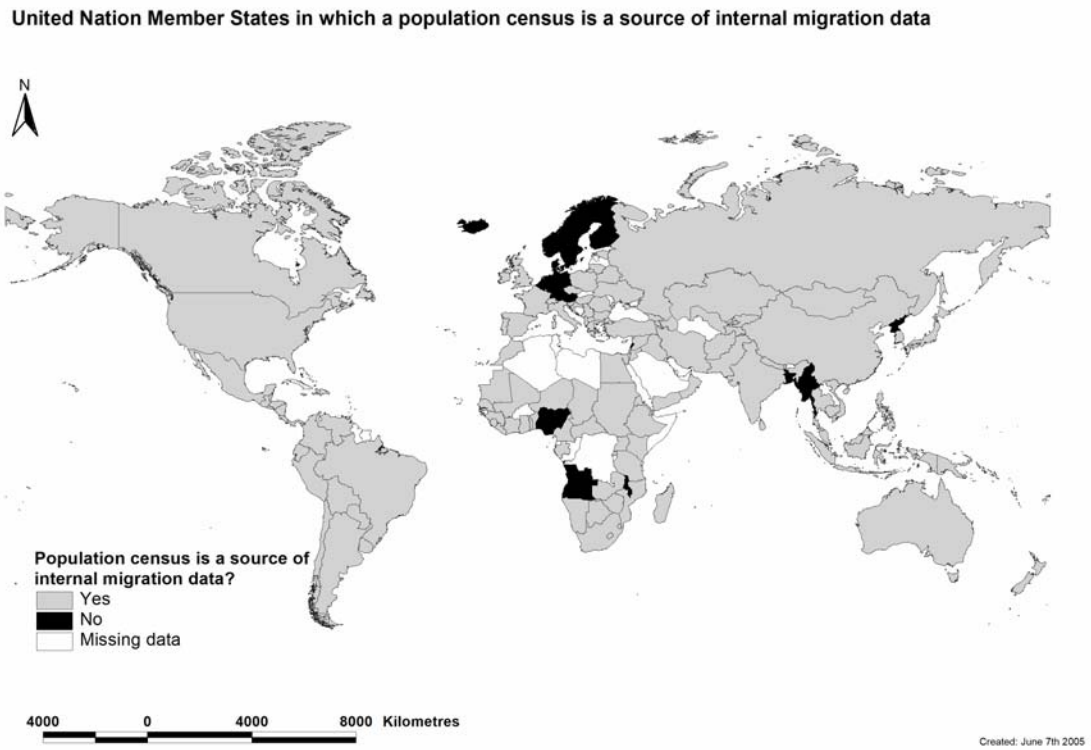
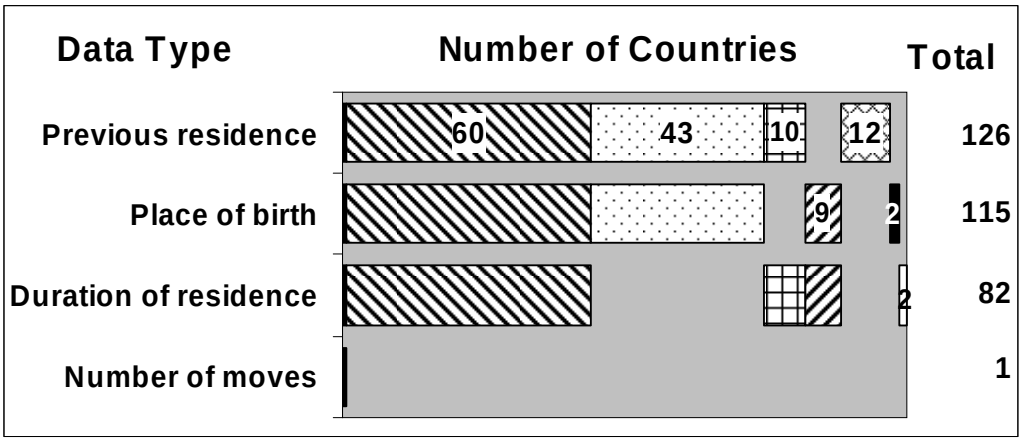
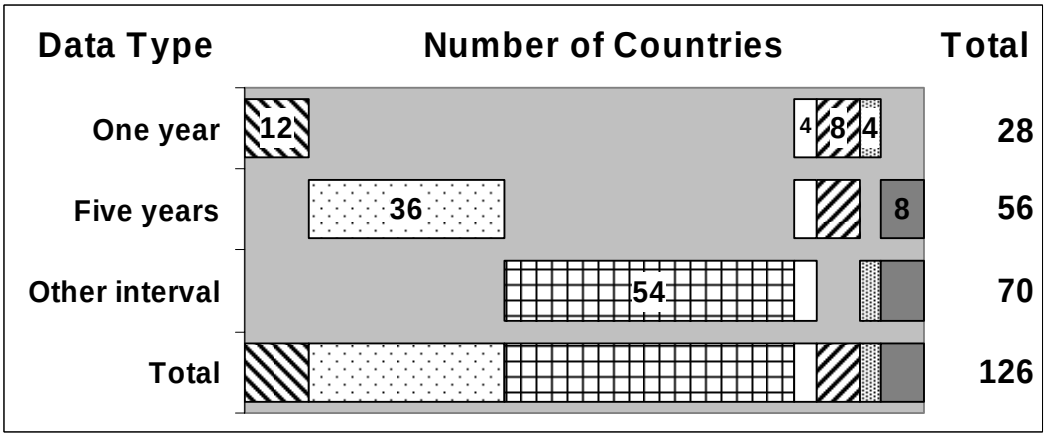

United Nation Member States in which a population census is a source of internal migration data
N
Population census is a source of internal migration data?
Yes
No
Missing data
4000 0 4000 8000 Kilometres
Created: June 7th 2005

Figure 2: Countries collecting multiple types of data at the Census by data type



Source: University of Queensland Survey

Figure 3: Countries collecting transition data at the Census by transition interval



Source: University of Queensland Survey

Figure 4: Facsimile of University of Queensland Internal Migration Inventory Query Page
http://www.geosp.uq.edu.au/qcpr/database/IMdata/Imdata.htm

Australia	
Is Internal Migration Data Collected?	Yes
Is a Census a source of internal migration data?	Yes
Is a Register a source of internal migration data?	No
Is a Survey a source of internal migration data?	No

Census	
Date of Last Population Census	06/08/2001
Date of Next Population Census	2006
Place of Usual Residence	Yes
1 Year Question	Yes
5 Year Question	Yes
Other Transition*	No
Duration of Residence	No
Number of Moves in 'n' Years	No
Place of Birth	No
Data Available by Sex	Yes
Data Available by Age	Yes
Comments	No Data

*'Other Transition' refers to questions such as place of usual residence at time of last census etc. which can not be classified as 1 year or 5 year questions

Register	
Register Name	Not Applicable
Purpose of Register	Not Applicable
Length of Register Operation	Not Applicable
Characteristics Collected	Not Applicable
Data Available by Sex	Not Applicable
Data Available by Age	Not Applicable
Comments	Not Applicable

Survey	
Survey Name	Not Applicable
Purpose of Survey	Not Applicable
Survey Sample Size	Not Applicable
Place of Usual Residence	Not Applicable
1 Year Question	Not Applicable
5 Year Question	Not Applicable
Other Transition	Not Applicable
Duration of Residence	Not Applicable
Number of Moves in 'n' Years	Not Applicable
Place of Birth	Not Applicable
Data Available by Sex	Not Applicable
Data Available by Age	Not Applicable
Comments	Not Applicable

http://www.geosp.uq.edu.au/qcpr/database/IMdata/Imdata.htm