Internal Migration and Development: Comparing Migration Intensities Around the World

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Completion of the first demographic transition in many parts of the world has seen migration replace fertility and mortality as the leading agent of demographic change. Population movement is now the primary process shaping patterns of human settlement within and between countries. Migration underpins the efficient functioning of the economy and the operation of the housing market, is a key mechanism in flight from danger, and is widely regarded as being integral to development (Skeldon 1997; United Nations 2009). At the individual level, it is also instrumental in mediating transitions through the life course and enabling individuals and families to achieve their goals and aspirations (Bernard, Bell, and Charles-Edwards 2014a). While progress has been made in measuring the changing incidence and spatial patterns of international migration (see, e.g., United Nations 1998; Abel and Sander 2014), statistics on internal migration—population movements involving changes of residence within countries—remain poorly developed (White and Lindstrom 2005; Skeldon 2012), and comparative measures of internal migration remain largely absent from international statistical collections.

The dearth of comparable statistics on internal migration can be traced in part to differences in the way migration is defined and the nature of the data collected (Bell et al. 2014). It also reflects the absence of agreed international standards for the measurement of migration (Rees et al. 2000; Kupiszewska and Nowok 2008) and the challenging technical issues involved in harmonization of spatial and temporal frameworks (Rogers, Raymer, and Newbold

2003; Bell and Rees 2006). Another impediment is the absence of an accessible international repository from which internal migration statistics can be easily extracted. Even when collected by national statistical agencies, internal migration data can still be difficult to obtain.

This article seeks to advance understanding of global variations in migration within countries by drawing on the IMAGE (Internal Migration Around the GlobE) project, an international program of research centered at the University of Queensland,[1] which has established an inventory of internal migration data collections across the 193 UN member states (Bell et al. 2014), together with an extensive data repository (Bernard et al. 2014) and analytical software (Stillwell et al. 2014). While internal migration can be explored across a number of dimensions, including its spatial patterns, composition, and distance traveled, our focus is on the overall intensity, level, or incidence of migration—that is, the propensity to change one's place of usual residence within a country. Following van Imhoff and Keilman (1991), we adopt the generic term "intensities" to encompass both migration rates and migration probabilities. We define migration to include all permanent or semi-permanent changes of usual address within a country, thus encompassing both residential mobility and internal migration more broadly defined. Although such moves comprise only one component of human mobility, they offer a clear starting point for the comparison between countries of internal migration. Specifically, we construct league tables that rank countries according to the intensity of internal migration and examine possible explanations for the observed differences between countries.

We begin with a brief synthesis of prior work comparing internal migration intensities across countries and review the key limitations to such comparisons. We set out the data and methods used to construct our league tables and we report the results and compare them with previous estimates. We then examine possible explanations for cross-national differences in migration and assess the observed variations against selected indicators at the national level using bivariate methods. We conclude by identifying the need for more nuanced measures of mobility that can be linked to particular aspects of development and replicated in a variety of contextual settings.

Prior research

While there has been longstanding interest in mobility differentials (Thomas 1938; Weber 1899), Long (1988) is generally credited with the first concerted attempt to compare levels of internal migration across multiple countries. Long identified two avenues for empirical comparisons of internal migration: comparisons of total residential mobility and comparisons based on distance. A lack of appropriate data has remained a barrier to international comparisons based on measured migration distance. However, drawing on 1970–71 census

data for ten countries together with Hong Kong and Puerto Rico, Long documented widespread variations in residential mobility, conspicuous among which were very high rates of movement in the new world countries of North America and Australasia, compared with the countries of Western Europe. A later study (Long 1991) drawing on 1980 census data for 15 countries confirmed these broad geographic patterns, which Long ascribed (at least in part) to the more open nature of employment and housing markets in the former countries and to peripatetic traditions inherited from immigrant forebears.

Long confined his 1991 analysis of residential mobility to the handful of countries that collected census data on all changes of address, but a much larger group of countries only record moves across regional or administrative boundaries. The nomenclature of such zones varies widely (Law 1999), but a common distinction is made between major and minor regions, the former referring to larger entities such as states or provinces, the latter to smaller districts or municipalities. In the absence of data on all residential moves, these data can be used to provide limited comparisons of migration intensities, based on implied movement distance. Simply stated, two countries with similar migration rates, but widely differing average zonal size, can be ranked, with the country with the larger zones accorded a higher level of mobility. This approach was used by early migration scholars (Ravenstein 1885; Weber 1899) and later adopted by Long (1988) in a comparison of 23 countries. A number of contemporary cross-national studies have adopted a generalized version of the implied-distance approach by comparing internal migration intensities across major and minor regions. Rodriguez-Vignoli (2008) drew on five-year interval data for major regions to explore migration intensities across 18 countries in Latin America and the Caribbean, while Bell and Muhidin (2009) examined a broader sample of 28 countries, comparing five-year and lifetime migration at the level of both major and minor regions. Bell and Charles-Edwards (2013) extended that analysis to 70 countries, detecting a systematic decline in current migration intensities across much of the globe since the 1990s and a slowing in the rise of lifetime intensities.

A major problem with these studies comparing intensities from interregional migration data is that no intra-regional flows are included, and countries differ widely in the number and spatial patterning of regions for which the data are collected and/or reported. This shortcoming is widely recognized as the modifiable areal unit problem, or MAUP (see, e.g., Wrigley et al. 1996). As a result, it is unclear whether apparent differentials in migration intensity between countries reflect real, underlying differences in the propensity to move between regions, or whether they are instead simply a product of variations in statistical geography—that is, in the spatial units between which migration takes place. Rees and Kupiszewski (1999) tackled this problem using an approach devised by Courgeau (1973a) that harnesses the intensities observed at various levels of spatial disaggregation to derive a

scale-independent index, *k*, representing the slope of a linear regression line linking migration intensities to the log of the number of regions for which each intensity was observed. Although *k* has no intrinsic, plain-language meaning, it serves as a measure of relative intensity that is directly comparable between countries and is arithmetically scalable. Rees and Kupiszewski (1999) relied primarily on single-year movement data from population registers and identified a gradient across ten European countries. Bell and Muhidin (2009) applied Courgeau's *k* to five-year and lifetime intensities in a similar manner in their 28-country study, reporting low intensities across much of Asia and considerable diversity in Latin America.

Other analysts have relied on survey data in place of census or register-based statistics to measure internal migration differences between countries. While surveys lack the detail on spatial patterns of migration available from other sources, they have the capacity to differentiate movers from non-movers and often identify reasons for migration (Bell et al. 2014). An example is the study of 26 OECD countries, based mainly on the 2007 EU Survey of Income and Living Conditions, which reported the proportion of households that had changed residence over the last two years (Caldera Sanchez and Andrews 2011). Despite its distinctive time interval and household focus, the results mirror the pattern identified by Rees and Kupiszewski (1999), with high mobility in Northern Europe and significantly lower intensities in Southern and Eastern Europe. The World Bank (2009) assembled a more eclectic set of estimates drawn from national household surveys conducted between 1992 and 2005 and confined to people of working age who had moved between districts. Although the geography of migration was not clearly defined, the report provides insight into several countries rarely considered elsewhere, including parts of Africa, where migration intensities are reportedly low, and the former Soviet bloc, where rates appear consistently high. More recently, Esipova, Pugliese, and Ray (2013) have reported a cross-national comparison of internal migration intensities among adults aged 15 and over for 139 countries, based on data collected by the Gallup World Poll. Again, the geography is somewhat ambiguous, with migration measured simply as a move from "another city or area" within a country in the past five years, but the global sample is substantial and the results conform closely to the spatial patterns identified in other work.

Cross-national comparisons have been made on a number of other dimensions of migration, including age composition (Rogers and Castro 1981; Bernard, Bell, and Charles-Edwards 2014b), distance (Long, Tucker, and Urton 1988), and population redistribution (Champion 1989; Rees and Kupiszewski 1999). All of these features are connected in various ways to overall migration intensities, but each has its own distinctive characteristics. For the purposes of this article, we confine attention to the way overall migration intensities vary between countries around the world.

Impediments to cross-national comparisons of migration intensity

Cross-national comparisons of migration intensity face a number of impediments relating to the form of data collected, the temporal intervals over which migration is measured, and the differing spatial frameworks (Bell et al. 2002). Equally problematic is the availability of data in the first place.

Data availability

A global inventory undertaken for the IMAGE project revealed that 175 of the 193 UN member states collect some form of internal migration statistics (Bell et al. 2014). While population censuses are the most common source (158 countries), population registers and administrative data are a source in 50 countries, and nationally representative surveys are also widely used (110 countries). However, data collection does not guarantee dissemination; availability may be constrained by processing costs or by confidentiality considerations. Moreover, even where data are made available, formats vary widely, from detailed origin–destination matrices to regional summaries of total arrivals and departures and single figure counts of movers at selected spatial scales. Counts of migrants within areas may not be included or may be included together with counts of the population who have remained *in situ*. Data are sometimes disaggregated by age, sex, and other characteristics, but often only at the national level. In the absence of common international standards, detailed data are often available only upon request or from a secure site. Although collections of migration data exist, the lack of a central warehouse for such data from across the globe has consistently hampered comparative work.

To address this deficit, the IMAGE project assembled a repository of internal migration data from established collections and holdings of national statistics agencies. One important source was the Integrated Public Use Microdata Series-International (IPUMS-International), which, at the time of writing, held census sample files for 74 countries dating back to the 1960s (Minnesota Population Center 2014). Origin–destination flow matrices and/or counts of migrants were extracted from IPUMS sample files for 42 countries. The Centro Latinoamericano y Caribeño de Demografía (CELADE) holds complete census counts for much of Latin America and was the source of flow matrices for 23 countries. Data for an additional 50 countries were acquired from national statistics agencies' electronic reports or on request. For a number of countries, the IMAGE repository holds data from multiple sources, years, and formats, so that holdings in mid-2014 covered 103 countries, including 97 origin–destination matrices at various levels of scale. For the present article, we generate estimates of aggregate migration intensities for 96 of these countries.

Data types

As in all cross-national comparisons, account must be taken of differences in the types of data collected. Two principal types of migration data can be identified: events and transitions. Event data, usually associated with population registers, are the most common form of internal migration data available in many European countries. Transition data, which measure migration by comparing place of residence at two points in time, are the form of data most commonly derived from censuses (Bell et al. 2014). Because of the way they are measured, events and transitions count different things: population registers count migrations, while censuses count migrants. The difference is important because transition data fail to capture return and onward moves that occur within the observation interval and therefore undercount the number of migration events. There are also differences in the treatment of migration among those who are born or die in the interval, as well as in the inclusion or exclusion of immigrants (Bell and Rees 2006), and this varies further between countries. The impact of these differences on overall migration intensities is small over relatively short intervals (Long and Boertlein 1990), although care is still needed to eliminate or control for variations in population coverage (Boden, Stillwell, and Rees 1991). For the analysis presented here, we confine comparisons involving both event and transition data to one-year intervals and follow Rees et al. (2000) in excluding external migration and in establishing appropriate populations at risk.

Observation intervals

Migration transitions can be measured over any time interval, but the most common are one and five years (Bell et al. 2014). Despite their commonalities, transitions measured over different length intervals are not readily comparable because of the effects of repeat and return movement. Return movement is particularly frequent when large zonal systems are used in the measurement of migration. Empirical evidence shows that the ratio between one-year and five-year transition rates varies over time and space, and, while approximate conversions have been proposed, there is no straightforward analytical solution (Courgeau 1973b; Kitsul and Philipov 1981; Rogerson 1990; Rogers, Raymer, and Newbold 2003). Moreover, non-response and errors of recall are commonly higher for longer observation intervals, which further hinder comparability. We therefore compare countries separately with respect to migration intensities over one year and over five years.

Censuses also commonly collect data on lifetime migration and on the place of residence prior to the last move, the latter usually in association with duration of residence in the current location. Indeed, these are the two most common measures of internal migration collected in censuses worldwide (Bell et al. 2014). Lifetime migration data compare place of current residence with

place of birth and provide useful insights into the cumulative impact of migration over a population's collective lifetime. However, because individuals have been exposed to migration for varying periods, differences in age structure restrict comparability between countries; moreover, lifetime migration data offer limited insights into contemporary migration processes. Data on the "last move," irrespective of when this occurred, present a similar conundrum because they effectively combine movements that span a broad time frame. However, by classifying last move data by selected durations of residence (e.g., one or five years) where available, it is possible to derive a surrogate estimate of migration that is broadly comparable to the conventional migration transition. Lack of precision in the measurement of duration, coupled with ambiguity in the locality to which it applies, represents the major limitation to broader use of these data, but judicious use permits cautious comparisons (Bell et al. 2014).

Spatial frameworks

Even where countries collect the same type of data over equivalent time intervals, comparisons of inter-regional migration are compromised by differences in the number of spatial units into which countries are divided. This is because the number of migrants or migrations captured by any collection instrument—census, register, or survey—is defined by the number of spatial units, or zones, into which the country is divided. Since countries differ widely in size, statistical geography, and patterns of settlement, simple cross-national comparisons of inter-regional migration intensities referenced to each country's particular statistical geography are not viable (Long 1991). For example, internal migration in the US 2000 census was measured between more than 3,000 counties, and in the UK 2001 census between more than 10,000 wards. In Mongolia, on the other hand, the data trace movements between just 21 aimags, and in Nepal between 74 districts.

To circumvent the problems of different spatial scales and lack of intra-area migration counts, we adopt a measure of the Aggregate Crude Migration Intensity (*ACMI*) that encompasses all "permanent" changes of address within each country, computed as:

$$ACMI = 100\, M / P \tag{1}$$

where M is the total number of internal migrants (transition/last move data) or migrations (event data) in a given time period and is expressed as a percent of P, the national population at risk of moving. Rees et al. (2000) define clearly how the latter should be measured.

As noted earlier, the central problem is that very few countries collect or disseminate statistics that account for "all residential moves." Globally, combining information on census transitions with data on duration of residence, together with estimates from population registers and surveys, delivers direct

estimates of the *ACMI* for just 26 countries. To generate estimates for those countries that do not collect such data, we build on the approach originally developed by Courgeau (1973a) and subsequently adapted by Courgeau, Muhidin, and Bell (2012).

Computing aggregate crude migration intensities

The approach developed by Courgeau, Muhidin, and Bell (2012) generates an estimate of the *ACMI* for each country by fitting a regression line to a series of Crude Migration Intensities (*CMI*s) observed at various geographic scales, each involving a different number of areas, *n*, as follows:

$$CMI_n = 100 \sum_i \sum_{j \neq i} M_{ij} / \sum_i P_i \quad (2)$$

where M_{ij} represents migrants between origin area $i = 1, n$ and destination area $j = 1, n$; and P_i is the population of each area i at risk of migrating. The underpinning logic is that, as the number of zones into which a territory is divided increases, so does the number of inter-zonal migrants. In its original formulation, Courgeau (1973a) derived a linear relationship between observed migration intensity at each level of zonation[2] and the natural logarithm of the number of zones, *n*, at which each intensity was observed, as follows:

$$CMI_n = k \ln[n] \quad (3)$$

Key assumptions are that zones are of equal size and population density. The slope, *k*, of the resulting linear equation represents an index of relative intensity that is arithmetically scalable and is therefore readily suited to cross-national comparisons. One limitation, already noted, is that *k* has no intrinsic meaning (Bell and Muhidin 2011). In a subsequent reformulation, Courgeau, Muhidin, and Bell (2012) address this by replacing the number of zones in equation 3 with the average number of households per zone, H/n, at that spatial level, where *H* is the total number of households summed across all zones (*n*):

$$CMI_n = w + k \ln (H/n) \quad (4)$$

where the parameter *k* scales this relationship and *w* is a constant. For countries that provide migration data at more than one level of spatial scale (e.g., states, provinces, counties), it is therefore possible to estimate equation 4. Substituting $H/n = 1$ in the estimated equation then corresponds to a hypothetical level of spatial resolution at which there is just one household per zone and therefore captures all migrations. Since $\ln(1) = 0$, the corresponding *ACMI* can be read directly from the *y* intercept on a graph or computed from equation 4 as the constant. An additional point can be included for the

purpose of fitting equation 4, corresponding to the situation where there is only a single zone in the country such that $CMI = 0$ at $\ln(H)$. This is shown as the x intercept in Figure 1.

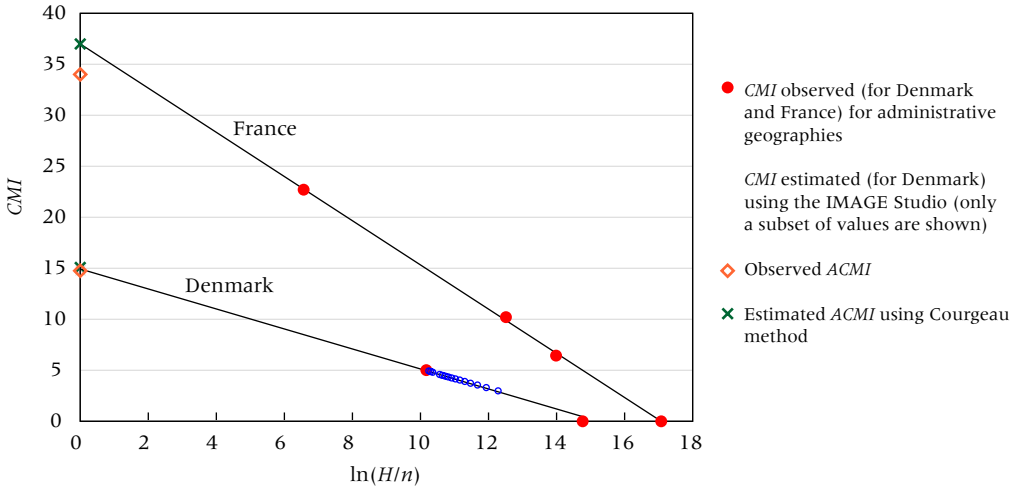
Courgeau, Muhidin, and Bell tested the hypothesized relationship between the *CMI* and the natural log of the average number of households per zone using a mix of event and one-year transition data for seven countries. They showed a strong linear relationship, with coefficients of determination exceeding 0.94, but only had access to migration data indicating migration status at a limited number of spatial levels, corresponding to standard administrative geographies in each country (see, e.g., Law 1999). Data of this type, comprising counts of the aggregate number of migrants or migrations between zones at selected levels of the spatial hierarchy (such as counties or provinces), are often made available by statistical agencies. We have sought to generate a more robust foundation for estimating the *ACMI* by using the IMAGE Studio, a bespoke software system, to generate estimates of migration intensity for additional geographies at multiple spatial scales (Bell et al. 2013; Stillwell 2014; Stillwell et al. 2014).

We calculate the *CMI*s for a cascading sequence of zonal aggregations, beginning with the Basic Spatial Units (BSUs) available in the country-specific origin–destination flow matrix and aggregating upward in user-defined increments. At each spatial level, the algorithm creates a series of spatial configurations by stepwise aggregation of BSUs into Aggregate Spatial Regions (ASRs) of varying shapes and sizes. Multiple iterations at each spatial level provide a range of random spatial configurations. *CMI*s are then computed for each configuration at a given level, and the results are averaged before repeating the process at the next level of aggregation. The result is a sequence of *CMI*s estimated for the selected levels of spatial aggregation—for example, 200, 190, 180….40, 30, 20.

Figure 1 illustrates application of the technique using data for two European countries. For France we have census data on aggregate migration between municipalities, between departments, and between regions, giving three data points, which together generate an estimated *ACMI* of 37 percent over the five-year interval using equation 4. This compares favorably with an observed *ACMI* of 34 percent. For Denmark we have a matrix of moves between 99 regions over a single year and use the IMAGE Studio to estimate *CMI*s for random aggregations of these BSUs. The construction of multiple levels of geography from a single set of BSUs generates a sequence of *CMI*s that are plotted against the log of the average number of households per zone. The subsequent regression estimates the *ACMI* at 14.6 percent, very close to the actual value of 14.8 percent recorded by the Danish population register. For many other countries there is no observed *ACMI*, but we use the method developed by Courgeau, Muhidin, and Bell in the same way to generate an estimate.

How reliable are the estimates made using equation 4? Courgeau, Muhidin, and Bell tested the method for five countries for which they had

FIGURE 1 Observed and estimated *ACMI* for France and Denmark using the Courgeau method and the IMAGE Studio

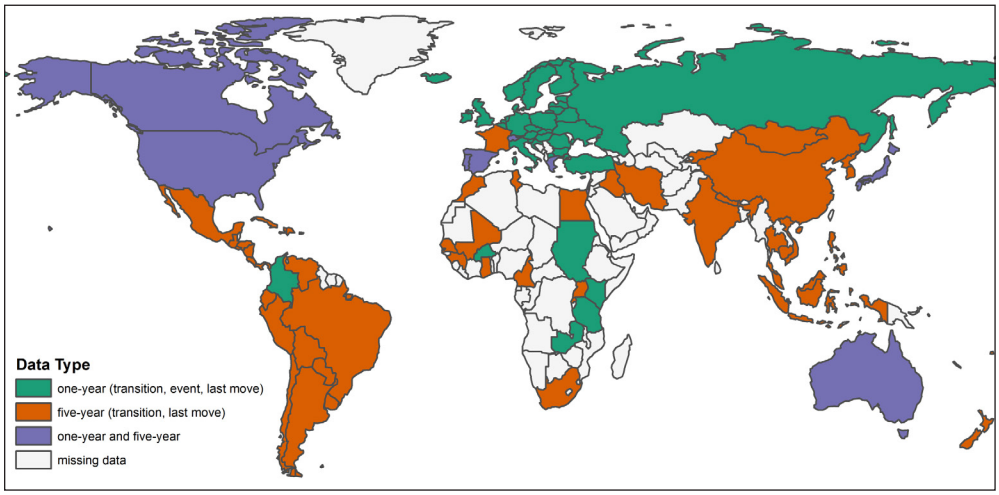


direct measures of the *ACMI* and reported errors generally below 5 percent. We tested the method using a broader sample of 17 countries with estimates of the *ACMI* based on a combination of administrative geographies and ASRs from the IMAGE Studio and obtained a mean error of 8.7 percent. While there is scope to further enhance application of the Courgeau methodology, this represents a comparatively small discrepancy in the context of the marked variations in migration intensity found between countries, as will become evident below.

A total of 26 countries measure the *ACMI* directly, through censuses and registers that capture all moves or transitions. We use the method developed by Courgeau, Muhidin, and Bell to estimate the *ACMI* for an additional 70 countries. For ten of these 96 countries we have data for more than one time interval, so the total number of estimates is 106. Of these, 61 refer to five-year migration intervals, while 45 cover one-year intervals, the latter including a mix of event and transition data. The ten countries for which we have both one-year and five-year estimates are Australia, Canada, Greece, Israel, Japan, Malta, Portugal, Spain, Switzerland, and the United States.

Figure 2 shows the geographic coverage of the estimates by observation interval. Coverage is high for Europe, North America, and Latin America and the Caribbean, with estimates for more than two-thirds of countries. It is less complete for Asia (38 percent of countries), Africa (32 percent), and Oceania (21 percent). Overall, global coverage stands at just under half of the 193 UN member states. However, many of the missing countries are relatively small city or island states, and if attention is focused on populations, rather than countries, global coverage rises to more than 80 percent. There is also a marked spatial distinction between the countries for which one-year and

FIGURE 2 League table coverage by type of data



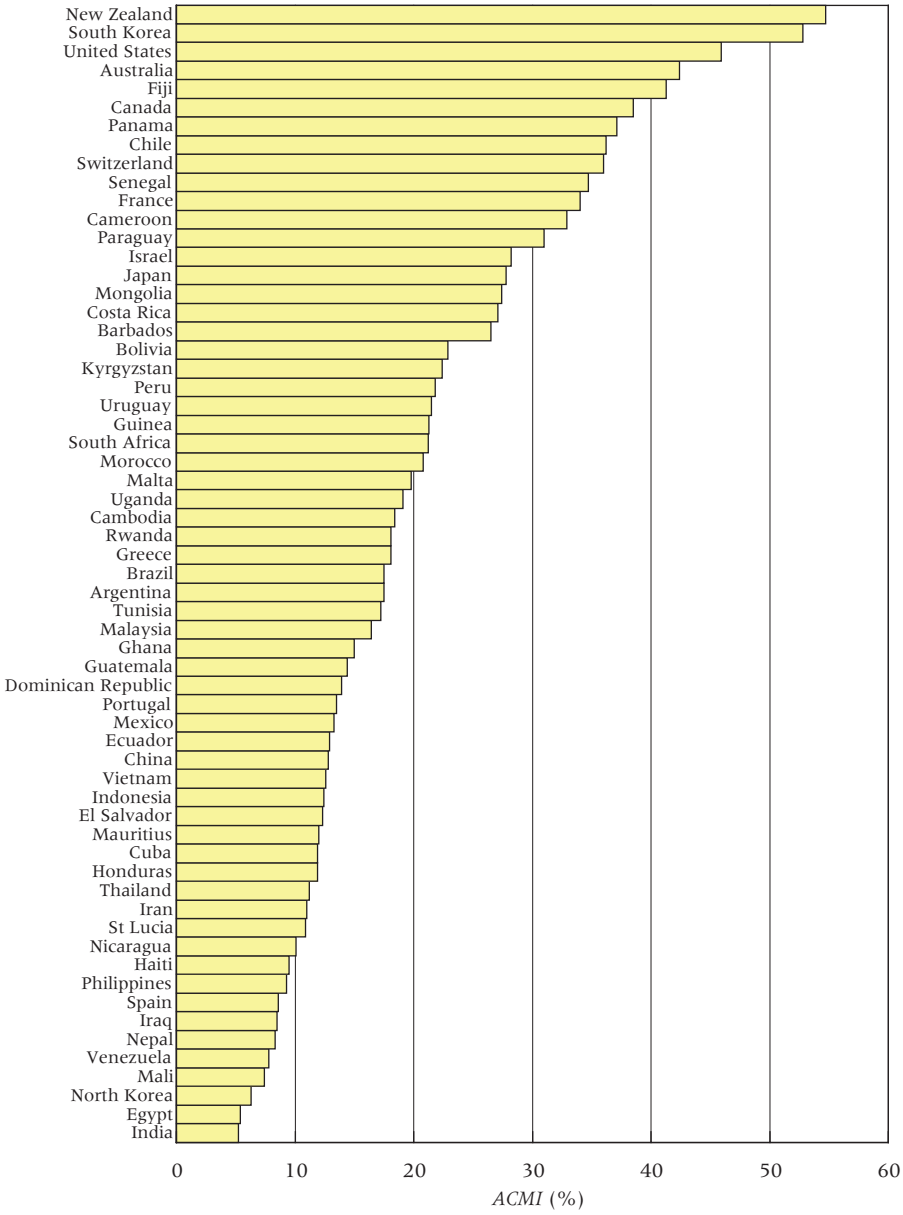
five-year estimates can be generated: the former predominating in Europe and the latter in Latin America and the Caribbean and in South, East, and Southeast Asia, while Africa exhibits a mix of both intervals.

Countries also vary in the time period to which the observations apply. Despite persistent attempts by the United Nations to harmonize data-collection practice, there is widespread variation in the timing of censuses and in the release of migration data. Similarly, for some countries, data from population registers and administrative sources may be collected routinely, but are made available only sporadically. For the analysis presented here, we bring together estimates centering, as far as possible, around the middle of the 2000–2010 decade. While this approach means that the data cited for some countries are not the latest available, it serves to improve cross-national comparability. Moreover, in practice, the evidence suggests that national migration intensities are broadly stable over time, despite a general downward trend (Bell and Charles-Edwards 2013). Full details of data sources, migration intervals, estimation methods, observation timing, and the resulting estimates of *ACMI*s are provided in the Appendix available at http://www.gpem.uq.edu.au/image.

League tables of national migration intensities

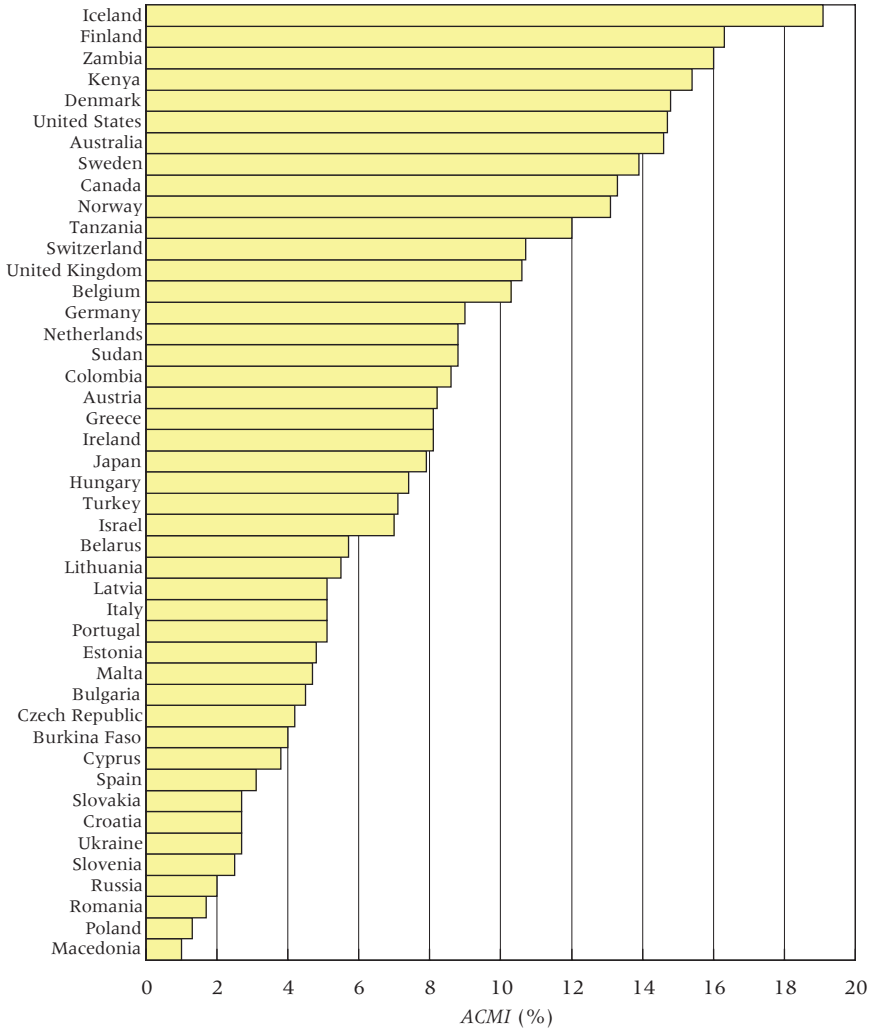
Figures 3 and 4 rank countries to produce league tables from highest to lowest intensities and reveal marked variations. Five-year intensities range from a low of 5 percent in India to a high of 55 percent in New Zealand, with a median of 18 percent. Thus, in India, just one person in 20 changed their place of residence over the five-year interval, whereas in New Zealand more than half

FIGURE 3 Five-year *ACMI*s by country, ranked



of the population did so. The highest five-year intensities are observed in the new world countries of New Zealand, the United States, Australia, and Canada, along with Fiji, South Korea, Panama, Chile, and Switzerland. These results for the four new world countries are consistent with Long's (1991) findings on residential mobility in the early 1980s. At the other end of the scale, intensities

FIGURE 4 One-year *ACMI*s by country, ranked



below 10 percent are found in a scattering of countries across Asia (India, North Korea, Nepal, Iraq, and the Philippines), Africa (Egypt and Mali), and Latin America (Venezuela and Haiti), with Spain being the one European example.

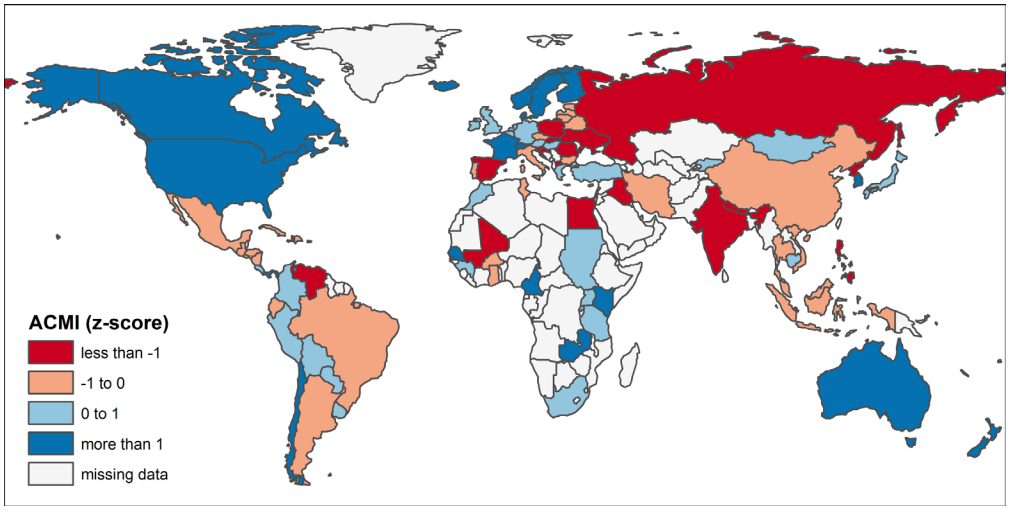
The very low *ACMI* for India may be partly explained by the relative prosperity of rural areas following the country's Green Revolution and the lower propensity for people to migrate to the cities for job opportunities compared with countries such as China. Moreover, Munshi and Rosenzweig (2009) suggest that cultural forces are also at work, with individuals continuing to marry "within their jatis simply because they have a strong preference for partners with the same background and characteristics" (p. 2).

The results for one-year intensities (Figure 4) confirm the wide variation in migration intensities across the world, ranging from just 1 percent in Macedonia to 19 percent in Iceland. Scandinavian countries display consistently high one-year intensities, while the results for Eastern and Southern Europe point to much lower levels of migration. The picture across the rest of the world is more heterogeneous. Poland records the second-lowest intensity in the sample (1 percent), while Zambia (16 percent) is among the highest. Notably, the ten countries for which we have both one-year and five-year estimates appear in similar rank order in both league tables, although Greece is higher than expected on the one-year table, and Malta somewhat lower.

Despite the wide variation in migration intensities, clear spatial patterns emerge when the results are considered within and between geographical regions, and these are most readily apparent when intensities for the two intervals are standardized. Although we cannot compare one-year and five-year *ACMI*s directly, standardization using z-scores provides a basis for comparing the distribution of intensities in a way that effectively integrates estimates for the two intervals. Following tests for normality and spread, z-scores were calculated separately from log transformation of one-year and five-year estimates. The results, depicted in Figure 5, should be treated with caution because of differences in measurement and geographical coverage, but do provide intriguing insights into relative levels of internal migration around the world.

In Europe, the data reveal a marked spatial gradient traveling from Northern to Southern Europe, and from Western to Eastern Europe. A similar gradient is apparent in Latin America and the Caribbean, with lower mobility in Mexico and parts of Central America grading to moderate intensities in Brazil and Argentina, rising to a spine of high mobility extending from Chile through the Andean countries of Bolivia and Peru into Paraguay. Intensities across North America and Oceania (Australia, New Zealand, and Fiji) are consistently high. In much of Asia, on the other hand, intensities are generally low, and this is especially marked in South and Southeast Asia, where five-year intensities range from just 5 percent (India) to around 12 percent (Indonesia and Vietnam), with highs of 17–18 percent in Cambodia and Malaysia. South Korea stands out as the high-mobility outlier, followed by Japan, Israel, Mongolia, and Kyrgyzstan. Census coverage for Africa is much more fragmented, with the available census data covering just 17 of the 46 countries, and a mix of one-year (five countries) and five-year data (12 countries). The picture that emerges is of high migration intensity in parts of East (Tanzania and Kenya), West (Senegal, Cameroon, Guinea), North (Morocco), and Southern Africa (South Africa and Zambia), with lower intensities elsewhere. Caution is needed in interpreting migration intensities in sub-Saharan countries such as Mali where internal migration is blurred by nomadic tribes and the meaningless nature to these populations of international boundaries between contiguous states like Burkina

FIGURE 5 Standardized *ACMIs*, one year and five years (z-scores)



NOTE: Where estimates are available for both one-year and five-year intervals, five-year data are shown.

Faso and Niger (Grémont 2014). More generally, one must recognize that the estimates are compromised by issues of data quality in some developing countries, with censuses and surveys likely biased toward stayers and likely failing to capture the more mobile groups in the population. In addition, permanent relocations represent only one segment on the mobility continuum, and low permanent migration intensities in some countries may be compensated by alternative forms of population movement, including temporary migration and circulation.

How do the results reported here compare with earlier estimates? As noted above, there have been few previous attempts to assemble comparative estimates of internal migration intensities, and some proprietary figures, such as those prepared from the Gallup World Poll (Esipova, Pugliese, and Ray 2013), are not readily available. However, two independent sets of estimates invite comparison. First are the figures assembled by the World Bank (2009) drawn from national household surveys conducted between 1992 and 2005, which measured five-year movement between districts among people of working age for 35 countries. Second is the 2007-based study by Caldera Sanchez and Andrews (2011), which used survey data to estimate the proportion of households changing residence over a two-year period in 26 OECD countries. We have comparable estimates for 18 of the former countries and 24 of the latter. Pearson's correlation coefficients reveal a moderate association with the World Bank data ($r = 0.51$, $n = 17$, $p < 0.05$) but a much closer correlation with the OECD data ($r = 0.93$, $n = 24$, $p < 0.00$). For the former, the discrepancy almost certainly lies in the difference in population coverage and the spatial framework employed; the nature of the districts between

which migration is measured is not defined in the World Bank report, but almost certainly varies between countries. The OECD data, on the other hand, although measured over a two-year period, are conceptually much closer to the one-year transition and event data analyzed here and provide solid support as to their validity.

Explaining differentials in migration intensities

Explanations for these differences in migration intensity can be sought from a number of perspectives. One contributing factor is age composition. As with all crude rates, migration intensities are affected by differences in the age structure of the population. Countries with younger age structures will record higher *ACMI*s than those with older populations, even though the underlying propensity to move is the same, simply because a larger share of the population is composed of young adults, among whom mobility is high (see, e.g., Rogers and Castro 1981; Bernard, Bell, and Charles-Edwards 2014b). Ideally, comparisons should be made using standardized migration intensities (*SMI*s) (Rees et al. 2000), but the requisite data, disaggregated by age, are not commonly available. However, it is possible to gauge the effect of age composition on the variability in *ACMI*s by calculating *SMI*s for selected countries. To explore the impact of age structure, we calculate direct standardized rates for selected countries with reference to three standard populations: Malaysia (2000), the youngest population in the sample with a median age of 23.8; Japan, the oldest population in the sample with median age of 41.3; and the unweighted average of the 2000 population of the 12 countries in the sample with a median age of 36.2.

*SMI*s are reported alongside *ACMI*s for the five-year data in Table 1. Adopting Malaysia as the standard population substantially inflates the intensities for all other countries in the sample, with the largest increases being for Japan and France, countries with two of the oldest populations. Thus, Japan and France would display *ACMI*s more than 20 percent higher if they retained their own age-specific migration propensities but had Malaysia's much younger age profile. For other countries in the sample, *SMI*s are around 10–15 percent higher. Importantly, however, there is little change in the range of intensities from high to low and minimal change in country order. Adopting Japan as the standard lowers the *SMI*s compared with *ACMI*s for most countries, but again country order and the high–low range remain largely unchanged. A similar result is found when the unweighted average of the 12 country populations is used as the standard. Age standardization of *ACMI*s measured over a one-year interval produces similar results, although some shifts in rank order are apparent.

Other things being equal, the near-universal peak in migration propensities among young adults means that younger populations will experience

TABLE 1 Crude and standardized migration intensities, selected countries

Country and interval	Median age	*ACMI*	Standard population (2000): Malaysia *SMI*	Malaysia Percent difference	Japan *SMI*	Japan Percent difference	Unweighted average *SMI*	Unweighted average Percent difference
Five-year interval								
Malaysia	23.8	17.1	18.9	10.5	15.6	–8.8	16.4	–4.1
Japan	41.3	27.6	34.3	24.3	27.7	0.4	29.4	6.5
France	37.6	34.0	41.8	22.9	34.0	0.0	35.9	5.6
Switzerland	38.6	36.1	41.1	13.9	35.5	–1.7	37.0	2.5
Canada	36.8	38.5	45.1	17.1	38.5	0.0	40.1	4.2
Australia	35.4	42.4	47.5	12.0	40.8	–3.8	42.4	0.0
United States	35.3	44.3	49.5	11.7	42.1	–5.0	43.9	–0.9
New Zealand	34.3	54.7	60.6	10.8	53.7	–1.8	55.0	0.5
Range		37.6	41.7	—	38.1	—	38.6	—
One-year interval								
Italy	40.2	5.1	5.8	13.7	5.0	–2.0	5.2	2.0
Austria	38.2	8.1	10.1	24.7	7.9	–2.5	8.4	3.7
Canada	36.8	13.3	15.5	16.5	12.9	–3.0	13.4	0.8
United States (CPS 2000)	35.3	15.5	18.2	17.6	14.8	–4.6	15.5	–0.2
Denmark	38.4	16.0	20.6	29.1	16.6	4.0	17.3	8.4
Iceland	32.8	19.1	21.9	14.7	17.7	–7.3	18.6	–2.6
Australia	35.4	17.6	19.9	13.1	16.7	–5.1	17.4	–1.1
Range		14.0	16.1	—	12.7	—	13.4	—

NOTE: Direct standardization, see text.

higher overall migration intensities than older populations, and this will be intensified where high age-specific intensities coincide with large cohorts. Despite broad similarities in the shape of the migration age profile (Rogers and Castro 1981), recent evidence shows that the age and level at which migration peaks vary widely between countries, and these differences combine with age-composition effects to modulate overall migration intensities. Migration age profiles are shaped by the timing, spread, prevalence, and sequencing of life-course transitions, such as leaving home, completing education, and household and family formation, and these differences between countries in the age profile of migration are of direct interest in themselves (Bernard, Bell, and Charles-Edwards 2014a). However, they are shaped in turn by broader contextual factors, including the cultural context, economic development, social customs, and political framework, which vary between countries and over time.

Zelinsky (1971) linked the level of migration to progress through the demographic transition, arguing that there were "definite patterned regulari-

ties in the growth of personal mobility through space-time" (pp. 221–222) and that these formed an integral part of the modernization process. According to Zelinsky, cross-national differences in mobility could be interpreted as reflecting different stages on the development ladder. Jones and Brown (1985) articulated a somewhat different approach, identifying four overlapping stages of national development, each characterized by distinct factors generating internal migration. The first stage involves the expansion of infrastructure, with the development of transport networks and improvements in connectivity increasing market size and labor supply. This stage leads to subsequent urbanization and diffusion of innovations as pro-development attitudes and beliefs become more prevalent. Economic development follows, during which rising inequalities become key factors triggering migration. Finally, social development occurs whereby access to education and other goods comes to the fore, declining in significance as educational and other opportunities diffuse across the settlement system. In a similar fashion, Zelinsky's early thesis anticipated a fall in migration in "super-advanced" societies as commuting and electronic communications replaced permanent relocations.

The idea of a single mobility transition has been criticized as Eurocentric and time bound (Woods, Cadwallader, and Zelinsky 1993), and later interpretations stress global diversity and the contextual framework (see, e.g., Skeldon 1997). Moreover, mobility transitions are perhaps more readily seen as involving changes in form and spatial pattern rather than in overall intensity. Nevertheless, transition theory provides useful insights into the different aspects of development that shape mobility. At least three aspects can be broadly categorized as economic, social, and demographic. For the analysis presented here, we seek explanations for the observed variations in *ACMI*s through associations with a range of readily available indicators under these three headings. Table 2 also includes a fourth set of variables, broadly categorized as geographic, which might be expected to influence the level of migration intensity.

In examining these results, one should recall that the one-year and five-year *ACMI*s presented in Table 2 encompass different groups of countries: single-year estimates are drawn predominantly from Europe, with a scattering of Asian and African countries, while five-year data relate to a much broader group of countries at various levels of development. Only seven countries appear in both the one-year and five-year lists. The level of association with particular explanatory variables might therefore be expected to differ between the two groups. In fact, with few exceptions, the correlation coefficients are remarkably consistent across the two intervals, which lends some strength to the significance of the selected variables.

Turning first to broad considerations of physical and human geography, one might expect that migration propensities would be mediated by physical size and patterns of settlement, since these influence the opportunities for mi-

TABLE 2 Correlation coefficients, one-year and five-year *ACMI*s with selected indicators

	One-year interval		Five-year interval	
Variable	**n**	**r**	**n**	**r**
Geographic				
Geographic area (sq. root)	44	0.46**	61	0.14
Population density	44	–0.10	60	–0.10
Urbanization	40	0.65**	61	0.39**
Economic				
Gross domestic product (GDP) per capita (2005 PPP$)	40	0.69**	57	0.61**
Gini coefficient (income inequality 2000, 2005)	28	0.07	34	0.01
Foreign direct investment/GDP (2000)	43	0.03	56	0.02
Female labor force participation (2000)	43	0.53**	61	0.20
Labor force participation (2000)	42	0.40*	61	0.24
Social				
Human Development Index (2000)	40	0.62**	59	0.48**
Mobile phone subscribers (2000)	40	0.66**	61	0.54**
Literacy (2000)	25	–0.76**	49	0.06
Percent males 20–24 living at home	11	–0.81**	4	–0.97*
Demographic				
Growth rate (2000–2005)	45	0.40**	60	–0.25
Life expectancy at birth (2000–2005)	45	–0.01	61	0.25
Total fertility rate (TFR) (2000–2005)	40	0.45**	59	–0.14
Median age	40	0.05	61	0.38**
Net international migration rate (2000–2005)	40	0.35*	56	0.48**
Remittances as percent of GDP (2000)	41	–0.27	54	–0.34*

*Significant at $p < 0.05$; **$p < 0.01$.

gration. Table 2 shows a moderate association with country area for the one-year data, but population density is not strongly correlated for either group of countries. Level of urbanization, on the other hand, returns a moderate to strong correlation with both datasets: the more highly urbanized the country, the greater the intensity of migration. For countries in the midst of the urban transition, this finding can be readily explained as a direct consequence of the rise in rural-to-urban migration that is a key driver of urbanization itself. As the level of urbanization increases, however, rural-to-urban migration declines (Dyson 2010; Lerch 2014), and high migration intensities are more likely associated with inter- and intra-urban migration.

Economic development, measured in terms of GDP per capita, is a significant predictor of migration intensities across both intervals, underlining its global significance. High per capita income and expenditure are clearly

conducive to mobility, reflecting both the financial capacity to move and the breadth of employment opportunities found in developed economies. Labor force participation shows a clear positive association with migration intensity, at least among the advanced economies that are included in the one-year dataset, and is strongest where women have a significant labor force presence. Correlations with the other economic variables in Table 2 are much weaker. Measures of regional inequality, thought to be a key driver of inter-regional migration, are not readily available, but overall income inequality shows no appreciable association with migration intensity. Similarly, there is no apparent link between migration and foreign direct investment, probably because the latter tends to be capital-intensive rather than labor-intensive and is concentrated in a relatively small number of countries.

Turning to the social indicators in Table 2, there is a strong positive association between the Human Development Index (HDI) and migration intensity measured over both five-year and one-year intervals. The HDI is a composite index encompassing economic (income), demographic (life expectancy), and social (education) dimensions, and the results confirm the link between mobility and development. Literacy appears to be negatively associated with migration, at least across the sample of predominantly European countries, but there is a surprisingly strong, positive association with the proportion of the population with a mobile phone subscription that holds across both country samples. One interpretation is that greater connectivity is facilitating internal migration, rather than acting as a substitute as originally anticipated by Zelinsky (1971). Another prominent finding is the very high negative correlation between migration intensity and the proportion of young adults still living in the parental home. Bernard, Bell, and Charles-Edwards (2014b) have shown that the age at peak migration is closely tied to cross-national differences in the timing of key life-course transitions. For our sample countries, it appears that age at leaving home also affects the overall level of migration: later ages at leaving appear to reduce aggregate migration intensities in the same way that later ages at first childbearing curtail lifetime fertility.

Demographic attributes display more mixed results. One-year migration intensities are moderately correlated with total fertility and national growth rates, but over the five-year interval these effects are reversed: high-growth, high-fertility countries tend to have low migration intensities. Median age, on the other hand, is positively associated with migration among countries in the five-year group. More notable among the demographic indicators are the positive relationship between internal migration intensity and the international migration rate, and the reverse relationship with remittances. As other commentators have noted, migration within countries does not occur in isolation: it is closely linked to other forms of mobility, particularly international migration. For countries experiencing net gains from international migration, the results in Table 2 are indicative of displacement effects

whereby international inflows trigger internal outflows (Frey 1979). Among countries registering net international losses, on the other hand, international outflows may be substituting for, and thereby reducing, internal mobility.[3] Remittances are grouped with the demographic variables in Table 2 because they are closely tied to international migration. The coefficients are low but negative for both periods, indicating that as international remittances climb, the intensity of internal migration is reduced. International labor migration is one element in the kitbag of livelihood survival strategies for poor people in developing countries. The negative association reported here suggests that work abroad, which supplements household budgets at home, may well limit the need for internal migration.

These correlations offer suggestive insights, but it seems clear that migration intensities cannot be explained solely by reference to level of development, since ostensibly similar countries often display markedly different migration intensities. Moreover, variations in the strength of relationships between the countries encompassed in the one-year and five-year datasets suggest that these forces mix differently to shape migration in particular settings. In more developed economies, for example, the housing market may be a significant factor. Long (1991) suggested that the open nature of housing markets together with low housing costs and lax planning controls in the new world countries encouraged new housing construction, thereby facilitating population movement. In Australia, high mobility has been linked to movement through urban housing markets for the specific purposes of capital accumulation (Bell 1992). Conversely, low migration intensities in countries of the former Soviet Union have been attributed in part to state-run housing systems and underdeveloped housing markets (Rees and Kupiszewski 1999; Andrienko and Guriev 2004). Caldera Sanchez and Andrews (2011) found that the probability of moving within 23 European countries was constrained by transaction costs and rental regulations and facilitated by more flexible housing supply and ease of access to credit.

In other parts of the world, expansion in personal freedom may be central to growth in personal mobility. Countries that restrict the mobility of individuals, for example through permit systems, appear to have lower migration intensities than those in which freedom of movement is assured. China is perhaps the most cogent exemplar, with the *hukou* household registration system acting as a brake on formal changes of residence, although this is partly compensated by high temporary mobility. It is notable that inter-provincial migration in China rose sharply following the relaxation of movement restrictions in the late 1990s, contrary to the downward global trend (Bell and Muhidin 2009; Bell and Charles-Edwards 2013; Liu et al. 2014). Zelinsky (1971) anticipated that state-imposed restrictions would inhibit migration, but contemporary views hold that mobility is essential to the process of human development and strongly advocate the removal of barriers to migration (World Bank 2009; United Nations 2009). In some countries, however, high

mobility may be a response to conflict and constraint, rather than the pursuit of opportunities.

Conclusions

Despite rising recognition of its significance, few attempts have been made to develop rigorous, comparative indicators of internal migration, still less to explain observed variations between countries. This article has drawn on the data repository assembled as part of the IMAGE project to generate estimates of internal migration intensities for a large sample of countries around the world, drawing on censuses and population registers. Reviewing the various problems that restrict cross-national comparisons, we elected to make estimates of aggregate crude migration intensities, representing all changes of address within a country, and to generate separate league tables for five-year and one-year intervals. Since few countries collect information on all residential moves, we adopted the method proposed by Courgeau, Muhidin, and Bell (2012), coupled with the randomized geographies algorithm developed as part of the IMAGE Studio (Stillwell et al. 2014) to generate estimates for the remaining countries. Suitable data are not available for all countries, but the league tables reported here include 96 of the 193 UN member states, accounting for more than four-fifths of the global population. We reported estimates for 61 countries based on five-year migration intervals and for 45 countries that measure migration over a single year; ten countries collect data for both intervals.

The results revealed substantial variation in the incidence of internal migration. Measured over five years, migration intensities varied from highs exceeding 50 percent in New Zealand and South Korea to lows of less than 6 percent in Egypt and India. Measured over a single year, the differential was no less striking, with the migration intensity in Iceland almost 20 times the level recorded in Macedonia. When mapped, these results created a patchwork across the world, but distinctive patterns were evident both between and within regions. North America and Australasia emerged as global poles of high mobility, while low migration intensities were common across much of Asia, with South Korea and Japan being notable exceptions. Europe and Latin America displayed more variation but with clear spatial gradients: from high mobility in Northern and Western Europe falling steadily to the south and east, and from a spine of high mobility in the Andes declining rapidly to the east and north of the continent into Central America. Evidence for Africa was fragmented but suggested nodes of high mobility in the east, west, and south of the continent.

Accounting for these differences in migration intensity is difficult. Part of the variation could be traced to age-composition effects, but age standardization has little effect on international rankings. We sought explanations for the observed global differences through simple correlations between internal

migration intensities and a number of economic, social, and demographic variables thought to be associated with development. The results revealed moderate to strong correlations with the level of urbanization, with per capita GDP, and with the HDI, with each of these variables statistically significant across both the five-year and one-year datasets at $p<.01$. Mobile phone subscriptions, another indicator of modernization, also showed a strong association with migration. For the subset of predominantly European and other developed countries that measure migration over a one-year interval, geographic area, population growth, fertility, and female labor force participation were positively correlated with migration intensities. More notable, however, as evidenced by both datasets, was that aggregate migration intensities appear to be reduced by later departures from the parental home. The evidence also revealed close functional links with international migration: net international gains appear to increase internal mobility while net losses substitute for internal movements, in part perhaps because the inflow of remittances reduces the need for migration.

The battery of explanatory variables tested in this article might usefully be extended to encompass other factors likely to influence migration. Levels of personal freedom, housing market variables, industry composition, occupational mix, levels of education, transportation infrastructure, and civil unrest may all play a role. Multivariate analysis is called for but confronts serious autocorrelation constraints. One possible way forward is through a factor analysis of selected independent variables, although this risks generating constructs that are difficult to interpret and have a limited theoretical foundation. Such work would best be advanced within a targeted theoretical exploration of the determinants of internal migration. Development of a truly global picture is also seriously hindered by the absence of data for countries in key parts of the developing world, particularly Africa and West Asia. Differences in the time intervals over which migration is measured also remain a major obstacle to an integrated, global comparison, and further efforts are needed to assemble fully harmonized and internationally comparable internal migration statistics.

Within the constraints of available data, considerable scope exists to explore the ways in which countries vary with respect to other key aspects of internal migration, including its impacts on population redistribution, the distances over which people move, and how migration connects cities and regions (Bell et al. 2002). It is equally important to extend comparative analysis beyond contemporary definitions of permanent migration to encompass circular, seasonal, and other forms of temporary population movement that are significant components of total mobility in much of the developing world. Differences between countries in the intensity of permanent internal migration reported here may well be complemented by other forms of mobility rarely captured in conventional statistics but no less significant to national and individual development.

Notes

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1 Details of the IMAGE project are available at http://www.gpem.uq.edu.au/image.

2 Underlying this formulation are theoretical models that represent, in synthetic form, the distribution of distances between individuals in a country (Borel 1924) and models that represent the frictional effect of migration distance, first conceived by Ravenstein (1885) and developed subsequently as gravity models.

3 Lerch (2014) provides a lucid account of this process in Albania.

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