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Visualizing Australian internal and international migration flows

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Migration research in Australia has tended to focus on internal migration, partly due to the paucity of international migration statistics at the regional scale, especially for emigration. In this regional graphic, internal and international migration flows for 50 major regions of Australia are presented using census data on internal migration and immigration over the one-year interval before the 2011 Census together with new estimates of regional emigration. Because of the difficulties of mapping migration flows for a country with huge variations in the geographical size of regions, a new visualization tool – the circular migration plot – is employed. It enables a more complete, and more interpretable, summary picture of the spatial pattern of internal and international migration in Australia to be depicted than has been possible previously.

Keywords: circular migration plot; internal migration; international migration; Australia; estimates

The impact of migration on national settlement systems is well recognized by population scholars, and reflects variations in the intensity and spatial patterns of internal and international migration flows. Research in Australia has tended to focus on the spatial patterns of internal migration (e.g. Hugo, 2005), reflecting the paucity of sub-national data on international migration flows, particularly emigration. As a consequence, little is known about the relative impact of internal and international migration at the sub-national level or the degree of complementarity between these two sets of flows.

Our regional graphic (Figure 1) illustrates internal and international migration flows for 50 major regions of Australia which comprise state and territory Greater Capital City Statistical Areas together with other large statistical regions of each state and territory (termed SA4 regions by the Australian Bureau of Statistics – ABS). It couples census data on internal migration and immigration from overseas over the one-year interval before the 2011 Census with new estimates of emigration to overseas over the same period. These census-type (transition) estimates of emigration were estimated using census data on 'returned emigrants' (those living in a region five years ago, overseas one year ago and in Australia on census night), census immigration flows to each region, together with state-level immigration and emigration estimates.

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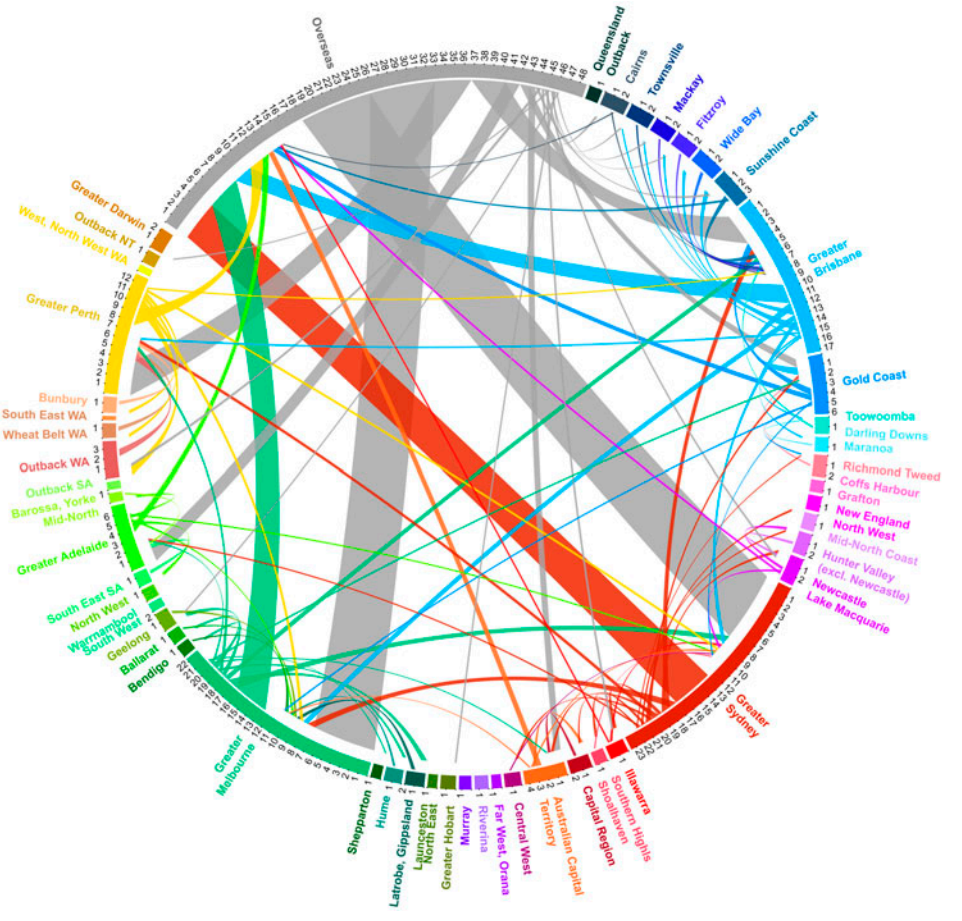

Figure 1. Internal and international migration flows to and from Australian regions, 2010–2011. Data source: Australian Bureau of Statistics (ABS) Census migration data and authors' estimates of emigration. This figure is available in colour in the online version of the journal.

Because of the difficulties of mapping migration flows for a country with huge variations in the geographical size of regions, we use a new visualization tool: the circular migration plot (Abel & Sander, 2014). The plot shown in Figure 1 was created with the software package Circos (see http://circos.ca/) using the code described in Sander, Abel, Bauer, and Schmidt (2014). The 50 regions of Australia are arranged in a circular layout, with each region assigned a distinctive colour, together with 'Overseas' shown in grey. The direction of a migration flow is depicted by its colour and proximity to the circle. Flows originating from a particular region are shown in that region's colour and are very close to the circle, while a wider gap indicates the flow's destination. The width of each flow represents the volume of migration, measured out around the edge of the plot in tens of thousands of migrants. To maintain clarity, flows between origin and destination pairs of less than 1700 people are not shown.

The visualization presents a more complete, and more interpretable, summary picture of the spatial pattern of internal and international migration in Australia than has been possible previously. Of particular note are the following facts:

- The size of interregional migration flows is largely a function of regional population size and proximity – a long-established finding with migration patterns (Ravenstein, 1885). For example, one of the largest flows (8500 migrants) is from the biggest population centre, Greater Sydney, to the second biggest, Greater Melbourne.
- Internal migration shows a high degree of containment within states, with significant flows between the capital city (generally by far the most populous region of each state) and other regions of the state.
- Internal migration flows between capital cities are relatively balanced, with strong reciprocal flows between them.
- Immigration to Australia is focused on the largest capital cities, especially Sydney (77,900) and Melbourne (70,800), but there are significant flows to smaller cities and resource centres (Outback Australia).
- Similarly, state capitals are the main senders of emigrants. The smaller non-capital city regions do not contribute significantly to emigration.

Disclosure statement

No potential conflict of interest was reported by the authors.

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