

<b>Institution:</b> University of Leeds
<b>Unit of Assessment:</b> C-17
<b>Title of case study:</b> Case 2 - Research on methods of estimating immigration to local authorities in England helped National Statistics improve their immigration and population statistics
<b>1. Summary of the impact</b> (indicative maximum 100 words) <p>The quality of estimates in the 2000s of immigration to local authority areas in England needed radical improvement. School of Geography (SoG) researchers Rees and Boden developed a method, based on administrative data including NHS Patient, National Insurance and Higher Education records, to improve the accuracy of immigration estimates. The research had a direct impact on the Office for National Statistics (ONS), which adopted and further developed the method for annual estimates of local immigration statistics. These are used as inputs to mid-year population estimates and projections, which play an important role in formulae for allocating funds to local authorities and health bodies.</p>
<b>2. Underpinning research</b> <p>Numbered citations refer to underpinning publications, e.g. [1], and funding, e.g. [IV].</p> <p><b>Context of the Research</b>          Local authority (LA) populations in England gain people from births, in-migration and immigration, and they lose people through deaths, out-migration and emigration. Since 2000, net international migration has directly contributed 54% to population growth in the UK. Between the 2001 and 2011 Censuses, there was a 63% increase in the number of people living in the UK who were born abroad. However, the official system for estimating immigration to LAs needed radical improvement. Immigration estimates are a key input to population estimates that are used to allocate funds to local authorities, so accuracy is crucial.</p> <p><b>Difficulties with using survey and census data (the pre-2011 ONS method)</b>          In 2006 Philip Rees (Professor) and Peter Boden (Director, Edge Analytics Ltd, SoG PT Research Fellow 2008-11, SoG PhD 1989) were commissioned by the Greater London Authority [I] to estimate changes in London's immigrant population in the 2000s. This work highlighted the need for better statistics on immigrants to UK local areas. Prior to 2011 ONS used International Passenger Survey (IPS) data, the Labour Force Survey (LFS) and the 2001 Census to produce sub-national statistics on international migration at regional and local scales. The IPS and LFS sample only a small proportion of arrivals, making regional and local estimates unreliable. Because data from the 2001 Census were used to allocate immigrants from intermediate zones to local areas, sub-national estimates of immigration became problematic after 2004 when large numbers of immigrants from Eastern Europe entered the UK.</p> <p><b>Use of administrative data and a new model for estimating local immigration</b>          Rees and Boden therefore proposed a new framework, the New Migrant Databank (NMD) [1]. The NMD is a database containing aggregate statistics that proxy immigration from all administrative, survey and census sources in the public domain, including NHS and National Insurance new registrations by people previously resident abroad. The NMD provided surrogate variables for local immigration which could be used in improved models allocating national immigration totals to local areas.</p> <p><b>Review for the UK Statistics Agency (UKSA)</b>          Rising concerns about the accuracy of migration statistics led the UKSA to commission [III] a review of the migration statistics literature by a University of Leeds team [2]. The review concluded that the ONS should adopt methods based on administrative data to improve their estimation of immigration statistics. The Leeds researchers compared the results of the ONS method for allocating national totals to local authorities with a simple allocation using GP new registrations of immigrants. This data set covered most of the target population of immigrants whereas the ONS allocations to regional and local areas were only based on sample surveys, the LFS and IPS.</p> <p><b>Estimation of immigration to English local authorities by ethnicity</b>          The Leeds work was further developed through ESRC funding awards [III] and [IV]. For the ethnic population projections, the researchers needed to estimate immigration to all English local authorities by ethnic group. The model presented in [2] was refined by using different administrative sets for each broad age/purpose of migration group. The researchers used National</p>

## Impact case study (REF3b)

Insurance Numbers issued to persons previously resident outside the UK for those entering work aged 16-64, Higher Education Statistics Agency data on foreign students for those coming for study and the new GP registrations of persons previously resident abroad for children aged 0-15 and for the retired, aged 65+ [3, 4]. This method gave more robust results than the existing ONS method based on survey data. In a journal paper [5], **Rees** and **Norman** (lecturer since 2006) quantify the importance of immigration on the ethnic group populations of the UK and local authorities.

**3. References to the research** (indicative maximum of five references)

The commissioned reports (outputs 1 and 2) were key inputs in the development of outputs 3, 4, and 5, which were funded by ESRC and published in: an internationally-recognised, peer-reviewed journal which is a flagship journal of the Royal Statistical Society (output 3); a peer reviewed book chapter (output 4); and a peer reviewed journal of the Royal Geographical Society (output 5). Output 3 is included in REF2.

- [1] *Report commissioned by the Greater London Authority (GLA), who were concerned about official immigration estimates for London*  
**Rees, P.** and **Boden, P.** (2006) *Estimating London's new migrant population. A Report commissioned by the Greater London Authority for the Mayor of London.* Available at: <http://static.london.gov.uk/mayor/refugees/docs/nm-pop.pdf>. Accessed 24/9/2013.
- [2] *Report commissioned by UK Statistics Authority, evaluating UK migration statistics*  
**Rees, P.**, **Stillwell, J.**, **Boden, P.** and **Dennett, A.** (2009) *A Review of Migration Statistics Literature.* Part 2, pp.53-140 in UKSA (2009) *Migration Statistics: The Way Ahead?* United Kingdom Statistics Authority. Available at: <http://www.statisticsauthority.gov.uk/reports---correspondence/reports/authority-report-4--migration-statistics-the-way-ahead.pdf>. Accessed 24/9/2013. [Available on request]
- [3] *The paper setting out the alternative methodology for estimating immigration to local authorities*  
**Boden, P.** and **Rees, P.** (2010). Using administrative data to improve the estimation of immigration to local areas in England, *Journal of the Royal Statistical Society Series A – Statistics in Society*, 173(4), 707-731. DOI: 10.1111/j.1467-985X.2009.00637.x. Cited by 22, Google Scholar.
- [4] *A full account of the methodology in a recent book (all chapters were peer reviewed)*  
**Boden, P.** and **Rees, P.** (2010) New Migrant Databank: concept and development. Chapter 6, pp.111-132 in **Stillwell, J.**, **Duke-Williams, O.** and **Dennett, A.** (eds.) *Technologies for Migration and Commuting Analysis.* IGI Global, Hershey, PA. Print ISBN 9781615207558, eISBN 9781615207565.
- [5] *Peer reviewed paper using the immigration estimates that shows the importance of immigration in subnational population change*  
**Rees, P.**, **Wohland, P.** and **Norman, P.** (2013) The demographic drivers of future ethnic group populations for UK local areas 2001–2051, *The Geographical Journal*, 179(1): 44–60. DOI: 10.1111/j.1475-4959.2012.00471.x. Open access paper

**Research Funding for the underpinning research**

- [I] **Rees** and **Boden**, The Greater London Authority, 2005-6, *Estimating London's New Migrant Population: Review of Methodology.* Consulting Leeds, £15k. This funded output 1.
- [II] **Rees**, **Stillwell**, **Boden**, **Dennett**, UK Statistics Authority, 2009, *Academic Review of Migration Statistics Literature.* Consulting Leeds, £15k. This funded output 2.
- [III] **Rees** and **Norman**, ESRC RES-163-25-0032, 2007-2010, *What happens when international migrants settle? Ethnic group population trends and projections for UK local areas under alternative scenarios.* University of Leeds, £252k (100% FEC). Graded Very Good. This funded outputs 3 and 4.
- [IV] **Norman** and **Rees**, ESRC RES-189-25-0162, 2010-11, *Ethnic group population trends and projections for UK local areas: dissemination of innovative data inputs, model outputs, documentation and skills.* University of Leeds £106k (100% FEC). See <http://www.ethpop.org/> (Accessed 24/9/2013) which disseminates the projections. This funded output 5.

**4. Details of the impact** (indicative maximum 750 words)

The ONS produces population estimates for each mid-year (MYEs) for local authorities. The latest MYEs form the base populations in sub-national population projections (SNPPs). These MYEs and

SNPPs are used throughout central and local government in planning services and in allocating resources from central to local government. For example, the SNPPs for a funding year were used to drive the funding formula that allocated an NHS budget of £89 billion to Primary Care Trusts in England [A]. The ONS uses a cohort-component model to roll forward local area populations from the 2001 Census. The immigration component is highly uncertain and this affects MYEs directly. The research has had a direct impact on ONS, who have adopted and further developed the Leeds approach to estimating immigration to local authorities. To understand this impact, we first outline how the researchers developed the new estimation model for immigration to local authority areas, in collaboration with end users. We then turn to the specific impacts of the research for ONS.

### **The process leading to impact**

ONS estimates total immigration to the UK by year using the IPS with Home Office information on Asylum seekers and Irish Central Statistical Office data on UK-Irish Republic migration. Prior to 2011 ONS employed the IPS and LFS to allocate the national immigration estimates to English regions and Wales (10 zones). The IPS was utilized to distribute regional totals to intermediate zones (63 zones). Census 2001 immigration statistics were then used to assign intermediate zone totals to local and health authorities. However, the GLA were sceptical that the very small IPS could be used to estimate immigrants at the intermediate geography scale and were concerned that use of the 2001 Census would misestimate the distribution of new immigrants from countries which joined the EU in May 2004. In 2006 at the request of the GLA, **Rees** and Boden compiled administrative data proxies for local authorities and used them to create new estimates of sub-national immigration [1].

### **Impacts on the ONS methodology for the estimation of sub-national immigration**

After a commissioned evaluation [B], the ONS adopted the SoG recommendations that sub-national immigration be estimated by allocation the national totals by purpose of migration. ONS made improvements by using detailed administrative data available to National Statistics. For example, ONS used Migrant Worker Scan data (Department of Work and Pensions) to distribute immigrants coming to work. Higher Education Statistics Authority data were used to distribute University students from outside the UK to subnational areas. GP Patient Register data were employed to distribute immigrant children, dependents aged 17-59 and those aged 60+. Home Office data were used to distribute asylum seekers. The methodology generated the sub-national immigration estimates employed in the 2011 local population estimates and will be used in future population estimates and projections. Full documentation on the methodology and its impacts was published on 17 November 2011 [C].

In an email [D] to **Rees**, the ONS project leader confirmed the importance of the Leeds research: *"Work undertaken by Phil Rees and Peter Boden on using administrative data to distribute national immigration flows to local authority level has laid an important foundation to the improved methodology developed by ONS. This work has been elaborated on by ONS through improved access to a range of administrative data sources. These improved immigration figures have been incorporated into a set of indicative population estimates, which are widely accepted as being an improvement on the current figures. These in turn have been used for the 2010-based sub-national projections published on 21 March 2012, which are a key input in allocating local authority funding from central government. ONS intend to use this approach moving forward from the 2011 Census and so this work will leave a lasting legacy."*

Local authority planning has benefitted from the improved local population estimates resulting from the new sub-national immigration estimates. The GLA demographer wrote as follows [E]:

*"The work that SoG carried out on improving immigration estimates has been of immense use to us here at the GLA. Prior to the introduction of the revised MSIP/IMPS methodology by ONS, informed by your work, we had very little faith in the accuracy of estimates of immigration to local authorities in London or even for the city as a whole. I consider the approach to improving the methodology to be sound and sensible and the subsequent estimates are shown to be far more realistic than what has gone before by all sources of evidence that we have available to us - most notably the results of the 2011 Census. The estimates have afforded the opportunity to greatly improve central funding allocations within the capital. The availability of the improved estimates for use in our own population modelling work has been one of the biggest steps forward in the quality of intelligence we've been able to provide to decision makers and planners across the capital."*

The Intelligence Manager of Leeds City Council, wrote to say [F]:

*“the 2011 Census endorsed the work that Peter Boden had undertaken, showing a fall [far] smaller population compared to what had previously been suggested by ONS. The subsequent future estimates for the Leeds population are now accepted as a more robust representation of the changes to population for Leeds, and LCC are pleased to see that the involvement of Peter Boden and yourself have led to the amendment of the methodology now adopted by ONS to improve the accuracy of immigration estimates; LCC has also accepted that the improved accuracy for the estimates of immigration to local authority areas will negatively impact upon the allocated funding received from central government, based upon the revised methodology.”*

#### **What the new population estimates will mean for local authorities from 2013 onwards**

An ONS publication [G] compared two sets of mid-year 2011 MYEs for LAs: (1) MYEs rolled forward from Census 2001 using *old* immigration estimates, (2) MYEs rolled forward from Census 2001 using *new* immigration estimates with MYEs rolled forward populations from Census 2011, the most accurate. Set (2) population estimates are much closer than the set (1) to the Census 2011 estimates. The changes in sub-national immigration estimates led to a revision of the 2005-2011 MYEs and 2011-2036 projections in the 2010 based SNPPs.

The impact of switching to immigration estimates using the new methodology has been measured in an ONS report [H], independently verified by the Leeds researchers. The report shows significant shifts in estimated immigration occurred from local authorities in the East of England, Yorkshire and The Humber, South East and South West to the West Midlands and London.

The new population estimates and projections influence the budgets of LAs and local health agencies because they are used by central government to allocate resources. For example, consider a *thought experiment* in which £100 billion is allocated to local agencies. By using SNPP populations employing the new immigration estimates and assuming population to be the only driver of allocations, there would be a shift of £1.9 billion in 2020 allocations. Some 156 LAs would see increased budgets LAs with Newham (+£145m) and Brent (+£91m) at the top and 170 LAs would lose with Leeds (-£99m) and Bristol (-£101m) at the bottom. Actual allocations are, of course, more sophisticated and nuanced, because factors other than the population are taken into account. However, the experiment serves to demonstrate that demographic methods can potentially influence the delivery of services to local residents in important ways.

#### **5. Sources to corroborate the impact** (indicative maximum of 10 references)

- [A] Department of Health (2011) *Resource Allocation: Weighted Capitation Formula*. Seventh Edition. Pp.21 and 27. Available at: <https://www.gov.uk/government/publications/resource-allocation-weighted-capitation-formula>. Accessed 12/10/2013.
- [B] Bijak, J. (2010) *Independent review of methods for distributing International Immigration Estimates to Regions*. Available at: <http://tinyurl.com/pdqfjke>. Accessed 24/9/2013 [Available on request]
- [C] ONS (2011a) *Improved Immigration Estimates to Local Authorities in England and Wales: Overview of Methodology*. Office for National Statistics, Research Report, 17 Nov 2011. Available at: <http://www.ons.gov.uk/ons/guide-method/method-quality/imps/improvements-to-local-authority-immigration-estimates/overview-of-improved-methodology.pdf>. Accessed 24/9/2013. Section 3.2, p6 discusses the University of Leeds approach.
- [D] Email from the ONS project leader [Available on request]
- [E] Email from GLA Demographer [Available on request]
- [F] Email from Leeds City Council Intelligence Manager [Available on request]
- [G] ONS (2013) *Comparison of Previous and Improved Methods of Estimating International Immigration at Local Authority Level*. Research Report, 26 June 2013. Available at: <http://tinyurl.com/p3w6gg2>. Accessed 24/9/2013 [Available on request]
- [H] ONS (2011b) *Impact Assessment of Improved Immigration Estimates on Local Authorities in England and Wales*. Research Report, 17 Nov 2011. Available at: <http://www.ons.gov.uk/ons/guide-method/method-quality/imps/improvements-to-local-authority-immigration-estimates/imps-impact-assessment.pdf> Accessed 24/9/2013.