

Long-Term International Migration Estimates

Methodology Document

1991 onwards

November 2015

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1.0 Introduction

1.1 Purpose

The aim of this paper is to provide a description of the methodology used to calculate final estimates of Long-Term International Migration (LTIM) for the period since 1991. The current methodology was introduced in 2009 for the calculation of the 2008 estimates, and revisions were made to earlier years as appropriate. This paper also sets out previous methodological changes made to the series since it was introduced.

1.2 Definition of a migrant

ONS use the UN recommended definition of a long-term international migrant:

‘A person who moves to a country other than that of his or her usual residence for a period of at least a year (12 months), so that the country of destination effectively becomes his or her new country of usual residence.’

p 18, [Recommendations on Statistics of International Migration](#)

This is the definition used to calculate net migration, and is also used for the UK usually resident population estimate series. This definition does not necessarily coincide with those used by other organisations.

1.3 Issues with measuring migration

There is no single, all-inclusive system in place to measure all movements of people into and out of the UK. Therefore it is necessary to use a combination of data from different sources, which have different characteristics and attributes, in order to produce estimates of international migration. None of the data sources used, while offering the best data currently available, are specifically designed to capture information solely on international migration.

The London School of Economics¹ identified 3 main categories of illegal or 'irregular' migrants, which include:

- Illegal entrants – including both those who evade formal migration controls and those who present false papers
- Migrants who have been lawfully present in the country but remain after the end of the permitted period. This category includes two main subcategories:
 - i. failed asylum seekers who stay in the country despite a final decision refusing them continuing right to remain
 - ii. overstayers whose period of legal residence has expired without renewal. This group includes those who are no longer eligible to apply for extensions because of the introduction of the points system
- Children born in the UK to irregular migrant couples. They are not migrants themselves, but have no right to remain

By its very nature it is impossible to quantify accurately the number of people who are in the country illegally. For this reason ONS does not produce estimates on the size of the illegal migrant population. However, while our data do not identify illegal migrants separately, many will be included in our data. Those who overstay their visa would have been counted in our immigration

figures by the IPS when they originally entered the country and those who arrived illegally and then subsequently claimed asylum will also be included.

Furthermore, every 10 years ONS conducts the Census and at this time a notable proportion of the illegal migrant population should be captured in the population estimates. The 2011 Census initially captured 94% of the resident population using an address register and focussing on hard-to-count areas. Adjustments were then made following the Census Coverage Survey to estimate the whole population.

In June 2005, the Home Office published the outcome of an assessment of whether methods used in other countries to estimate the size of the illegal population could be applied to the UK. The outcome estimated that the total unauthorised migrant population living in the UK in 2001 was 430,000. Please see the following reports for more information: [29/05 - Sizing the unauthorised \(illegal\) migrant population in the United Kingdom](#) and [58/04 - Sizing the illegally resident population in the UK](#). As mentioned above a report written by the London School of Economics¹ estimated that in 2007 the number of 'irregular' migrants was 618,000 (which includes all of the above listed main categories)².

1. 'Economic impact on the London and UK economy of an earned regularisation of irregular migrants to the UK', London School of Economics, (Greater London Authority, 2009)
<http://www.lse.ac.uk/geographyAndEnvironment/research/london/pdf/irregular%20migrants%20full%20report.pdf>

2. A more recent report has been published by Migration Watch who have updated the LSE report based on several different assumptions <http://www.migrationwatchuk.org/briefing-paper/190>

2 Current methodology

The methodology outlined below was first applied in 2009 for the calculation of the 2008 estimates and revisions were made to earlier years as appropriate.

As a consequence of these methodological improvements, the Long-Term International Migration (LTIM, formerly known as Total International Migration or TIM) back series was revised. The impact of these revisions can be seen in [Appendix A](#).

2.1 Data sources used to compile final estimates of Long-Term International Migration (LTIM)

Estimates of LTIM are produced from these main data sources:

- International Passenger Survey (IPS)
- Labour Force Survey (LFS) – provide a geographical distribution of migrants for the calibration methodology (see [Section 2.3](#))
- Home Office data on asylum seekers and their dependents and on non-asylum enforced removals
- forecasted Long-Term International Migration estimates based on previous GP registrations from the Northern Ireland Statistics and Research Agency (NISRA) for estimating long-term

international migration to and from Northern Ireland and the rest of the world, from 2008 onwards; forecasted data is replaced with final data for LTIM final annual estimates

2.2 Components of LTIM

LTIM is comprised of a number of components ([Box 1](#)), which are described in detail below.

Box 1: Method to produce Long-Term International Migration (LTIM)

<p>Long-Term International Migration</p>	<p>=</p> <p>International Passenger Survey</p> <p>+</p> <p>Northern Ireland migration flows</p> <p>visitor switcher flows</p> <p>asylum seeker flows (including an adjustment for non-asylum enforced removals)</p> <p>-</p> <p>migrant switcher flows</p>
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2.3 International Passenger Survey (IPS)

The [International Passenger Survey](#) (IPS) is a sample survey of passengers arriving at, and departing from, United Kingdom air and sea ports and the Channel Tunnel. It is carried out by the ONS for a range of public and private sector organisations. In particular, it provides figures used for the travel account of the balance of payments, captures data on international tourism as well as providing data on the numbers and characteristics of short-term and long-term international migrants. [Map 1](#) shows each port at which the IPS interviewing currently takes place.

The long term international migration data from the IPS is the largest component of LTIM. It is important to note that these data are intentions based, for example, the survey asks how long each migrant intends to remain in or out of the UK, as opposed to recording what they have done on their later journeys.

In 2009 adjustments were made to the methodology of the IPS, in terms of both sampling and data processing. This resulted in a sample design that is better optimised for collecting data on migrants.

Please note that net migration estimates for 2001 to 2011 have been revised in light of the results of the 2011 Census, which showed that net migration was higher than implied by published migration estimates. A review into the [Quality of LTIM estimates](#) showed that the IPS missed migration flows, particularly of EU8 citizens, prior to improvements to the survey in 2009 which increased its coverage of regional airports.

[Appendix A](#) provides further detail on the IPS, including its sample design; how the collected data is weighted to be representative of the total numbers travelling; information about the quality of the estimates; and details of the recent changes and their impacts. Further general information about the IPS can be obtained from the annual report [Travel Trends – A Report on the International Passenger Survey](#).

A copy of the 2015 version of the IPS questionnaires can be found in [Appendix B](#).

The IPS has some limitations with respect to measuring immigration and emigration, as it:

- is a sample survey and so only a sample and not every migrant to or from the UK is interviewed; as a result, the estimates are subject to a degree of uncertainty
- does not capture all asylum seekers who may be entering or leaving the UK
- does not take into account the changing intentions of passengers (those who intended to remain in or out of the UK for 12 months, but actually spent less than a year; and those who believed they would be staying or leaving for less than a year but actually spent longer)
- does not capture those who are crossing the land border between the UK (Northern Ireland) and the Republic of Ireland

The IPS asks long term immigrants to state where they intend to move to within the UK. ONS research, as part of the [Migration Statistics Improvement Programme \(MSIP\)](#), compared IPS data with the 2001 Census and the [Labour Force Survey \(LFS\)](#) (a sample survey of households living at private addresses in Great Britain). This revealed that there are some migrants who will live at their intended destination for only a short period of time before moving elsewhere. In particular, IPS data show a greater proportion of migrants stating London as their destination compared with either the LFS or Census data. One explanation is that London is the international gateway to the UK and is therefore a transition point before they settle in other parts of the UK.

Map 1 – International Passenger Survey Locations



The geographical distribution of immigrants who were recorded entering the UK by the IPS can therefore be improved with the use of the LFS. This is because it asks respondents where they

lived a year ago and this identifies recent migrants. The LFS can therefore provide more reliable data on where migrants actually live rather than on their intentions when they first arrive.

A methodology has been developed that adjusts the IPS data to the geographical distributions provided by the LFS (known as “calibration”) and is described in detail in the paper [The use of calibration in estimating international in-migration to UK countries and the regions of England](#). The main steps are as follows:

- LFS data are used to identify the geographical distribution of recent immigrants (those that arrived in the UK within the last year) by UK country and English Region
- these distributions are applied to IPS inflows to create a ‘control total’ for each geographical area
- IPS data are calibrated to each control total

An IPS dataset is created which has the same total inflows as the original, but the estimates by geographical area are consistent with LFS data on where recent migrants are living.

Calibration is applied to individual IPS contacts, potentially changing the weight of each contact so that regional proportions match those of the LFS. Calibration can therefore affect all IPS breakdowns (for example, citizenship) not only regional breakdowns.

Outflow data is not put through the process of calibration and remains unchanged. An assessment of the impact of these changes on the LTIM series can be seen in [Impact of Revised Methodologies on Total International Migration \(TIM\) Estimates](#).

This improved methodology has been implemented back to 1999 since the scope of the original research only went back this far. Prior to this, the IPS alone was used to distribute migrants around the UK. Care therefore needs to be taken when examining detailed breakdowns of the IPS estimates before and after 1999, particularly when comparing regional or country estimates before and after this point.

2.4 Migrant and visitor switchers

As mentioned in [Section 2.3](#), one of the key features of the IPS estimates is that they are based on passengers’ intentions. The IPS classifies migrants as travellers who intend to change their country of residence for at least a year. This can be either overseas residents arriving to live in the UK, or UK residents leaving to live abroad.

Sometimes these intentions may not be realised. People who enter or leave the UK intending to be a visitor, that is staying or being away for less than 12 months, may actually migrate for more than a year. These people are, in effect, visitors who subsequently become migrants, and are referred to as ‘visitor switchers’. These migrants must therefore be added to the estimate of migration to make it comprehensive.

Alternatively, some people who enter or leave the UK intending to migrate (for 12 months or more), may actually stay in or leave for less than a year. These people are known as ‘migrant switchers’ as they intended to be migrants, but were actually visitors. They need to be removed from IPS migrant flows. These adjustments improve the accuracy of the LTIM estimates.

These switchers are identified by the IPS as they complete their journey when subsequently entering or leaving the UK. The passenger is asked how long they intended to stay in the UK or overseas when they initially arrived or departed, and for how long they actually remained in or out of the UK. Please see [Boxes 2](#) and [3](#) for more information on the current visitor and migrant switcher methodology used to adjust the IPS estimates to calculate LTIM.

Box 2: Visitor switcher methodology

Travellers who intend to stay in or leave the UK for less than 12 months are recorded by the IPS as 'visitors'. It is known that a proportion of visitors, who state an intention to stay in their destination country for 6 to 12 months or possibly 12 months, could potentially stay for more than 12 months and therefore subsequently become migrants. These people are known as 'visitor switchers'.

In response to a need for more accurate estimates of visitor switchers, new IPS questions were introduced in 2004. These questions collect data on respondents who did not intend to stay in or leave the UK for longer than a year, but subsequently did. These data are then used to provide a more informed indication of how many visitors will change their intentions and become migrants. This is an improvement to the previous methodology which estimated how many of the potential visitor switchers would become migrants, without the additional information from the IPS (see [Section 3.0](#)).

It is known that the likelihood of a visitor changing their intentions can vary depending on their citizenship and place of last or next residence. To take these differences into account, the visitor switchers are split into four groups before any calculations are carried out: those entering the UK who are EEA and non-EEA citizens, those leaving the UK who are EEA citizens going to the EU, and all 'other' citizens leaving the UK going to anywhere in the world. (The EEA refers to the European Economic Area, which is the EU plus Iceland, Liechtenstein and Norway.)

For each group the following calculation is made:

$$\frac{\text{(respondents who did not intend to stay in or leave the UK for longer than a year, but subsequently did, over previous three years)}}{\text{(respondents who stated an intention to stay in their destination country for 6-12 months or possibly 12 months, over previous three years)}} \times \text{(respondents who stated an intention to stay in their destination country for 6 to 12 months or possibly 12 months, this year)}$$

For details of the proportions of components that make up LTIM estimates, please see [Table 1.01](#) for long-term migrants.

Box 3: Migrant switcher methodology

The new IPS questions introduced in 2004 also collect data which can help improve the estimation of the number of migrant switchers. As with visitor switchers, these questions gather information on a traveller's completed journey, therefore allowing the estimate to be calculated using actual migrant switcher data, as opposed to just using data for those who originally intended to be migrants.

As with the calculation of visitor switchers, a fraction is produced that takes the number of migrant switchers (over the previous three years) and divides these by the number of migrants recorded by the IPS in the previous three years. This denominator is therefore the pool of travellers who could potentially become migrant switchers as they were initially recorded stating an intention to be migrants. It is produced separately for both immigration and emigration. Unlike visitor switchers, there is no distinction between citizenships or countries of last or next residence for migrant switcher calculations.

The number of migrant switchers is then removed from the estimate of LTIM in the reference year as these people are not migrants. The proportion will change each year depending on the number of both migrants and migrant switchers captured by the IPS.

For details of the proportions of components that make up LTIM estimates, please see [Table 1.01](#) for long-term migrants.

Due to the new IPS questions being introduced in 2004, a decision was made to apply the new methodology to the 2004 estimates onwards. Care therefore needs to be taken when comparing LTIM estimates before and after this year. The 2006 calendar year estimates were the first to use a full three years of data as required by the methodology as the new questions in the IPS were only introduced in 2004.

Further details of the improved switcher methodology are provided in the paper [Estimation of People Whose Intentions Change With Respect to Their Length of Stay](#) and a comparison of how the fractions have changed using the previous and current methodologies are provided in Appendix C of [Impact of Revised Methodologies on Total International Migration \(TIM\) Estimates](#).

2.5 Asylum seekers and non-asylum enforced removals

As mentioned in [Section 2.3](#), the IPS does not interview all asylum seekers entering or leaving the UK. In order to produce LTIM, ONS obtains data from the Home Office (as they are responsible for immigration control, and applications for settlement, citizenship and asylum) on principal applicant asylum seekers and their dependants. Details can be found on the [Home Office \(UK Visas and Immigration Agency\)](#) website.

Data are provided for different types of asylum seekers. This includes the number of those who applied for asylum, were refused asylum, appealed against their asylum decision, asylum seekers who were returned home and those who withdrew. These different categories dictate whether the

asylum seeker is leaving or entering the UK. An adjustment for asylum seekers returned, departing voluntarily, or withdrawing their application and leaving the UK within a year of the application, is made. This therefore excludes those who are not long-term migrants from the LTIM estimates.

Asylum applications covered by the Home Office can be identified as either 'port' or 'in-country'. Port asylum seekers – the minority – are those who apply at port when entering the UK. Most port asylum seekers are not captured in the IPS because they are usually escorted over the IPS counting line. An allowance is made when estimating port asylum seekers for the small number of migrants in the IPS data who give 'seeking asylum' as their reason for entry, and will therefore be double-counted if kept in.

In-country asylum seekers are those who enter the UK and later apply for asylum while in the UK. It is assumed that information about planned duration of stay given to the IPS interviewer is the same as that given to the Immigration Officer and, therefore, that in-country asylum seekers are unlikely to be captured as migrants in the IPS.

In summary, asylum seeker immigration figures are based on the number of people applying for asylum. This data is used to adjust the IPS estimates in order to:

- exclude those asylum seekers counted by the IPS on arrival in the UK to remove the possibility of double-counting
- allow for the small numbers of those counted in both the principal applicant and dependant applications data, and
- exclude those who were returned within a year of their application

Asylum seeker emigration figures are based on, (a) the number who were returned to their country of origin, (b) the number who withdrew their application and were known to have left the UK, and (c) a small number of applicants who had been refused asylum in the previous year (and, if appropriate, had been unsuccessful at appeal) or who had withdrawn their application and were not known to have left the UK.

The Home Office also collect data on non-asylum enforced removals – these are people who have been removed from the UK and who have not claimed asylum at any stage. They would not be interviewed by the IPS upon leaving the UK as they would not cross the sampling line. No adjustment for these people is required for inflow estimates, as they were not asylum seekers and therefore would have crossed the IPS sampling line on entering the UK.

For 2013 data onwards, it is possible to identify long-term migrants within the data on non-asylum enforced removals. Therefore for 2013 estimates onwards, an adjustment is made to include non-asylum enforced removals in asylum seekers emigration estimates. The approximate impact of applying the adjustment is to increase emigration estimates by 2,000-3,000 per annum and reduce net migration by around 1%.

2.6 Estimate of migration to and from Northern Ireland

As mentioned in [Section 2.3](#), the IPS does not sample those passengers who cross the land border between the UK (Northern Ireland) and the Republic of Ireland. In addition, no ports in

Northern Ireland have historically been surveyed in the IPS, although this started at Belfast International Airport in 2009.

Family doctor registration data is the most complete source that can be used to estimate international immigration to Northern Ireland. This source gives information on an intention to stay for a period of time and covers all age groups.

The health card system records de-registrations with family doctors in Northern Ireland, while the Central Statistics Office (CSO) Ireland Quarterly National Household Survey provides the number of people moving from Northern Ireland to the Republic of Ireland. In combination, these sources are used to estimate emigration from Northern Ireland to all countries outside the UK.

These estimates are then incorporated into the LTIM estimates. A more detailed explanation of this methodology and the recent changes is available in [Improving estimates of international migration in Northern Ireland, and between the UK and the Republic of Ireland](#). Further information about international migration statistics for Northern Ireland is available at the [Northern Ireland Statistics and Research Agency \(NISRA\)](#).

It should be noted that since 2014, ONS use forecasted data provided by NISRA for quarterly LTIM estimates. This is to improve timeliness of statistical outputs. Forecasted data is replaced with final data for the annual final LTIM estimates.

2.7 Assumptions made in order to produce LTIM

The published LTIM figures are broken down to show estimates by variables such as citizenship and age and sex. To produce estimates for each of these variables, data from the sources that contribute to LTIM also need to be broken down by the same variables.

Migrant data from the IPS is available broken down by each variable. Data on Northern Ireland flows and asylum seeker data are not, and need to be derived using a series of assumptions. In addition, the IPS data used to calculate the visitor switcher adjustments are based on a relatively small sample size each year, but still need to be broken down in the same way.

The following tables detail how the Northern Ireland flow data, asylum seekers and visitor switcher data are broken down for each variable. It is not necessary to do further processing to form assumptions for the migrant switcher data as it is applied as a direct proportion of the IPS migrant estimates.

2.7.1 Citizenship (and country of birth) assumptions

Table 1: Assumptions made for citizenship

Source	Assumption made for citizenship
Northern Ireland immigration data	Uses IPS immigration data constrained to NISRA family doctor registration data by age, sex, country of last residence and reason for migration
Northern Ireland emigration data	Uses 75% of the immigration distribution from Northern

	Ireland data and 25% of the IPS emigration distribution, constrained to total Northern Ireland emigration
Asylum seeker and non-asylum enforced removals data	None as Home Office provides data by citizenship
Visitor switcher data	A three year average of the visitor switcher data by citizenship is used.

2.7.2 Country of last or next residence assumptions

Table 2: Assumptions made for country of last or next residence

Source	Assumption made for country of last or next residence
Northern Ireland immigration data	Data comes from family doctor registration
Northern Ireland emigration data	Uses 75% of the immigration distribution from Northern Ireland data and 25% of the IPS emigration distribution, constrained to total Northern Ireland emigration
Asylum seeker and non-asylum enforced removals data	Assumed to be the same as citizenship
Visitor switcher data	A three year average of the visitor switcher data by country of last or next residence is used

2.7.3 Main reason for migration assumptions

Table 3: Assumptions made for main reason for migration

Source	Assumption made for main reason for migration
Northern Ireland immigration data	Data comes from family doctor registration
Northern Ireland emigration data	Uses 75% of the immigration distribution from Northern Ireland data and 25% of the IPS emigration distribution, constrained to total Northern Ireland emigration
Asylum seeker and non-asylum enforced removals data	Is always included in the 'other' reason for migration category
Visitor switcher data	A three year average of the visitor switcher data by reason for migration is used

2.7.4 Usual occupation (prior to migration)

Table 4: Assumptions made for usual occupation (prior to migration)

Source	Assumption made for usual occupation (prior to migration)
Northern Ireland immigration data	Uses IPS immigration data constrained to NISRA family doctor registration data by age, sex, country of last residence and reason for migration
Northern Ireland emigration data	Uses 75% of the immigration distribution from Northern Ireland data and 25% of the IPS emigration distribution, constrained to total Northern Ireland emigration
Asylum seeker, non asylum enforced removals and visitor switcher data	In consultation with the Home Office it was agreed that usual occupation is linked to 'reason for migration'.

2.7.5 Origin or destination distribution within the UK, assumptions

As discussed in [Section 2.3](#), IPS data are adjusted using the LFS distributions to more reliably distribute immigrants throughout the UK, known as calibration. The following assumptions are made for people who are not covered by the IPS or whose intended length of stay changes:

Table 5: Assumptions made for origin or destination distribution within the UK

Source	Assumption made for origin or destination distribution within the UK
Northern Ireland flow data	Northern Ireland
Asylum Seeker and non-asylum removals data	Distribution calculated using asylum support data (a data set indicating the number of asylum seekers receiving support) which is supplied by the Home Office
Visitor switcher inflow data	Use the LFS distribution to assume the migrant's destination within the UK
Visitor switcher outflow data	Calculated by using the most recent three year average of the IPS visitor data by origin

2.7.6 Age and sex assumptions

Table 6: Assumptions made for age and sex

Source	Assumption made for age and sex
Northern Ireland flow data	Data come from family doctor registration
Asylum Seeker and non-asylum enforced removals data	None as the Home Office provides the data by age and sex

Visitor switcher flow data	Calculated by using the most recent three year average of the IPS visitor data by age and sex
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2.7.7 Sex and marital status assumptions

Table 7: Assumptions made for sex and marital status

Source	Assumption made for sex and marital status
Northern Ireland immigration data	Data on sex comes from family doctor registration. Data on marital status use IPS immigration data constrained to NISRA family doctor registration data by age, sex, country of last residence and reason for migration
Northern Ireland emigration data	Data on sex comes from family doctor registration. Data on marital status use 75% of the immigration distribution from Northern Ireland data and 25% of the IPS emigration distribution, constrained to total Northern Ireland emigration
Asylum seeker, non-asylum enforced removals and visitor switcher data	Estimated using a three year average of the marital status distribution taken from the IPS. Carried out separately for males and females aged 15 and over

2.7.8 Intended length of stay assumptions

A distribution for intended length of stay from the IPS is used for those entering and leaving the UK for work or study.

Table 8: Assumptions made for intended length of stay

Source	Assumption made for intended length of stay
Northern Ireland immigration data	Uses IPS immigration data constrained to NISRA family doctor registration data by age, sex, country of last residence and reason for migration
Northern Ireland emigration data	Uses 75% of the immigration distribution from Northern Ireland data and 25% of the IPS emigration distribution, constrained to total Northern Ireland emigration
Asylum seeker, non-asylum enforced removals and visitor switcher data	In consultation with the Home Office it was agreed that length of stay for asylum seekers, non-asylum enforced removals and visitor switchers is linked to 'reason for migration'. Asylum seeker, non-asylum enforced removals and visitor switcher data are combined to give totals for each 'reason for migration'. A length of stay distribution is then applied to each 'reason for migration' total

2.8 Provisional LTIM estimates

Provisional estimates give a timely indication of the flow levels of international migration, being produced five months after the reference date, compared to 11 months for final data. For Long-

Term International Migration (LTIM) they are produced quarterly on a rolling year basis. Top level figures, in addition to estimates by citizenship and reason for migration, are available. They are produced in exactly the same way as final LTIM estimates, except that some of the data sources are provisional. Previous time periods on the chart only use final data. More information on the differences between provisional and final LTIM data is available in: [Frequently Asked Questions and Background Notes for Long-Term International Migration Estimates](#).

3.0 Summary and timeline of methodological changes

Over time small adjustments have been made in the methodology to produce LTIM estimates. These reflect improvements in the components or statistical techniques used to estimate the flow of international migrants. [Table 9](#) summarises changes, whereas [Table 10](#) identifies where discontinuities exist in the present time series of LTIM, from 1991 to the latest time period.

Table 9: Summary of methodological changes to components of final LTIM estimates, 1991 to 2013

Period of data on which change was implemented	Component of LTIM affected	Changes made	Impact of changes	Further information
2013 onwards	Asylum seekers	Including an adjustment for non-asylum enforced removals within the asylum seeker adjustment.	Increase emigration by 2,000-3,000 per annum, reducing net migration by about 1%.	
2009	IPS	Changes to sample design and data processing.	Survey more statistically robust, particularly for international migrants not entering the country through Heathrow.	International Passenger Survey Methodology
2008	IPS and Republic of Ireland (ROI) component	IPS figures on the Republic of Ireland used in LTIM instead of data from the Central Statistics Office of Ireland.	Discontinuity between 2008 and earlier years, as revisions to the back series of final IPS data (used in final LTIM figures) have not been run. But it is thought that between 2001 and 2006, UK immigration would have increased by an average of 10,000 per year and UK emigration would have decreased by an average of 2,000 per year.	Improving estimates of international migration in Northern Ireland, and between the UK and Republic of Ireland
2008	IPS and Northern Irish component	Northern Irish data is calculated using data from family doctor registrations in Northern Ireland. Previously data from the IPS was used.		
2008 and back series to 1999	IPS – geographical distribution of immigrants	IPS inflow calibrated to LFS distribution of recent migrants.	Inflows – reduction of migrants into London and increase of migrants elsewhere. Calibration also introduced some secondary effects on other variables. Revised back to 1999 – small discontinuity with years prior to 1999.	Impact of Revised Methodologies on Total International Migration (TIM) Estimates
2006 and back series to 2004	Visitor and Migrant Switchers	New IPS questions introduced to capture “actual migrants”. This data informs the visitor and migrant switcher calculations.	Applied to 2004 data onwards. Total inflows - negligible impact. Total outflows – reduction of 20K a year in 2004 and 2005 incorporated into revisions. Small discontinuity with years prior to 2004.	Estimation of People Whose Intentions Change With Respect to Their Length of Stay
2003 and back	Visitor	Previously estimates were	Between 1992 and 2001, these	Impact of Revised

series to 1991	Switchers	based just on visa data supplied by the Home Office. Now calculated by ONS for the first time using fixed proportions.	changes led to a reduction in the net inflow of 97,000. Incorporated into 2003 revisions	Methodologies on Total International Migration (TIM) Estimates
2003 to 1991	Migrant Switchers	Assumed that 5% of those identified by the IPS as immigrants became migrant switchers. For outflows it was assumed that 1% of emigrants returned to the UK within a year, also became migrant switchers.	Same methodology used for years 1991 to 2003.	Impact of Revised Methodologies on Total International Migration (TIM) Estimates

Period of data on which change was implemented	Component of LTIM affected	Changes made	Impact of changes	Further information
2002 backdated to 1991	Asylum Seekers	Improvement in the estimation of the outflow of unsuccessful asylum seekers; and an allowance for the dependants of asylum seekers not captured by other data sources.	Negligible difference to net flow of asylum seekers.	
1999 backdated to 1992	Adjustments to IPS Weightings	Improvements were made to the methods used to weight up the estimate of migrants from the IPS.	The net effect of these weighting changes in 1999 was to decrease the inflow by 4.2% and increase the outflow by 3.4%. The adjusted flows for each year remained within originally published error bands for the IPS estimates.	MN No.26 International Migration 1999
1992 to 1994, revised	Adjustments to Home Office data (visitor switchers and asylum seekers)	Revisions to the previously provided visitor switcher and asylum seeker data for 1992 to 1994.	These revisions reduced the total visitor switcher inflow by 26,000 and increased the total asylum seeker inflow by 21,000 over the three year period. The net effect on LTIM estimates was small, as it only reduced the inflow by 5,000.	Impact of Revised Methodologies on Total International Migration (TIM) Estimates

Table 10: Discontinuities in the component data of final LTIM estimates

	International Passenger Survey (IPS)	Data on flows to and from Northern Ireland	Data on flows to and from the Republic of Ireland	Visitor Switchers	Migrant Switchers	Asylum Seekers
1991		Data from the IPS	Data from Central Statistics Office of Ireland.	Estimated using fixed proportions of EEA and non-EEA citizens to EU and Other countries.	Estimated that 5% of inflow of IPS migrants and 1% of outflow become	Calculated by ONS using Home Office Data.
1992						
1993						
1994						
1995						
1996						
1997						

1998						Migrant Switchers each year.	
1999	IPS inflow calibrated to LFS distribution of recent migrants.						
2000							
2001							
2002							
2003							
2004							
2005							
2006					Visitor Switcher calculations based on information from new IPS questions on actual length of stay.	Migrant Switcher calculations based on information from new IPS questions on actual length of stay.	
2007							
2008							
2009	IPS inflow calibrated to LFS distribution of recent migrants.	Changes to sample design and data processing.	Data supplied by NISRA using family doctor registrations.	IPS data used.			
2010							
2011							
2012							
Most current data							Adjustment for non-asylum enforced removals included.

Unfortunately it is not always possible to apply changes in methodology to the entire back series. This is because of problems regarding data availability in earlier years. This has resulted in unavoidable discontinuities in the time series. Overall these discontinuities are small and it is important not to confuse the size of the revisions with the real underlying trends in LTIM.

Appendix A

Further information on the International Passenger Survey (IPS)

IPS Sample Design

Background

The IPS uses a multi-stage sample design, which is carried out separately for air, sea and tunnel travel. The underlying principle is that, in the absence of a sampling frame of travellers, time shifts or sea crossings are selected and then travellers are systematically chosen at fixed intervals within these shifts or crossings.

At the airports a certain number of shifts are sampled randomly each quarter, each stratified by time of day and by day of the week. Passengers are counted as they cross a predetermined line and every *n*th person is interviewed. At sea ports, passengers may be sampled on the quayside as they embark or disembark. The sampling approach is similar to that at the main airports as the timing of the interviewing shift is selected randomly. At other ports, interviewers travel on the boats and sample passengers systematically. For tunnel routes, the method is different for passenger trains and vehicle shuttles. Passenger trains are treated in a similar way to airports, where time shifts are selected and then a sampling interval used within a time shift. In contrast, for vehicle shuttles, crossings are randomly selected and interviewing takes place on board the shuttles themselves.

Prior to 2009

Prior to 2009, the main UK airports – Heathrow, Gatwick and Manchester – were always included in the sample. Other airports were included in the sample if they had at least one million passengers a year passing through them. Sea routes were treated similarly to the smaller airports, in that they were included or excluded in the sample depending on the size of the international traffic passing through.

Extra samples, referred to as migration filter shifts, were also carried out on the inward (arrival) flows at the four Heathrow and two Gatwick terminals to boost the sample of migrants. These were first run in departures (outflow) in 2007. Contacts were asked a brief series of questions to identify whether or not they were migrants and only migrants were given a full interview.

Changes made in 2009

In January 2009, changes were made to the sample design and data processing of the IPS. These changes were introduced following a Port Survey Review in response to the recommendation put forward by the Inter-Departmental Task Force on Migration Statistics in 2006. Further information on the Port Survey Review is available in [Port Survey Review - Stage Two Final Technical Report](#)

The sample design changes consisted of:

- increasing the number of shifts run at many air/sea/tunnel ports apart from at Heathrow
- decreasing the number of shifts run at Heathrow
- new shifts being established at Aberdeen and Belfast airports and the Portsmouth to Bilbao sea route
- abolishing the migration filter shifts

- introducing a primary sampling interval for screening migrants (around 1:10) and a sub-sample interval for travel and tourism contacts (around 1:30) within the ordinary shifts, therefore travel and tourism contacts are a sub-sample of the migrant sample

The new sample design aims to be both more migrant focused and more balanced in terms of the routes that migrants use. An optimization exercise was undertaken using 2006 IPS data to determine the distribution of IPS shifts by route that would be expected to deliver the most statistically robust sample.

Grossing the IPS interviews to total numbers travelling

Sample contacts need to be grossed to represent total estimates. This is done by using a complex weighting system. The method of grossing the interviews to national estimates varies depending on the method of travel.

The 2009 changes included improvements to the weighting and imputation of IPS records. A detailed description of how the IPS raw data is grossed is available in [Travel Trends – A Report on the International Passenger Survey](#)

Quality of the IPS survey data

The IPS is a sample survey and is, therefore, subject to some uncertainty. Figures obtained from the IPS are subject to both sampling and non-sampling errors.

Sampling error

Sampling error arises due to the variability that occurs by chance because a sample, rather than an entire population, is surveyed; that is, sampling error results because not every migrant who enters or leaves the UK is interviewed. Sampling errors are determined both by the sample design and the sample size. Sampling error may sometimes present misleading changes as a result of the random selection of those included in the sample.

Confidence intervals (CI) are provided with IPS based estimates and are a statistical method by which sampling error can be measured. A confidence interval is the range within which the true value of a population parameter lies with known probability. For example the 95% confidence interval represents the range in which, over many repeats of the sample under the same conditions, we would expect the confidence interval to contain the true value 95 times out of 100. Equivalently, we can say that there would be a 1 in 20 chance that the true value would lie outside of the range of the 95% confidence interval. The uppermost and lowermost values of the confidence interval are termed 'confidence limits'.

When estimates are broken down to lower levels of detail, greater care must be taken with their interpretation. This is because these estimates will be based on a smaller number of survey contacts, which increase the uncertainty around the estimate. For example, it is not possible to produce estimates for most individual citizenships or countries of last/next residence, within a single year, because of the small number of survey contacts that comprise each estimate.

Even where the sample size allows individual country estimates to be produced, it is often not possible to say that a change in the estimate from one year to the next is real or not. This is because smaller estimates often have proportionately larger confidence intervals than larger estimates. However, in a few instances where the estimates are based on large enough sample

sizes, we can be at least 95% certain that the change in the estimate represents a statistically significant change.

Details of the possible effects of sampling error on the migration estimates by various characteristics are given in [Table 1.02](#) of the Long-Term International Migration tables. Entries in this table show that estimates based on the sampling of passengers on certain routes have proportionately larger confidence intervals associated with them. Thus, generally speaking, the reliability of the estimate increases in proportion to the size of the estimate.

Statistical Significance

Confidence intervals are also useful when comparing differences between estimates. If a change or a difference between estimates is described as 'statistically significant', it means that statistical tests have been carried out to reject the hypothesis that the change has occurred by chance. Therefore significant changes are very likely to reflect real changes in migration patterns. A quick method of identifying if the difference between two estimates is statistically significant is to determine if there is an overlap of their confidence intervals. If they do not overlap, then the differences can be described as statistically significant. However, if they do overlap, then a t test should be performed to determine significance. This test divides the difference of the estimates by the square root of the sum of the squared standard errors. The standard error can be calculated by dividing the published confidence interval by 1.96. The resulting t-value needs to be greater than 1.96 to be 95% certain that the estimates are different. It can also be used to create a confidence interval around the difference. It calculates the standard error of the difference directly from using the difference between the two individual standard errors. All main statistical software packages have the functionality required to perform a t test. If you need assistance with identifying whether the difference between two international migration estimates is statistically significant then please contact migstatsunit@ons.gov.uk.

With regards to the use of t-tests with LTIM estimates, the additional data sources used in LTIM are not subject to the uncertainty associated with a sample survey, although it is recognised that they are unlikely to be error free. There is no method of quantifying the possible error associated with the non-survey components of LTIM and these errors are unlikely to be random. Therefore statistical tests for significance are best applied to IPS based estimates.

Non-sampling errors

Non-sampling error is all error that is not sampling error. The challenge with non-sampling error is that it is difficult to directly calculate a numerical measure of its effect. This, therefore, makes it hard to incorporate when analysing results. Non-sampling error is best understood by referring to examples that apply to the IPS.

The first non-sampling error may be due to non-response. Bias will occur when passengers who do not respond to the survey have different characteristics to those who do respond. Possible low levels of response that might be expected due to the respondent not speaking English have been reduced in recent years by the introduction of separate sampling arrangements at the Port Health Channel. This improvement is at least partly because interviewers can more easily enlist the help of relatives or interpreters to translate for contacts who do not speak English.

A further source of bias may arise from contacts deliberately concealing their migration intentions from the interviewers. In addition, the question that determines whether the contact is a migrant or

not and their length of stay, is based on intentions and not actual behaviour. Measurement errors could therefore be introduced if there is a discrepancy between those intending to migrate, but who subsequently stay less than a year, and those not intending to migrate, but who stay for a year or more.

For those contacts identified by the IPS as migrants, the level of non-response is very low for most characteristics. Latest details of survey non-response can be found in Appendix E of the latest annual report [Travel Trends – A Report on the International Passenger Survey](#).

[International Passenger Survey: Quality Information in Relation to Migration Flows](#) provides an overview of the quality and reliability of the International Passenger Survey (IPS) in relation to producing estimates of long-term migration flows.

Impact of 2009 changes

Analysis carried out by ONS has shown that the 2009 changes to the collection of the IPS data have created some small discontinuities between the international migration estimates for 2008 and 2009. However these are all within one standard error of the published figures and are no cause for concern. As a result of the changes the estimates being produced are now more statistically accurate, particularly for international migrants who use arrival and departure points around the UK.

Appendix B

International Passenger Survey (IPS)

Questionnaires