2016-based national population projections

Update note – migration assumptions

Papers regarding the proposed fertility, mortality and migration assumptions for the 2016-based national population projections were issued in June 2017 to key stakeholders.

Consultation meetings were held during June by ONS and National Records of Scotland (NRS) to discuss the proposals. In addition, the Welsh Government (WG) and the Northern Ireland Statistics and Research Agency (NISRA) invited key stakeholders within Wales and Northern Ireland to comment on the proposed assumptions by correspondence.

As a result of the consultation no updates were made to the original proposed migration assumptions. The proposals were agreed by the NPP committee in July 2017.

It should be noted that there can be small rounding differences between the assumptions presented in this consultation paper and figures used in the projections.

NPP (17) 4

NATIONAL POPULATION PROJECTIONS CONSULTATION

2016-based national population projections: migration

Paper prepared by the Office for National Statistics Population Statistics Division for NPP consultation

June 2017

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2016-based National Population Projections: Migration

Summary and proposals

The proposed long-term net migration assumption for the UK is +165,000.

The long-term international migration assumptions proposed for the principal 2016-based National Population Projection (NPP) are shown in table 1.

Table 1: Proposed long-term migration assumptions for the 2016-based Principal National Population Projection

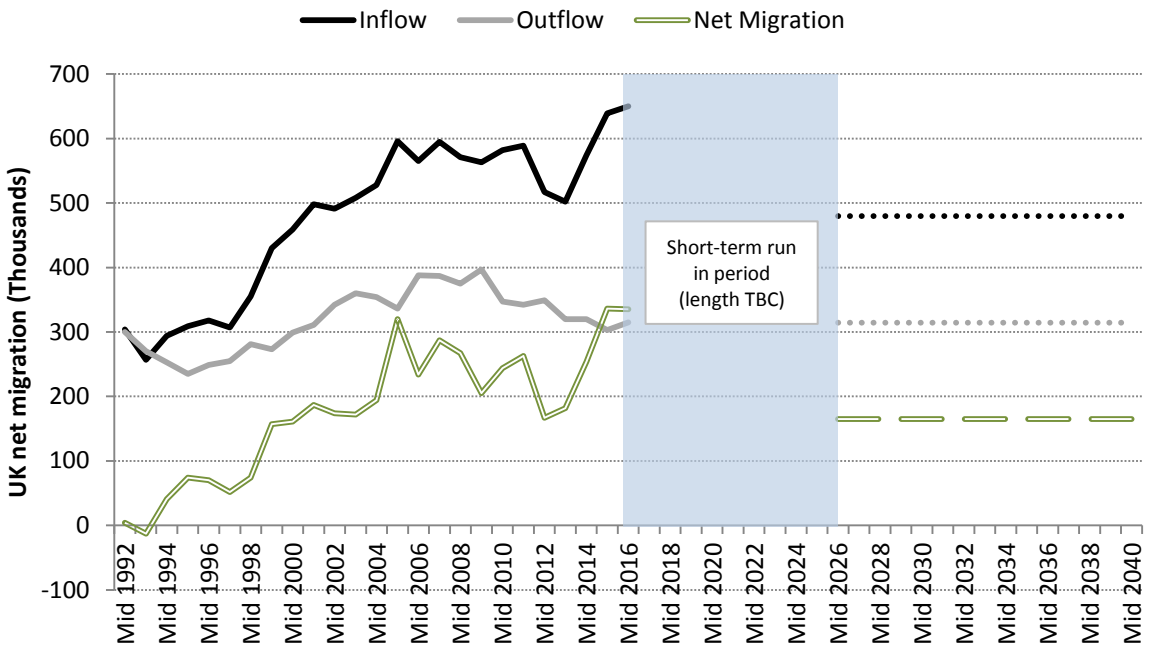
	Proposed 2016-based international migration (excluding asylum seekers)			Proposed 2016-based asylum seekers			Proposed 2016-based total international migration		
	In	Out	Net	In	Out	Net	In	Out	Net
UK	455,000	307,000	148,000	24,500	7,500	17,000	479,500	314,500	165,000
England	403,500	267,000	136,500	22,000	6,500	15,500	425,500	273,500	152,000
Northern Ireland	10,000	8,500	1,500	-	-	-	10,000	8,500	1,500
Scotland	29,000	23,000	6,000	1,500	500	1,000	30,500	23,500	7,000
Wales	12,500	8,500	4,000	1,000	500	500	13,500	9,000	4,500

As with the 2014-based NPP, cross border migration will be set as rates derived using data from the last 5 years (see section 5.1). The use of cross border migration rates prevents the projections from producing implausible scenarios such as negative population stocks; ONS are not currently seeking consultation on the use of cross border migration rates.

Figure 1 shows the assumptions for the UK as a whole compared with historical estimates of long-term international migration (LTIM). As with previous projections, it is proposed that long-term assumptions will remain constant throughout the projection and take effect following a short-term run in period of between 5 to 10 years (subject to consultation).

In the 2014-based NPPs, the short-term run in period was set to 7 years, after which the long-term assumptions took effect. For consistency, ONS proposes the 2016-based NPPs also follow a short-term run in period of 7 years.

Figure 1: Long-term international migration (LTIM) estimates and proposed UK migration assumptions mid-1992 onwards, 2016-based projections



Notes:
1. Source of data: Provisional estimates of long-term international migration (LTIM) (2016), LTIM 2.10 table: Citizenship by mid-year (1992 to 2015)
2. Data for 2016 are provisional
3. LTIM estimates of net migration for the years ending mid-2001 to mid-2011 were revised in light of the result of the 2011 census. However, estimates were not revised for inflow and outflow.

Table 2 shows the proposed low and high migration variant projection assumptions. The assumptions were derived by only changing assumptions of international migration; all other assumptions remain identical to those used in the principal projection.

Table 2: Proposed 2016-based low and high migration variant assumptions

Country	Proposed 2016-based high variant	Proposed 2016-based principal	Proposed 2016-based low variant
Annual net international migration			
England	+214,500	+152,000	+89,500
Northern Ireland	+6,000	+1,500	-3,000
Scotland	+15,500	+7,000	-1,500
Wales	+9,000	+4,500	0
United Kingdom	+245,000	+165,000	+85,000

ONS welcomes views on:

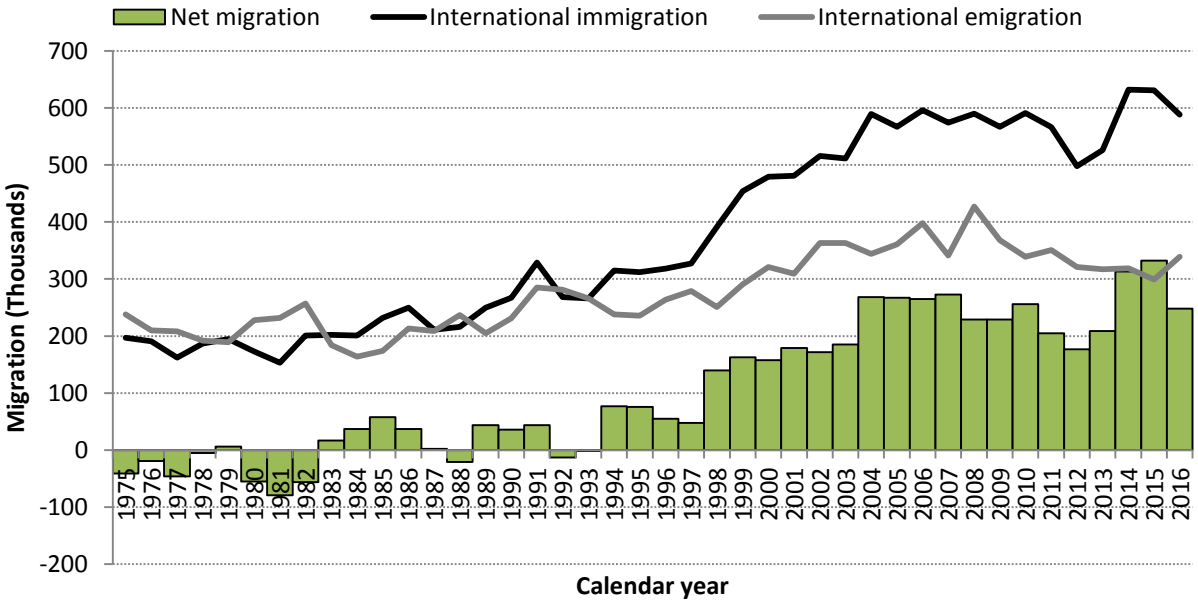
- The proposed international long-term migration assumptions in table 1
- The length of the short-term run in
- The proposed high and low migration variant assumptions (table 2)

1. Overview of past migration trends

In this section, we provide an overview of historical and recent trends in international migration to the UK and each of its constituent countries.

1.1 UK level migration

Figure 2: UK long-term international migration from calendar year 1975 to 2016



Notes:
1. Source: Estimates of long-term international migration (LTIM) and International Passenger Survey (IPS) data, ONS
2. Data for 2016 are provisional

Net migration at the UK level has seen significant change from 1975 to 2016. The UK was characterised by mostly negative net migration until the early 1980s. From 1983 to 1997, net migration was generally positive and relatively stable.

More recently, in the decade from 1998 to 2008, UK net migration followed a strong upward trend as a result of increasing levels of international immigration alongside

comparatively stable levels of emigration. The latest provisional LTIM figures estimate international net migration at +248,000 in 2016.

From 2004 to 2011 International immigration levels remained high but stable at around 550,000 to 600,000 per year. Immigration fell to a low point of 498,000 in 2012 before increasing sharply to the highest levels recorded; for calendar years this was seen in 2014 (estimated at 632,000). The latest provisional estimates of LTIM showed international immigration to the UK at 588,000 in the year ending 2016.

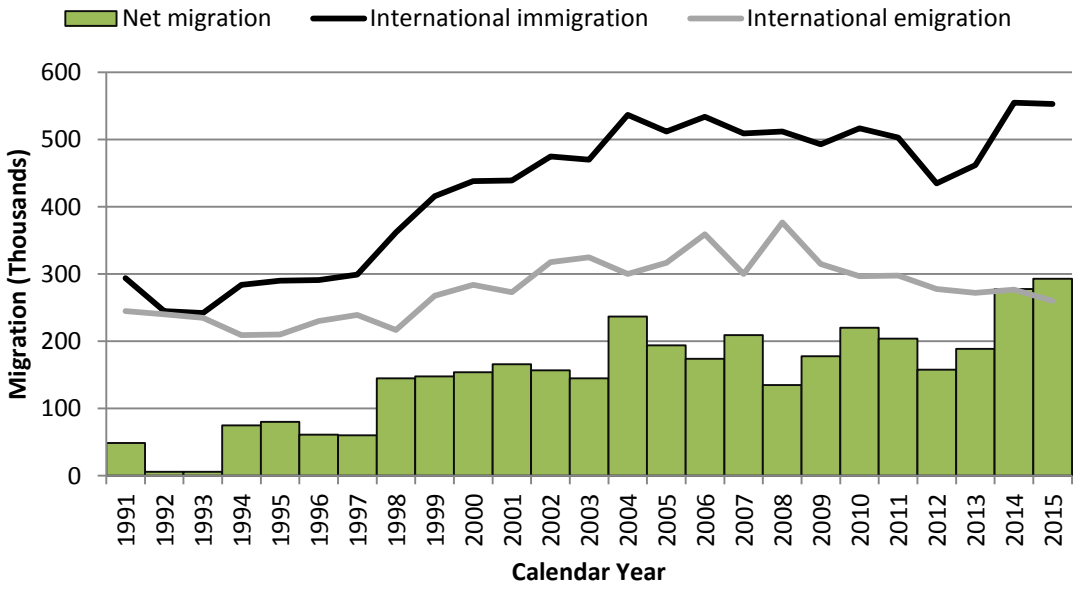
By contrast, international emigration has remained relatively stable since the mid-1970s. There has been an overall increasing trend from 1975 to 2008 (with a peak of 427,000 in 2008) but emigration has remained far below immigration since 2000. In more recent years, emigration has shown a slight downward trend. However, in the latest provisional LTIM figures international emigration was 339,000, an increase compared with the previous year.

1.2 Migration trends by constituent country

Please note that at the time of writing the latest long-term international migration (LTIM) estimates at country level are only available up to the calendar year 2015. Additionally, the earliest year for which LTIM estimates are available is 1991.

The data in this section are presented as calendar years unless otherwise stated.

Figure 3: Estimates of international migration for England



Source: Estimates of long-term international migration (LTIM) table 2.06, ONS

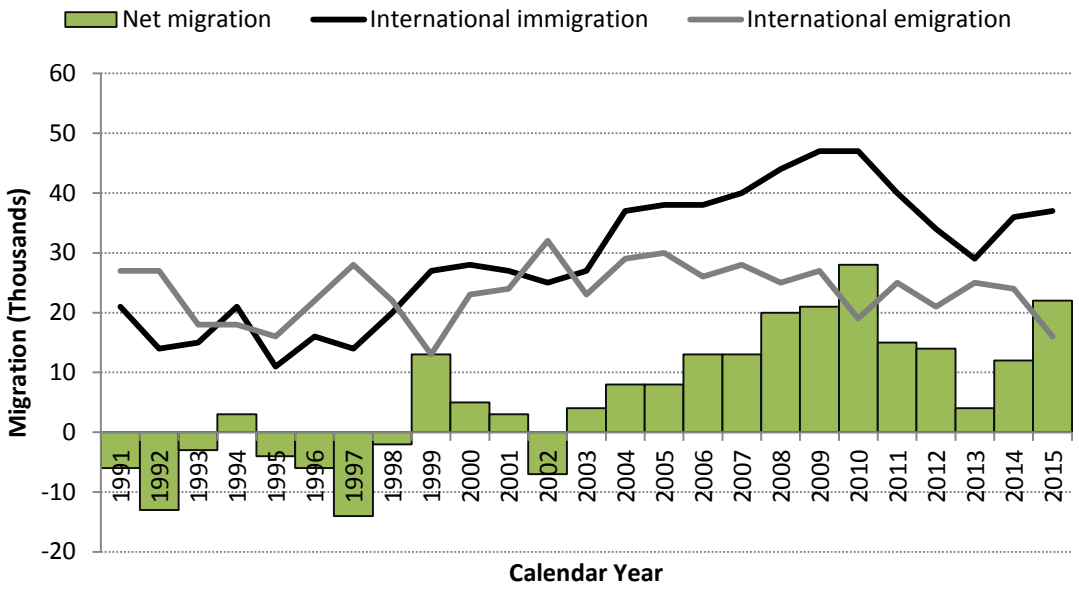
Migration trends seen in England are similar to those for the UK as a whole; this is to be expected as the majority of the UK population live in England.

As seen in figure 3, England has experienced significant increases to immigration and comparatively stable emigration from 1991 to 2015. Net migration has remained above 0 throughout this period.

In more recent years, international immigration to England saw a sharp decline between 2011 and 2012, falling from 503,000 in 2011 to 435,000 in 2012. This was followed by a quick increase where international immigration rose to 555,000 in 2014, the highest estimate on record.

International emigration from England has been much more stable when compared with international immigration. The overall trend seen in international emigration is a gradual increase from 284,000 in 2000 to a peak of 377,000 in 2008 followed by a gradual decline to 260,000 in 2015.

Figure 4: Estimates of international migration for Scotland

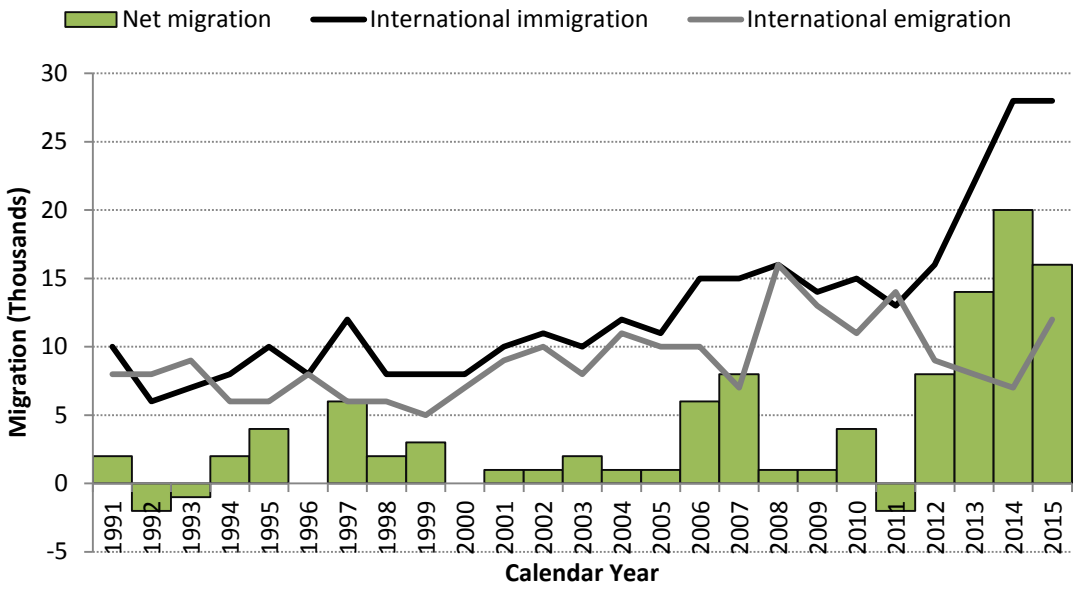


Source: Estimates of long-term international migration (LTIM) table 2.06, ONS

In the years 1991 to 1998, Scotland generally experienced negative net international migration. From 2000 onwards, net migration followed trends bearing some resemblance to those seen for the UK as a whole, with rising levels of net migration from 2004 until the late 2000s/early 2010s when net migration experienced a dip and fell to a estimated low point of +4,000 in 2013 before rising again to +22,000 in 2015.

In recent years, international immigration to Scotland reached a peak estimate of 47,000 migrants in both 2009 and 2010. This was followed by a sharp fall to 29,000 in 2013 before increasing to 37,000 in 2015. Conversely, international emigration has remained at broadly similar levels since the early 2000s.

Figure 5: Estimates of international migration for Wales

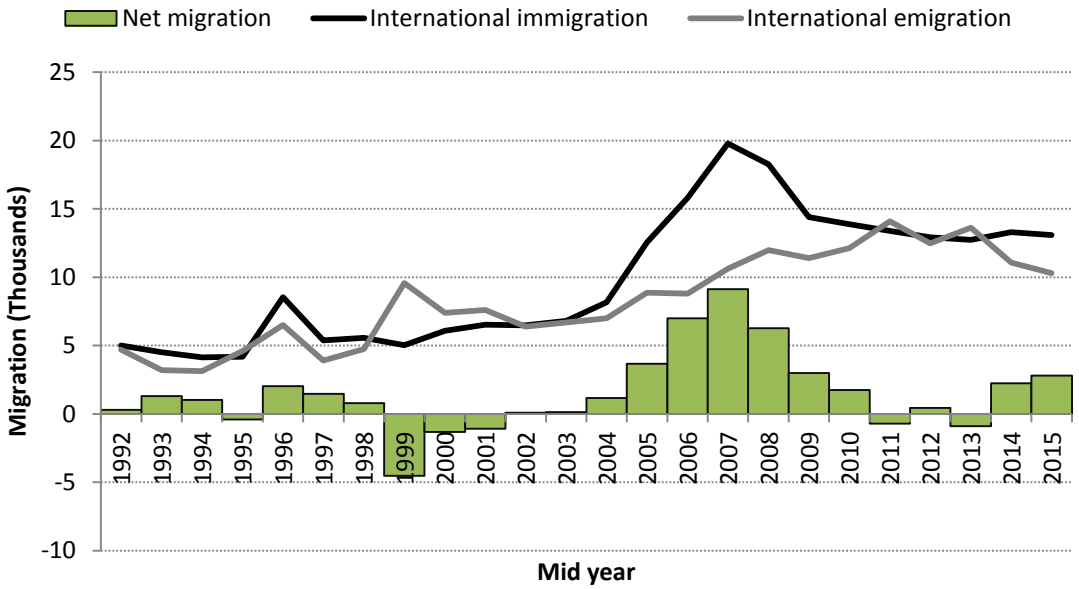


Source: Estimates of long-term international migration (LTIM) table 2.06, ONS

Both international immigration to and international emigration from Wales remained relatively stable between 1991 and 2011. Immigration rose sharply from 13,000 in 2011 to the highest on record of 28,000 in 2014. International emigration experienced fluctuating trends over the same period but remained broadly similar to levels seen in the prior decade.

In recent years, net migration to Wales has seen a notable increase driven by increased immigration and reached a historical peak of 20,000 in 2014. Net migration fell to 16,000 in 2015, but this is still the second highest estimate on record.

Figure 6: Estimates of international migration for Northern Ireland



Notes:
1. The data presented are supplied by the Northern Ireland Statistics and Research Agency (NISRA) for the purpose of producing NPP
2. Data from 2000 onwards are published in Long-term international migration statistics (2015) by NISRA
3. Data are presented for the 12 months up to the mid-year
4. The earliest available data are for mid-1992

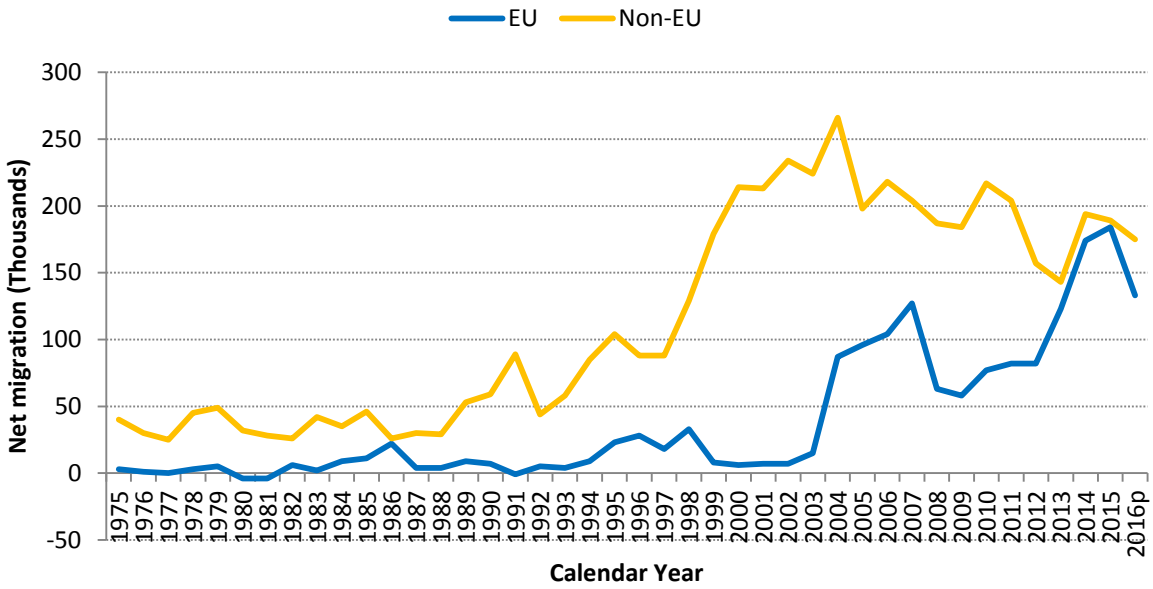
Net migration for Northern Ireland was generally stable from mid-1991 to mid-2004, with international immigration and emigration at broadly similar levels; the exception to this was mid-1999 as seen in figure 6.

International immigration rose sharply from mid-2004 to mid-2007, reaching a peak of around 20,000 in mid-2007, while emigration remained stable over the same period leading to notable increases in net migration.

In more recent years, immigration has fallen to levels similar to that of emigration, causing net migration to remain well below the peak of around +9,000 in mid-2007. The latest long-term international migration statistics from NISRA estimate net migration to Northern Ireland at around +2,800 in mid-2015.

1.3 UK net migration by EU and Non-EU citizenship

Figure 7: UK net migration by EU and Non-EU citizenship grouping (Excluding British)



Notes:
1. Source: Provisional estimates of long-term international migration (LTIM), ONS
2. Data for 2016 are provisional
3. Calendar year refers to the year ending (YE) December
4. EU grouping does not include British citizens

Net migration at the UK level by EU and Non-EU citizenship are shown above in figure 7. Historically, non-EU net migration has always been higher than that of EU net migration. This became more apparent at the end of the 1990s when non-EU net migration saw a notable increase from 1997 onwards.

It should be noted that the total population of non-EU countries far exceeds that of EU countries and the “non-EU” geographic grouping contains a much more diverse range of countries, as such, there was likely no single significant event which caused the increase seen in non-EU net migration, but rather, the trend seen was the result of a combination of many different factors.

On the other hand, net migration of EU citizens remained relatively low until a significant rise in 2004. This coincided with the enlargement of the EU and opening of the UK labour market to the citizens of the EU8 countries (Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia and Slovenia).

EU net migration continued to rise each year until a significant decline in 2008, falling from an estimated +127,000 in 2007 to +63,000 in 2008. This coincided with the start of the economic downturn.

Between 2008 and 2012 net migration of EU citizens remained comparatively low before sharply rising over the following years to an estimated figure of +184,000 in 2015; the highest calendar year estimate on record.

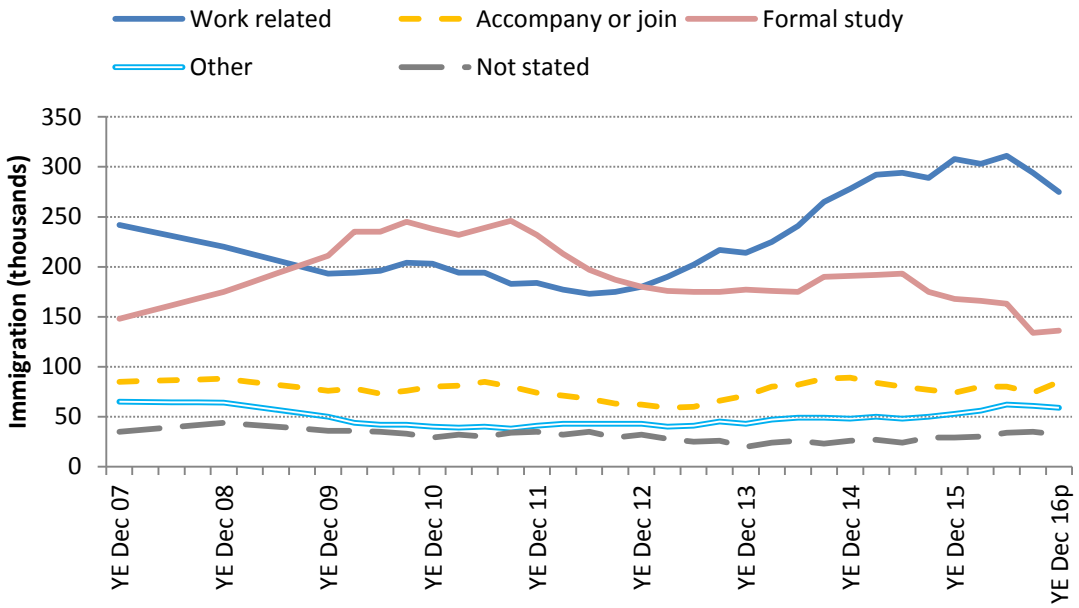
The relatively high levels of EU net migration in more recent years up to 2015 follows the lifting of work restrictions previously imposed on EU2 countries (Bulgaria and Romania) as well as notable increases in the net migration of EU15 citizens; from +18,000 in 2010 to +80,000 in 2015 as highlighted by Markaki and Vargas-Silva (2016).

However, the most recent estimates of LTIM showed a statistically significant reduction in EU net migration to an estimate of +133,000, a fall of 51,000 compared with the previous year. The latest estimate for non-EU net migration stands at +175,000 compared with +189,000 the previous year (this difference was not statistically significant).

1.4 Reasons for migration

In the latest provisional estimates of long-term international migration (LTIM) the most common reason for immigrating to the UK was for work while the second most common reason was formal study.

Figure 8: LTIM estimate of immigration to the UK, by main reason for migration, YE Dec 2006 to YE Dec 2016



Notes:
1. Source: Provisional estimates of long-term international migration (LTIM), ONS
2. Data for 2016 are provisional

Historically, work has always been the most common reason stated for migration to the UK. The exception to this was the period from 2009 to 2012 when study was the most common reason (Figure 8).

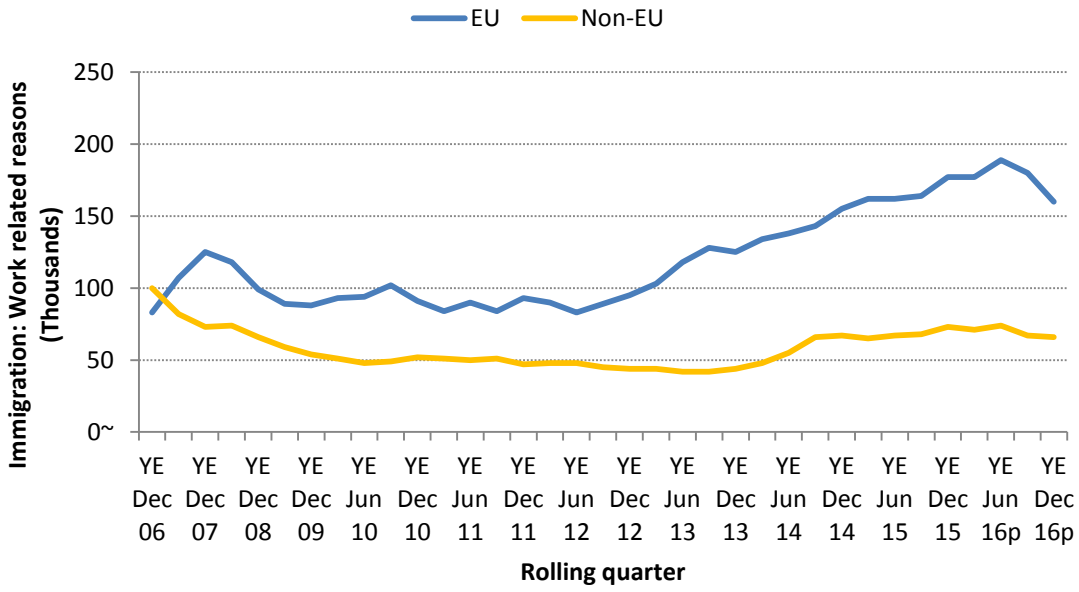
Since 2013 migration for work related reasons has steadily increased to the highest estimate on record in year ending (YE) June 2016 at 311,000. This change can be in part attributed to increased migration from EU2 countries (Romania and Bulgaria) following the removal of previously imposed work restrictions as well as an increase in the number of EU15 citizens immigrating for work related reasons, rising from 66,000 in YE June 2014 to 85,000 (highest estimate on record) in YE June 2016.

In the most recent provisional estimates of LTIM, immigration to the UK for work related reasons stands at an estimated 275,000 in YE December 2016 while immigration for formal study was estimated at 136,000 over the same period.

Over the decade 2007 to 2016, the majority of migrants coming to the UK for work related reasons were EU citizens while the majority of those coming here to study originated non-EU citizens (figures 9 and 10). This may be a reflection of the work restrictions imposed on non-EU citizens.

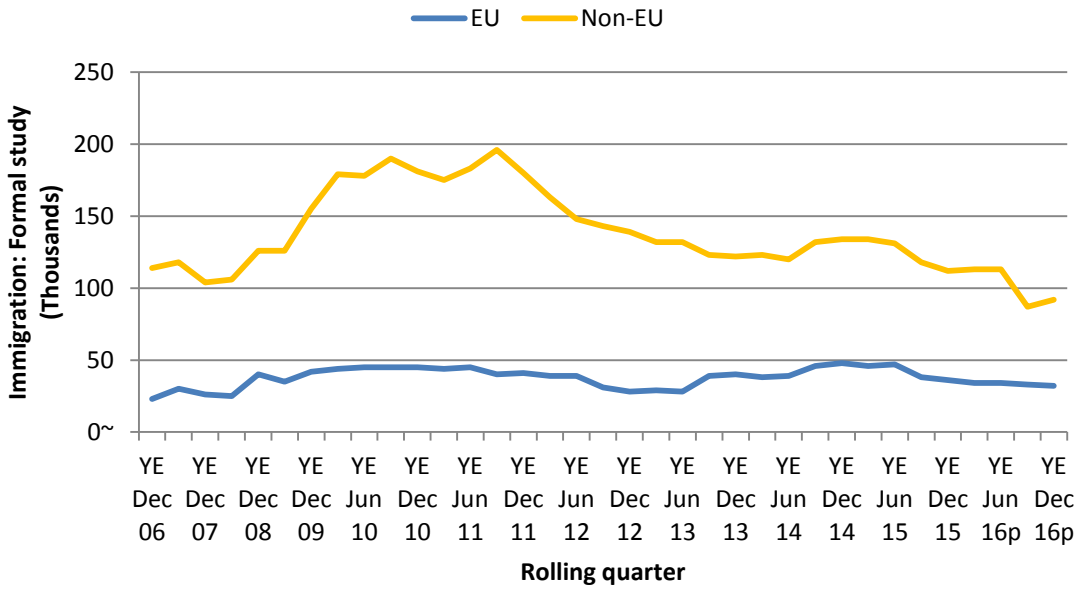
The estimates of immigration to the UK for work related reasons by EU and non-EU citizenship grouping is shown below in figure 9. Immigration for formal study by EU and non-EU citizenships is shown in figure 10.

Figure 9: Immigration for work related reasons by EU and non-EU grouping



Notes:
1. Source: International Passenger Survey (IPS) data from provisional estimates of LTIM, ONS
2. Data for 2016 are provisional

Figure 10: Immigration for formal study by EU and non-EU grouping



Notes:
1. Source: International Passenger Survey (IPS) data from provisional estimates of LTIM, ONS
2. Data for 2016 are provisional

1.5 Asylum seekers

Applications for asylum have followed a general upward trend since 2010. The Home Office reports there were a total of 30,603 main applications in the year ending December 2016, a decrease of 7% from the previous year. Overall asylum seeker numbers have remained relatively stable over the past decade compared with the peak of 84,132 recorded in the year ending December 2002.

2. Future trends in migration

Migration is described as a very volatile process by the United Nations (UN), one that is affected by changes in economy, social, political and environmental factors (United Nations, 2015). In the context of population projections, Wilson and Rees (2005) describe migration as the component with the greatest uncertainty, a view shared by the UN which recognises that migration is the most difficult component to project (United Nations, 2015).

Following the United Kingdom's vote to leave the European Union in June 2016, there has been much speculation on the effect the Brexit process will have on future levels of migration to and from the UK.

The latest provisional long-term international migration estimates showed that work was the main reason migrants came to the UK, and that the large majority of these people were from within the EU.

Currently all EU citizens have the right to free movement between all countries within the EU as well as the right to work within the UK (with the exception of Croatian citizens who are still subject to transitional restrictions in the UK). However, this could change in the aftermath of Brexit negotiations as potential new legislations are brought into place.

Although changes in policy may indeed have significant influence on future migration trends, in practice it is very difficult to predict what the demographic consequences of Brexit might be. Despite the official trigger of Article 50 in March 2017, the negotiated terms of the UK's departure are still unknown at the time of writing and it is impossible to know the final outcome of the dialogues.

During the 2017 National Population Projection (NPP) expert advisory panel, ONS asked a group of eight academic experts in the field of demography the question of how they felt Brexit will influence future levels of UK migration.

The general consensus amongst the panel was that of great uncertainty. The experts explained that Brexit was a relatively short term process and that the long term is much more important. It was advised that ONS should not attempt to speculate or pre-empt future policies. A summary of the experts' responses to the pre-meeting questionnaire can be found in the next section.

As with all previous NPPs, the 2016-based NPPs will not be produced as population forecasts, and therefore will not attempt to predict the impact that future government policies, changing economic circumstances or other factors might have on demographic behaviour (however, the projections of people of pensionable age do take account of future changes in State Pension Age under existing legislation). The projection will remain the outcome of a calculation showing what happens if particular assumptions are made.

This approach is in line with the advice given by the demographic experts who emphasised the huge uncertainty surrounding the potential outcome of Brexit negotiations and that it is not possible to know the effect of any future policies at this stage.

3. NPP expert advisory panel

In March 2017, ONS invited a group of eight demographic experts to share their views on the future of UK migration.

Prior to the meeting, each expert received a questionnaire which asked for their opinions on the potential forces that could influence trends in international migration (the economy, political instability, environmental change and Brexit) as well as their estimates of long-term international migration in 2020 and 2040.

Summaries of the experts' responses are presented in this section.

Please note that one expert did not provide any response to the migration section of the questionnaire.

3.1 Migration in 2020

The experts predicted that on average annual immigration to the UK in 2020 would be 516,000, with an average 67% confidence interval of 400,000 to 589,000 and 95% confidence interval of 323,000 to 627,000.

The average annual emigration from the UK in 2020 was estimated to be 313,000, with an average 67% confidence interval of 258,000 to 383,000 and 95% confidence interval of 226,000 to 410,000.

The average annual net migration from the UK in 2020 was estimated to be +221,000, with an average 67% confidence interval of +170,000 to +289,000 and 95% confidence interval of +64,000 to +354,000.

Figure 11: Respondents' estimates of net migration 2020 (and associated 67% confidence intervals)

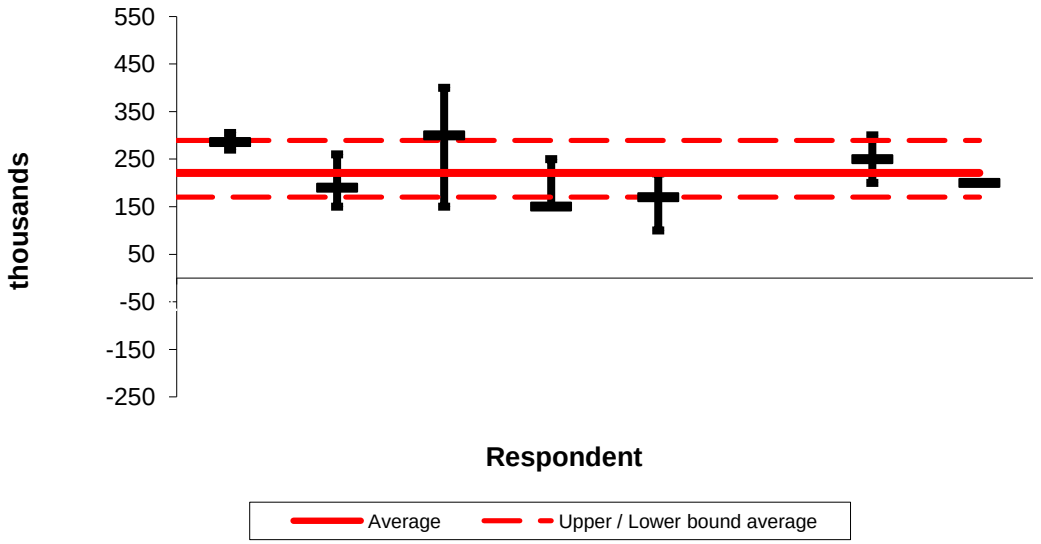
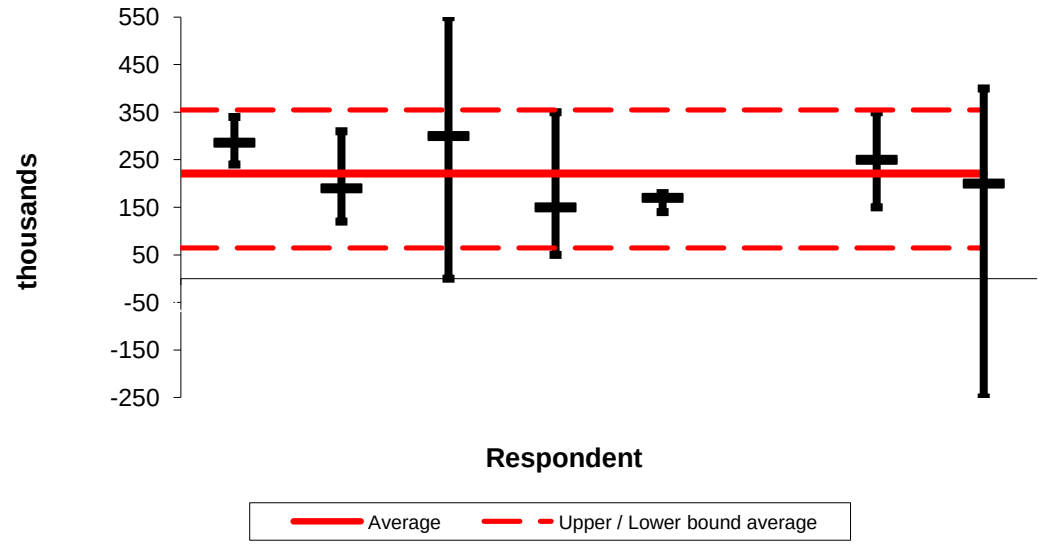


Figure 12: Respondents' estimates of net migration 2020 (and associated 95% confidence intervals)



3.2 Migration in 2040

On average the experts estimated annual immigration to the UK in 2040 would be 441,000; with an average 67% confidence interval of 318,000 to 556,000 and 95% confidence interval of 230,000 to 630,000.

For emigration from the UK, on average the experts thought 318,000 would leave the UK in 2040. The average 67% confidence interval was 214,000 to 413,000 and 95% confidence interval of 170,000 to 469,000.

The UK average annual net migration in 2040 was estimated to be +144,000; with the average 67% confidence interval of +78,000 to +303,000 and 95% confidence interval of -61,000 to +374,000.

The experts' average net migration estimate of +144,000 in the long term is lower than the proposed 2016-based principal long-term migration assumption of +165,000 per year. This principal migration assumption was set using a 25 year average, an approach the experts felt was valid; please see section 5.5.2 for further details.

It should also be noted that in comparison to the responses to the 2014-based expert advisory panel questionnaire, the answers to the 2016-based questionnaire have considerably more variation between each expert, further highlighting the uncertainty surrounding future levels of migration.
Figure 13: Respondents' estimates of net migration 2040 (and associated 67% confidence intervals)

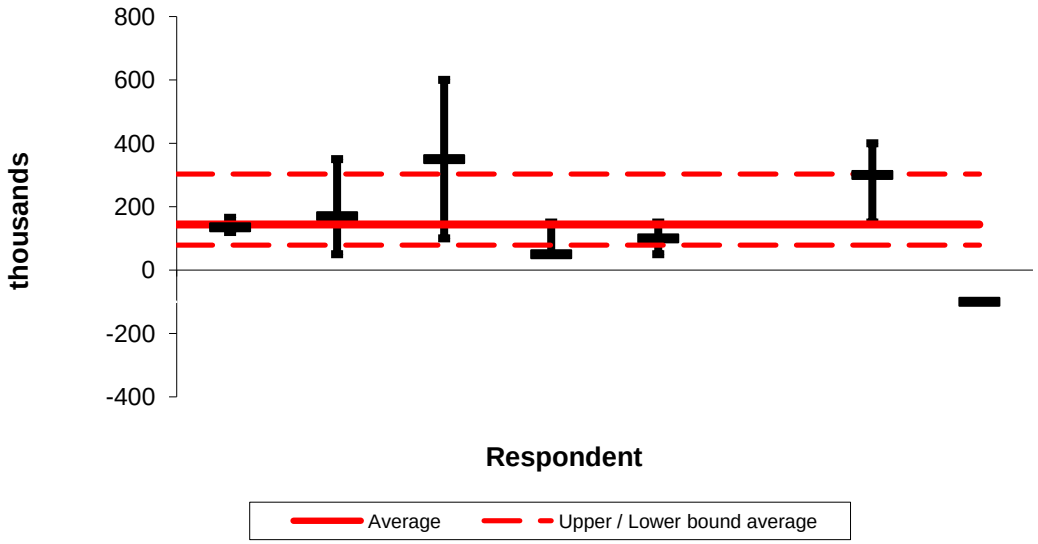
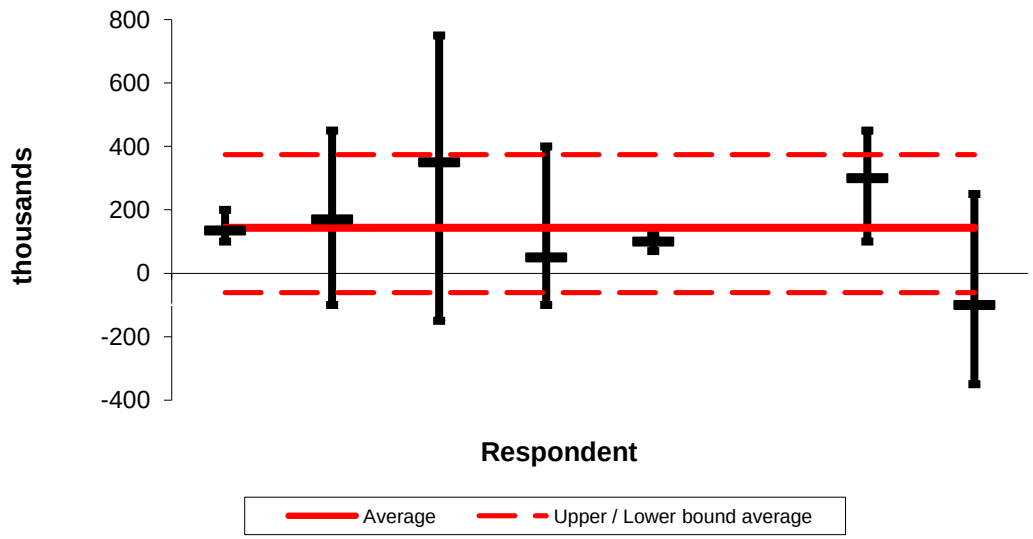


Figure 14: Respondents' estimates of net migration 2040 (and associated 95% confidence intervals)



3.3 Economy

There experts had mixed views on how the changing global economy would affect UK net migration in both the short and long term.

In the short term, 3 experts thought it would have a small upwards effect, 3 thought it would have little or no effect and 2 thought it would have a small downwards effect.

In the long term, 3 thought it would have a small downwards effect, 1 a large downwards effect, 3 a small upwards effect and 1 thought it would have little or no effect.

Some experts thought possible stagnation of the economy or economic uncertainty would be likely to act as a deterrent for UK immigration.

3.4 Political instability

In the short term the majority of experts thought global political instability would have a small upwards effect on UK net migration (5 out of 8). 3 experts thought it would have little or no effect in the short term.

In the long term 6 out of 8 experts thought political instability would have a small upwards effect on UK net migration. 2 experts thought it would have little or no effect.

There was consensus from the experts that future political instability would be likely to result in an increase in refugees in both the short and long term; however the UK's willingness to accommodate them would largely be determined by government policy.

3.5 Environmental change

Half of the experts thought environmental change would cause little or no effect on the levels of UK net migration in the short term. The remainder thought it would have a small downwards effect (1 out of 8) or an upwards effect (small: 2 or large: 1) on UK net migration.
In the long term the majority thought environmental change would have a small upwards effect (5 out of 8) and 1 expert thought it would have a large upwards effect on UK net migration.

Some of the experts suggested environmental change is likely to trigger environmental disasters in the long term, which is likely to increase flows in to the UK as a result of displacement. However, the actual immigration numbers would be contingent on governmental policy concerning the accommodation of refugees. Some experts also pointed out that climate change could also contribute to migration flows due to the growing aridity of at risk regions.

3.6 Brexit

In the short term 5 out of 8 experts thought Brexit will result in a small downward effect on UK net migration while 1 expert thought there would be a large downwards effect. The remaining 2 experts answered with small upwards and little or no effect respectively.

Similarly, in the long term, 5 out of 8 experts thought Brexit would have a small downward effect while 2 experts believed it would cause a large downwards effect to UK net migration. 1 expert thought Brexit would have little or no effect. There was consensus among the experts that both the short and long term trends will be strongly influenced by government policy concerning the terms of Brexit.

3.7 Cross-border migration

The main factors which the experts suggested were likely to impact on cross-border migration were possible Scottish independence and the future nature of the border between Northern Ireland and the Republic of Ireland (which may also impact onward movements to the rest of the UK).

3.8 Other factors which could affect international migration

Other factors the experts noted could affect international migration:

- Greater immigration restrictions by the US could divert migration flows to other destinations such as the UK
- Global education markets – growing numbers of educated young people in developing countries could lead to an increase in international migration to the UK for education
- Government policies towards international students
- An ageing population is likely to contribute to a greater demand for immigrants

4. Assumption setting methodology

4.1 International migration flows

For the 2016-based projections, the proposed long-term international migration assumptions have been produced by modelling the historical time series data for the flows to and from each country of the UK.

The net flows for the countries and assumptions for the UK have been calculated by aggregating the modelled data. The asylum seeker flows are modelled separately from the IPS-based flows.

4.2 Cross border (intra-UK) flows

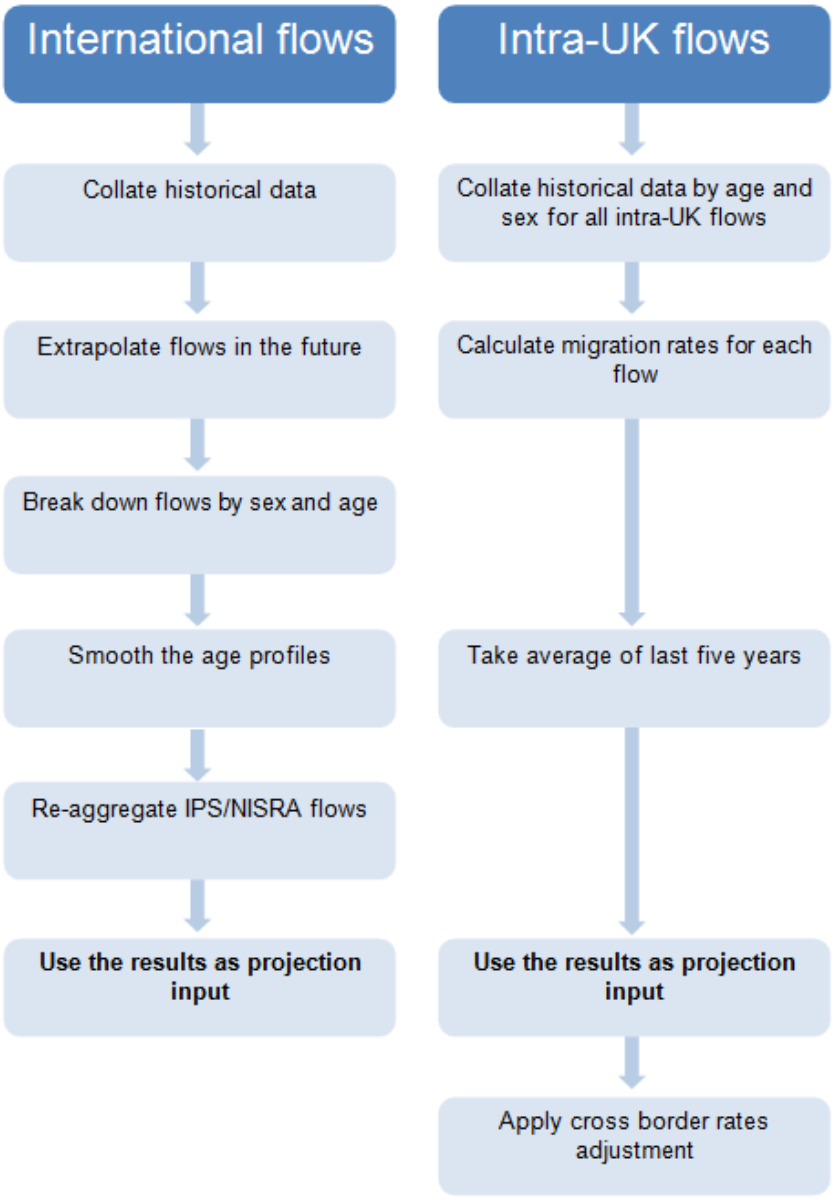
The 2016-based projections will continue to use the rates-based method to calculate cross border flows first implemented in the 2014-based projections.

The main advantage of the method is that it allows migrant flows to change on the basis of the underlying population size and age structure. This means that the projections cannot produce implausible values, such as negative population stocks when projected fixed levels of emigration are greater than the initial population size.

A more detailed explanation on the further advantages of the rates based method is available in section 3 of the 2014-based migration assumptions discussion paper.

The overall workflow process for migration assumption setting is outlined in figure 15.

Figure 15: Work flow for creating the 2016-based NPP migration assumptions



Note: More detail on cross border rates adjustment can be found in Annex 1

5. Detailed methodology

Collate historical migration flows

Migration flows will be modelled in five groups as set out below:

1. Cross border migration
2. International inflow
3. International outflow
4. Asylum seeker inflow
5. Asylum seeker outflow

5.1 Cross border (intra-UK) flows

Migrant numbers for each flow are obtained from the England and Wales National Health Service Central Register (NHSCR), Northern Ireland Statistics and Research Agency (NISRA) and National Records Scotland (NRS).

However, it should be noted that the Central Health Register Inquiry System (CHRIS) was closed in February 2016 and as a result, no complete NHSCR data is available beyond 2015. ONS determined that for the mid-2016 population estimates the optimal approach is to re-apply the NHSCR data for the year ending mid-2015, so the projections will also use these data.

Annual age and sex-specific migration rates for each cross border flow are calculated for a specific historical reference period (eg 2012-2016), where migration rate = number of migrants at end of year/population of country of origin at start of year.

A reference period of the last five years has been selected in order to reflect recent trends and because the availability of age-specific data adjusted to account for the under-estimation of student migrants between England and Wales is limited.

The denominator for the rates, which represents the population at risk of migrating, is the population estimate for the country of origin at the beginning of the year in question. This is, strictly speaking, not a true rate since the denominator does not exactly represent the population at risk of migration, but the use of this simplified ‘pseudo-rate’ enables straightforward application of the rates during the projections process.

An unweighted average of the annual rates from the reference period is calculated for each flow and age-sex group.

5.2 International immigration flows

The modelled flows of international immigration are as follows:

- Total inflow to England
- Total inflow to Northern Ireland
- Total inflow to Scotland
- Total inflow to Wales

The majority of the data are from the International Passenger Survey (IPS), including the adjustments made for “switchers”, and are available from the year ending June 1976 to the year ending June 2016. Data for the flows to Northern Ireland are obtained from the Northern Ireland Statistics and Research Agency (NISRA) and are available only for the period from 1992 onwards. Estimates of migration between the UK and Irish Republic from 1991 to 2007 were provided by the Irish Central Statistics Office. Lastly, international migration inflows for the years 2002 to 2011 use data from the revised components of change for international migration from the mid-year population estimates (MYEs) in order to reflect the results of the 2011 Census.

5.3 International emigration flows

As with international immigration, the majority of the data are taken from the International Passenger Survey (IPS), including the adjustments made for “switchers” and are available from the year ending June 1976 to the year ending June 2016. Data for the flows from Northern Ireland from 1992 onwards are obtained from NISRA. Estimates of migration of all citizenships between the UK and Irish Republic from 1991 to 2007 are provided by the Irish Central Statistics Office. For the years 2002 to 2011, international emigration data are also from the revised MYE components of change to account for the result of the 2011 Census.

The following flows are modelled:

- International outflow from England
- International outflow from Northern Ireland
- International outflow from Scotland
- International outflow from Wales

5.4 Asylum seekers (inflow and outflow)

The asylum seeker data come from the Home Office and are available from the year ending June 1992 to the year ending June 2016. Asylum seekers to and from

Northern Ireland are included in NISRA international flows from 2008 onwards so cannot be modelled separately. Northern Ireland asylum seeker inflows and outflows are therefore set to zero.

The following asylum seeker flows are modelled:

- Asylum seeker inflow to England
- Asylum seeker inflow to Northern Ireland (set to zero)
- Asylum seeker inflow to Scotland
- Asylum seeker inflow to Wales

- Asylum seeker outflow from England
- Asylum seeker outflow from Northern Ireland (set to zero)
- Asylum seeker outflow from Scotland
- Asylum seeker outflow from Wales

5.5 Extrapolate flows into the future

5.5.1 Intra-UK migration flows

For the intra-UK migration flows, averages are calculated using a reference period of the last five years. The averaged rates are fed into the projections system and are applied to the relevant population at the start of each projection year, with the resulting migrant numbers added onto / taken away from the relevant country populations in the same way as is done for the fixed numbers flows.

Finally, an adjustment is applied at the beginning of each year before migrant numbers are calculated in order to take the population of the destination country into account (the “Statistics Canada cross border rates adjustment” – see Annex 1).

5.5.2 International migration flows (excludes asylum seekers)

The statistical method used to derive the 2016-based international migration assumptions was a 25 year average. The method was chosen due to the substantial uncertainty surrounding the future of UK migration. During the 2016-based National Population Projections (NPPs) expert advisory panel meeting in April 2017, we presented our intention to use a 25 year average to a group of 8 demographic experts; there were no objections to this methodology and it was also advised that it was not necessary to use more complex methods unless they actually added something to the projections.

The use of 25 years of historical data was deemed appropriate because the UK has experienced periods of comparative low net migration, rising net migration and historically high levels of net migration over the past 25 years.

Each constituent UK country is modelled separately and assumptions at the overall UK level are derived through the addition of the country level assumptions.

The 25 year average method proposed for the 2016-based NPPs is similar to the 25 year moving average used in the 2014-based NPPs. The 25 year moving average approach involved extrapolating historical data for 7 years and taking the projected value of that year as the long-term migration assumption; the issue with this approach was that the final assumptions varied depending on the number of years the moving average extrapolated. For example, assumptions based on extrapolating historical data for 6 years using a moving average approach will be different than those based on an extrapolation of 10 years.
A simple 25 year average, on the other hand, will produce a single figure based on the past 25 years and distributes “weight” evenly across each year; each of the 25 years contributes an equal amount of information towards the final average.

In the 2012-based NPP, ARIMA models were fitted to historical migration flows and the resulting mean forecasts were taken as migration assumptions. However, the most commonly fitted model was that of ARIMA (0,1,0) or “Random walk without drift”, the mean of which is simply a continuation of the most recent data point. It was recommended in the NPP methodology review by the University of Southampton that ARIMA models in demography do not exceed (1,1,1) (Bijak, 2012 with reference to Keilman et al. 2001) which meant that the forecasting models only took into account information from the previous data point in the series, effectively placing all the weight on the data from the year previous to the projected year (however the autoregressive and moving average terms; which act as coefficients in the equations would have been determined by information from the entire time series).

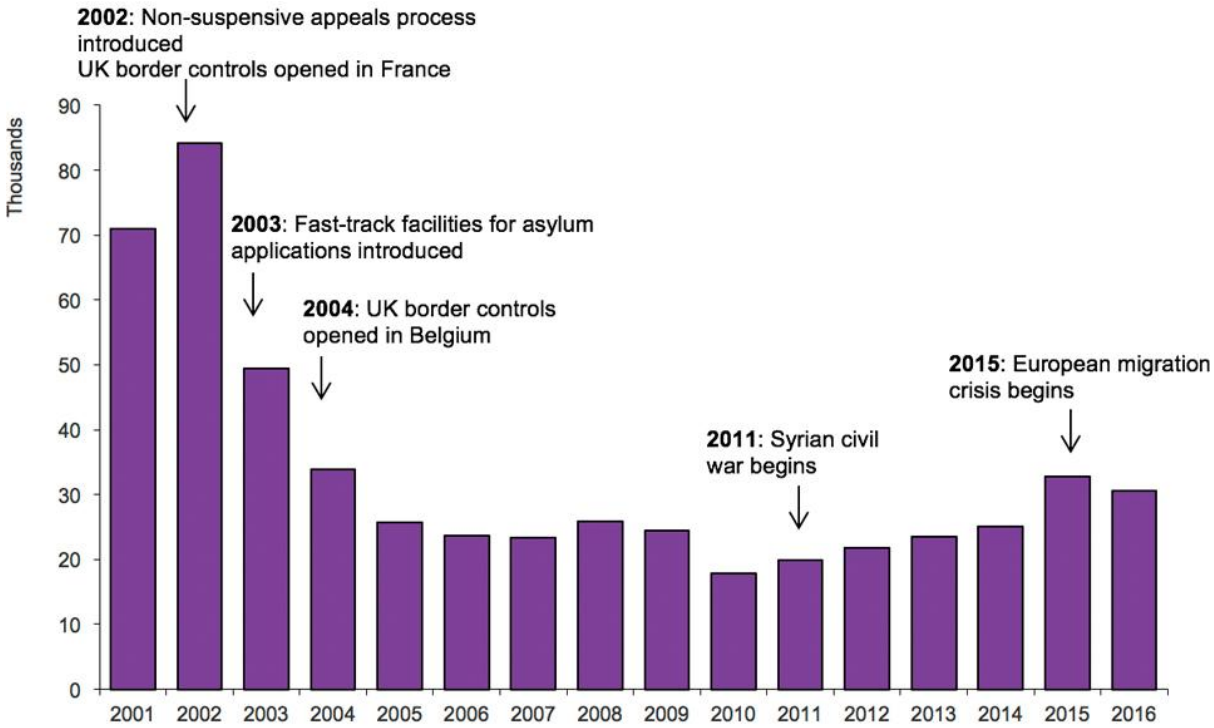
As such, ARIMA models often produced projections which were essentially continuations of the migration levels seen in the most recent year. At the time this was thought to be a plausible scenario, however with the increase in net migration up to the time of the 2014-based NPPs, it was felt that taking the mean of ARIMA models would no longer produce plausible long-term assumptions since the models would simply project the high levels of net migration to remain at similar levels throughout the entire projection period.

5.5.3 Asylum seekers flows

Asylum seeker flows were modelled separately from international migration flows. A 10 year average was used to derive the long-term asylum seeker assumption as opposed to the 25 years used for international migrants. The reason for this was that historical trends for asylum seekers (based on numbers of applications for asylum) saw a significant decrease around the early 2000s.

The Home Office states that the fall in the number asylum applications since 2002 coincides with the introduction of a process which prevented certain nationalities from appealing a decision while in the country in 2002, the opening of UK border controls in France and Belgium in 2002 and 2004 respectively, and the introduction of fast-track facilities for asylum applications in 2003 (Home Office, 2013).

Figure 16: Long-term trends in applications of asylum



Source: [Asylum, Immigration Statistics October to December 2016, Home Office]

From figure 16, it is seen that the number of applications of asylum has remained relatively low in recent years compared to levels prior to 2004. As such, it was deemed more reasonable to produce long-term assumptions for asylum seekers based on a historical period after the events described by the Home Office.

5.5.4 Adjustments to international migration data

In the 2016-based NPPs, historical international migration data used to produce the long term assumptions were taken from the revised components of change from mid-year population estimates for the years ending mid-2002 to mid-2011 for the countries of England, Wales and Scotland. This was done to reflect the results of the 2011 Census and agreed with the NPP Committee prior to implementation.

These data were supplied by ONS for England and Wales and National Records of Scotland (NRS) for Scotland. No adjustments were made to Northern Ireland migration data from the Northern Ireland Statistical and Research Agency (NISRA) because these data already take into account the results of the 2011 Census.

5.6 Smooth and apply age-sex distributions

The flows of migrants are projected at a total level so need to be broken down by single year of age and sex before being input into the projections production system.

For the intra-UK flows, annual age and sex-specific migration rates for each cross border flow from the last five years are calculated.

For the international flows, IPS, NRS and NISRA age/sex data only are used because the other datasets (eg visitor switchers) are not available by single year of age. These distributions are also applied to the asylum seeker flows because the asylum seeker data are available only by broad age groups.

For each international flow, the projected total migrants per year are broken down by sex using the average sex proportions from the last five years of data. The single year of age distributions for each sex for the last five years are then averaged and smoothed using an appropriate variation of the Rogers-Castro curve. The smoothing outputs single years of age up to 89 years old only, so an assumption of zero migration will be made for all ages 90+. The smoothed age distributions are applied to the projected male and female migrants for each year of the projection to give projected migrants by age and sex for each flow.

5.7 Re-aggregate the flows and calculate net migration levels

The assumptions for each flow, expressed as numbers of migrants by single year of age and sex for each year of the projection, are then combined to produce net migration levels by age and sex for each UK constituent country. These figures are the principal international migration assumptions.

5.8 Outputs

The following data is fed into the projections production system:

- Cross border rates by single year of age and sex for each UK country
- International inflows and outflows by single year of age and sex for each constituent country of the UK
- Asylum seeker inflows and outflows by single year of age and sex for each constituent country of the UK (with Northern Ireland asylum seeker inflow and outflow set to zero)
- Historical population data in order to adjust cross border rates.
- Any other known migration flow, not covered by the above, by single year of age and sex for each constituent country of the UK (eg the phased return of armed forces from Germany to England, and refugees)

5.9 Variant assumptions

The high and low migration variants (if required) will be produced by varying the international in and out flow assumptions only and using the principal assumptions for all other flows. Variant cross border rates assumptions will not be used because varying the rates adds an extra level of complexity to both the variant assumptions and the outputs, and there is no evidence that this would actually better meet user needs.

6. Results

Proposed assumptions

The long-term international migration assumptions proposed for the principal 2016-based National Population Projection (NPP) are derived through a 25 year average (10 year average for asylum seeker flows) are shown below in table 3.

As discussed previously, cross border migration are set using a rate based method. At the time of writing the final cross border migration rates for the 2016-based NPP are not yet available, however; assumed cross border flows from the 2014-based NPP have been included as Annex 4 for reference.

Table 3: Proposed Migration assumptions for the 2016-based Principal National Population Projection

	Proposed 2016-based International migration (excluding asylum seekers)			Proposed 2016-based asylum seekers			Proposed 2016-based total international migration		
	In	Out	Net	In	Out	Net	In	Out	Net
UK	455,000	307,000	148,000	24,500	7,500	17,000	479,500	314,500	165,000
England	403,500	267,000	136,500	22,000	6,500	15,500	425,500	273,500	152,000
Northern Ireland	10,000	8,500	1,500	-	-	-	10,000	8,500	1,500
Scotland	29,000	23,000	6,000	1,500	500	1,000	30,500	23,500	7,000
Wales	12,500	8,500	4,000	1,000	500	500	13,500	9,000	4,500

Comparisons of the proposed 2016-based assumptions against the 2014-based assumptions for international migration and asylum seekers are shown in tables 4 and 5 respectively.

Table 4: Comparison of the proposed 2016-based NPP migration assumptions and final assumptions from the 2014-based NPP (Figures include asylum seekers)

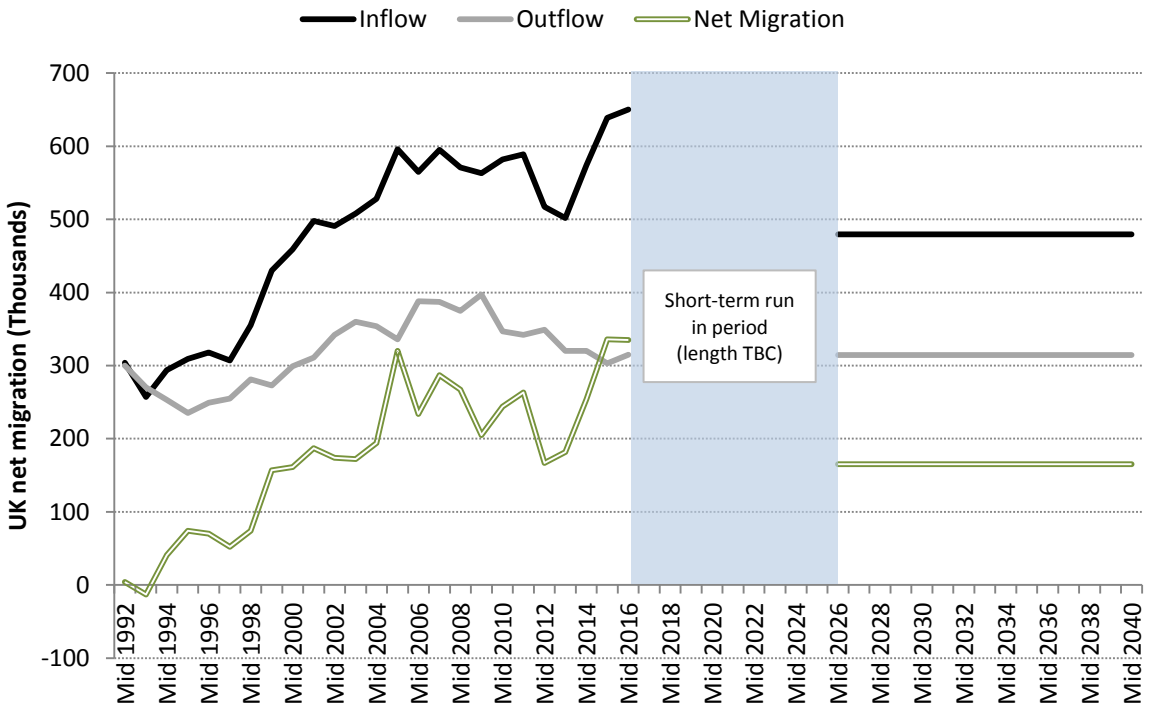
	2014-based international migration assumptions (includes asylum seekers)			Proposed 2016-based international migration assumptions (includes asylum seekers)			Change between 2014 and 2016-based		
	In	Out	Net	In	Out	Net	In	Out	Net
UK	518,500	333,500	185,000	479,500	314,500	165,000	-39,000	-19,000	-20,000
England	458,500	288,000	170,500	425,500	273,500	152,000	-33,000	-14,500	-18,500
Northern Ireland	13,000	12,000	1,000	10,000	8,500	1,500	-3,000	-3,500	500
Scotland	33,500	24,000	9,500	30,500	23,500	7,000	-3,000	-500	-2,500
Wales	13,500	9,500	4,000	13,500	9,000	4,500	0	-500	500

Table 5: Comparison of the proposed 2016-based NPP asylum seeker assumptions and final assumptions from the 2014-based NPP

	2014-based asylum seekers			Proposed 2016-based asylum seekers			Change between 2014 and 2016-based		
	In	Out	Net	In	Out	Net	In	Out	Net
UK	23,000	8,000	15,000	24,500	7,500	17,000	1,500	-500	2,000
England	20,500	7,000	13,500	22,000	6,500	15,500	1,500	-500	2,000
Northern Ireland	-	-	-	-	-	-	-	-	-
Scotland	1,500	500	1,000	1,500	500	1,000	0	0	0
Wales	1,000	500	500	1,000	500	500	0	0	0

Finally, figure 18 shows the assumptions for the UK as a whole compared against historical estimates of long-term international migration (LTIM).

Figure 18: Proposed assumptions for UK long-term international migration estimates



Notes:

1. The equivalent graphs for each UK country can be found in Annex 2.
2. The equivalent graphs for asylum seekers are found in Annex 3.

7. Rounding

As with the migration assumptions of previous NPPs, the 2016-based final long-term assumption for UK net migration has been rounded to the nearest 5,000 and individual flows were rounded to the nearest 500. This was done to ensure a spurious level of accuracy is not implied in the projections.

8. Returning armed forces

There are approximately 9,500 Home Armed Forces personnel stationed in Germany who will be returning to the UK (mainly England) with their dependants by the end of 2020.

Armed forces personnel are not included in IPS flows, so a separate flow will be created to account for this specific short-term movement (the flow will be set to zero for years beyond 2020). A specific age/sex distribution taking into account the characteristics of this flow will be applied to the totals by year. Armed forces movements will be input into the projections production system as a separate migration flow.

9. Persons granted humanitarian protection under various resettlement schemes

In 2015, the Government made significant extensions to the Syrian Vulnerable Persons Resettlement (SVPR) scheme. Under the scheme, up to 20,000 people from Syria granted humanitarian protection will be resettled in the UK by 2020 (McGuiness, 2017).

The 2016-based Mid-Year Population Estimates (MYEs), which are used as the base population for the 2016-based National Population Projections (NPPs), includes migrants that have been resettled in the UK under the SVPR scheme based on data from the Home Office, the 2016-based NPP will make an assumption that a further 4400 persons will arrive under the SVPR scheme each year up to a figure of 20,000 by 2020.

Persons granted humanitarian protection and resettlement to the UK under the SVPR scheme will not be modelled along with international migration flows; like returning armed forces, they will be input into the projections production system as a separate short-term migration flow because it is assumed that migrant flows under the SVPR scheme will cease in 2020.

Please note:

The proposals and information provided in Section 9 are based on the most recent government commitments at the time of writing.

ONS are aware that the timeframes quoted may be subject to change following the June 2017 general election. ONS endeavours to update the proposals set out in section 9 if and when new information becomes available.

10. Variant projections

This section sits in the context of the paper NPP17(4) on variant projections. In particular, note that we only wish to produce those variants for which there is an identified user need. The following information applies on the assumption that variant migration projections are required, but we reserve the right to vary the values if they better fit requirements.

Since the 2000-based projections, the official high and low migration variants have assumed that annual net migration to the UK would be 60,000 higher or lower than in the principal projection.

This figure of +/- 60,000 was increased to +/- 80,000 in the 2014-based projections to reflect the uncertainty surrounding future net migration.

It is proposed that the 2016-based high and low migration variant assumptions continue to use the “variant width” of +/-80,000. As with the 2014-based variants we also propose that only levels of international migration will be varied and a consistent set of cross border rates will be applied to the principal, low and high migration variants. Cross border migration will still vary between the principal, low and high projections since each projection will have different total population sizes.

Table 6 shows what the 2016-based variant assumptions would be if the principal assumptions were to be as indicated in table 4. Please note that both principal and variant assumptions are provisional at this stage.

Table 6: Variant projections: provisional proposed long-term annual net migration flows for each country.

Country	Proposed 2016-based high variant	Proposed 2016-based principal	Proposed 2016-based low variant
Annual net migration			
England	+214,500	+152,000	+89,500
Northern Ireland	+6,000	+1,500	-3,000
Scotland	+15,500	+7,000	-1,500
Wales	+9,000	+4,500	0
United Kingdom	+245,000	+165,000	+85,000

Note: Variant projections are intended as plausible alternative scenarios and not as upper or lower limits for what might happen in the future.

Annex 1: The cross border rates adjustment

The Statistics Canada adjustment[1] works by modifying the provincial out-migration rates according to the relative population sizes of the regions to balance the migration flows. For each year of the projection, the outmigration rates are adjusted on the basis of the average outmigration rates, the population sizes from the reference period and the basis of the population sizes at the beginning of the year to be projected.

The equation is as follows:

$$m_{ij}^{t,t+1} = m_{ij}^{ref} \frac{P_j^t / \sum_k P_k^t}{P_j^{ref} / \sum_k P_k^{ref}}$$

Where:

$m_{ij}^{t,t+1}$ is the new adjusted rate for the flow and year in question

m_{ij}^{ref} is the averaged rate from the reference period

P_j^t is the size of the population of the region of destination at the beginning of the projection year

$\sum_k P_k^t$ is the sum of the populations of all the regions in the system at the beginning of the projection year

P_j^{ref} is the average size of the population of the region of destination from the reference period

$\sum_k P_k^{ref}$ is the sum of the average sizes of the populations of all regions from the reference period

[1] Dion, P. (2014). Chapter 8: Projection of interprovincial migration In: Statistics Canada. *Population Projections for Canada (2013 to 2063), Provinces and Territories (2013 to 2038): Technical Report on Methodology and Assumptions*. Available at: http://www.statcan.gc.ca/pub/91-620-x/2014001/chap08-eng.htm

The adjustment can be applied to the UK, with the UK countries being analogous to the Canadian provinces. The effect is that if the receiving country makes up a smaller proportion of the UK than it did in the reference period, the migration rate to it for the year in question will be scaled down slightly. Conversely, if the receiving country makes up a larger proportion of the UK than it did in the reference period, the migration rate to it for the year in question will be scaled up slightly.

This basically assumes, in line with Plane (1993)[2], that faster growing countries will become more attractive destinations for in-migrants as well as naturally producing more out-migrants due to their greater population size. The eventual outcome of this is that net migration levels between countries are kept more stable than without the adjustment.

[2] Plane, D.A. (1993). Requiem for the fixed-transition probability migrant. *Geographical Analysis*, 25, 211–223

Annex 2. International migration flows and long-term assumptions by country

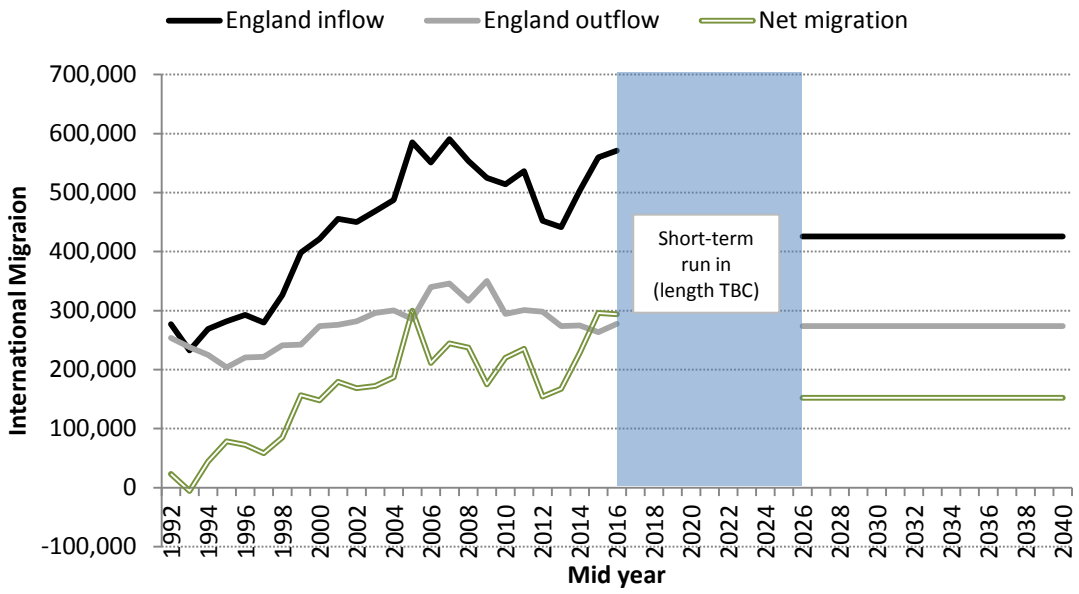
Note 1: The historical flows included in the charts for England, Scotland and Wales are based on actual data used to construct the international migration assumptions. These include the adjustments for international inflow and international outflow using mid-year population estimates' components of change for 2002 to 2011.

Note 2: The historical flows for Northern Ireland are as supplied by NISRA.

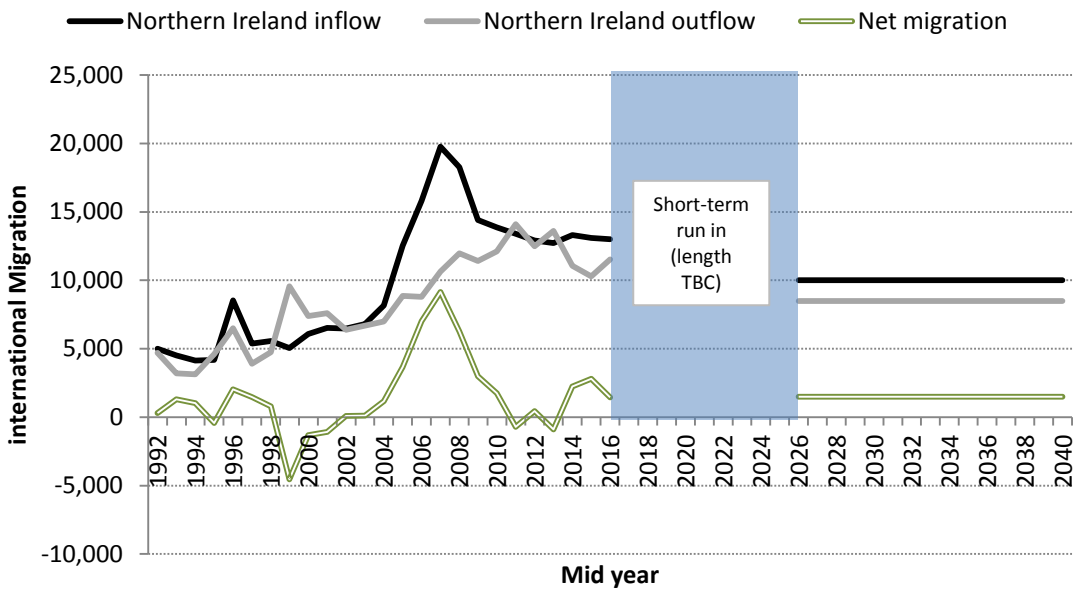
Note 3: The international migration flows in this section include asylum seekers, visitor switchers and migrant switchers.

Note 4: Long-term assumptions are rounded to the nearest 500.

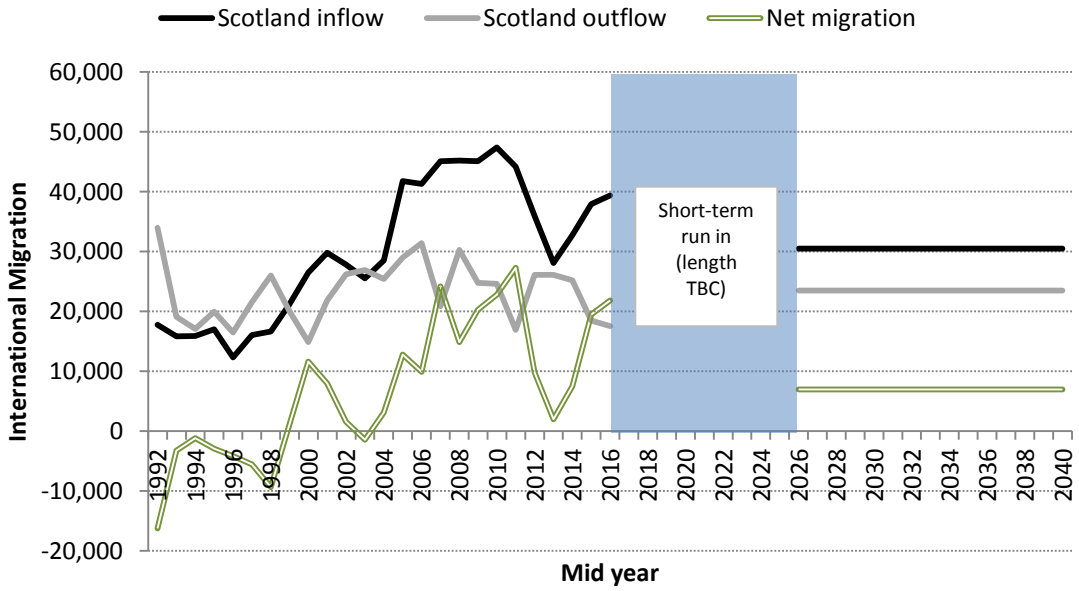
England



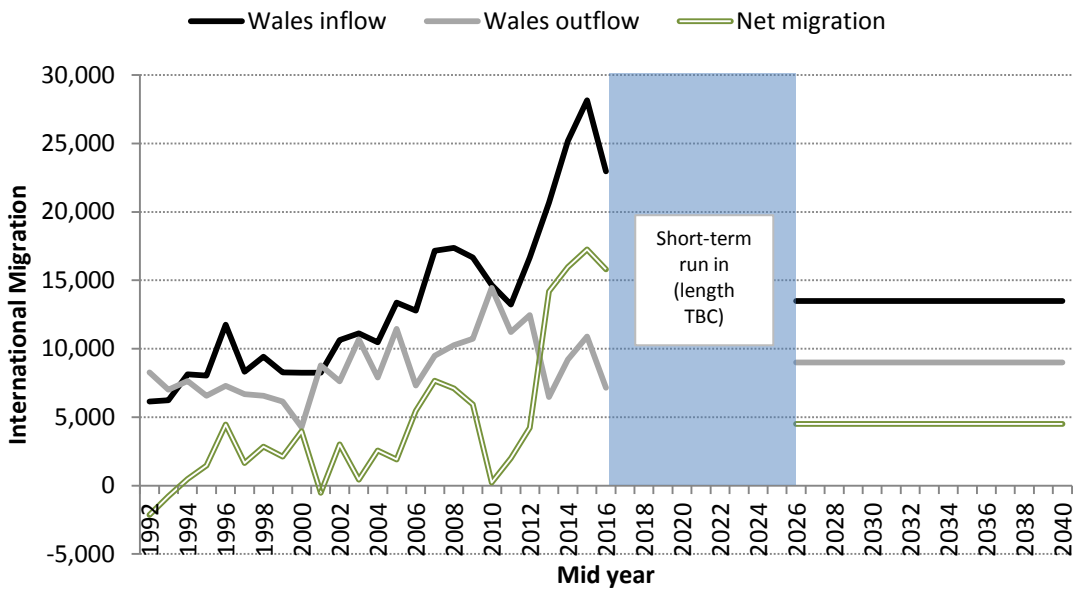
Northern Ireland



Scotland



Wales


Wales inflow
Wales outflow
Net migration
30,000
25,000
20,000
15,000
10,000
5,000
0
-5,000
International Migration
Short-term run in (length TBC)
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
Mid year

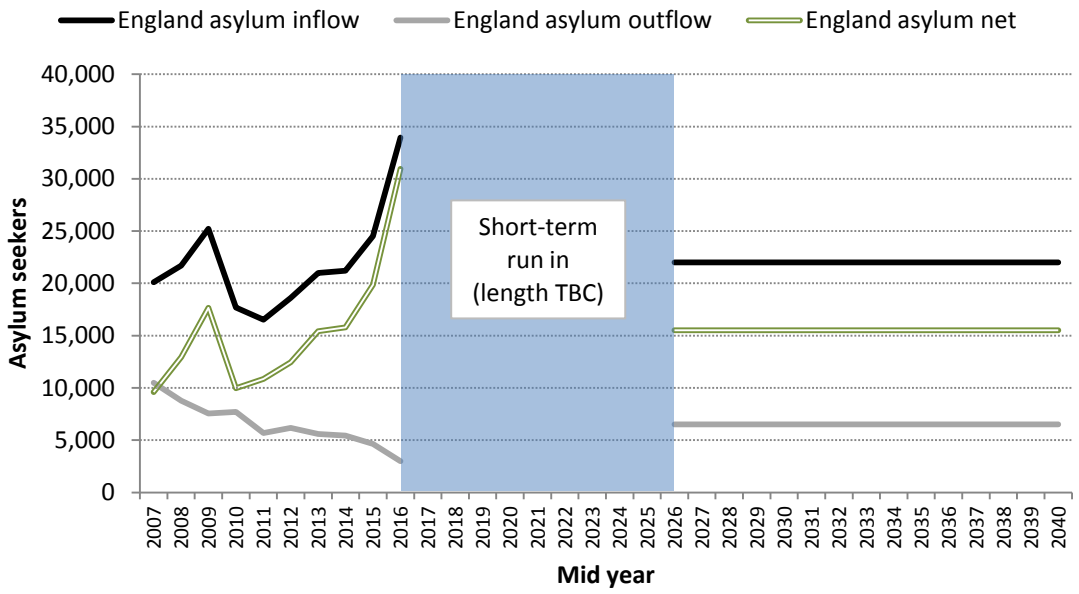
Annex 3. Asylum seeker flows and long-term assumptions by country

Note 1: The historical flows included in the charts for England, Scotland and Wales are based on actual data used to construct the asylum seeker (AS) assumptions, these include the adjustments for AS inflow and AS outflow using mid-year population estimates' components of change.

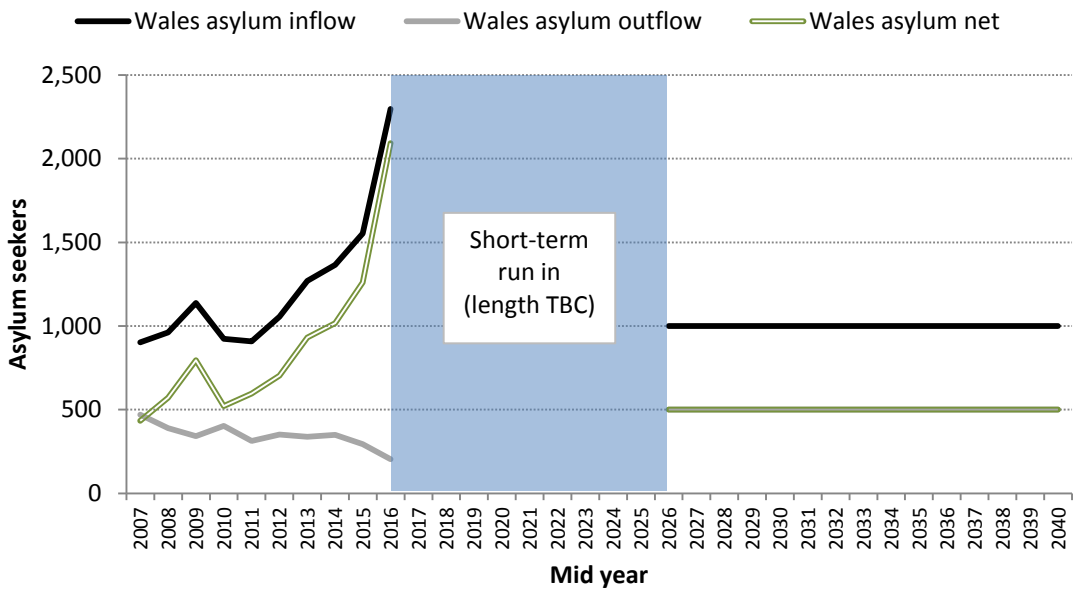
Note 2: Northern Ireland asylum seeker flows are included and modelled together with their international migration flows.

Note 3: Long-term assumptions are rounded to the nearest 500.

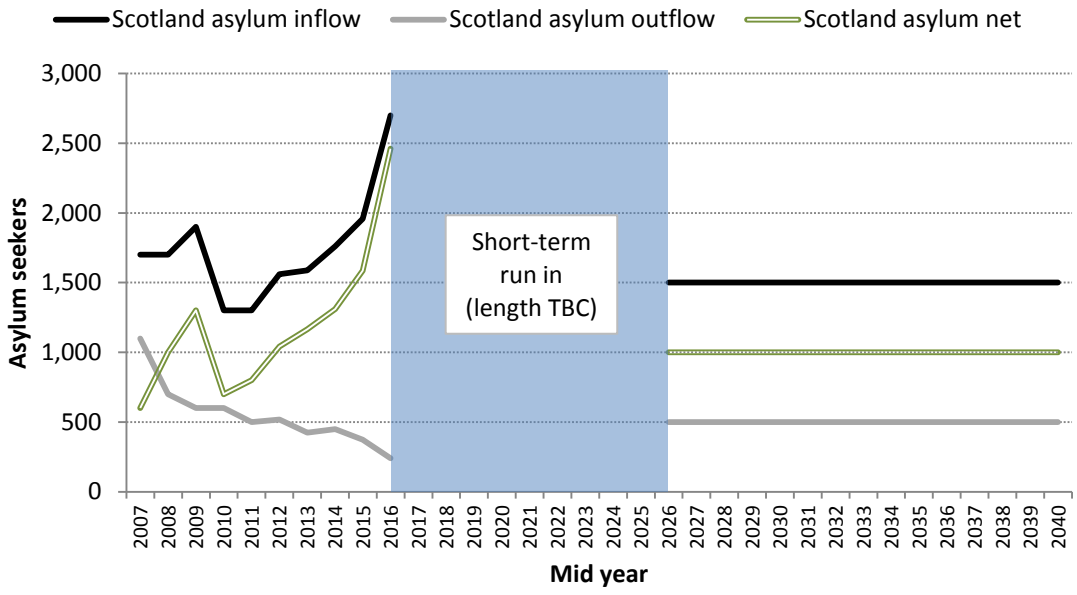
England



Wales



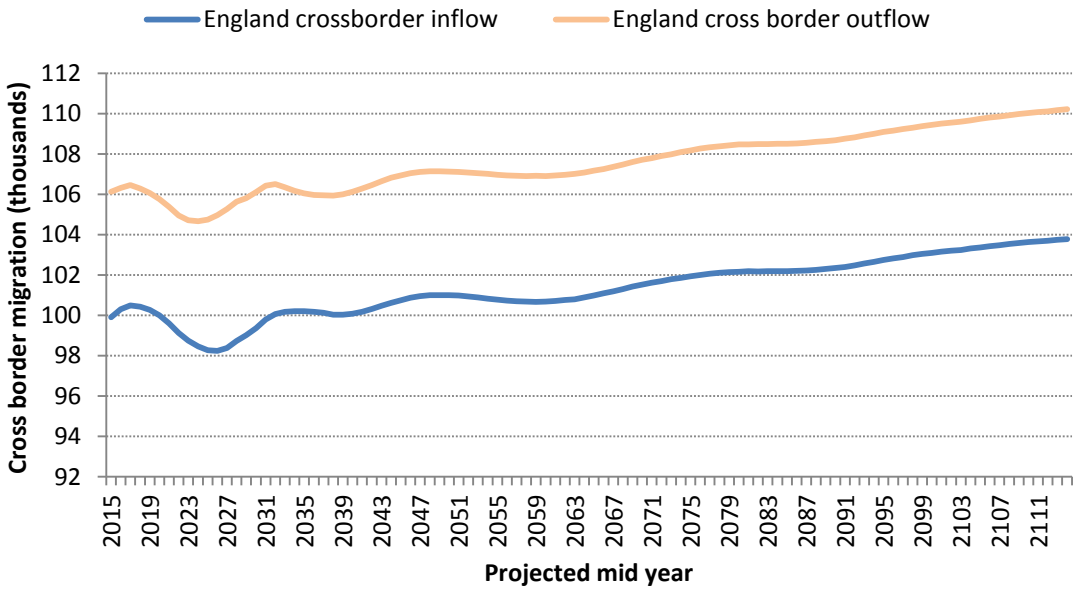
Scotland



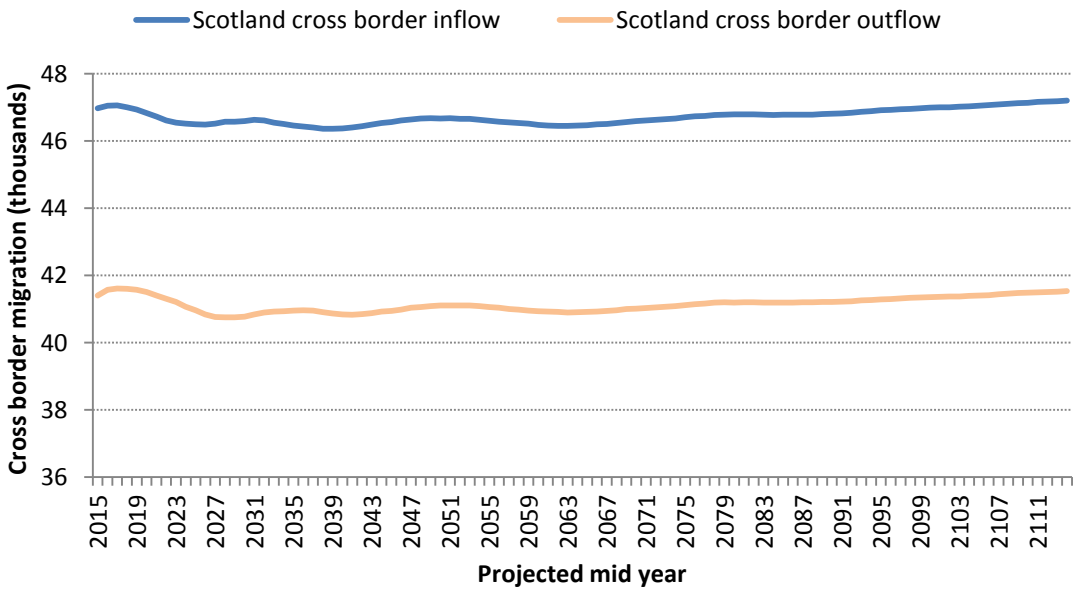
Annex 4. Assumed cross border migration flows from the 2014-based National Population Projections

Note: The fluctuations occurring in the earlier years of the projection were due to differences in the age and sex structure of the underlying population (a cohort effect).

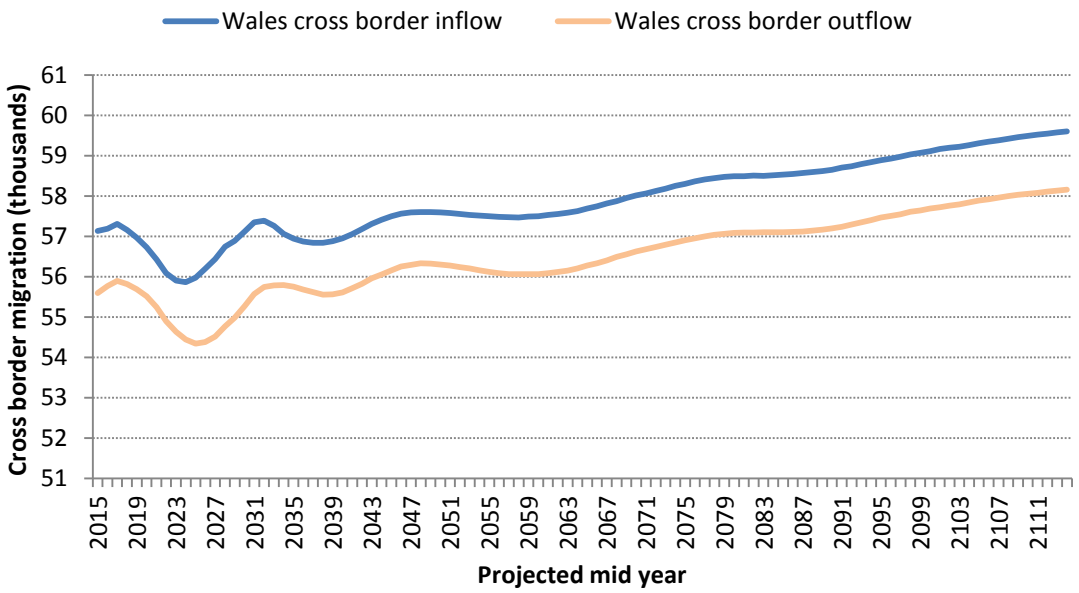
England



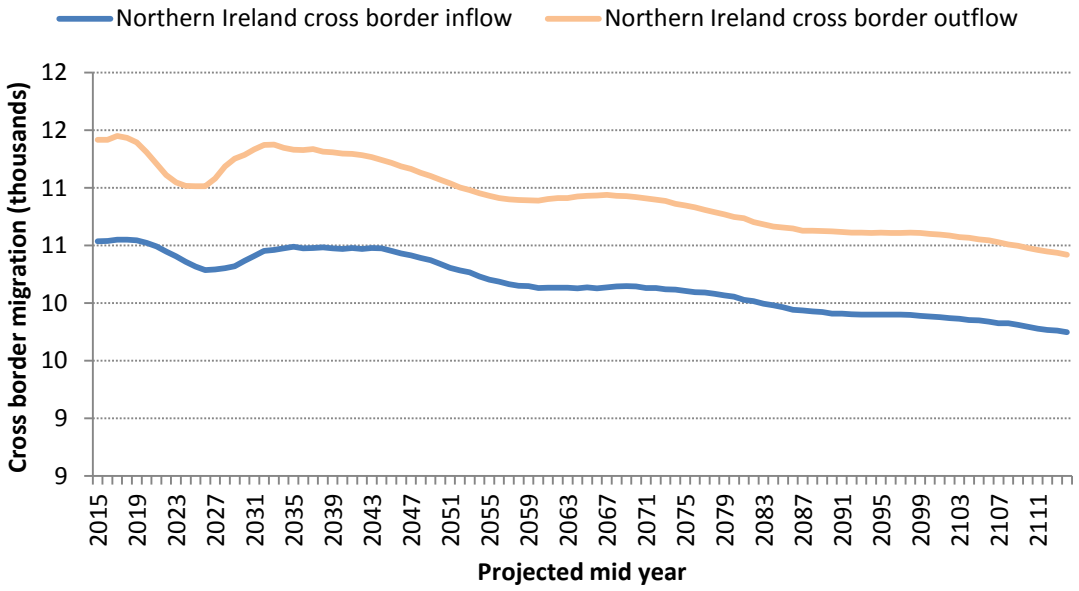
Scotland



Wales



Northern Ireland



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Glossary

ARIMA time series modelling
"Autoregressive Integrated Moving Average" models. Time series data are used to predict future data points in the series. ARIMA models can take into account trends, autoregression, errors and non-stationary aspects of a data set when making forecasts.

EU2
The EU2 (formerly known as the A2) are the two countries that joined the EU on 1 January 2007: Bulgaria and Romania. EU2 nationals previously had certain restrictions placed on them; in the first 12 months of stay, working Bulgarian and Romanian nationals are generally required to hold an accession worker card or apply for one of two lower-skilled quota schemes. Other Bulgarian and Romanian nationals could apply for a registration certificate to obtain proof of a right to live in the UK. These restrictions were lifted in 2014, EU2 nationals now have the same rights as other workers from the EU and EEA.

EU8
The EU8 (formerly known as the A8) are the eight central and eastern European countries that joined the EU on 1 May 2004: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. The EU8 does not include the two other countries that joined on that date: Cyprus and Malta. EU8 nationals previously had restrictions on their rights to work and were required to register under the Worker Registration Scheme, but since 1 May 2011 EU8 nationals now have the same rights as other workers from the EU and EEA.

EU15
Austria, Belgium, Denmark, Finland, France, Germany, Greece, Republic of Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and Sweden. The UK is excluded.

International Passenger Survey (IPS)
The International Passenger Survey (IPS) is a survey of a random sample of passengers entering and leaving the UK by air, sea or the Channel Tunnel. Over a quarter of a million face-to-face interviews are carried out each year. The IPS is carried out by ONS.

NISRA
Northern Ireland Statistics and Research Agency.

NRS
National Records of Scotland.

Switchers

These are responders to the IPS who intended to remain in or out of the UK for 12 months, but actually spent less than a year (migrant switchers) and those who stated an intention to staying or leaving for less than a year but actually spent longer (visitor switchers).