

ALL TOGETHER BETTER

ACCESSIBLE LABOUR: A NECESSITY FOR REGIONAL ECONOMIC PROSPERITY

SEPTEMBER 2018



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EXECUTIVE SUMMARY

For nearly half a century the free movement of labour has had a significant positive impact on the performance of the Northern Irish economy. In particular, since the financial crisis of 2007/2008, the economy's dependence on labour from the European Economic Area has become ever-more pronounced¹. Due to the relatively small indigenous population, maintaining access to people around the world is a high priority for the Northern Irish economy. As well as having a larger pool of talent and skills, inflows of international workers bring productivity gains², foreign direct investment³, and insights into best practices and innovative production processes⁴.

The purpose of this report is to first understand the current structure of migration in Northern Ireland and then analyse the potential impact of increasing frictions on in-migration on economic activity. Policy recommendations are generated from these findings and an evidence-based migration system that takes into consideration the full range of influencing factors, such as business needs and demographics, is called for. This report follows a similar structure and methodology as a recent publication by the Scottish Government on Scotland's population needs and the importance of migration⁵.

Main findings

- The population of Northern Ireland in June 2017 was estimated at 1.87 million. This includes 97,000 EU and 26,000 non-EU citizens.
- The number of births in Northern Ireland to EU 26 mothers has increased by more than 800% over the last 20 years, suggesting that Northern Ireland has become more socially intertwined with other EU nations.
- Although the proportion of international citizens living in Northern Ireland fell from 7.7% in June 2016 to 6.6% in June 2017, the Northern Irish economy has become increasingly more dependent on migrant workers seeing an increase of 40,000 EU 26 workers over the last 10 years.
- Most immigrants come to work and study. They fill skills gaps in both low-level and high-level jobs, and are particularly prominent in education, healthcare, hospitality, agri-food, and digital industries.
- Principal population projections from the Northern Ireland Statistics and Research Agency and the Office of National Statistics show that the population of Northern Ireland is aging, suggesting that over the next 25 years, the pensionable age cohort is to increase by over 40%.
- Although the total population is set to increase over the next 25 years, projections also show that the working age population in Northern Ireland is set to decrease by around 2%.

1 Northern Ireland Statistics and Research Agency, "Overview of People Movement and Migration in Northern Ireland", March 2018

2 Rolfe, H., et al., "Migration and Productivity: Employers' Practices, Public Attitudes and Statistical Evidence", National Institute of Economic and Social Research, November 2013

3 Burchardi, K., et al., "The Effect of Migration on Foreign Direct Investment", VoxEU, 12th November 2016

4 Bosetti, V., et al., "Migration of Skilled Workers and Innovation: A European Perspective", Journal of International Economics, 2015

5 Scottish Government, "Scotland's Population Needs and Migration Policy: Discussion Paper on Evidence, Policy and Powers for the Scottish Parliament", February 2018

- Changing demographics and a reduced access to migrant workers is going to impact some Northern Irish sub-regions, such as Derry & Strabane, more than others, such as Armagh City, Craigavon & Banbridge.
- Increasing frictions for migrants from Brexit suggests that population projections should be revised downwards. From the 50% EU migration and low migration scenarios we find that real GDP in Northern Ireland will decrease 5.3% and 9.1% respectively relative to what could be generated without frictions.
- Under these same scenarios, the working age population in Northern Ireland would shrink by around 6% and 8% respectively.
- Northern Ireland's economy faces a much greater economic impact from reduced migration relative to the rest of the UK.

Recommendations

Overall, this report recommends that any migration system for Northern Ireland is evidence-based and takes into consideration the full range of influencing factors, such as industry needs and demographics. Given this basis, a new system on migration should:

- Allow firms of all sizes to benefit from better access to people and skills from around the world, not just the EU.
- Allow firms to have access to willing workers of all skill levels.
- Focus on forming strong linkages with people from the EU and across the world as Northern Ireland seeks to create and enhance external trade.
- Recognise that continued access to migrant labour, as well as skills, is required to avoid critical shortages across all sectors – public and private.
- Allow firms to continue to easily move staff to and from Europe under any new system that replaces free movement.

INTRODUCTION

“We need a light touch system for managing EU migration. We face intense competitive pressures from firms operating in the Republic and any increased administrative burdens as a result of the new system will put us at a disadvantage when compared to rival firms south of the border.”

Northern Irish software firm

Positive net migration has been integral to Northern Ireland’s social and economic rejuvenation over the past 20 years. Migration from the European Economic Area (EEA) has created jobs⁶ and boosted foreign direct investment⁷. Migrant workers are currently supplementing the indigenous labour force, plugging skills gaps and creating prosperity. EEA migrants are often key to filling critical ‘lynchpin’ roles which support supply chains and public services – HGV drivers, care workers, manufacturing workers, seasonal agri-labour, hotel staff etc.⁸

For the United Kingdom, the future of migration and policies surrounding it remain uncertain, and therefore so too does its impact on employment and the economy. This study investigates the potential impact of restrictions on net migration flows and the consequence that any institutional and labour shock would have on long-run economic prosperity of Northern Ireland. In doing so, we demonstrate that without access to inward migration, Northern Ireland’s population and economy will struggle to grow. This impact will have a cascading effect on the already weak productivity and investment levels⁹, which would be in danger of deteriorating further. Specifically, given Northern Ireland’s relatively small population, its future economic success is highly dependent on the private sector’s ability to access international labour and a wide range of skills.

Uncertainty surrounding the implications of Brexit on labour mobility has created a chill factor for current and prospective immigrants to the UK¹⁰. Furthermore, weak sterling and improving economies across Europe have combined to reduce the number of EU nationals in the local economy. We need to begin to take seriously the impact of any proposed future with fewer migrant workers and limited access to skills combined with a continued exodus of skilled indigenous workers seeking employment elsewhere in the global economy; widely referred to as Northern Ireland’s “*brain drain*” problem. This report models the impact on the local economy from such a scenario.

6 Northern Ireland Statistics and Research Agency, “Northern Ireland Labour Market”, September 2018

7 Invest Northern Ireland, “Track record”, November 2017

8 Hoy, I., “CBI Northern Ireland Policy Briefing: Migration”, Confederation of British Industry, July 2018

9 Canning, M., “Huge Decline of Over 50% in Foreign Investment here in 2017”, The Belfast Telegraph, 12th June 2018

10 Travis, A., “Net Migration of EU Nationals to Britain Falls by 75,000”, The Guardian, 22nd February 2018

The demographic statistics in this report demonstrate that local employers will need to continue accessing young EU and international workers as the pool of indigenous 'working-age' people in Northern Ireland diminishes.

Given the natural demographic backdrop which includes an ageing population structure, the local economy is expected to require significantly increased subvention from HM Treasury if future living standards in Northern Ireland are to be maintained. This report advocates that continued migration of working people from inside and outside the EU is one of the most realistic ways of mitigating our reliance on Westminster funding in the future. From a macroeconomic perspective, any government-imposed restrictions on Northern Ireland's private sector to access people will only serve to restrict private sector growth and increase the economy's future dependence on public spending and subvention from HM Treasury.

Northern Ireland is also in a unique geographic position, being the only region to have a land border with an EU country, the Republic of Ireland. As can be derived from the initial quote, Northern Irish industry has a direct source of competition and cooperation with its EU neighbour. This competition includes a competition for labour and investment which may directly impact Northern Ireland if heavy restrictions are imposed on the free flow of willing migrant workers. Although we do not necessarily stress this unique circumstance of Northern Ireland, be sure that it is a factor that runs in the background and should be brought to light in the development of any policy development on this issue.

The CBI strongly recommends that any migration system for Northern Ireland is evidence-based and takes into consideration the full range of influencing factors such as industry needs, demographics and historical migration flows particularly relating to outward migration flows of Northern Ireland's young (educated) population cohort. Both the long-term and short-term consequences of any change to migration policy must be fully analysed.

PAST AND PRESENT DEMOGRAPHICS

Population overview

The population of Northern Ireland has been growing steadily over the past century; increasing at an average rate of 0.31% year-on-year. In June 2017, the population was estimated to be 1.871 million; which constitutes for 2.81% of the total population of the UK (66.57 million)¹¹.

From June 2016 to June 2017 the population of Northern Ireland rose by 8,700 (0.5%), while population growth for the rest of the UK was estimated to increase by 0.6% during the same period. The population in all 11 Local Government Districts increased, ranging from 0.19% in the Belfast district to 1.03% in Lisburn and Castlereagh district. The overall increase can be attributed to natural growth (i.e. births minus deaths) and positive net migration. However, the level of out-migration (i.e. people leaving Northern Ireland to live elsewhere) and in-migration (i.e. people coming here to live) both decreased over the year to mid-2017, by 6.5% and 7.3% respectively.

The population continues to age with the number of those aged 65 and over increasing by 1.8% in the year ending mid-2017 to reach 303,000 people (16.4% of the population). Within this group, the population aged 85 and over increased by 1.9% to reach 37,200 people (2.0% of the population). By way of contrast, the number of children aged 0 to 15 years increased by just 0.7% to reach 390,700 children (20.9% of the population) and the working age population increased by 0.66% to reach 1,167,586 people (62.4% of the population)¹².

Recent migration

Northern Ireland has continued to welcome people to live and work within its borders. Since the Belfast (Good Friday) Agreement in 1998, the region's economic success has been complemented with positive net migration (i.e. in-migration minus out-migration) from the EU and the rest of the world, combined with a positive natural change (i.e. births minus deaths). Particularly, from the turn of the 21st century to the financial crisis of 2008/2009, Northern Ireland has benefited from a dramatic increase in migration inflows and, consequently, an increase in the natural change in population.

However, propagated by the global financial crisis, the level of positive net migration declined; falling into negative territory between 2010 and 2014 as more people left the region than came into it. While some improvement has since occurred, along with stronger economic growth between 2013 and 2016, net migration has remained subdued and has still far to go before it reaches the pre-crisis peak of 9,140 people in 2007. (See Figure 1).

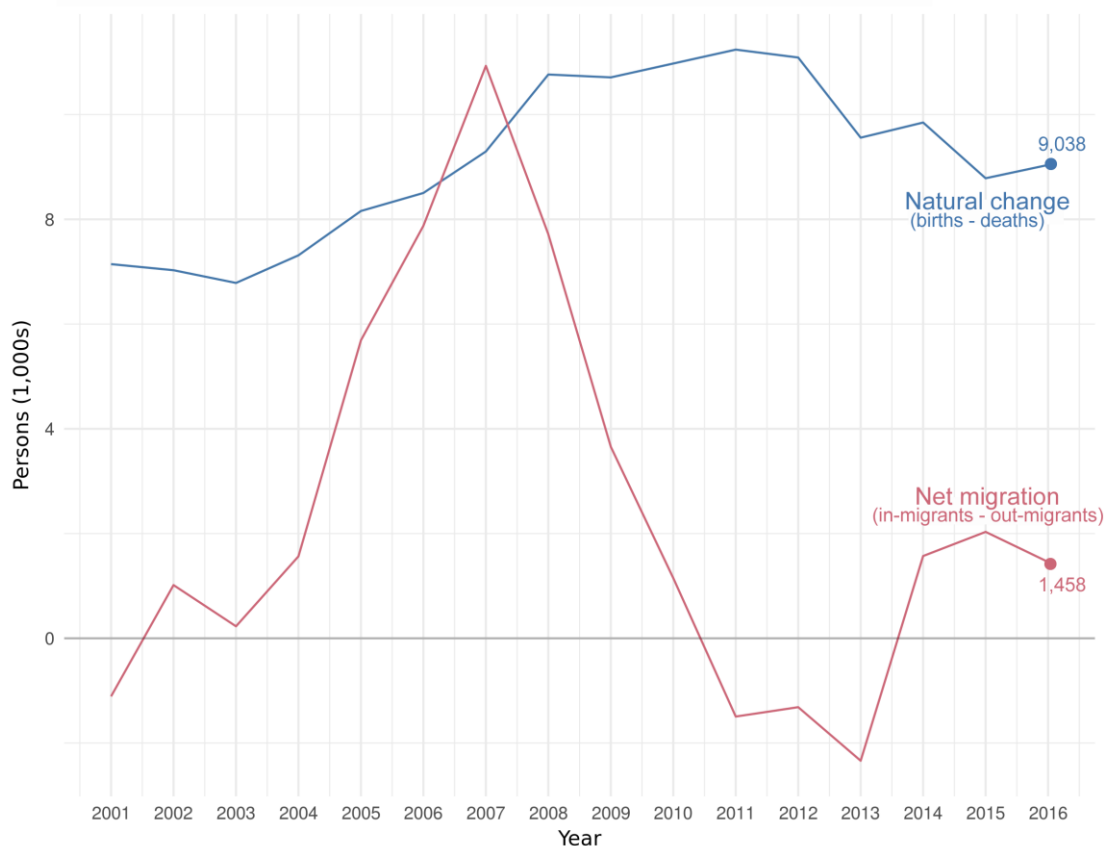
Alongside lower net migration, Northern Ireland has also observed a broad downward trend in the natural change of population since its 2011 peak of 11,240 – falling to 9,038 in 2016. This is a trend that has been observed throughout all regions of the United Kingdom, driven

11 Northern Ireland Statistics and Research Agency, "2017 Mid-Year Population Estimates for Northern Ireland", June 2018

12 Northern Ireland Statistics and Research Agency, "Northern Ireland – Population by Sex and Five Year Age Bands (1971-2017)", June 2018

by a decline in the baby-boomer generation and the fact that families across the UK are having fewer children^{13,14}.

Figure 1. Natural change and net migration, Northern Ireland, 2001-2016



Source: *Population Estimates and Components of Population change, NISRA (October, 2017)*

Inward migration and demographic trends

Rising in-migration has been coupled with a shift in the demography of Northern Ireland. Official surveys show that most migrants in Northern Ireland come to work (40.5%), join family (25.6%), or study (14.5%). Furthermore, they found that in mid-2016 79,000 persons resided in Northern Ireland were born in the EU 26¹⁵; with 71,000 (89%) aged 16 or over. Of these EU 26 residents, 57,000 (80%) were employed and working in Northern Ireland.

Population breakdown

Of the non-NI born working age population, 38,000 residents in Northern Ireland were born in the Republic of Ireland; with 37,000 aged 16 or over. Of these, 21,000 (57%) were employed and working in NI. The total number of Northern Irish residents born in EU 26 and Ireland from 2007 to 2016 can be seen in Figure 2.

The Northern Ireland Statistics Research Agency (NISRA) reported that between October and December 2016 there were 117,000 EU, including Republic of Ireland, residents in

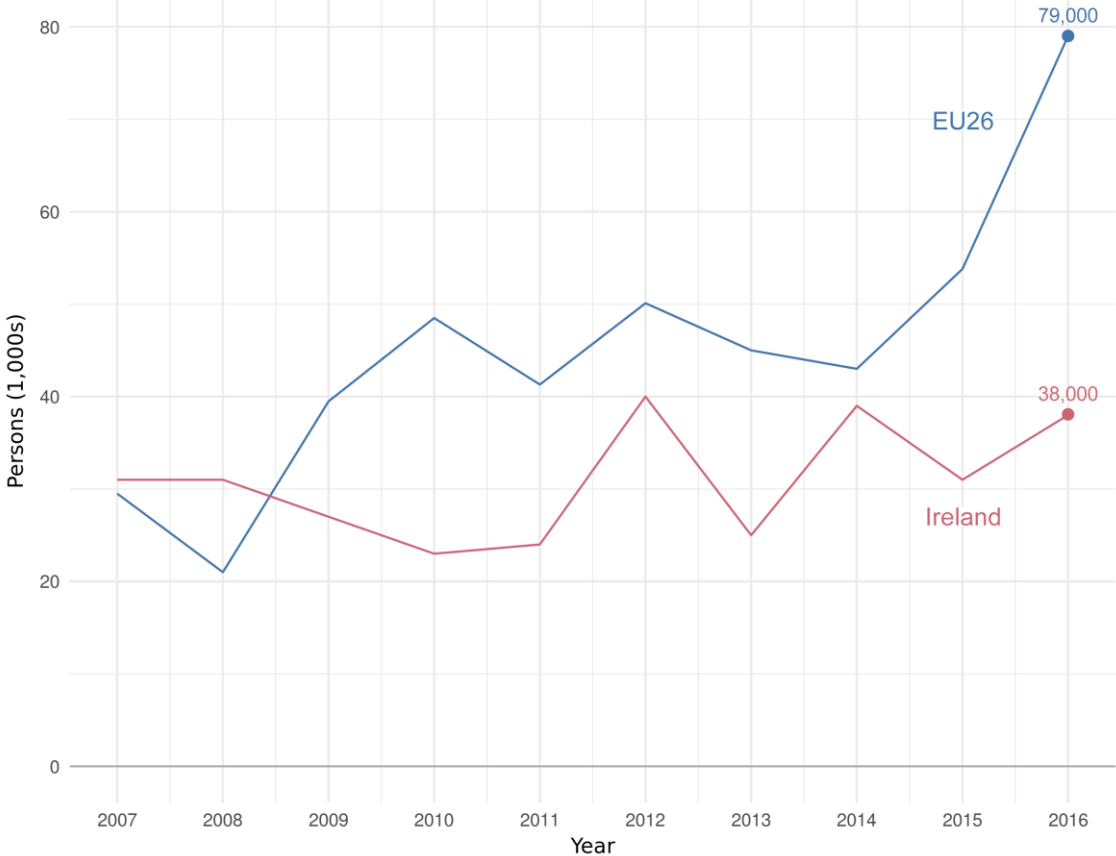
13 DataBlog, "Family size: why are we having fewer children?", The Guardian Newspaper, 2013

14 Cary, P., "Women Having Fewer Children Than At Any Time In History, Statistics Show", The Independent, 25th November 2017

15 Note that within this report the EU 26 refers to the EU 28 member states minus the United Kingdom and Ireland.

Northern Ireland representing 6.3% of the local population. This research by NISRA was conducted very shortly after the Brexit referendum.

Figure 2. Republic of Ireland and EU 26 citizens residing in Northern Ireland, 2007-2016



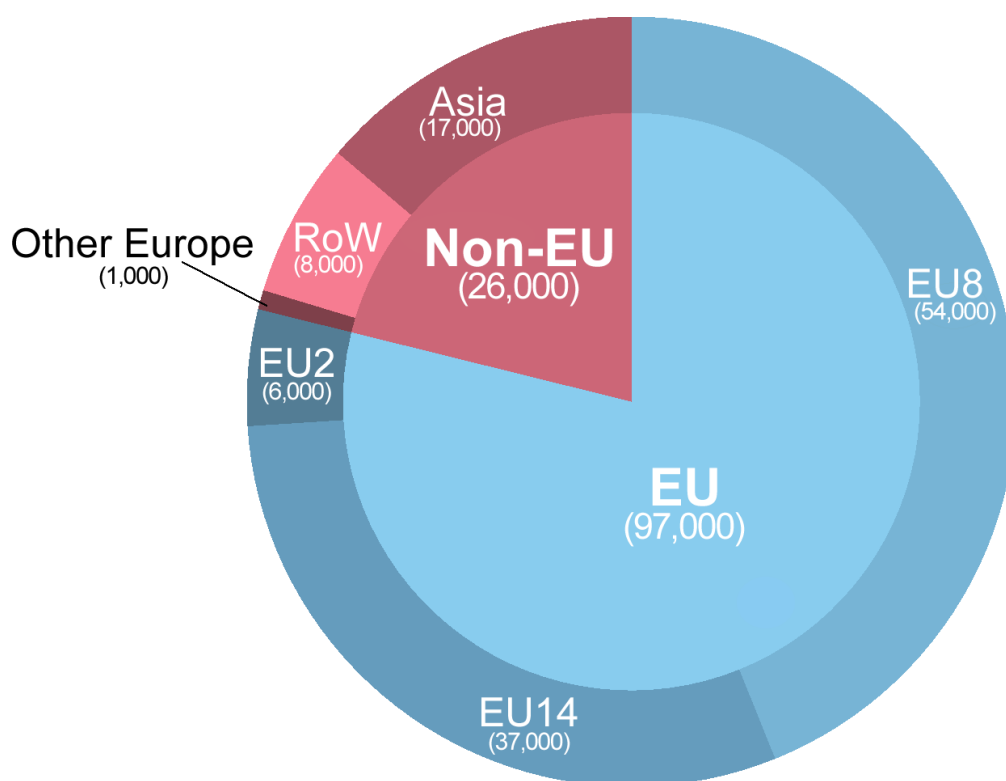
Source: Labour Force Survey, NISRA (March 2018)

By June 2017 that figure had fallen by approximately 20,000 people to an estimated 97,000 EU citizens living in Northern Ireland. Alongside EU born citizens, there were an estimated 26,000 other international migrants. In total, it is estimated that in 2017 Northern Ireland was home to 123,000 EU and international citizens, who represent 6.6% of the region's population. The full demographic breakdown is given in Figure 3.

Trends in births

Notable phenomena have emerged over the past 20 years to suggest that the Northern Irish population has gradually become more socially intertwined with other EU nations. First, there has been a long-term decline in births in Northern Ireland to mothers born in Great Britain. This is a decline in both absolute and relative terms. Specifically, the proportion of births in Northern Ireland from Great Britain born mothers has fallen by 43%. There were 1,052 (4% of total) births in Northern Ireland to mothers from Great Britain in 2016, which is a fall from 1,756 (7% of total) births in 1997.

Figure 3. NI's Population by non-UK nationality, June 2017



Source: Annual Population Survey, ONS (June, 2017)

Note: The EU 2 (formerly known as the A2) refer to the two countries that joined the EU on 1 January 2007: Bulgaria and Romania. EU2 nationals currently have 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.

The EU 8 (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.

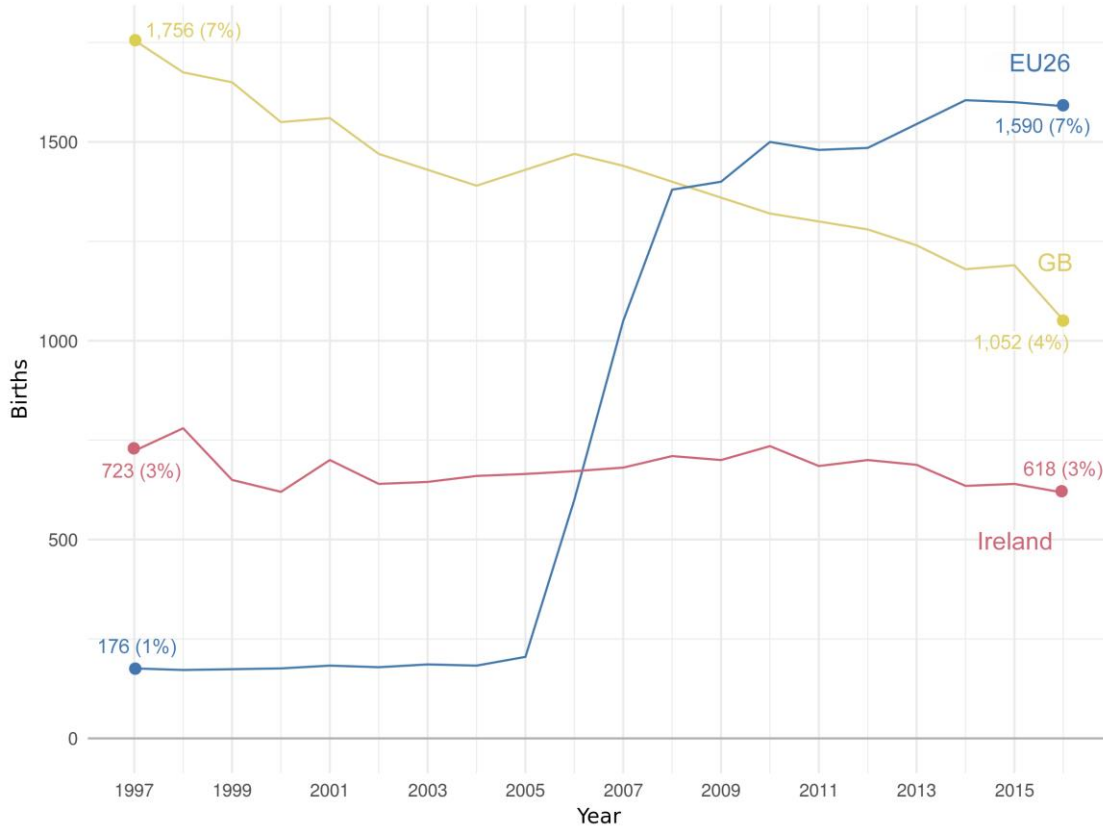
The EU 14 are the other older member countries of the EU (before 2004): Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden.

Second, there has also been a small fall in births in Northern Ireland to mothers born in Ireland: 618 births to mothers from Ireland in 2016; down from 723 births in 1997.

Finally, over the same period, there has been a substantial rise in births in Northern Ireland to mothers born in EU 26 countries. This is a significant increase in both absolute and relative terms. In 2016 there were 1,590 (7% of total) births to mothers from EU 26 countries; up

from 176 (1% of total) births in 1997. As can be seen in Figure 4, the biggest rise in EU 26 mothers came soon after the 2004 EU expansion.

Figure 4. Births in Northern Ireland to mothers born in GB, EU 26 and the Republic of Ireland, 1997-2016



Source: Registrar General Annual Report: Births, NISRA (2016)

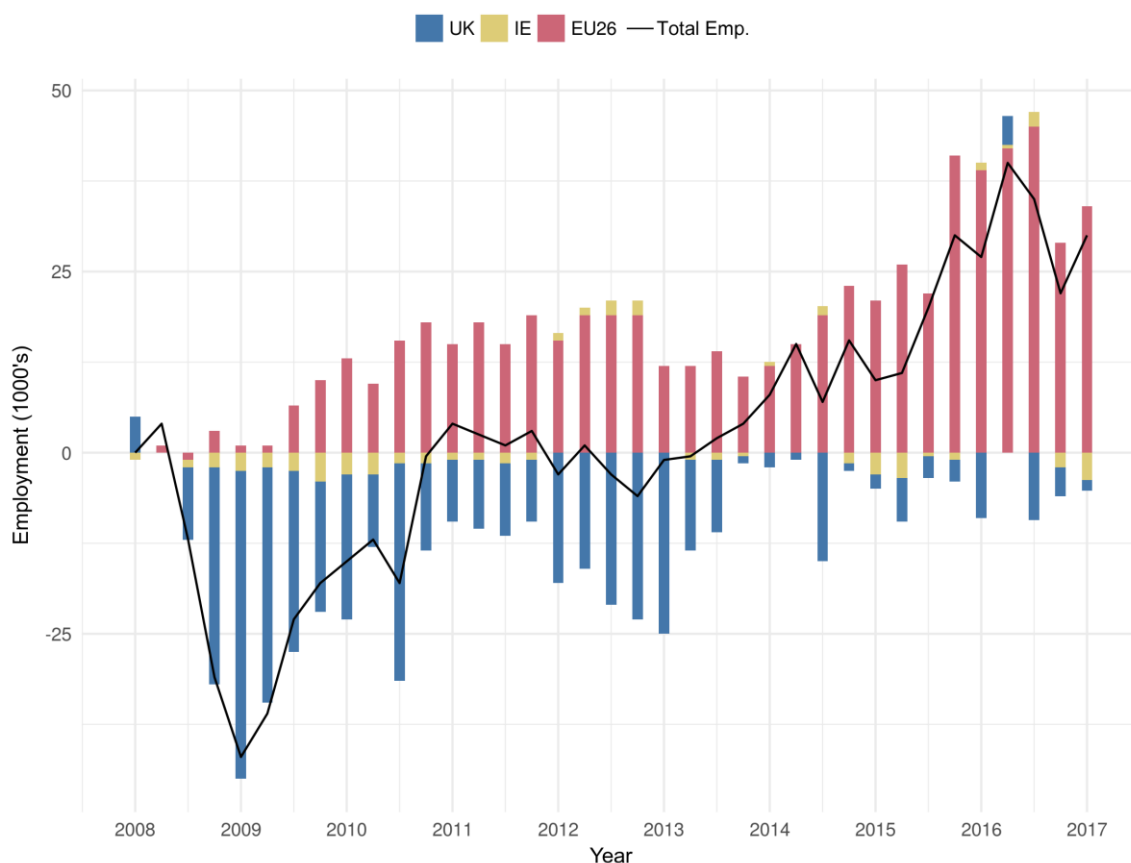
Inward migration and employment

Over the last decade, the growth of employment in Northern Ireland has become increasingly reliant on migrant labour. Due to the global financial crisis, employment fell by 40,000 between Q1 2008 and Q2 2009. By 2014 employment levels had risen back to pre-crisis levels, however this employment increase was driven by an inflow of migrant workers from the EU 26 countries.

Specifically, the employment of UK nationals was negatively impacted by the financial crisis, which still has not recovered. UK-worker employment had effectively been replaced by employment from EU workers. By 2016, employment had risen by nearly 40,000 above the pre-crisis levels. Again, this boost in employment was driven by people born in EU 26 now living in Northern Ireland. This information is shown in Figure 5.

The Department for the Economy (DfE) statistics suggest that between 2008 and 2016 the number of people in employment in Northern Ireland rose by 36,000; a substantial amount of these people are from the EU 26 economies.

Figure 5. Change in employment by country of birth, Northern Ireland, 2008-2017



Source: Labour Force Survey, NISRA (March, 2018)

Employment levels in Northern Ireland

In terms of the working age population, NISRA estimated that 841,000 people were employed and working in Northern Ireland by the beginning of 2017. Moreover, the latest labour market statistics from NISRA show that private sector employee jobs have grown to a series high in June 2017, however they also report that there is some evidence that the annual growth in private sector jobs is slowing; from 17,130 over the year to June 2016 to 10,700 over the year to June 2017.

Table 1: Labour market status by country of birth, Northern Ireland, Oct - Dec 2016

	RoI (%)	EU 26 (%)	Non-EU (%)	UK (%)	Total (%)
Employed	21,000 (57)	57,000 (80)	24,000 (56)	739,000 (57)	841,000 (58)
Unemployed	*	*	*	42,000 (3)	49,000 (3)
Inactive	16,000 (43)	11,000 (15)	11,000 (35)	527,000 (40)	565,000 (39)
Total	37,000 (100)	71,000 (100)	40,000 (100)	1,307,000 (100)	1,455,000 (100)

Source: Economic and Labour Market Statistics Branch (NISRA) Labour Force Survey

Figures may not sum due to rounding

* Sample size too small for a reliable estimate

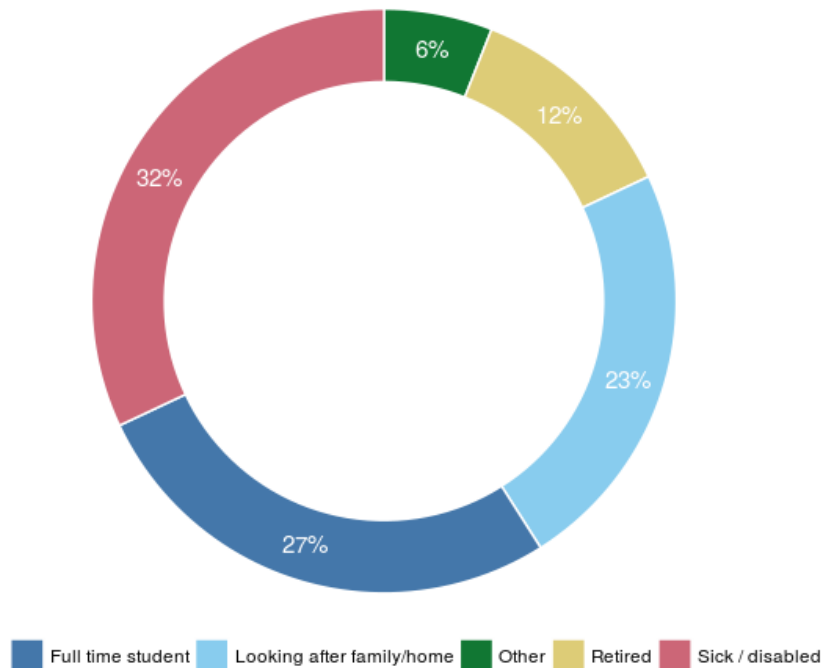
Unemployment levels in Northern Ireland

Using Labour Force Survey data, NISRA found that between April and June 2018 the unemployment rate was at 3.8%; which represents 33,000 unemployed persons in Northern Ireland. This is lower than the unemployment rate for the UK as a whole; which stands at around 4%.

Inactivity in Northern Ireland

The latest labour force data for Q1 2018 shows that there were 325,000 inactive people in the Northern Ireland working-age population. Figure 6 demonstrates that over one quarter of the inactive are full-time students (88,725); less than one quarter of the inactive are looking after family (74,625) while just under one third are long-term sick or disabled (103,350 people).

Figure 6. Structure of Economically Inactive Population, Northern Ireland, Q1 2018



Source: *Labour Force Survey, NISRA (March, 2018)*

When the number of inactive persons is broken down into these various categories, it appears that around two thirds of the inactive are currently unavailable for work. However, some supply-side support for the remaining one third (the long-term sick and disabled population) in terms of training programmes, upskilling and reskilling, could potentially have a small but positive influence on the local labour market.

Skills deficit: A competitiveness issue for Northern Ireland employers

Firms in Northern Ireland have traditionally struggled to attract workers from management level right down to low-skilled workers. The rise in migrant workers had helped to take a degree of pressure of the firms seeking workers. However, currently there is a fear amongst the business community that the increased uncertainty (regarding arrangements for

immigration flows post Brexit) along with a lack of devolved government in Northern Ireland, will cause the number of EU and international migrants to continue declining into the long-term as migrants find better social, political and economic opportunities elsewhere in the global economy. In CBI NI's 2017 migration survey, 96% of firms believed that Northern Ireland is facing a growing skills shortage. Into 2018 the concern regarding skill shortages is mounting, having more of a pressing concern to businesses than the lack of an Executive or the uncertainty of a looming Brexit.

Against a backdrop of low unemployment and an ageing workforce, more than a third (35%) of CBI businesses surveyed view access to labour supply as a threat to the UK's labour market competitiveness. This is a rising concern, with half (50%) believing it to be a threat to competitiveness in five years' time.

Already, uncertainty over future access to EU labour and skills is causing firms to consider relocating their Northern Ireland operations elsewhere. Several businesses, particularly larger firms, have already signaled that they have already started exploring relocation opportunities. A number have already purchased facilities in the Republic of Ireland and others are considering expanding facilities they already possess.

Today's firms are operating in a globally competitive environment and if they have any barriers to accessing global talent then employers from academia to engineering and manufacturing will be at a distinct competitive disadvantage, particularly with competitive pressures from across the border. Given Northern Ireland's desire to grow the knowledge economy, such barriers would undoubtedly prove to be incompatible with economic growth.

Language proficiency is a prime example where there are not enough local workers in Northern Ireland with the necessary skills; this has forced local businesses to recruit native speakers to fill the language skill gap.

EU workers: Reducing pressures in a range of skill levels

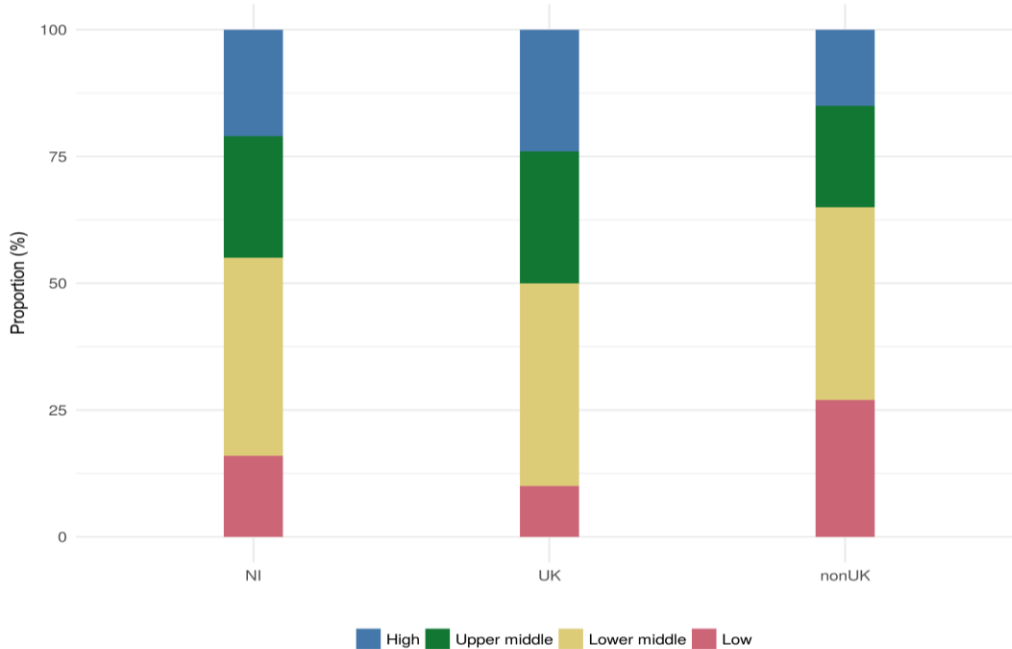
EU workers in Northern Ireland have also helped to ease pressure on skills deficits in knowledge-economy sectors. As noted, it is widely recognised that Northern Ireland suffers from a so-called 'brain drain'. Approximately 36% of local A-level students leave the region to study elsewhere and a large proportion do not return. Many skilled and well-educated indigenous workers see greater opportunities elsewhere in the UK and further afield. Thus, migrant workers help to offset some of that pressure by offering skills at all levels, seen in Figure 7. Figure 7 indicates that migrant workers do not fulfil proportionately as many high skilled jobs as Northern Irish and other UK workers. However, it's notable that they still provide a significant number of skills to technology, education and healthcare sectors.

However, the contribution of migrant workers to low-skilled work should not be overlooked. Businesses in sectors such as agriculture and agri-food processing have reported that a significant proportion of their workforce are EU migrant workers. Businesses are dependent on these workers all year round and have proven to be indispensable to the operations of these crucial industries. Indeed, it is not only worth measuring simply the value-added on each migrant worker, but also how irreplaceable the workers are to many firms across all sectors of Northern Irish industry.

During the last two decades, the business community in Northern Ireland has benefited hugely from the free movement of skilled workers. Productivity data for the region shows that in the last number of decades, the biggest productivity gains were attained during 2003-2007 when Eastern European migrant workers came to live in Northern Ireland. Immigration

has played a vital role by supplementing skills and plugging skills gaps, which is critical for the overall success of Northern Ireland’s economy.

Figure 7. Proportions of skill level of occupation and country of birth groups employed in Northern Ireland, Q4 2015 – Q3 2016



Source: *Labour Force Survey, NISRA (March, 2018)*

Wider benefits of inward-migration

Demographic and economic benefits of migration to Northern Ireland are directly linked through growth in the working age population and the impact on tax revenue. The size of the population aged 16 to 64, which makes up most of the working age population, is crucial for the economy and public finances. Migrants are often hired for bringing unique cultural understanding or specialist knowledge which indigenous workers cannot provide. Such individuals can potentially generate more tax receipts for the local economy and through the multiplier effect they raise economic activity well beyond their immediate work place. Indeed, a recent article by the Financial Times showed that European migrants pay more in taxes than they receive in benefits or public services¹⁶.

However, immigration must not only be viewed through the narrow prism of economic growth and filling domestic skills shortages. It is widely accepted that overseas workers bring fresh ideas, and in the case of Northern Ireland, they have added cultural diversity to a region which has traditionally been divided by sectarian conflict between two communities.

Brexit-impact so far on migrant workers

Although Northern Ireland has been a big beneficiary of migrant workers, over the past two years businesses have reported a growing number of long-established migrant employees are leaving Northern Ireland. Crucially, and for the first time, those leaving are not being replaced by new arrivals. DfE statistics suggest that the number of EU nationals (excluding Irish citizens) employed in Northern Ireland has fallen from 54,000 at the end of June 2016

¹⁶ The Financial Times, “The Effects of EU Migration on Britain in 5 Charts”, September 2018

to 40,000 by the end of March 2018 – a drop of 26%. Due to this, Northern Ireland's employers are facing a growing skills shortage. Firms have in 2018 reported that they have been forced to turn away new orders and new customers as they no longer have the labour skills to cope with increasing orders.

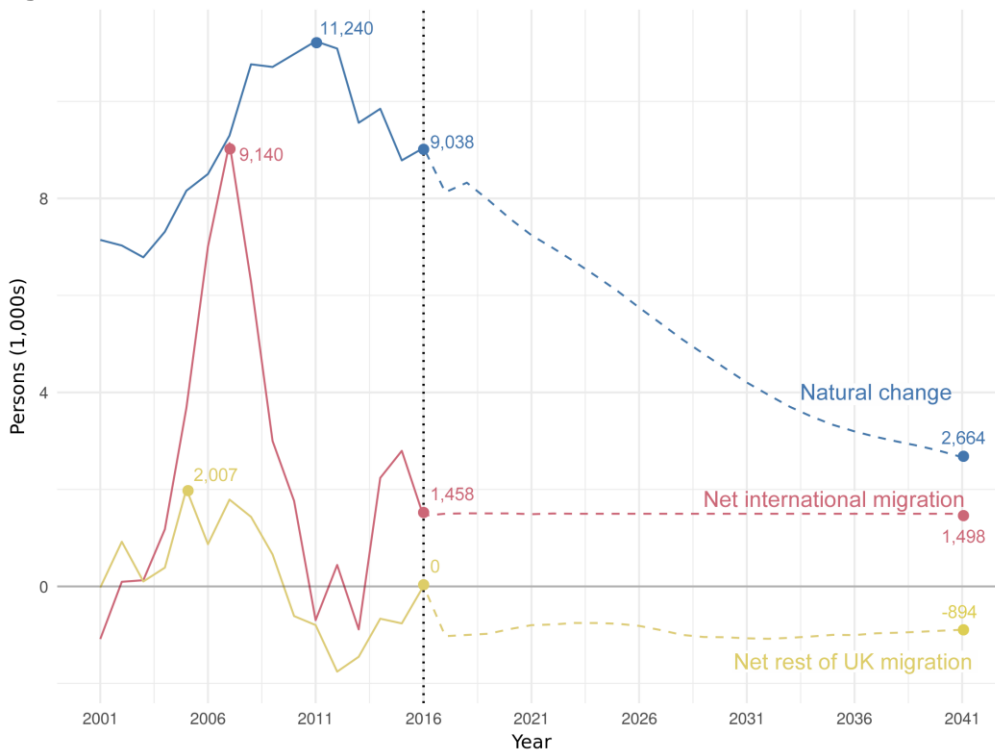
POPULATION PROJECTIONS

The demographic benefits of migration are made clear in projections from the ONS regarding Northern Ireland's future population growth. These projections use the Office for National Statistics (ONS) principal projection¹⁷ of migration and natural change (births minus deaths) for the Northern Irish population.

Migration and natural change

The principal projection of the Northern Irish population can be seen in Figure 7. From this, we can see that migration — particularly from international citizens moving to Northern Ireland — helps mitigate long-term economic and demographic challenges; but other challenges remain.

Figure 7. Actual and projected natural change and net international and rest of UK migration, Northern Ireland, 2001 – 2041



Source: Northern Ireland Principal Population Projection Summary, ONS (October, 2017)

There are projected to be more births than deaths in every year going forward, but the level of this positive natural change is to decline from its peak of 11,240 in 2011 to 2,664 by 2041. Northern Ireland's population growth is projected to come from this (declining) natural change and net international migration, which includes migration from the EU and the rest of the world.

This international migration is based upon NISRA projections, which have not included a tightening of immigration restrictions in a post-Brexit world. However, UK Government policy ambitions to reduce immigration to “tens of thousands” combined with the impact of Brexit would suggest that net international migration to Northern Ireland will decline further and never again reach its peak seen prior to the global financial crisis of 9,140 which boosted

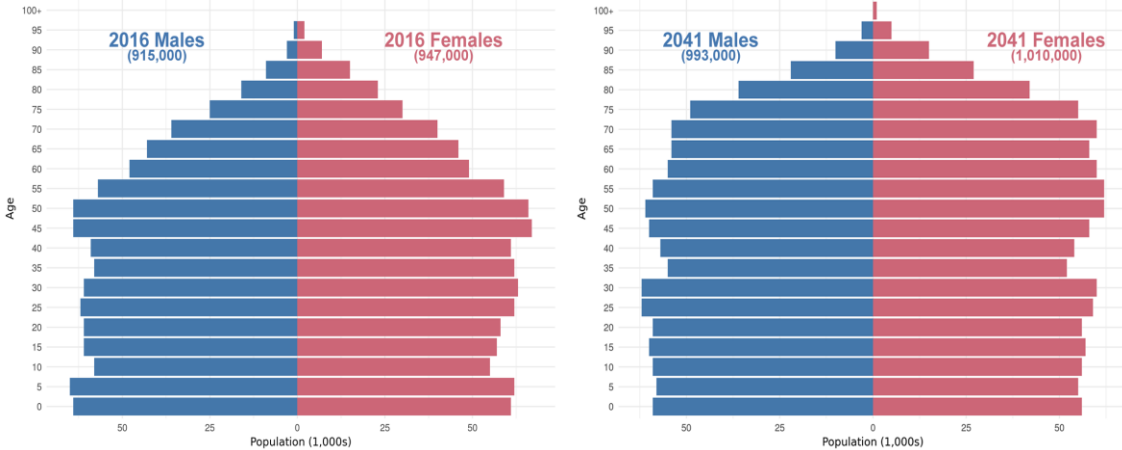
¹⁷ A full description of population projections are given in section A.1 of the Technical Annex.

Northern Irish employment and real GDP. Overall, this Government policy would further inhibit Northern Ireland's population growth.

Projected population age structure

Official statistics from NISRA (2017) show that the region's overall projected population growth over the 25-year period to mid-2041 is significantly lower than in the rest of the UK (7.6 % compared with 11.2%). Moreover, the age profile of the population is projected to change dramatically over the next 25 years, as shown in Figure 8. Significantly, the proportion of the population of state pension age will increase dramatically over the forecast period.

Figure 8. Estimated and projected age structure of the Northern Irish population, mid-2016 and mid-2041



Source: *Projected populations in five year age groups, Northern Ireland, ONS (October, 2017)*

Out of all the UK countries, at 43.1% Northern Ireland had the largest percentage growth of people aged 85 and over between mid-2006 and mid-2016. The population aged 65 and over in Northern Ireland is projected to increase by 65.1% to 491,700 people from mid-2016 to mid-2041, with the result that almost one in four people (24.5%) will be in this age category. People aged 75 and over are projected to be the fastest growing age group in Northern Ireland, increasing by 64% over the next 25 years. The population aged 85 and over is projected to increase by 127.2% to reach 82,800 people over the same period, which will see their share of the population doubling from 2.0% to 4.1%.

These demographic changes will serve to put much more pressure on the dependency rate in NI. The dependency rate for children has fallen from two thirds of the total number of dependents to just over a half (55.3%) in 2016 as the ratio of children to working age people declined.

Simultaneously, the dependency ratio of people of pensionable age has been rising and is expected to increase from 271 per 1,000 people of working age to 377. For Northern Ireland, these population statistics are a stark reminder that employers will need to access young international workers as the local pool of working age people diminishes.

Although the prediction that people in Northern Ireland are to live longer is welcome, it is also the case that people in the oldest age categories become more likely to need access

to health and social care services to support them in old age. This trend is expected to put significant strain on health and social care resources.

In anticipation of this population change, common throughout most developed nations, the Department of Health in Northern Ireland has been striving to transform how it delivers and manages health and social care to meet the population needs. In 2011, a review of healthcare delivery by the Department of Health set out a vision and strategy for responding to the many challenges that the health sector faced.

Transforming your Care set out a shared view of how that transformation would take place and a huge component was the reallocation of resources from secondary care to the primary and community care sectors¹⁸. Private sector companies charged with delivering that community care for the NHS however are encountering severe problems accessing staff to fulfil those contracts.

Population projection across sub-regions

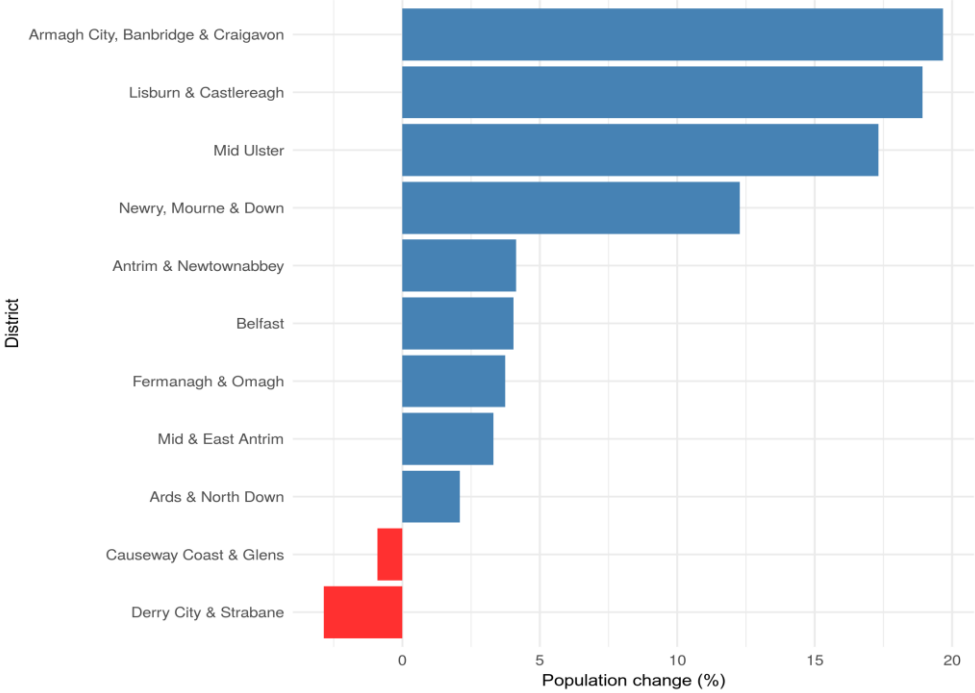
Migration not only enhances our economic prospects and contributes to our demographic sustainability, it also enriches our culture and strengthens our society. Migrants contribute to a diverse, open and modern society and there is also some evidence to suggest that they increase qualities of tolerance, inclusiveness and openness to inter-cultural learning amongst Northern Irish citizens. Migration supports key places such as our rural communities, bringing a supply of labour to the rural economy and helping sustain essential public services including healthcare and schools.

Ageing and declining rural populations heighten the need for migrants. For example, in the *Causeway Coast & Glens*, the combination of lower levels of unemployment with growth in important sectors such as tourism and food and drink has attracted migrants to live and work in rural areas. Between 2005 and 2015, around 20% of total estimated population growth in the *Causeway Coast & Glens* came from people born outside the UK.

A projected reduction in migration due to Brexit will impact sub-regions of Northern Ireland in different ways. As shown in Figure 9, most local districts will experience a slight population increase; especially for districts in and around Belfast. However, districts such as the *Causeway Coast & Glens* and *Derry City & Strabane* will experience a fall in population over the 25-year period. Any further restrictions on migration are anticipated to further suppress these more rural areas.

18 Department of Health (NI), "Transforming Your Care: A Review of Health and Social Care in Northern Ireland", 2013

Figure 9. Sub-regional projected percentage change in total population, 2016-2041



Source: 2016-based population projections for areas within Northern Ireland, NISRA (April, 2018)

MODELLING THE IMPACT OF REDUCED MIGRATION

In this section we investigate the importance of migration on the macroeconomic indicators of the Northern Irish economy. Specifically, we model the impact of two scenarios regarding reduced migration on Northern Ireland’s real Gross Domestic Product (GDP). This is done to measure the impact of reduced migration on economic growth within a post Brexit economy.

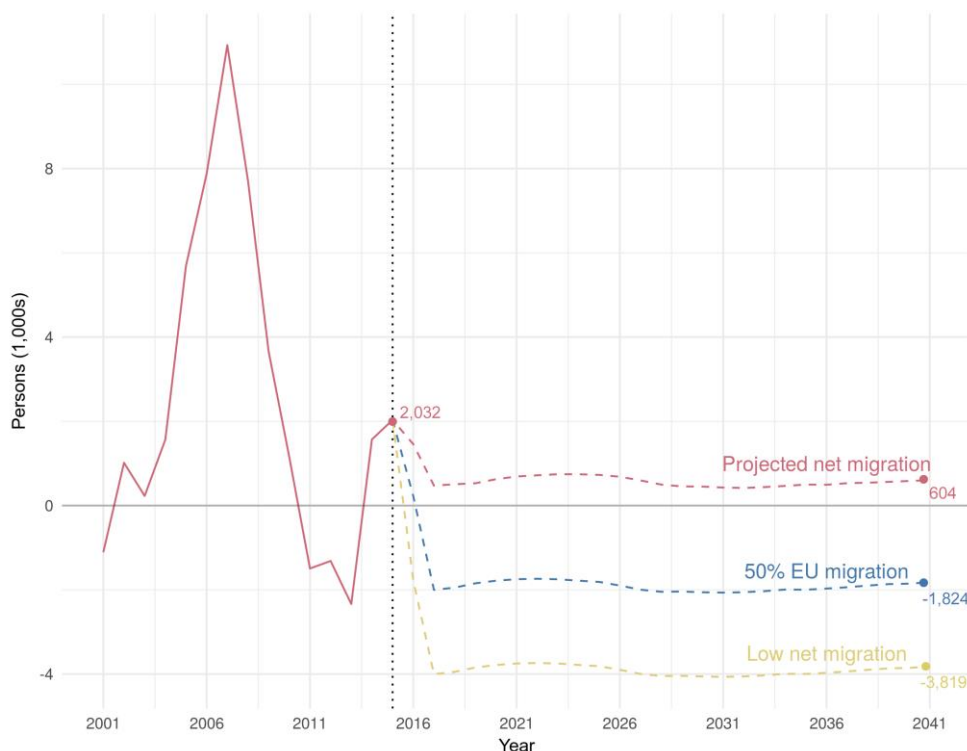
As a baseline, we first consider what the level of migration could be if recent migration trends continued, as per the principal projection. Second, we consider the level of migration after the UK leaves the EU. Since we do not yet know what the post-Brexit migration agreement will be, we use two main scenarios:

- **Scenario 1.** Models a 50% reduction in the future EU migration population – suggesting a difficulty for migrant workers from the EU to enter Northern Ireland.
- **Scenario 2.** Models a low net overall migration (from all countries) – estimating a reduction in migration by around 3,000 people per year.

Population effects

The different migration scenarios used within the model are shown in Figure 10 and simulated through the economic model. Specific interest is paid to the impact of these scenarios on the number of people of working age from 2018 to 2041.

Figure 10. Northern Irish net overseas migration, historical and projections, 2001-2041



Source: *Components of change (mid-year to mid-year), total fertility rate and expectation of life at birth based on the mortality rates for the year, ONS (October, 2017)*

Taking factors, including the changing relationship between the UK and EU, demographic change and possible future policy changes into account, we judged that the 50% less future EU migration and low migration variants of the population projections were appropriate for Northern Ireland economy in preparing forecasts.

The difference between the scenarios on the working age population can be seen in Table 2. Unsurprisingly, the low net migration scenario shows a significantly diminished work force relative to Scenario 1; a 50% reduction in EU migrants.

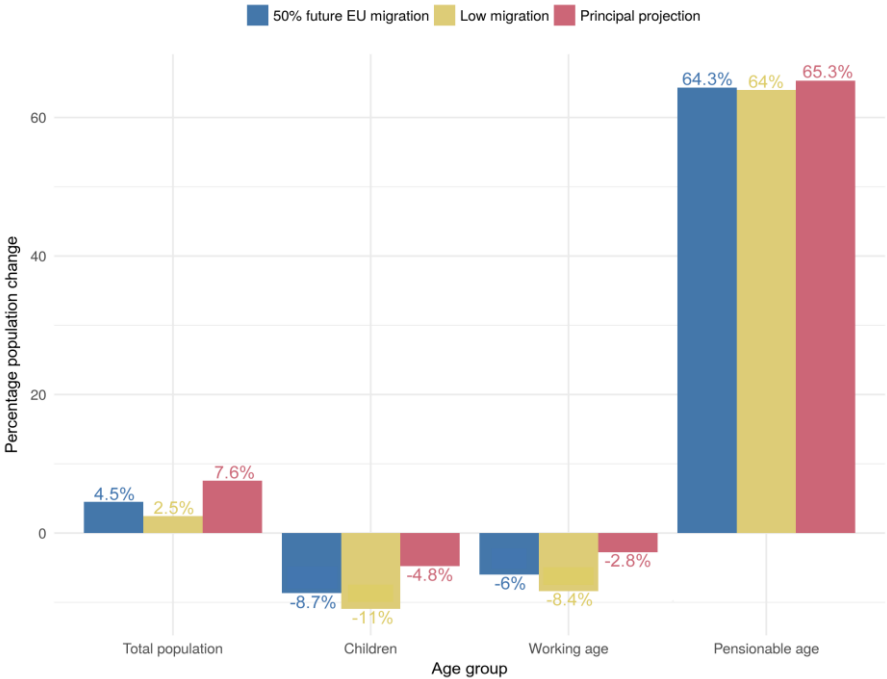
Table 2. Difference in working age population for Northern Ireland, 2018-2041

	2018	2021	2026	2031	2036	2041
Scenario 1	0	-4,000	-13,000	-21,000	-30,000	-40,000
Scenario 2	-6,000	-16,000	-36,000	-55,000	-76,000	-100,000

Impact on Age Profile of Population

Figures 11 and 12 demonstrate how the variants affect the age structure of the population compared to the principal projections in Northern Ireland and the UK. Specifically, they show the proportional change in the population different age cohorts. These Figures highlight the significance of migration to Northern Ireland's population growth relative to the rest of the UK, and the greater exposure Northern Ireland faces to reduced inward migration because of UK policy changes. This outcome would severely impact Northern Ireland's economic prospects.

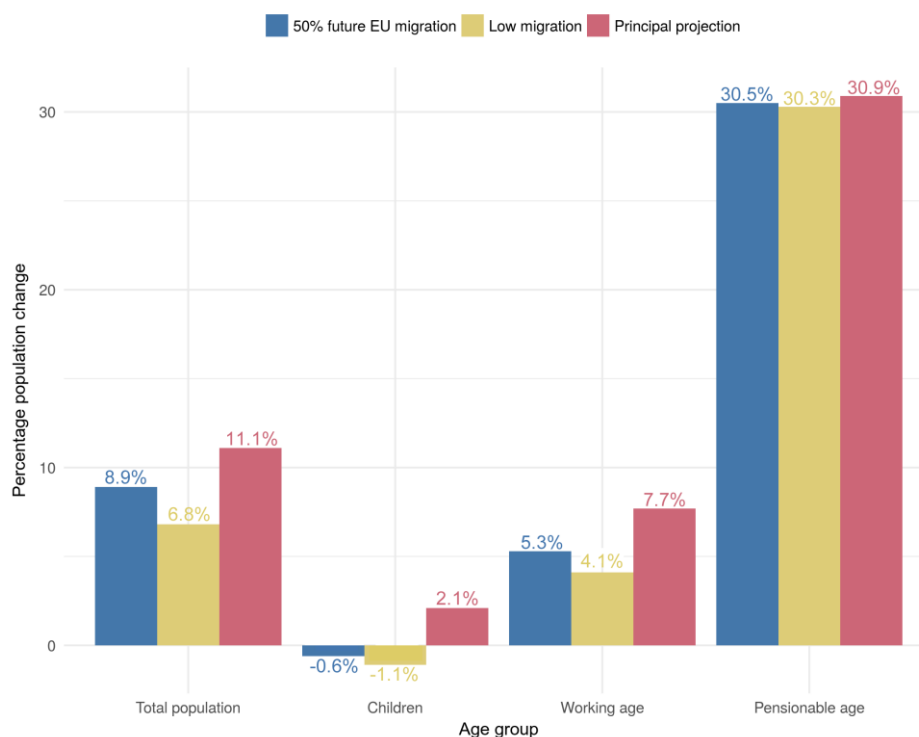
Figure 11. Projected population by age group, Northern Ireland and UK, 2016-2041



Source: *Projected populations at mid-years by age last birthday in five year age groups, NI, ONS (October, 2017)*

The 50% future EU migration and low migration scenarios used here are produced by varying the international in and out flow assumptions and using the principal assumptions for fertility and mortality.

Figure 12. Projected population by age group, United Kingdom, 2016-2041



Source: *Projected populations at mid-years by age last birthday in five year age groups, UK, ONS (October, 2017)*

The comparison between the impact of Northern Ireland and the UK reflects both the greater significance of migration to Northern Ireland's population growth relative to the rest of the UK, and the greater exposure that Northern Ireland faces from reduced inward migration because of UK policy changes. This outcome would severely impact Northern Ireland's economic prospects.

Macroeconomic consequences

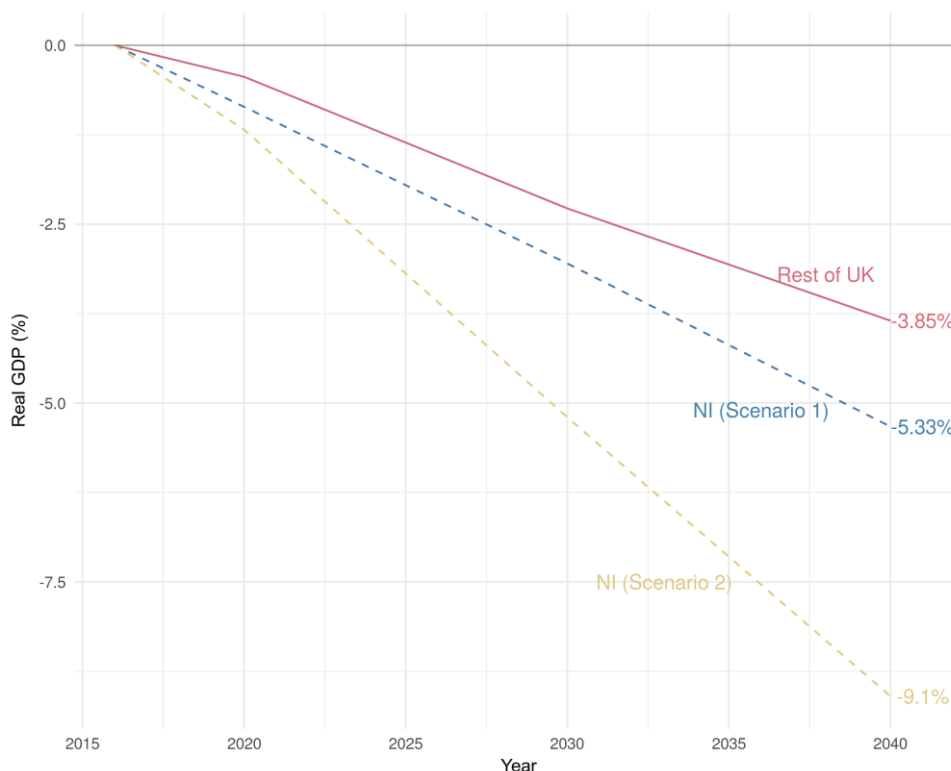
The impact of Brexit, and the consequence of lower levels of net migration, will have a negative impact on the real GDP of Northern Ireland. Using the 50% future EU migration scenario¹⁹, the labour market shock due to the projected reduction in net migration from Brexit is simulated through a dynamic stochastic general equilibrium (DSGE) model and the size of the shocks are estimated by calculating the percentage change in working age population between the two projections²⁰.

The model seeks to quantify the impact that lower migration post Brexit could have on the Northern Irish economy. It estimates that real GDP in Northern Ireland will reduce by at least 5.33% by 2041 than it would have been otherwise, using the principal projection of migration. See Figure 12. This is equivalent to a fall of approximately £625 million in GDP by 2041.

¹⁹ Description of the 50% future EU migration variant is given in section A.1 of the Technical Annex and reasoning as to why this population projection variant was used is given in section A.2.

²⁰ An explanation of DSGE modelling is given in section A.3 of the Technical Annex.

Figure 13. Projected change in real GDP, Northern Ireland and rest of UK, 2016-2041



The predictive model also suggests that if the consequence of Brexit leans closer to a low migration scenario, real GDP would fall in Northern Ireland by 9.1% compared to a fall in the rest of the UK of 7.9%. Proportionally, Northern Ireland experiences a larger negative impact relative to the rest of the UK. For more information, consider the Technical Annex of this report.

Sector-specific consequences

Industry leaders have expressed concerns regarding the impact of Brexit and restricted migration on their specific sectors of Northern Ireland.

- Agri-food:** The Northern Ireland Food & Drink Association has estimated that 48% of their members' full-time employees, and 91% of seasonal contract agricultural workers, are EU nationals. While local firms do not wish to be so reliant on European labour, they recognise that these workers are not replacing indigenous labour but instead are addressing important shortages in the regional labour market. Without access to European labour the agri-food sector cannot grow and contribute to the Executive's efforts to rebalance the regional economy.

“Growing concern and a lack of clarity over the future migration system is another factor tipping the scales in favour of us relocating south of the border – an option we are now actively considering.”

Agri-food manufacturer

- **Health:** From a macroeconomic perspective, any restrictions on Northern Ireland’s private sector to access people will reduce the health sector’s ability to maintain standards. The Department of Health in Northern Ireland published *Transforming your Care* (2013) which sets out a shared view of how the much-needed transformation of health services would take place if health needs are to be met. Within that ambition and strategy there is a huge component which relies on the reallocation of resources from secondary care to the primary and community care sectors. Private sector companies charged with delivering that community care for the NHS however are encountering severe problems accessing staff to fulfil those contracts. They have reported that they must now turn down a significant proportion of tendering for new contracts because they have no staff to carry out the work. Furthermore, increasingly, much of the labour to support the healthcare industry has come from EEA labour.

“The Northern Ireland Care Home sector has suffered from an indigenous qualified nurse shortage for the last 25 years. As a result, we have been forced to mitigate against this by recruiting staff nurses from inside and outside the EEA. Further restrictions on our sector’s ability to recruit from abroad will have a negative knock on impact on the quality of care services in the region.”

Care provider

“Since the referendum applications from EU nationals for care positions have fallen off a cliff.”

National healthcare provider

- **Tourism:** By 2020, the tourism sector in Northern Ireland aims to double the contribution to GDP and generate £1bn in tourism spend, creating 10,000 new jobs in the process. These ambitions cannot be achieved without access to migrant workers. This sector currently relies heavily on a strong supply of migrant labour and ambitions to grow requires an international pool of workers to remain accessible.

“The biggest impact on our business of a no-deal Brexit would be on migration of workers from the EU. A no-deal would presumably mean no right for people to move from the EU to work in the UK post Brexit. This would have a catastrophic impact on many industries and particularly on hospitality. An arrangement needs to be made for an agreed number of EU citizens to work here, within tests on salary levels, sponsorship from employers or skill tests. This is not free movement of people but a mechanism for sufficient workers to move to work in the UK.”

Property development and hospitality company

- **Construction:** Having experienced the worst housing crash in Europe back in 2008, Northern Ireland’s construction sector is only just recovering in terms of economic activity. In March 2016, the Construction Industry Training Board (CITB) commissioned a skills and training survey. The survey found that right across the UK this sector had common themes around recruitment difficulties and skill shortages,

skills deficiencies and gaps in established workforces as well as training and development activity. Construction firms in Northern Ireland report the same issues and additionally note that the industry has really struggled to attract young people as the sector's turbulent past during 2007-2014 – which resulted in parents encouraging young people to bypass this sector for job security reasons. Northern Ireland construction companies have expressed concerns about bidding for further work as they currently face skills shortages. Attracting international workers into this sector will also be crucial if Northern Ireland is to realise its ambitions for infrastructure delivery in terms of roads and housing.

- **Manufacturing:** CBI members report skills shortages in a range of manufacturing sub-sectors. While there is a significant need for lower and mid-tier skills in the manufacturing sector there is also a significant need for high-level skills too. For example, the regional manufacturing sector extends to knowledge intensive areas such as medical diagnostics, pharmaceuticals, food nutrition, aerospace and plastic composites and engineering. Companies report the need to attract qualified engineers (chemical, design as well as project management engineers), chemists and graduates with PhDs from across Europe to meet their business needs. Any restrictions on that access to professional talent will severely restrict Northern Ireland's ambition to grow its knowledge economy.

“If the new migration system hinders our ability to easily access the talent we need in Northern Ireland, we will relocate operations to the Republic where necessary.”

American parented business services company

- **Universities:** Securing a sustainable Higher Education system is vitally important as today's young people will drive tomorrow's economic growth. We must, therefore, nurture their talent so that students can maximise their potential as global citizens. Local universities have expressed deep concerns that restrictions on the freedom of movement between European countries will have implications for thousands of Northern Irish students who go to Europe to study or engage on work exchange programmes. Investment in research and development by local businesses has never been higher, although there is still more to do if we are to reach our knowledge economy growth ambitions. It is essential therefore that both businesses and universities in Northern Ireland will continue to have access to research funding opportunities as well as have access to the best international research staff to work on collaborative projects. The most successful universities globally are those that can attract world-leading talent. For example, Queen's University in Belfast currently employs 764 EU staff members (479 EU academics and researchers as well as 285 EU Professional Support staff). Future limitations on the freedom of movement of talent into Northern Ireland could potentially jeopardise both of our local universities' ability to produce world-class research - which is determined by their ability to collaborate on global projects and attract the best of international talent. Beyond damaging our universities' future research capabilities, this dent to their global competitiveness will be further amplified if local universities have restricted access to research funding and income from international students.

Inability to access skills has prompted some companies to consider investing in automation where possible. However, this option requires significant time and substantial capital expenditure. The option is also not yet viable in all sectors – hospitality, social care, agri-food for example - to reduce the number of workers required through greater investment in technology and automation. In all too many cases, rather than driving investment in technology, cutting off access to migrant labour will force employers to compete over too few workers. This leads to the sort of short-term wage inflation that erodes long-term competitiveness and could force businesses to close. Wage rises driven by productivity gains are desirable, however wage inflation driven primarily by a shortage of labour is a huge cause for concern for both businesses and policy makers. In a period of constrained public-sector budgets, higher wage costs will result in reduced service levels.

The trouble of being unique

We note that the methodology carried out in this report mimics that taken by the Scottish Government. The results follow in line with them, with the deterioration of real GDP a little more pronounced in Northern Ireland than in Scotland. This could be because of several factors; the most obvious being the substantial increase in the percentage of pensionable age cohort and fall in the working age cohort. Another obvious point is the substantial brain drain across all sectors of the Northern Irish economy of people and skills.

However, there is also a uniqueness to Northern Ireland's situation. The region's proximity to the Republic of Ireland, means that Northern Ireland businesses, unlike their counterparts in Great Britain, operate in two economies – the UK domestic market and the all-island market. This has resulted in a situation where Northern Ireland's primary economic competitor is not another UK region – which operates on the same economic policy playing field – but a nation-state which is free, within the constraints of EU rules, to amend economic policy levers at will. Northern Irish firms face direct competition from businesses in the Republic of Ireland, so new processes which make it more difficult and costly to recruit EU workers will undermine competitiveness and encourage relocation of operations south of the border.

It is this uniqueness of Northern Ireland that has been at the fore of policy debate and is the most difficult to agree upon and to model. The fact that businesses, investment, people and skills can potentially relocate south of the border to have access to more opportunities is an important factor that would add to the deterioration of lost real GDP over the next 25 years. Indeed, the number produced from the model should only be used as a guideline – an indication of the potential loss to society – but the reality may, in fact, be even more detrimental.

CONCLUDING POINTS

Given the demographic backdrop set out in this report, and the anticipated additional costs of the ageing population, a significant increase in subventions from HM Treasury would, in the baseline scenario, be weakened if health and living standards in Northern Ireland are to be maintained. That subvention can only be reduced with strong economic growth and an expanding private sector. Any government policy that severely restricts labour access for the private sector will thwart Northern Ireland's ambitions to re-balance the economy.

A strong economy with migration of working people from inside and outside the EU is one of the most realistic ways of mitigating our reliance on Westminster funding in the future. In summary, any ambitions to re-balance Northern Ireland's public and private expenditure will be thwarted by limited access to immigration.

Having modelled for two main scenarios in a post-Brexit migration restricted UK, we found that in both scenarios, limited migration would have a severe impact on local economic growth and the working-age population.

- In Scenario 1 (50% reduction in EU migration) it was expected that the Northern Ireland economy would see a reduction in real GDP of around 5.33% by 2041 relative to what could be generated without any uncertainty or restrictions.
- In Scenario 2 (a much more restricted migration projection) the Northern Ireland economy would see a reduction in real GDP of around 9.1% by 2041 relative to what could be generated without any uncertainty or restrictions.

Many businesses currently operating in Northern Ireland continue to express concern regarding the impact of reduced inflows of labour from the EU and around the world. They highlight issues such as skills shortages and a potential to move operations to the Republic of Ireland.

Prior to its dissolution the Executive was taking steps to address Northern Ireland's economic fragility through its own regionally focused Industrial Strategy which envisioned, "a globally competitive economy that works for everyone." This vision required Northern Ireland to transform its economic competitiveness, grow the private sector and increase wealth. Such objectives however are highly correlated with rising productivity and access to talent. Local companies argue that the private sector simply cannot grow and deliver industrial strategy goals if access to European migrant labour is unduly curtailed.

POLICY RECOMMENDATIONS

It is widely acknowledged that a wider pool of labour is beneficial for economic performance. The economic benefits of having access to international skills and labour manifest themselves in a boost in global trade, foreign direct investment and job creation. Specifically, a diversity of labour provides a range of innate skills which indigenous workers cannot acquire through training, such as, for example, the cultural understanding of markets. As this report notes, Northern Ireland has a high dependence on external markets, such as Ireland and other EU nations.

With regards to foreign direct investment, the movement of labour is typically followed by a flow of capital²¹. Indeed, the time spent in Northern Ireland is correlated with a higher likelihood of choosing to invest there rather than elsewhere in the future. Investment decisions could therefore be made due to time spent in Northern Ireland as part of an intra-company transfer, as a student, or as a worker. A more open economy allows for a more open flow of finance.

Northern Ireland employers want a flexible post-Brexit immigration system that meets the diverse needs of all regions and nations in the UK. This new system should:

- Facilitate frictionless access to migrants of all skill levels, including those with vocational and technical skills rather than just ‘the brightest and best’.
- Recognise that continued access to migrant labour, as well as skills, is required to avoid critical shortages across all sectors – public and private.
- Be flexible enough to work for all regions and nations of the UK and consider differing average wages across the regions.
- Allow firms to continue to easily move staff to and from Europe under any new system that replaces free movement.
- Include a new approach to migration policy designed to restore public confidence, including removal of the net migration target which has driven a narrow debate in the UK.

Further to this, the CBI strongly recommends that any migration system for Northern Ireland is evidence-based and takes into consideration the full range of influencing factors such as population trends as outlined above. Both the long-term and short-term consequences of any change to migration policy must be fully analysed.

The policies are built around developing public trust in the UK’s immigration system. The report stresses that the UK must remain open. Currently, businesses can access EU labour and skills given the free movement of labour status provided by the EU. After Brexit, businesses in Northern Ireland, who have become so dependent on the pool of labour and skills from throughout the EU, will need a new system as this free movement comes to an end. Any new system must be structured in such a way as to meet the skill requirements that businesses desire. Specifically, with any new system, businesses should have easier access to international workers from around the world. Reform of the existing non-EU immigration system will be needed to boost exports and investment with every country around the globe, not only those we already have a trade deal with.

Companies of all sizes must be able to access workers from overseas. Small and medium companies — which constitute the majority of businesses operating in Northern Ireland —

²¹ Fensore, I., “The Impact of Migration on Foreign Direct Investments”, September 2017

are most effected by the costly and largely prohibitive Tier 2 visa system. Specifically, policy needs to:

1. Realise that most companies in Northern Ireland are SMEs. The process for obtaining a visa needs to be simplified so that it is manageable for small companies, by making it easier to become a licensed sponsor or removing the requirement altogether.
2. Reform the Tier 2 visa route so that employers can access the range of skills that they need, not only graduates earning £30,000 or more. Northern Ireland's average wage stands at £26,000, putting NI employers at a significant disadvantage when seeking to address skills shortages. To address this imbalance, the government could consider varying regional salary thresholds to consider average salary imbalances.
3. Scrap the Tier 2 visa cap to give businesses the certainty that workers will get a visa if they meet the Points Based criteria.
4. Take into consideration a Northern Ireland Shortage Occupation List. The Scottish Shortage Occupations List in the non-EEA Tier 2 migration system should be replicated for Northern Ireland in the new EEA migration system. However, unlike the Scottish system, any future NI list should be controlled by Executive ministers – not the Migration Advisory Committee – ensuring government is able to rapidly respond to skills shortages.

As proposed by a recent CBI publication²², an open and controlled immigration system for EU citizens needs to be developed. Policy should aim to establish a new system for EU immigration because extending the current non-EU immigration system would be entirely unworkable for business. A more open route for EU workers, than the current non-EU system, is needed unless and until radical reform means that these needs can be met by a new global immigration system.

Finally, policy should focus on forming strong linkages with people from across the world as Northern Ireland seeks to create and enhance trade relationships with other countries. This should aim to preserve easy mobility of staff in our new relationship with the EU, including intra-company transfers, temporary postings and temporary business visits. Furthermore, it should ensure that both mobility and migration are an integral part of all future trade deals that the UK negotiates with other parts of the world, starting with the EU.

²² Percival, M. and Barrett, T. "Open and Controlled: A New Approach to Immigration After Brexit", CBI, August 2018

APPENDIX A: TECHNICAL ANNEX

Most economic literature on migration finds that migrant workers have a positive effect on the host country and can contribute to higher economic growth. This growth can be achieved through incoming migrants providing a boost to the labour supply, thereby expanding the productive capacity of the economy, resulting in higher levels of economic activity and employment, making the economy more competitive. As well as adding to the supply side of the economy (expansion in the labour force), migrants also contribute to increased demand for goods and services in the economy (as migrants are also consumers).

The impact of reduced migration is exacerbated given that most of the migrants who come to Northern Ireland are economically active and provide a significant remedy to the known skills shortage emanating from the brain drain. Indeed, a reduction of migration was shown to have a significant impact on the working age population of Northern Ireland. How the population is projected for the future is important to accurately estimate the impact that lower migration will have on real GDP.

A.1 Background on population projection variants

The Office for National Statistics (ONS) produce a set of population projections for all regions of Great Britain. These population projections provide an indication of the future size and age structure of the population based on mid-year population estimates and a set of assumptions of future fertility, mortality and migration. These projections are widely used for resource allocation and planning.

New principal projections are based on the long-term assumptions of future fertility, mortality and net migration (that is, immigrants minus emigrants), summarised in Table 3. The long-term assumptions are agreed in consultation with NISRA.

In terms of migration, the principal projection assumes that Northern Ireland will experience a net inflow of approximately 600 workers; that is, a net inflow of 1500 migrant workers from the EU and rest of the world and a net outflow of 600 Northern Irish workers.

Table 3: Long-term assumptions for the 2016-based national population projections

	Northern Ireland
Long-term average number of children per woman (Fertility)	2.00
Expectation of life at birth in 2041 (Mortality): Males	82.8
Expectation of life at birth in 2041 (Mortality): Females	85.8
Net international migration (Migration)	+1,500
Net UK migration (Migration)	- 900

Source: *Office for National Statistics*

The principal projection is not the only population projection produced by the ONS and NISRA. A number of other population projection variants are produced for the Northern Irish economy based on the principal population projection. In this report we considered the following:

- **High migration variant:** Inherits the fertility and mortality assumptions of the principal projection and further assumes that there will be a net international migration change of

6,000 per year and maintains the net UK migration change at approximately -900 people per year.

- **50% future EU migration variant:** Inherits the fertility and mortality assumptions of the principal projection and further assumes that there will be half in-migration from the EU than what is currently witnessed, which is approximately -1000 workers. Again, it maintains that the net UK migration change is approximately -900 people per year.
- **Low migration variant:** Inherits the fertility and mortality assumptions of the principal projection and further assumes that there will be a net international migration change of -3,000 per year and maintains the net UK migration change at approximately -900 people per year.

The assumed long-term annual net international migration variants are summarized in Table 4.

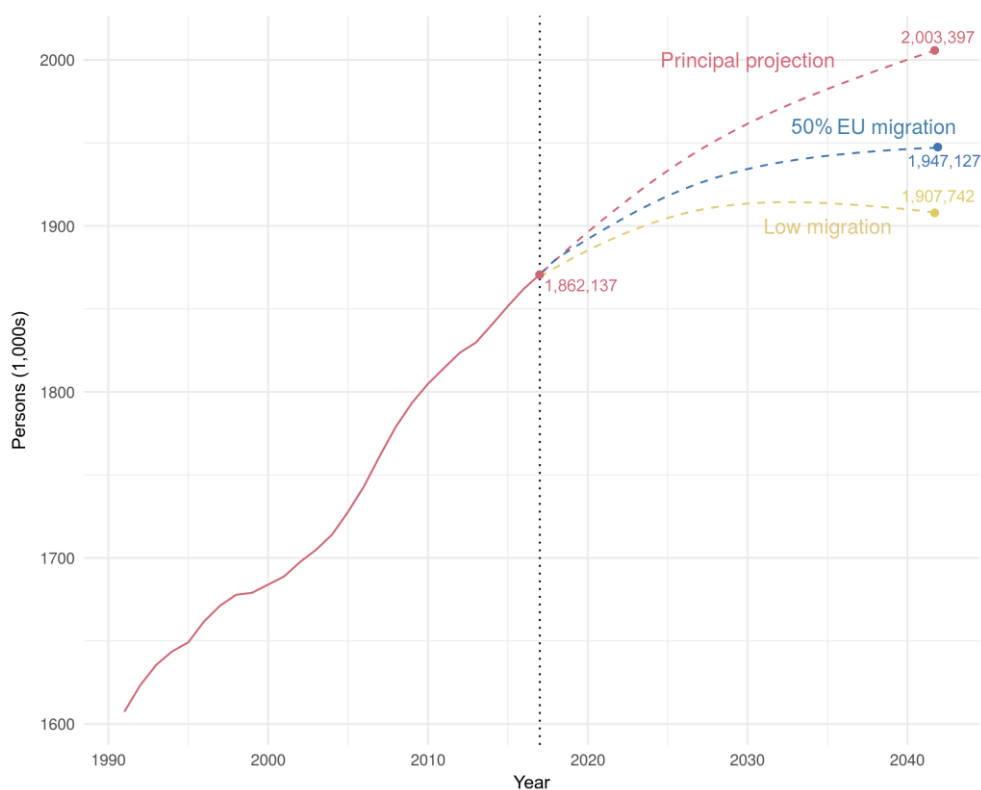
Table 4. Assumed long-term annual net international migration for the standard variants, Northern Ireland

	Principal	High	50% future EU	Low
Northern Ireland	1,500	6,000	-1,000	-3,000

Source: *Migration assumptions, Office for National Statistics*

These population projections can be drawn out and represented graphically to get an idea of the impact of each projection variant on the overall population of Northern Ireland. The impact of these population variants are shown in Figure 14. Here, we can see that the projected populations notably diverge over time.

Figure 14. Population projection variants, Northern Ireland, 1990-2041



Source: *Office for National Statistics*

A.2 Assumptions of future population and migration levels

To estimate the economic impact, we first consider what the level of migration could be if recent migration trends continued; and then consider the level of migration after the UK leaves the EU. To do so we take a few considerations:

- As noted in the previous section, there are many alternative projections for net overseas migration. Due to the erratic nature of migration prior to 2016 we take a cautious approach and take the principal projection as the projected net migration, which shows a healthy positive inflow of migration.
- We then take the 50% future EU migration population variant as a good indicator in the event of Brexit. This indicator suggests a difficulty for migrant workers from the EU to enter Northern Ireland. The friction provided by this indicator maps well to a difficulty, or potential reluctance, to enter Northern Ireland.
- The difference between these two projections—around 2,500 people per year—is the reduction in migration caused by Brexit.
- Due to the uncertainty presented by Brexit, we also replicate the model with the low net migration variant, which estimates a reduction in migration by around 4,500 people per year compared to the principal projection. This is done as a sensitivity analysis to see if similar results are derived.

A.3 Dynamic stochastic general equilibrium modelling

Dynamic stochastic general equilibrium (DSGE) models are a well-accepted method in macroeconomics that attempts to explain economic phenomena, such as economic growth and the effects of economic policy, through econometric models based on applied general equilibrium theory and microeconomic principles.

As their name suggests, DSGE models are dynamic (studying how the economy evolves over time), stochastic (taking into account the fact that the economy is affected by random shocks), general (referring to the entire economy), and of equilibrium (subscribing to the Walrasian, general equilibrium theory).

Much like computable general equilibrium (CGE) models, DSGE models are large-scale simultaneous equation models that combine general equilibrium theory with empirical economic data to derive the impact of policies or shocks. Within the model we define the objective functions of households, firms and Government as well as factor in price and wage setting problems, the growth of technology, rate of investment and market equilibrium conditions²³. Households and firms aim to maximize their objective functions subject to some constraints, whilst Government aims to maintain the chosen fiscal closure.

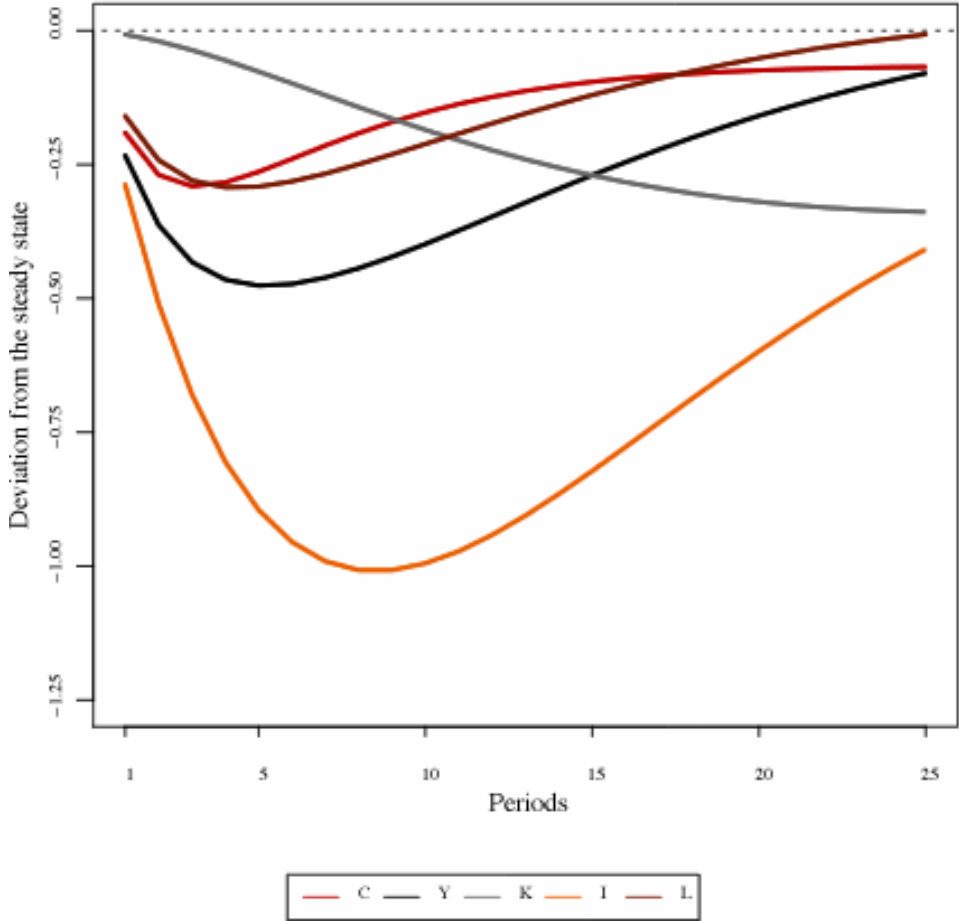
In absence of any economic shocks, the model is in steady state equilibrium. In this equilibrium, demand equals supply and every market clears. After an economic shock, the economy falls out of equilibrium and imbalances occur across the economy. Because of market clearing conditions, all markets adjust across time until a new equilibrium is achieved. Therefore, the economy transitions from one equilibrium and, over time, transitions to a new long-run equilibrium.

The labour market shock leads to a new equilibrium characterised by a lower natural rate of employment and lower real GDP. In doing so, due to the interlinked nature of the economy, a fall in the supply of labour will also trigger a fall in aggregate demand and therefore its

²³ The DSGE model used is a minor alteration of: Smets, F. and Wouters, R., "An estimated dynamic stochastic general equilibrium model of the euro area". Journal of the European Economic Association, 2003

components; consumption, Government spending and investment. Figure 14 shows the dynamics of consumption and capital investment given a sustained negative shock to labour following the working age population projections given above²⁴.

Figure 15. DSGE model simulating the impact of a negative labour shock



Source: Generated by the gEcon R package

Note: This shows the trajectories of capital (K), income (Y), consumption (C) and investment (I) due to a collapse of labour (L).

A.4 Model limitations

The DSGE model does not take into consideration the deeper intricacies of what lower migration and the institutional impact of Brexit can have on real GDP. First, migrant workers bring new skills and expertise and typically have high levels of entrepreneurship which helps lay the foundations for future economic growth. Second, many EU and international students that come to study in Northern Irish universities also add to the diversity of our communities, enrich the learning experience and, in the case of those who can remain in Northern Ireland, go on to contribute to economic prosperity. Third, the model does not consider the increased pull that economic centers such as London and Dublin will have on the brain drain and overall competition for labour and skills.

Further, the model is limited in that it does not take into account the full range of economic costs that emerge when firms in Northern Ireland relocate because they cannot access

24 The DSGE model was created and run in the R programming language using the gEcon library. The model used can be found at: https://github.com/O1sims/MigrationNI/blob/master/models/DSGE_model.gcn

labour. Indeed, many firms will decide to focus their future investments in alternative locations, and the Republic of Ireland is frequently cited as the most obvious choice. In Northern Ireland the option of relocating to the Republic of Ireland is far easier than it is for firms operating elsewhere in the UK to relocate overseas.

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