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Modelling Northern Ireland within the context of the all- island economy

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MODELLING NORTHERN IRELAND WITHIN THE CONTEXT OF THE ALL-ISLAND ECONOMY

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This report has been accepted for publication by the Institute, which does not itself take institutional policy positions. All ESRI Research Series reports are peer reviewed prior to publication. The authors are solely responsible for the content and the views expressed.

FOREWORD

In the 1980s, a group of researchers in the ESRI joined forces with colleagues in the Department of Finance and the Central Bank to develop a data-based macroeconomic model of the Irish economy. Over the subsequent 40 years, work on macroeconomic modelling has continued with existing models being re-estimated and re-designed, and new models being developed for specific purposes.

Throughout this time, macroeconomic models have proven to be critical in helping to understand the structure and dynamics of the Irish economy. The process of estimating models has prompted deep reflection on the mechanisms and relationships at work in the economy. The models have been used to estimate the effects of some of the most significant external shocks to the economy including the COVID pandemic, the introduction of the euro and the Great Financial Crash of 2008-2010.

When the Brexit referendum was announced in the UK, economists in Ireland drew heavily on the ESRI's macroeconomic model to provide quantifications of the possible impacts on Ireland. While it was clear that the different possible forms of Brexit would have economic impacts in Northern Ireland, the absence of a macroeconomic model meant it was difficult to get comprehensive estimates of these impacts. This prompted an interest in the ESRI in developing a model for Northern Ireland, but we saw that the need went well beyond Brexit. Many of the challenges which face the Northern Ireland economy in areas such as productivity, education and investment need to be seen and understood in an integrated way. The development of a macroeconomic model offered a fruitful route to enhancing this understanding.

Ibec approached the ESRI in 2021 about the possibility of undertaking work on the economy of Northern Ireland. Based on the thinking outlined above, Ibec and the ESRI agreed that there would be great value in developing a macroeconomic model for Northern Ireland which in turn would be linked to macro-models of Ireland and the UK. Having agreed the overall direction of the proposed project, we approached the National Institute for Economic and Social Research (NIESR) in London about working with us. In addition to the long-running connection between the ESRI and NIESR, NIESR's expertise in macro-modelling and their work on the other devolved nations of the UK made them the ideal partner for this project.

After three years of intensive work, the model has been developed and this report outlines its features and illustrates its possible uses. While this is an important milestone, we hope that the ongoing use of the model and the continual

refinement of its structure will contribute to policy analysis and debate in the future.

I want to take this opportunity to thank Ibec and its CEO Danny McCoy for funding this project, with a particular note of thanks to Fergal O'Brien and Michael D'Arcy for their significant contributions through the project's Steering Committee. The project also benefited enormously from the insights provided by the external members of the Steering Committee, Alan Bridle and Nola Hewitt-Dundas and I want to thank them for the time they devoted to this.

Finally, I would like to thank the colleagues who developed the model and who have written this report – Adele Bergin and Akhilesh Kumar Verma of the ESRI and Hailey Low and Stephen Millard of NIESR. This is an outstanding piece of work which will add considerably to our capacity to understand the economy of Northern Ireland with a view to proposing policies which can benefit all.

Alan Barrett, ESRI Director

January 2025

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EXECUTIVE SUMMARY

- Northern Ireland occupies a unique position following Brexit and the Windsor Framework. It is part of the UK fiscal, welfare and monetary unions – where the main policy levers are mostly exercised at a UK national level – along with its national economic policies for devolved administrations and regions. Simultaneously, it remains within the EU Single Market for goods with Dual EU/UK regulatory regimes, participates in the Common Travel Area (CTA) between the United Kingdom and Ireland and is supported by a commitment to continue specified areas of North-South cooperation. The economic effects of this will continue to evolve over time.
- Whatever the background situation, it is clear that the economies of both Northern Ireland and Ireland can have a mutually beneficial impact on each other through improved economic outcomes on both sides of the border and enhanced interaction.
- This report discusses the development of a model for the Northern Ireland economy. The model can be used to produce economic forecasts and to examine the effects of economic policies and shocks. The framework captures the various linkages between the Northern Ireland economy and that of Ireland and so aids our wider understanding of how the Northern Ireland economy functions within the context of the wider all-island economy. The modelling framework also captures linkages to Great Britain and the international economy. By developing such a model and ensuring that the unique features of the Northern Ireland economy – that it is part of the United Kingdom while also being part of the EU Single Market – are built into the model, we can better understand the evolution of the Northern Ireland economy and what it means for the all-island economy.
- The model can be used to generate a baseline projection over the medium term for Northern Ireland and the all-island economy. GDP growth in Northern Ireland is expected to average around 1.2 per cent per annum over the medium term, similar to its longer-term historical trend, although it is expected to be somewhat higher in the short term. The challenge of relatively low productivity in Northern Ireland needs to be addressed through sustained productivity enhancing investment to improve long-term economic prospects and living standards. While expected growth in Northern Ireland is relatively modest compared to Ireland, it is slightly stronger than the wider UK, in part driven by stronger export growth bolstered by demand from Ireland and its relatively more favourable (than the UK) trading relationship with the European Union. With growth in Ireland expected to moderate in the coming years from previous extraordinarily high rates, our projections are for growth in the all-island economy to average around 2.2 per cent per annum over the medium term. With the period of high inflation rates over, real wage growth is expected to

support increases in real personal disposable income in the all-island economy over the medium term.

- The modelling framework allows us to examine the effects of economic policies and shocks – both emanating from within Northern Ireland and from the outside world – on Northern Ireland, Ireland, the all-island economy, the UK and the international economy. The report considers a range of policy shocks and other external shocks. For example, the report develops a hypothetical scenario that is consistent with more devolution in Northern Ireland where income tax rates are increased and where the Northern Ireland Executive receives the revenue which it can then use for additional government spending and/or investment. This can also be seen as a proxy for the Northern Ireland Executive raising taxes on Northern Irish households in ways that it can do currently. In both scenarios, the overall impact on the level of Northern Irish output is positive but the impact is stronger and permanent in the case of higher government investment. The simulation results suggest that increased government spending leads to an increase (or ‘crowding-in’) of private sector investment which can enhance productivity. The stronger and permanent impact on overall output in the case of higher investment compared to higher spending highlights the importance of how the revenue is spent. In a similar vein, we examine scenarios where there is an increase in the block grant to Northern Ireland, which stimulates demand, employment and output with stronger impacts when the additional resources are used for government investment rather than government consumption spending.
- The report also considers a monetary policy shock, specifically an increase in the Bank of England interest rate and the simulation results suggest that the Northern Ireland economy is less sensitive to interest rate changes than the wider UK. The report also considers spillover effects from stronger growth in the Irish economy on the Northern Ireland economy and the impact on the all-island economy, focusing on positive shocks to Irish consumption and exports. The simulations reveal positive impacts in both cases on the Northern Ireland economy. Additionally, the report analyses the sensitivity of Northern Ireland's economy to global oil and gas price shocks. The simulations show a short-term spike in inflation that moderates over time, with output and investment recovering in the medium term after initially falling below the baseline.

CHAPTER 1

Introduction

1.1 MOTIVATION

The United Kingdom leaving the European Union is a systemic disruption to the patterns of trade and business that had developed on the island of Ireland prior to the 2016 Brexit Referendum. Prior to then, the combined effect from 1993 of the European Single Market removing Customs controls and creating free movement of goods, services, capital and people, followed soon after by paramilitary ceasefires ending 30 years of large scale political violence, and then the Belfast/Good Friday Agreement in 1998 consolidating commitment to democratic processes, had laid solid foundations for economic growth. The removal of security barriers along the border in 2006 accelerated this process and enabled the growth of an 'all-island' economy. This has resulted in significantly improved economic outcomes for households and businesses on both sides of the border.

The UK withdrawal from the European Union at the start of 2021 and its subsequent agreement with the EU of the Windsor Framework in February 2023 in recognition of the island's unique post Brexit circumstances, have left Northern Ireland in an exceptional position. It is part of the UK fiscal, welfare and monetary unions – where the main policy levers are mostly exercised at a UK national level – along with its national economic policies and growth trajectories for devolved administrations and regions. Simultaneously, it remains within the EU Single Market for goods with dual EU/UK regulatory regimes, it participates in the continuing Common Travel Area (CTA) between the United Kingdom and Ireland, and is supported by a commitment to continue specified areas of North-South cooperation. The profound economic effects of this unique interplay of institutions, policy and processes on both Northern Ireland and Ireland, and hence the all-island economy, are now becoming more evident and will continue to evolve over time.

The next phase of this evolution commenced following the 're-set' of relations between the United Kingdom and Ireland and hence between Ireland and Northern Ireland. These relationships will dictate the future evolution of the post-Brexit trading arrangements between Ireland and Northern Ireland with effects on both jurisdictions and, therefore, the all-island economy. Some of these effects may be positive for all-island business activity while some may potentially hinder such activity.

Whatever the background situation, it is clear that the economies of both Northern Ireland and Ireland can have a mutually beneficial impact on each other through

improved economic outcomes on both sides of the border and enhanced interaction.

The Northern Ireland economy has underperformed for many years – particularly relative to Ireland. Historically, its export trade intensity has been much lower than that in Ireland, as has the scale and nature of multinational investment. At the same time, Ireland has been growing much faster than the United Kingdom, meaning that it has become increasingly important for the Northern Irish economy. This, again, suggests a need for a more joined-up framework that enhances our capacity to share the process of considering economic policy choices that impact Ireland, Northern Ireland, and the all-island economy.

Such a framework could also help our understanding of how the relative performance of Northern Ireland can be influenced by policymakers making the most of the opportunities presented by its unique positioning in the UK fiscal and monetary union, while remaining within processes seeking to protect and improve connectivity, trade and business across the island of Ireland.

Against this background, the Economic and Social Research Institute (ESRI) in Dublin and the National Institute of Economic and Social Research (NIESR) in London agreed to develop a macroeconomic model of Northern Ireland, which could then be linked to ESRI's existing model of Ireland (COSMO), creating an overall framework for thinking about the all-island economy. Furthermore, the model can be linked to NIESR's model of the UK and global economies (NiGEM). By developing such a model and ensuring that the unique features of the Northern Ireland economy – that it is part of the United Kingdom while also being part of the EU Single Market – are built into the model, we can better understand the evolution of the Northern Ireland economy and what it means for the all-island economy.

This report discusses the model that we have developed and shows how we can use this model to produce economic forecasts for Northern Ireland and aid our wider understanding and knowledge of how the Northern Ireland economy functions within the context of the wider all-island economy.

This research builds on a large body of work, carried out by ESRI and other researchers, that seeks to understand the similarities, differences and connections between Ireland and Northern Ireland and what that means for the all-island economy. Many authors including Bergin and McGuinness (2022) and Jordan (2022) have examined productivity in Northern Ireland and shown how Northern Irish productivity has significantly underperformed that in Ireland. McGuinness et

al. (2024) look at cross-border working on the island of Ireland while Kren and Lawless (2023) examine trade flows between Ireland and Northern Ireland.

If we are to understand the various linkages between the Northern Ireland economy and that of Ireland, we need to construct a model that captures those linkages. In particular, such a model would need to include trade linkages between the two economies as well as their linkages with Great Britain. By linking our model of Northern Ireland to Ireland, Great Britain and the rest of the world within NiGEM, we can ensure that such linkages will be at work in our simulations of the effects of government policies and economic shocks.

More generally, building a macroeconomic model ensures that we can capture the effects of policy change coming through a complete range of channels. We have also ensured that the model is flexible enough so that it can be used to address a whole range of policy questions and types of shocks. As such, the model can be used to capture both the impacts of current changes in policy and the implications of possible future scenarios. Importantly, we do not have to restrict ourselves to the current set of devolved powers possessed by the Northern Ireland Assembly but can consider what might happen should the Assembly be given and use wider tax-raising powers. Thus, we have the ability to help move the economic policy discussion in Northern Ireland away from focussing on technical aspects of changes to the Barnett Formula¹ onto a broader set of economic policy tools. And because of the connectivity of the model with our model for Ireland, we can model the all-island impact of such changes. For example, we can capture the effects of changes in infrastructure spending on Northern Ireland output, as well as any spillover impacts on output in Ireland, and hence, all-island output. Similarly, the model allows us to estimate the impact of policy changes in Ireland on key economic variables in Northern Ireland and the whole island of Ireland.

We can also use our model to examine the effects on the Northern Ireland economy of economic shocks. These include shocks to Northern Ireland's competitiveness, UK interest rates, the sterling-euro exchange rate and world, or Ireland, demand for Northern Ireland's exports. We can also consider a range of fiscal simulations within the context of the powers devolved to the Northern Ireland Executive. What the model does not allow us to do is to examine the effects of more microeconomic shocks such as changes in demand for particular goods and services (e.g. food) or productivity improvements in particular industries (e.g. banking). Nor does the model currently allow us to consider the effects of cross-border investment, i.e. Irish companies building factories in Northern Ireland or vice versa. The model is an analytical tool that is built around the status quo and

¹ See Northern Ireland Executive (2024) for more details on the Barnett Formula.

estimates existing economic relationships through the use of data. Any significant political or institutional changes could impact these relationships.

In this report we consider the effects of the following shocks on the Northern Ireland economy:

- Income tax shocks, consistent with more devolution in Northern Ireland;
- An increase in Northern Ireland's block grant;
- An interest rate shock;
- An increase in demand in Ireland that spills over into Northern Ireland;
- An increase in global energy prices.

These shocks cover a mix of policy shocks and external or international shocks and were chosen to illustrate the capabilities of the model and to highlight north-south, all-island, and east-west linkages.

The launch of this report is particularly timely. The return of the Northern Ireland Assembly and the Executive has recommenced the preparation and adoption of a Programme for Government for Northern Ireland² with the current four key economic priorities being good jobs, regional balance, productivity growth and decarbonisation. Meetings of the Belfast/Good Friday Agreements Strand Two North-South Ministerial Council have also recommenced to agree joint commitments on North-South cooperation and collaboration. Combined, they provide optimal conditions along with a practical motivation for making this model available for Northern Ireland to take advantage of its many potential benefits.

1.2 STRUCTURE OF THE REPORT

The report is structured as follows. Chapter 2 offers a brief description of the model and discusses the work we have done putting together a database for Northern Ireland. Chapter 3 uses our model to produce a baseline forecast for Northern Ireland, and the all-island economy. Within Northern Ireland, we expect modest growth with low inflation but rising unemployment over the next few years, suggesting a period of economic stabilisation with potential challenges in the labour market. Chapter 4 examines the effects of some fiscal and monetary policy shocks and an external demand shock on the Northern Ireland and all-island economies. Chapter 5 provides our conclusions and thoughts on how to develop this work further.

² See <https://www.northernireland.gov.uk/PfG> for more details.

CHAPTER 2

Database and model framework

2.1 INTRODUCTION

This chapter provides a brief overview of the new macroeconomic model for Northern Ireland.³ The model is designed to be used for medium-term economic projections and policy analysis. The structure of the model is based on theory and the behavioural equations are econometrically estimated. To do this, we had to construct our own Northern Ireland database using publicly available data, and deal with issues around the consistency of data series over time and missing observations. Section 2.2 describes the model framework and Section 2.3 outlines the database and its construction.

2.2 MODEL FRAMEWORK

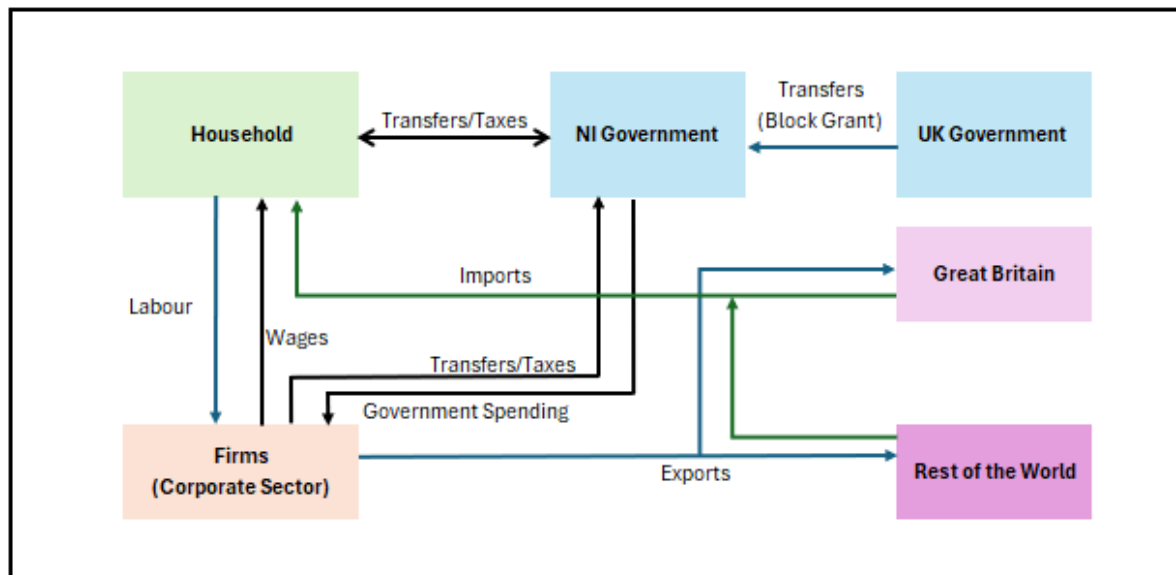
The model for the Northern Ireland economy is similar in structure to individual country models in NiGEM (see Hantzsche et al. 2018 for more detail on the NiGEM model). The model has a theoretical structure with econometrically estimated parameters and dynamics. It provides a framework to understand economic relationships, generate forecasts and assess policy impacts. As with all macroeconomic models, the model is a simplification of the complex relationships and processes that ultimately determine economic activity.

In the model, long-run output is supply driven and determined by the availability of factors of production and total factor productivity. In the short to medium term output is determined by demand. At any point in time output may deviate from its long-run level. Such deviations prompt price and wage adjustments to bring the economy towards equilibrium again. Figure 2.1 presents key aspects of the structure of the model. In terms of agents in the model, there are households, firms, government and the foreign sector. Households consume goods and services and supply labour to firms for which they earn a wage. Firms produce output, employ labour and invest. Government spends on consumption and investment with fiscal spending primarily funded through the Westminster Government's block grant, supplemented by local taxes and other revenues. The foreign sector captures Northern Ireland's economic interactions with the rest of the world. In the model, interest rates are determined by the relevant monetary authority, the Bank of England, and follow the same path as for the wider United Kingdom. The model reflects how each sector interacts with, and contributes to, the overall economy. This multi-sector approach reflects Northern Ireland's unique economic

³ A full technical description of the model is available in a supplementary ESRI Working Paper 'A Macro-Model of the Northern Ireland Economy'.

structure and complex relationship with the broader UK economy and the global market.

FIGURE 2.1 MODEL STRUCTURE



Source: Authors' analysis.

2.2.1 Household sector

The household sector plays a critical role in Northern Ireland's economy. Households maximise their utility by consuming goods and services subject to budget constraints. The primary sources of income for households are wages, government transfers to households, investment returns on financial assets, and housing investments. Additionally, households supply labour to firms, forming a critical linkage between household consumption and corporate production.

In modelling the household sector, we assume that individuals make decisions to optimise their lifetime utility, balancing present with future consumption via their savings and investment decisions. Labour supply is a function of wage rates and demographic factors, while consumption is driven by real personal disposable income, wealth, and interest rates.

2.2.2 Corporate sector

Firms within the corporate sector in the model produce goods and services using labour from households, capital and energy. Firms maximise profits by determining the optimal combination of factor inputs to meet consumer demand and maintain competitiveness.

Potential or capacity output is determined by an underlying production function that includes the factor inputs and labour-augmenting technical progress. Firms' desired factor demands can be derived from the production function. In the long run, labour demand depends on the real wage, technological progress and productivity. Wages are determined in a bargaining model and are influenced by the factors that affect the supply and demand for labour including labour productivity, unemployment and prices. Investment is ultimately determined by the level of output and the real user cost of capital. The interaction between wages, capital costs, and firm output determines firm's profitability and investment behaviour.

2.2.3 Public sector

Northern Ireland's public sector is modelled based on the devolved responsibilities of the Northern Ireland Executive, which oversees economic and social areas including health, education, infrastructure and justice. The Westminster Government's block grant heavily influences fiscal policy in Northern Ireland as it is the primary funding source for government spending.⁴ This grant is calculated using the Barnett Formula. This fiscal mechanism adjusts the financing in proportion to spending changes in the rest of the United Kingdom, accounting for Northern Ireland's population share. The model distinguishes between government spending on consumption (goods and services), investment and transfers to households. Government consumption and investment are modelled as rising in line with the economy's potential output. Government investment will also flow into the capital stock and can therefore impact the potential output of the economy, whereas changes in government consumption will only have a temporary impact on the economy.

The block grant, local taxes, and other revenues fund public sector spending in the model. However, key tax policies, such as income tax and VAT, remain under the control of the UK government.⁵ The interaction between public expenditure and revenue collection influences aggregate demand in Northern Ireland.

2.2.4 Foreign sector

The foreign sector captures Northern Ireland's economic interactions with the rest of the United Kingdom (Great Britain or GB), Ireland, and the Rest of the World (ROW). Northern Ireland's economy is uniquely positioned, given the Windsor Framework, as it remains within the EU Single Market for goods. At the same time, Great Britain is Northern Ireland's most significant trade partner. This dual

⁴ The block grant funds around 90 per cent of NI Executive led spending (Fiscal Commission Northern Ireland, 2022) but its share can change on an annual basis.

⁵ The Northern Ireland Executive has the power to lower the corporation tax rate compared to the UK, but this has not been enacted.

relationship has profound implications for trade, investment and regulatory alignment.

Exports in the model are driven by global demand and competitiveness, with key trading partners including Ireland, Great Britain and the rest of the European Union. Import demand is primarily determined by aggregate demand and relative prices. Influenced by Brexit and subsequent policy changes, the ongoing trade relationship with Great Britain plays a pivotal role in shaping Northern Ireland's economic outlook. The model also incorporates financial transfers from the UK government, directly impacting Northern Ireland's economic performance.

2.3 DATABASE

To build a comprehensive macroeconomic model for the Northern Ireland economy, it was essential to have an extensive dataset covering various dimensions of the economy, including the components of output, labour market, demographics, prices, interest rates etc. Given the absence of a centralised time series database specifically for Northern Ireland, it was necessary to construct one. As part of this process, we collected and consolidated data from a wide range of sources, including the Office of National Statistics (ONS) regional accounts, Northern Ireland Statistics and Research Agency (NISRA), and the Economic Statistics Centre of Excellence (ESCOE). With the exception of a few variables, the dataset spans the period from 1997 to 2021.

The final model database includes consistent time series for around 60 macroeconomic variables, and construction of the database required collecting around 180 macroeconomic variables. However, compiling data from different sources presented several challenges. These included issues of consistency across datasets, missing values, limited time series and, in some cases, the complete absence of data for Northern Ireland. To address these challenges, we employed a variety of techniques. For example, we applied statistical methods to fill in missing values and used UK-wide data to splice together limited time series. In cases where historical data for Northern Ireland were incomplete, we extended the datasets by applying the NI population share to UK-level data. Additionally, due to the lack of NI-specific prices and interest rates, we opted to use UK-wide prices and interest rates as proxies. Throughout this process, we conducted multiple checks to ensure the overall consistency and reliability of the dataset.⁶

To integrate the data into the macroeconomic modelling framework within NiGEM (the National Institute Global Econometric Model), we also needed to adjust the

⁶ The technical paper 'Northern Ireland macroeconomic model' has more details on the database including the procedures used to ensure consistency of the data.

data frequency.⁷ Specifically, we transformed the NI data from an annual frequency to a quarterly frequency through interpolation. This database then serves as the foundation for estimating equations for various sectors within the NI macroeconomic model.

⁷ The NiGEM platform was used to develop the macroeconomic model for Northern Ireland.

CHAPTER 3

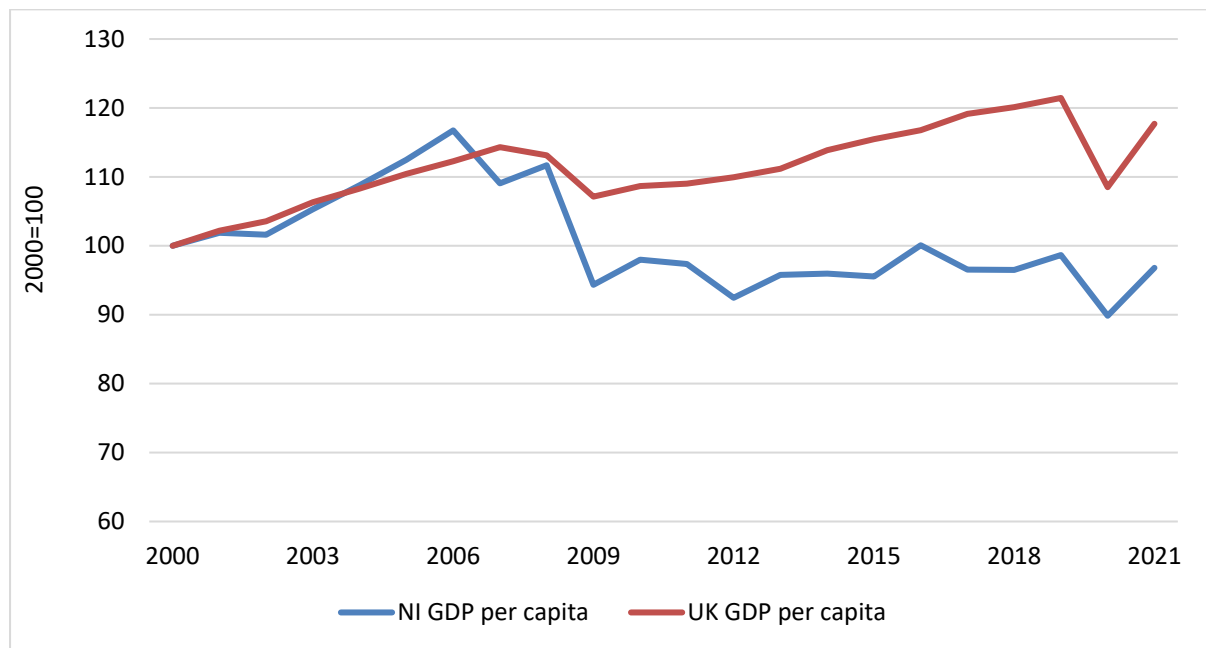
Macroeconomic outlook for Northern Ireland and the all-island economy

3.1 INTRODUCTION

This chapter begins by setting out in detail a baseline forecast for the Northern Ireland economy over the medium term. Overall, the Northern Ireland economy is expected to experience similar growth rates out to the end of the decade as during the past decade. The next section describes this baseline forecast alongside medium-term projections for the Irish economy, the wider UK economy and the all-island economy.

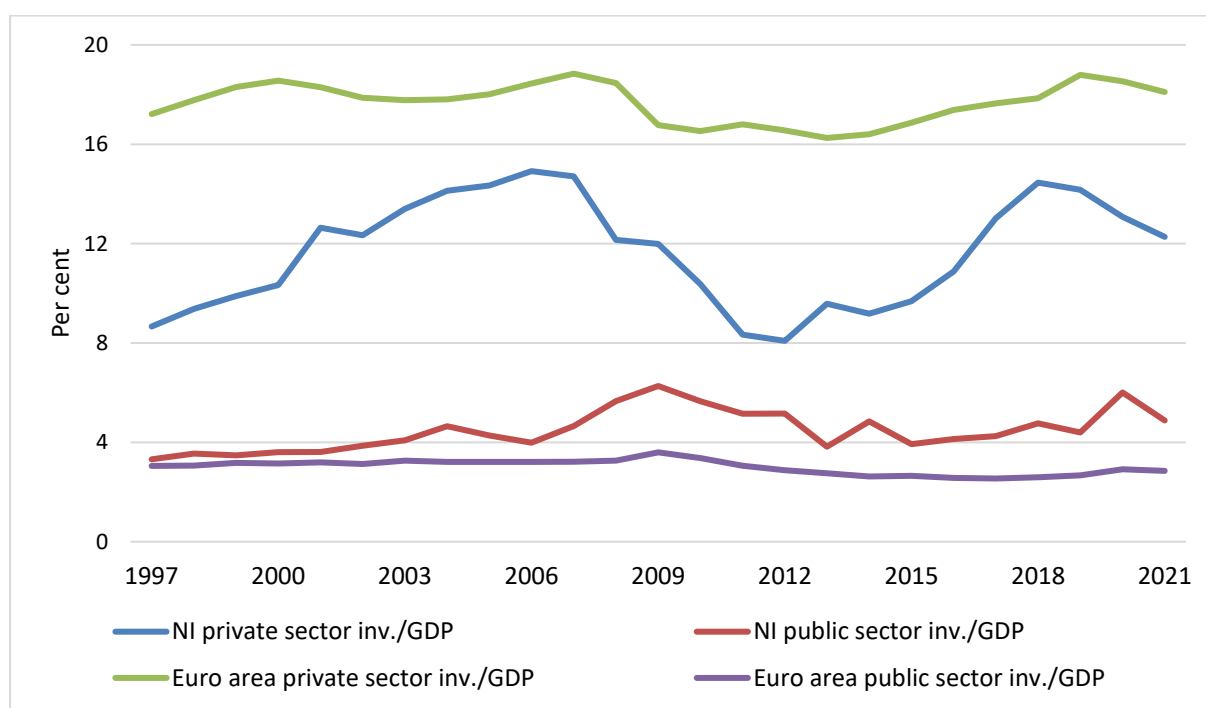
3.2 BACKGROUND

Many studies have shown that the Northern Ireland economy has historically been a poor performer relative both to British regions (see for example, Jordan 2022; Johnston and Stewart, 2019; McGuinness and Sheehan, 1998) and to Ireland (see for example, Bergin and McGuinness, 2021; 2022; McGuinness and Bergin, 2020; FitzGerald and Morgenroth, 2019). Low productivity growth is often cited as the cause of Northern Ireland's relatively weaker economic performance. Figure 3.1 shows the evolution of GDP per capita (a broad measure of aggregate productivity) for Northern Ireland and the wider United Kingdom over time. The figure indicates that while GDP per capita in Northern Ireland was growing at a similar pace to UK GDP per capita in the early 2000s, it fell after the financial crisis, has been broadly flat since then, and is now around 20 per cent below the UK average.

FIGURE 3.1 COMPARISON OF GDP PER CAPITA: NORTHERN IRELAND AND THE UNITED KINGDOM (2000=100)

Source: Authors' analysis and ONS UK regional statistics.

Bergin and McGuinness (2022) found that a higher share of educated workers, higher levels of investment and higher export intensity were all associated with higher sectoral productivity in Ireland compared to Northern Ireland. Figure 3.2 shows private and public investment as a share of GDP for Northern Ireland and for the euro area for comparison. The figure shows that overall investment as a share of GDP is below the euro area average. While public sector investment as a percentage of GDP is above the euro area average by around 2 percentage points in the last few years, private sector investment has been persistently below the euro area average by over 5.5 per cent of GDP in recent years. Overall, this points to low levels of private sector investment in Northern Ireland relative to other countries and is likely to be impacting productivity in Northern Ireland. Higher levels of private sector investment are needed to improve long-term economic prospects and living standards in Northern Ireland.

FIGURE 3.2 NORTHERN IRELAND AND EURO AREAS INVESTMENT AS A SHARE OF GDP

Source: Authors' analysis and ONS UK regional statistics.

3.3 NORTHERN IRELAND ECONOMY FORECAST

To generate a forecast for the Northern Ireland economy, we combine historical data with the model equations that capture the behaviour of and interlinkages in the economy (see Section 2.2 for an outline of the model). The forecast is conditioned on a set of additional assumptions relating to the path for interest rates, commodity prices, exchange rates and world trade. These assumptions are described in Section 3.3.1 and are broadly based on projections from the Summer 2024 National Institute UK Economic Outlook (NIESR, 2024).

3.3.1 Forecast assumptions

The model-based baseline projection provides a plausible profile of the economy over the medium term. This baseline forecast for Northern Ireland is conditioned on the following set of assumptions:

- The path for short-term policy interest rates follows a gradual decline from a peak of 5.25 per cent in early 2024. We expect interest rates to decline to 4.6 per cent and 4.1 per cent in 2025 and 2026 respectively before stabilising at around 3.25 per cent over the long term. This gradual easing signifies a shift towards supporting growth as inflationary concerns diminish.
- One pound sterling is projected to be worth €1.17 in 2024, and then experience a slight depreciation over the next two years. By 2026, the value of one pound sterling is expected to decline to €1.15, with a further modest depreciation (to €1.14) anticipated over the longer term.

- In terms of fiscal policy, our overall assumptions for the United Kingdom are consistent with the Office for Budget Responsibility (OBR) (2024). Major tax rates are assumed to remain broadly constant over the projection horizon.
- We expect the oil price to be at around \$86.8 per barrel by the end of 2024. We expect it to decline by around 4 per cent in 2025 and then to remain broadly unchanged over longer term.
- The labour force participation rate in Northern Ireland is expected to remain stable at 77.8 per cent in the coming years.
- World trade is projected to grow by 4.1 per cent in 2024, with further strengthening in the following years, rising to 5.3 per cent in 2025 and 5.1 per cent in 2026 before growth moderates to around 4.0 per cent per annum for the rest of the decade.

3.3.2 Medium-term forecast for Northern Ireland

Over the projection horizon, the model estimates average potential output growth of around 1.1 per cent per annum. In the near term, growth is expected to be higher. This reflects the continued recovery from the pandemic and moderating inflation. Conditions in the labour market are tight, and this is expected to contribute to real wage growth which will support demand in the economy. Strong global trade will also positively impact growth in the near term. Over the medium term, the Northern Ireland economy is expected to grow in line with potential output.

Table 3.1 presents data and forecasts for the Northern Ireland economy, for key indicators from 2020 to 2029. The table captures the initial impact of the COVID-19 pandemic in 2020 to the recovery in subsequent years, as well as projections for the Northern Ireland economy up to 2029. It includes GDP growth, per capita GDP growth, CPI inflation, Real Personal Disposable Income (RPDI) growth, and the unemployment rate.

TABLE 3.1 SUMMARY OF NORTHERN IRELAND DATA AND FORECAST

Column 1	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
GDP	-8.7	7.9	1.3	1.2	0.7	1.7	1.4	1.2	1.0	0.9
Per capita GDP	-8.9	7.7	0.6	0.6	0.2	1.2	1	0.8	0.7	0.6
CPI Inflation	0.6	2.2	7.9	6.9	2.2	2.4	2.5	2.7	2.4	2.2
Real Personal Disposable Income	-1.0	2.2	-3.9	-0.8	1.4	1.7	1.6	1.3	1.3	0.8
Unemployment Rate, per cent	3.1	4	2.8	2.4	2.9	3.1	3.2	3.4	3.4	3.4

Source: Authors' calculations.

Note: Reported numbers are annual average growth rates except for the inflation and unemployment rates which are in annual average terms.

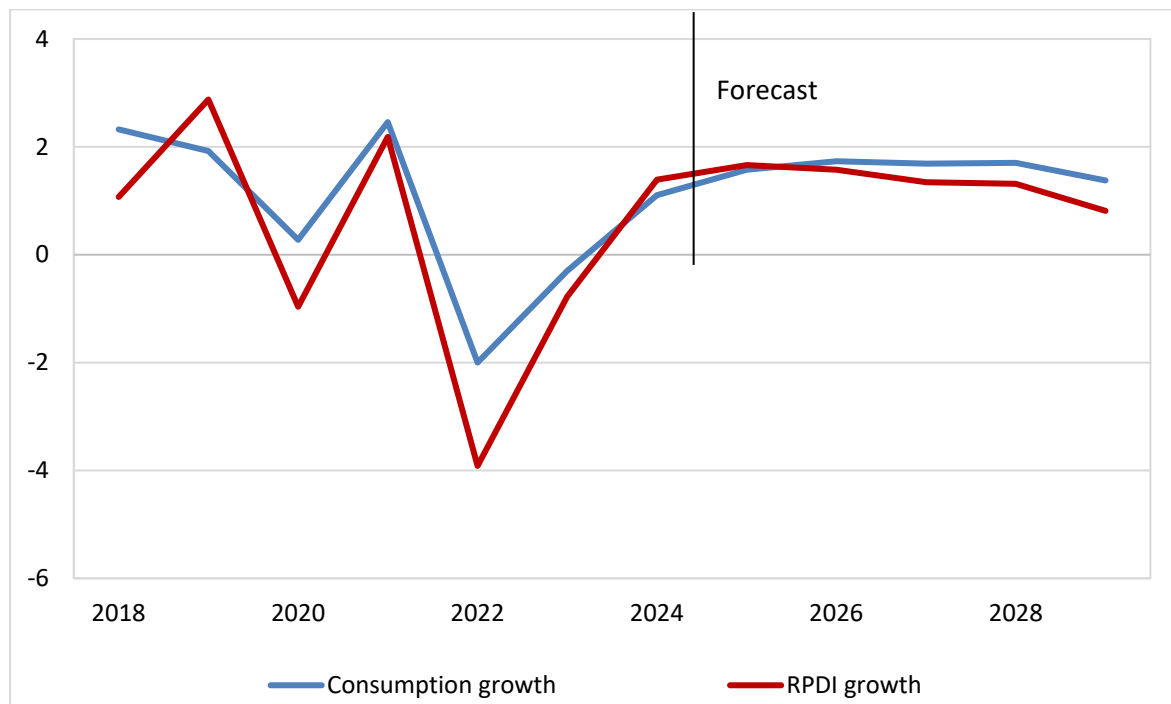
A summary of the Northern Ireland forecast is as follows:⁸

- GDP growth is expected to average around 1.2 per cent per annum over the medium term (2023 – 2029). Growth is expected to be higher in the near term, with GDP growth of 1.7 per cent forecast for 2025 and 1.4 per cent for 2026 before moderating in the later years of the projection to around 1.1 per cent, similar to its longer-term historical trend.
- Per capita GDP growth follows a similar pattern to GDP growth over the short to medium term but at a lower rate.
- After the peak of 7.9 per cent in 2022, CPI inflation is forecasted to remain relatively stable and low from 2024 to 2029, averaging around 2.4 per cent over the forecast horizon.
- Real personal disposable income is expected to recover from 2024 onwards, with growth averaging around 1.4 per cent per annum, after declining in 2022 and 2023.
- The unemployment rate is expected to increase slightly over the short to medium term from 2.4 per cent in 2023 to 3.4 per cent by 2027, and remain stable at this rate.

The economic outlook from 2024 onwards indicates modest growth, compared to recent years, with low inflation but a slight rise in unemployment, suggesting a period of economic stabilisation with some potential challenges in the labour market. The rest of this section examines the detail of the forecast for the Northern Ireland economy.

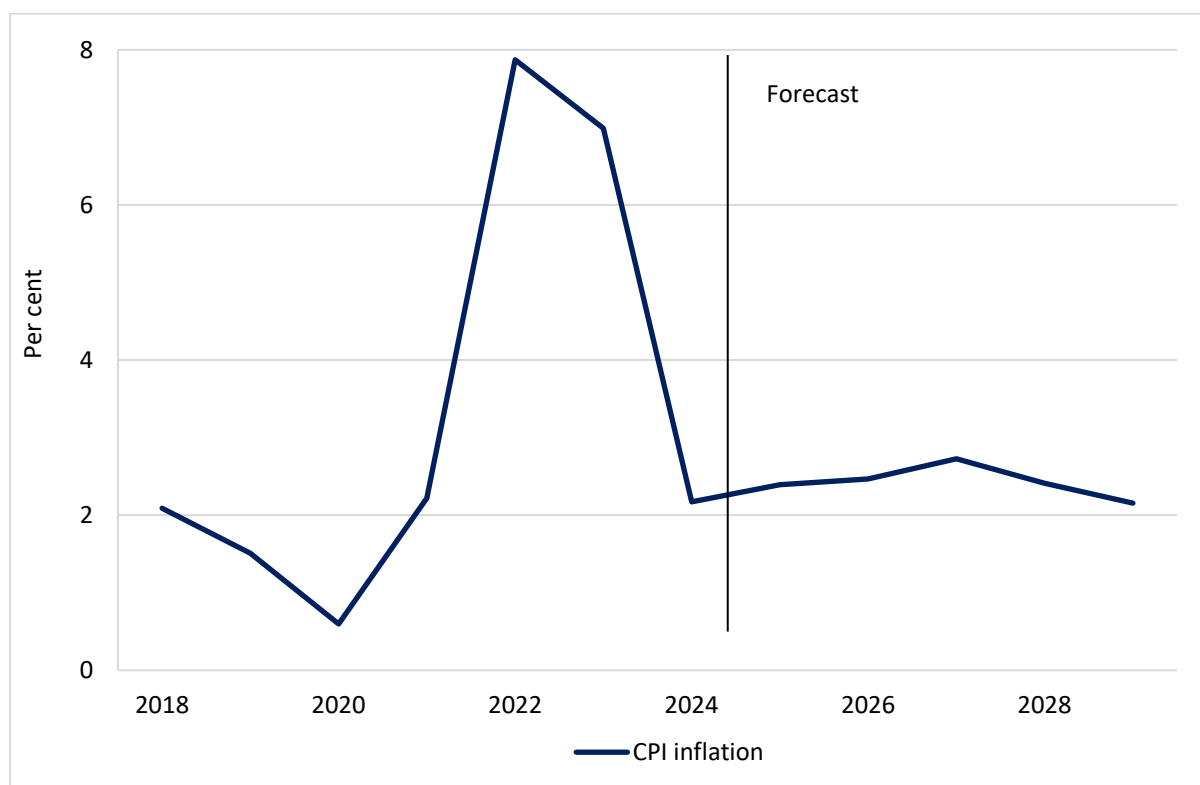
Figure 3.3 highlights a recovery in both consumption and real personal disposable income growth from 2022 onwards with the paths for both converging and stabilising at around 1.5 per cent annually by 2024. With the period of high inflation rates over, real wage growth will support increases in real personal disposable income over the medium term. This will have knock-on effects for domestic demand and consumption which is expected to rise broadly in line with growth in real personal disposable income. The projections suggest a period of modest but consistent economic improvement.

⁸ Detailed forecast tables are included in the Appendix to the report.

FIGURE 3.3 REAL HOUSEHOLD CONSUMPTION AND REAL PERSONAL DISPOSABLE INCOME (RPDI) GROWTH

Source: Authors' analysis and ONS UK regional statistics.

From 2021 to 2023, CPI inflation followed a steep upward trajectory, peaking at around 8 per cent in 2022 (Figure 3.4). This sharp rise in the price level likely resulted from global inflationary pressures caused by factors including supply chain disruptions, energy price surges, and the War in Ukraine. The Bank of England increased interest rates at various intervals since late 2021 and UK inflation has moderated over the last year and is close to the Bank of England's 2 per cent target. In Northern Ireland, the inflation rate has dropped significantly over the past year and has stabilised at a much lower rate of around 2.5 per cent in 2024; it is expected to follow the UK inflation rate over the medium term. The forecast period from 2024 to 2029 shows CPI inflation remaining relatively flat at around 2.5 per cent per annum over the next few years before moderating slightly to around 2.2 per cent over the medium term. This suggests that after the inflationary spike in 2022, the economy is expected to stabilise, with inflation returning to more typical levels.

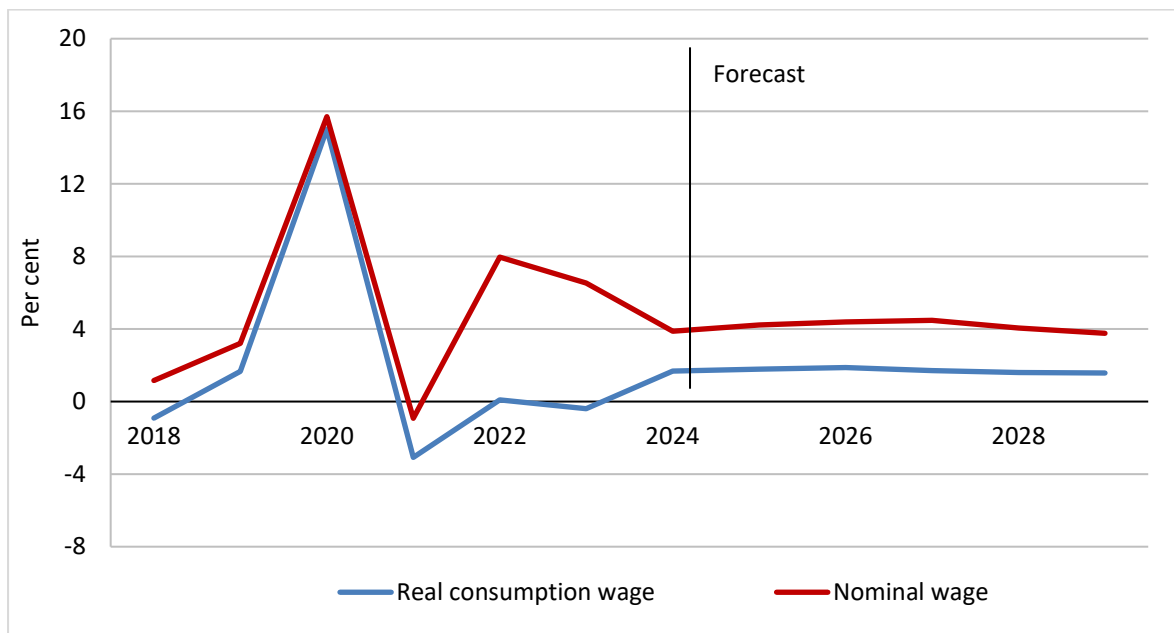
FIGURE 3.4 CPI INFLATION

Source: Authors' analysis and ONS UK regional statistics.

Nominal wage growth has shown significant fluctuations in recent years, with a sharp peak around 2020, likely due to temporary economic factors such as COVID-19 relief measures (Figure 3.5). Real wage growth also exhibits some volatility, but was more subdued following the pandemic, reflecting the impact of inflation eroding purchasing power. While nominal wage growth recovered in 2022, real wage growth has been flat owing to high inflation.

Over the short to medium term, the tightness in Northern Ireland's labour market, as evidenced in the low unemployment rate, is expected to lead to continued nominal wage growth averaging around 4 per cent per annum and, with inflation moderating, real wages will grow by around 1.7 per cent per annum.

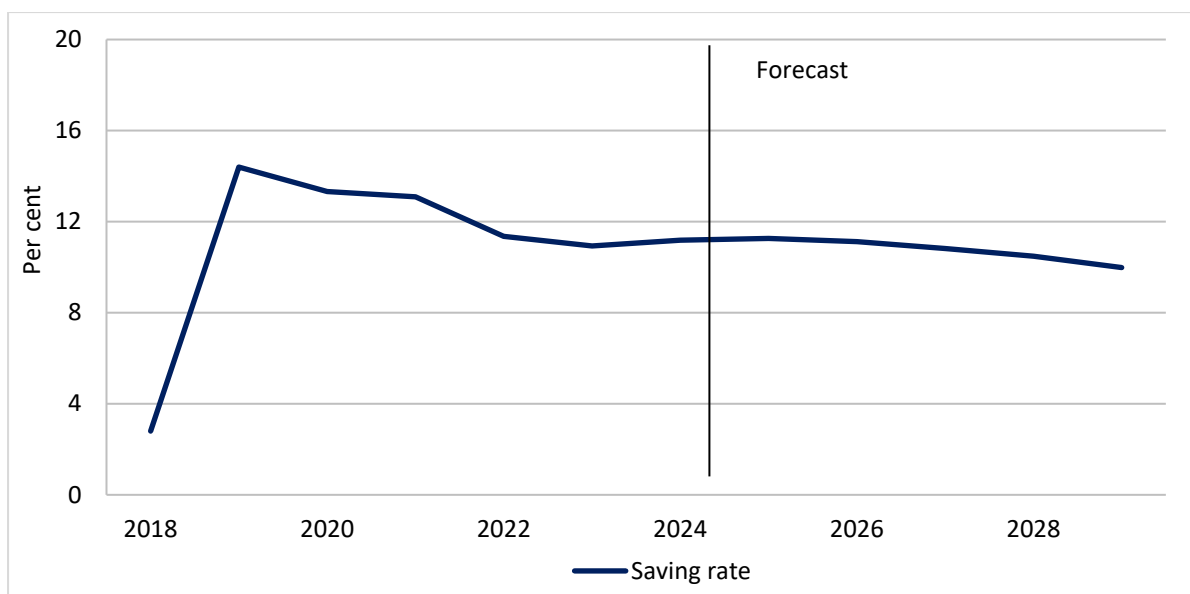
FIGURE 3.5 REAL AND NOMINAL WAGE GROWTH



Source: Authors' analysis and ONS UK regional statistics.

Our estimate of the savings rate shows that it has fluctuated in recent years, likely due to economic uncertainties including Brexit and the COVID-19 pandemic. It has been coming down in more recent years and is expected to gradually decline from around 11 per cent in 2024 to around 9 per cent by 2029. This anticipated decrease suggests a normalisation of consumer behaviour as economic conditions stabilise, potentially providing an impetus to consumer spending.

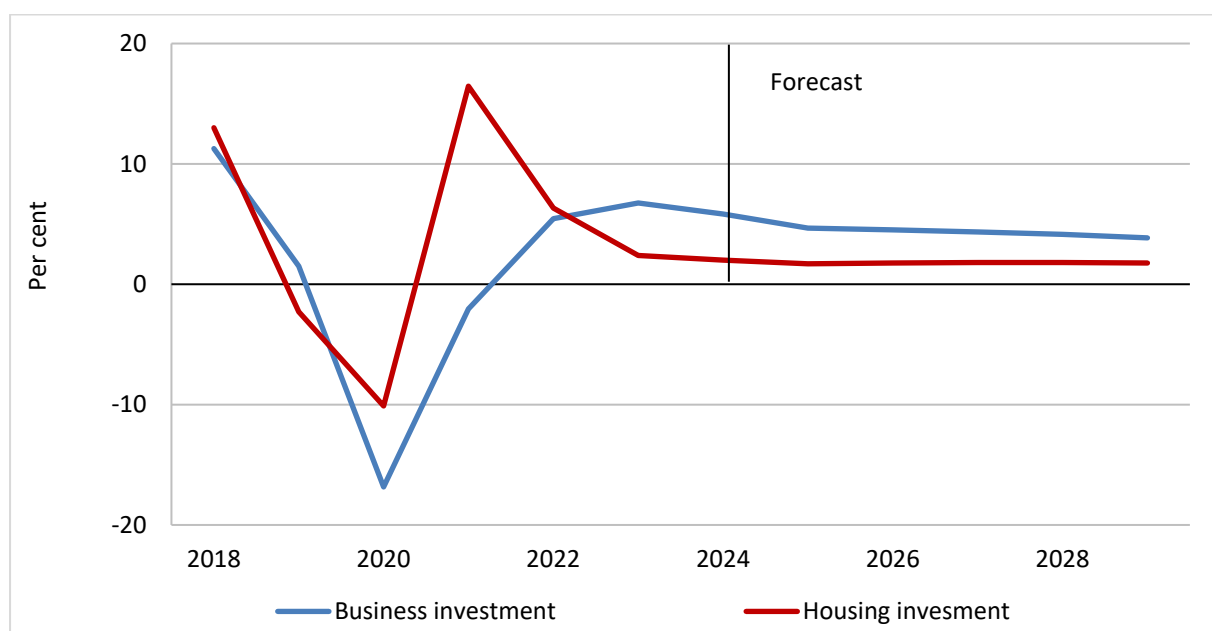
FIGURE 3.6 SAVINGS RATE



Source: Authors' analysis and ONS UK regional statistics.

From 2024 onwards, the growth rates of both business and housing investment are also forecast to stabilise (Figure 3.7), with these projections supported by moderating interest rates feeding into a lower user cost of capital. Post 2024, housing investment growth remains broadly stable at just under 2 per cent per annum, while business investment grows at a relatively higher rate averaging around 4.5 per cent per annum.

FIGURE 3.7 BUSINESS AND HOUSING INVESTMENT GROWTH

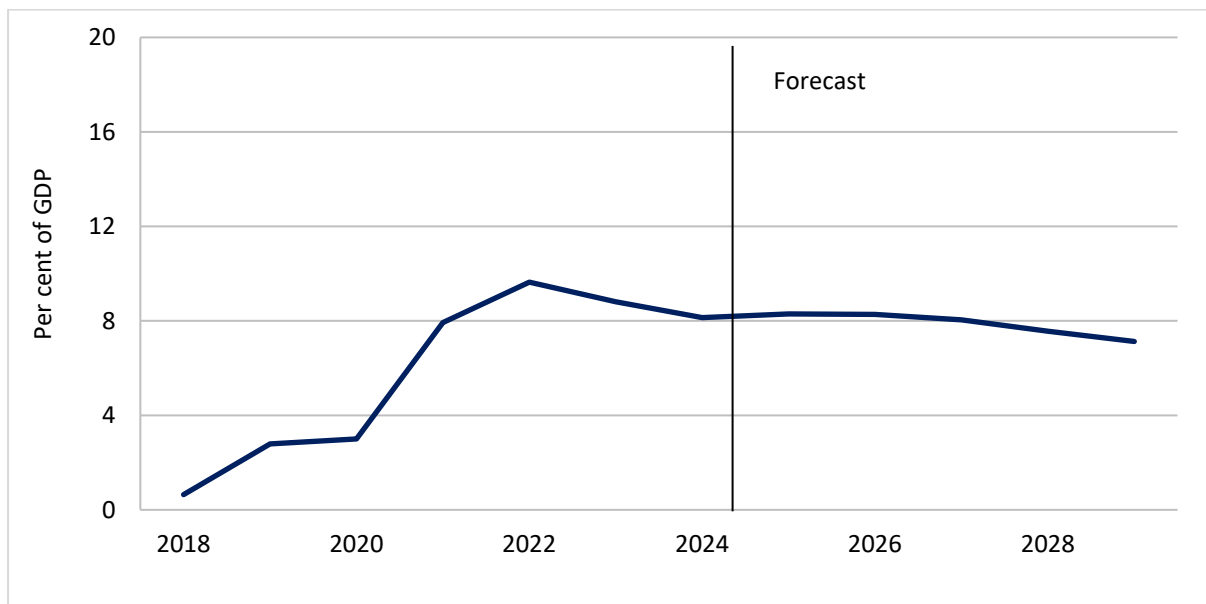


Source: Authors' analysis and ONS UK regional statistics.

On the external sector side, the trade balance (exports minus imports) stood at 8.8 per cent of GDP in 2023, showing a modest decline from 2022. The growth in recent years in the trade surplus highlights a favourable position, where exports are consistently surpassing imports. The trade surplus is expected to remain broadly stable as a percentage of GDP over the forecast horizon, benefiting from strong global demand for Northern Ireland's exports of goods and services (Figure 3.8).

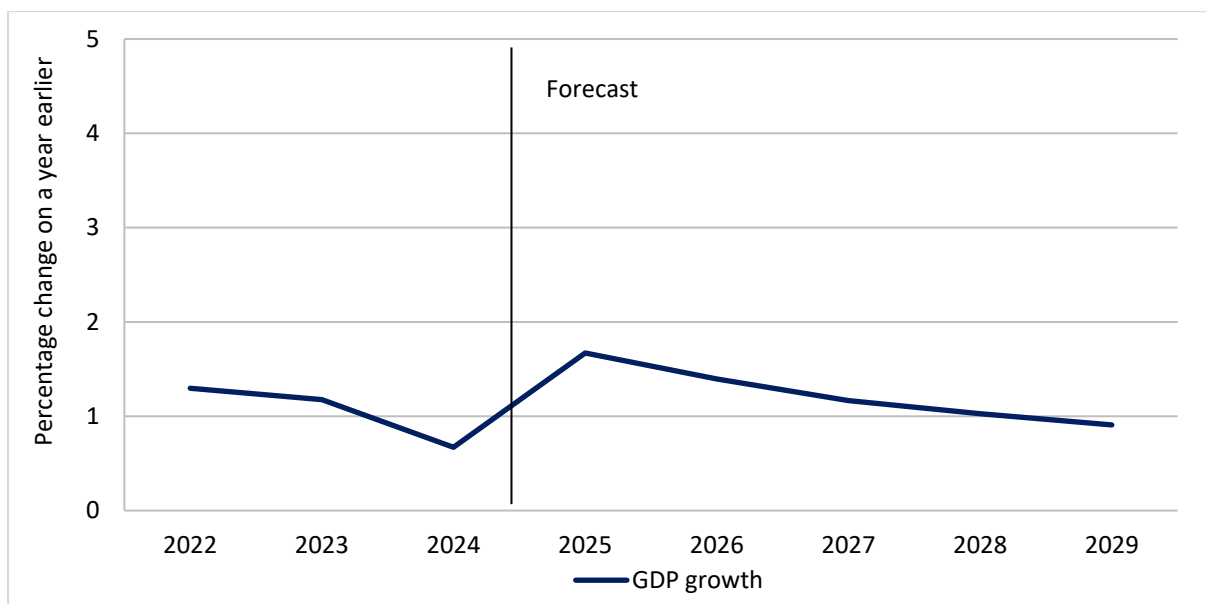
Overall, GDP growth is expected to be 0.7 per cent in 2024. The growth rate is expected to increase in the near term to 1.7 per cent and 1.4 per cent respectively in 2025 and 2026 on the back of the recovery in real incomes and relatively strong global demand for exports Figure 3.9. Over the more medium term, growth decelerates slightly to around 1 per cent per annum, similar to Northern Ireland's longer-term historical growth trend. Of course, unanticipated changes in policy and/or global events can alter the growth path for the economy.

FIGURE 3.8 TRADE BALANCE



Source: Authors’ analysis and ONS UK regional statistics.

FIGURE 3.9 GDP GROWTH



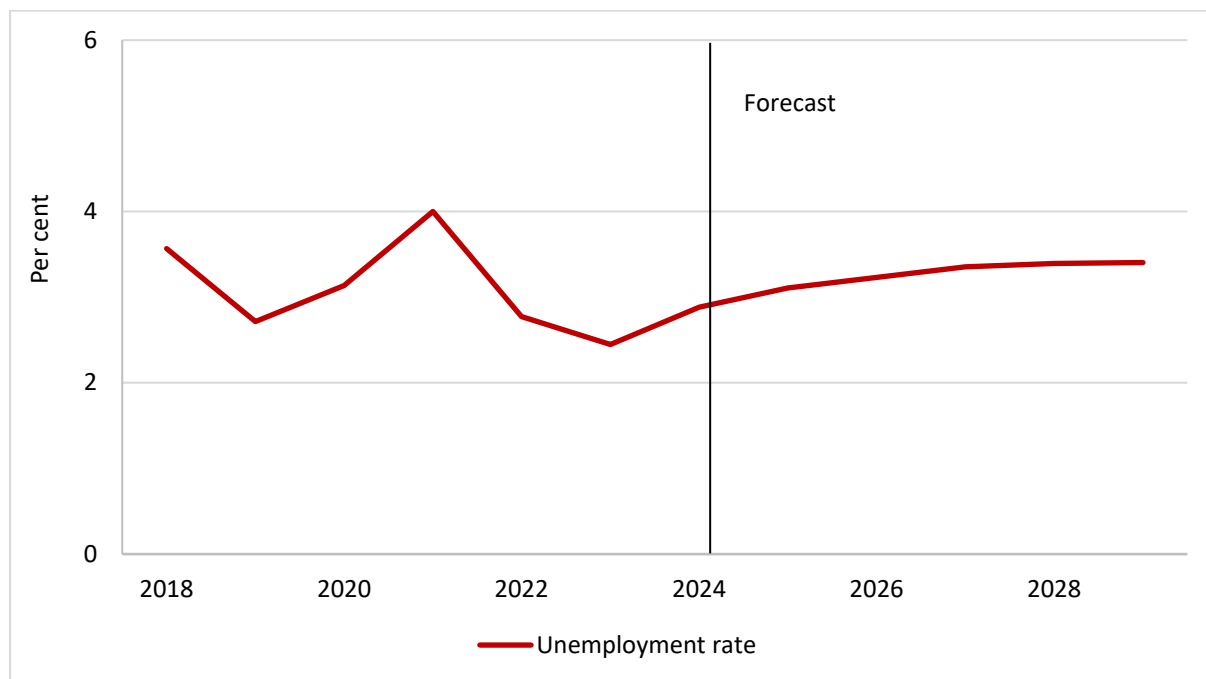
Source: Authors’ analysis and ONS UK regional statistics.

Labour force growth over the medium term is expected to be somewhat subdued owing to the lower growth in the population of working age as the population ages. Figure 3.10 shows the unemployment rate, which has been at historically low levels in recent years.⁹ The unemployment rate is projected to rise gradually, albeit marginally, over the medium term to around 3.4 per cent, reflecting the lower economic growth in the later years of the forecast.

⁹ The low unemployment rate in Northern Ireland masks the higher rate of inactivity relative to the UK and Ireland.

While the unemployment rate is set to remain low by historical standards, this slight upward trend points to potential challenges in sustaining strong job creation and economic momentum in Northern Ireland over the medium term.

FIGURE 3.10 UNEMPLOYMENT RATE



Source: Authors' analysis and ONS UK regional statistics.

3.4 ALL-ISLAND ECONOMY FORECAST

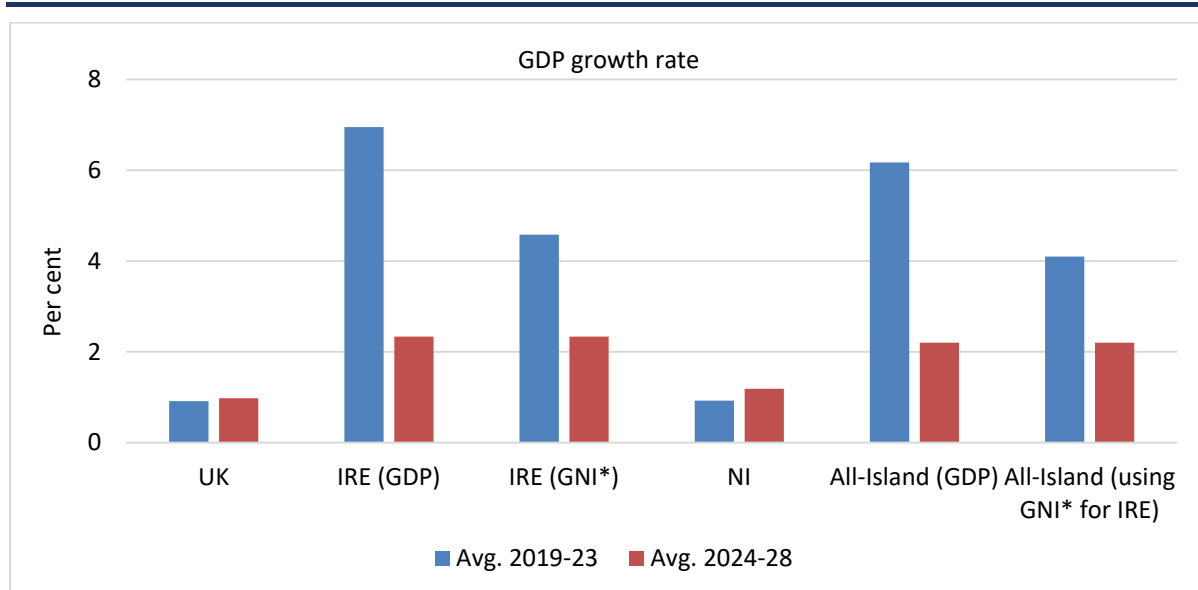
This section presents projections for the all-island economy over the medium term. For comparative purposes, we also present projections for Ireland and the wider UK economy.¹⁰

Over the past five years, annual average growth in Northern Ireland has been around 0.9 per cent per annum, similar to that of the wider UK but far below that of Ireland (see Figure 3.11). As Irish GDP is heavily distorted by globalisation effects, changes in GDP are increasingly disconnected from actual trends in underlying output so we also include another measure of Irish output, modified GNI or GNI*, as a more appropriate measure. Modified GNI grew by an average of 4.5 per cent over the past five years, far outpacing the growth in both Northern Ireland and the

¹⁰ The projections for the United Kingdom and Ireland in this section are taken from the Summer 2024 National Institute UK Economic Outlook (NIESR, 2024). The modelling framework allows us to take projections from the NiGEM model, the COSMO model for Ireland and indeed from other sources. The forecasts presented for Ireland are similar to those from other sources. For example, Department of Finance (2024) have a broadly similar although slightly stronger macroeconomic projection for Ireland; their medium-term forecast for GNI* is around 0.5 percentage points higher and their medium-term projection for the unemployment rate is around 0.5 percentage points lower. The forecasts for the all-island economy are generated as a weighted average (in a common currency) of the Irish and Northern Irish forecasts.

United Kingdom. Growth in Northern Ireland and the United Kingdom was likely impacted by Brexit-related uncertainty, while Ireland has benefited significantly from multinational investments in technology and life sciences, which drove its rapid expansion. This suggests that Northern Ireland, while somewhat resilient, lagged behind its southern neighbour's economic boom. The all-island economy grew by around 4.5 per cent per annum over the past five years when using modified GNI for Ireland,¹¹ or by around 7.5 per cent per annum in GDP terms. Over the next five years, the all-island economy is expected to grow by around 2.2 per cent per annum.¹²

FIGURE 3.11 GROWTH IN THE ALL-ISLAND ECONOMY, IRELAND, NORTHERN IRELAND AND THE UNITED KINGDOM



Source: Authors' analysis and ONS UK regional statistics.

Note: All-island output is determined using the output of Ireland and Northern Ireland (in a common currency) as weighted factors.

In line with the strong performance of the Irish economy, labour demand has been high and in part this demand has been met by strong population growth driven by net immigration. While we expect employment growth to moderate over the medium term, the labour market is expected to remain relatively tight, with the unemployment rate averaging around 5 per cent over the next five years (see Figure 3.12). The unemployment rate is projected to increase moderately in Northern Ireland, although from a low base, and is expected to remain relatively low over the medium term. Overall, the unemployment rate for the all-island economy is expected to average around 4.6 per cent over the medium term, the same average rate as the past five years.

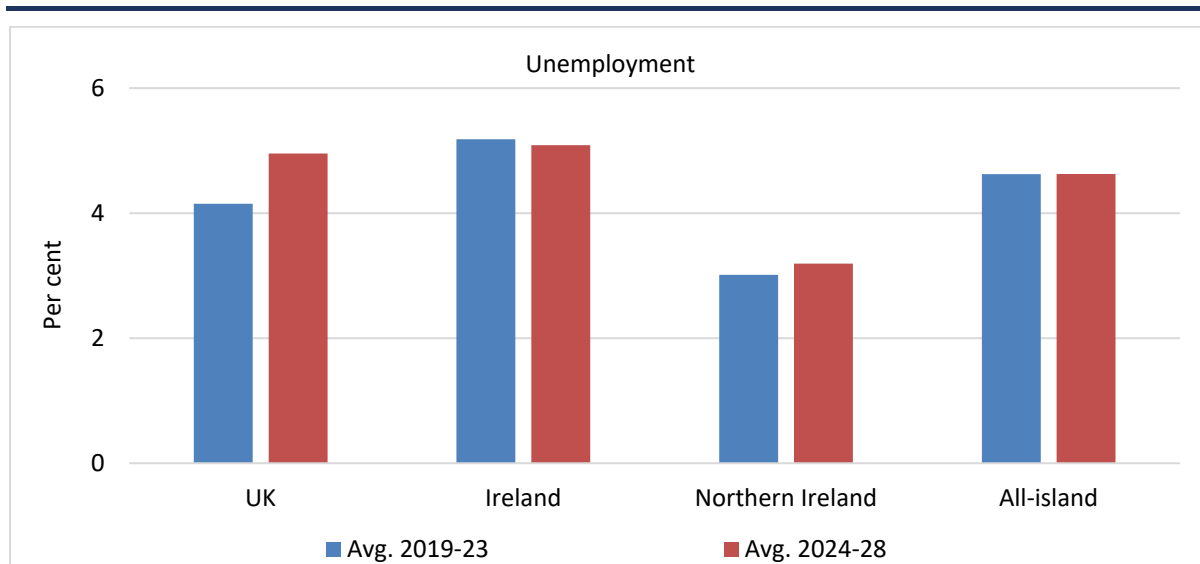
¹¹ We combine GNI* for Ireland with Northern Ireland GDP to generate an all-island growth rate.

¹² Ireland is projected to have faster growth than Northern Ireland over the period, with the UK expected to have lower growth over the medium term.

While the projected low overall unemployment rate is positive, it does indicate some potential challenges for the economies north and south. For Northern Ireland, the challenge of higher rates of inactivity/lower rates of labour market participation remains. For Ireland, participation and employment rates are already at record highs indicating that inward migration will continue to be a key driver of labour supply in the future. However infrastructure deficits in Ireland, particularly in areas such as housing, may result in Ireland being less attractive for international migrants.

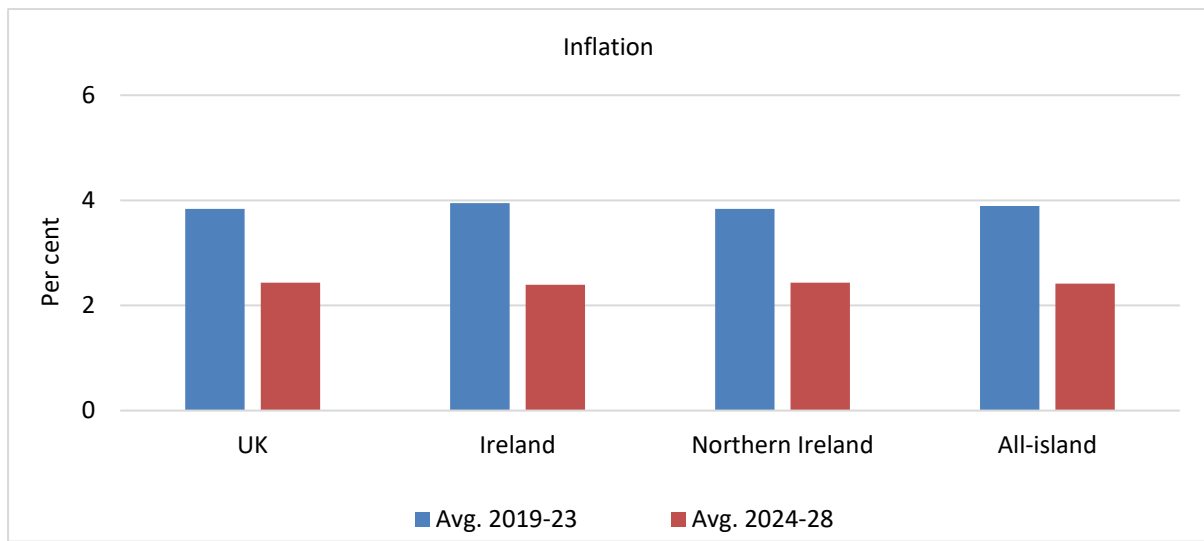
The further development of the all-island labour market could help alleviate some of these issues. For example, cross-border working could help lessen shortages in either jurisdiction and/or act as a mechanism for reducing the impacts of rises in unemployment in either jurisdiction. A recent study on cross-border working found that while the total number of cross-border workers is low in relation to the size of the labour market, the number of cross-border workers has increased by between 40 and 51 per cent over the period 2011 to 2021, with the bulk of the growth due to the expansion in the numbers travelling from Northern Ireland to Ireland for work purposes (McGuinness et al., 2024). McGuinness et al. (2024) find that the gap in wages between Ireland and Northern Ireland is likely to be a significant factor in the increased numbers travelling from Northern Ireland to Ireland for work purposes.

FIGURE 3.12 UNEMPLOYMENT RATE IN THE ALL-ISLAND ECONOMY, IRELAND, NORTHERN IRELAND AND THE UNITED KINGDOM



Source: Authors' analysis and ONS UK regional statistics.

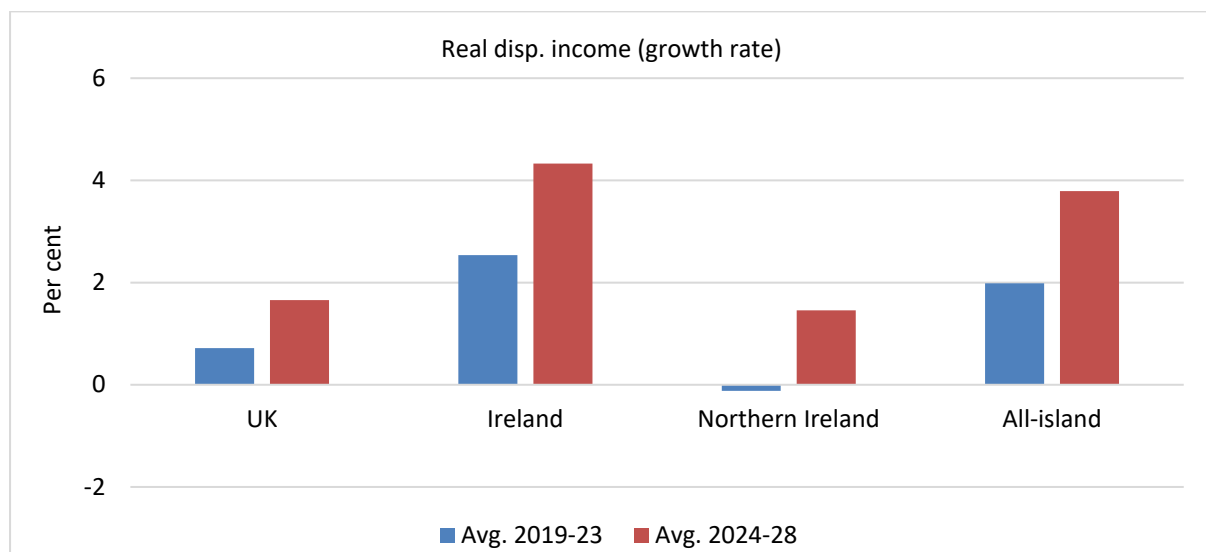
With inflationary pressures abating in Ireland, Northern Ireland and the United Kingdom, CPI inflation is projected to remain relatively stable and low over the next five years averaging around 2.4 per cent per annum for the all-island economy, with similar rates projected for Ireland north and south (see Figure 3.13).

FIGURE 3.13 INFLATION RATE IN THE ALL-ISLAND ECONOMY, IRELAND, NORTHERN IRELAND AND THE UNITED KINGDOM

Source: Authors' analysis and ONS UK regional statistics.

With lower inflation over the medium term, nominal wage growth is projected to lead to real growth in personal disposable income across Ireland, Northern Ireland and the United Kingdom, with stronger growth in Ireland, where wage growth is expected to outpace that in Northern Ireland and the United Kingdom (see Figure 3.14). As a result of faster growth in Ireland, real personal disposable income is expected to grow by around 4.5 per cent per annum over the medium term in the all-island economy. The stronger growth in incomes across Ireland, Northern Ireland and the United Kingdom over the next five years will help support the domestic economies and consumption growth over the period.

Household disposable income has been used as a measure of living standards, with research showing a gap in household disposable income that favours Ireland relative to Northern Ireland (Bergin and McGuinness, 2021). The forecast for stronger real personal disposable income growth in Ireland compared to Northern Ireland indicates that living standards will continue to diverge somewhat between the two jurisdictions over the medium term.

FIGURE 3.14 REAL PERSONAL DISPOSABLE INCOME GROWTH IN THE ALL-ISLAND ECONOMY, IRELAND, NORTHERN IRELAND AND THE UNITED KINGDOM

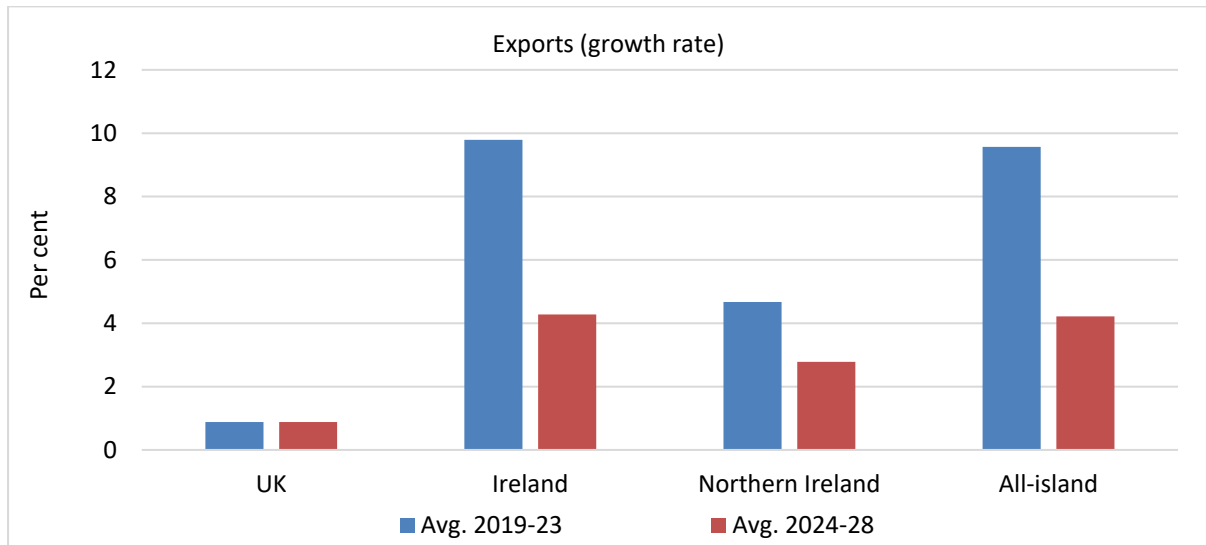
Source: Authors' analysis and ONS UK regional statistics.

Prospects for the external sector are also important for the future growth path for Ireland, the United Kingdom and Northern Ireland. As mentioned earlier, world trade growth is expected to average more than 4 per cent per annum over the medium term and export growth for Ireland is expected to average around 4.25 per cent per annum over the next five years (see Figure 3.15).

Recent research has highlighted the strong trade relationship between Ireland and Northern Ireland. Kren and Lawless (2023) shows that goods trade between Ireland and Northern Ireland has grown substantially since Brexit. While Great Britain accounts for the largest proportion of Northern Ireland's external trade, trade excluding Great Britain is heavily concentrated in cross-border trade with Ireland. In 2021, Ireland purchased 53 per cent of total Northern Ireland exports and accounted for almost 35 per cent of Northern Ireland's imports. Lawless (2021) finds that cross-border services trade is considerably lower than cross-border trade in goods. Services make up 26 per cent of the total trade going from Northern Ireland to Ireland, and 16 per cent of the trade going from Ireland to Northern Ireland. This suggests considerable scope for greater development of all-island services links.

Northern Ireland's export growth is expected to average around 2.75 per cent per annum over the next five years, higher than that of the wider United Kingdom, in part bolstered by demand from Ireland and its relatively more favourable (than the UK) trading relationship with the European Union.

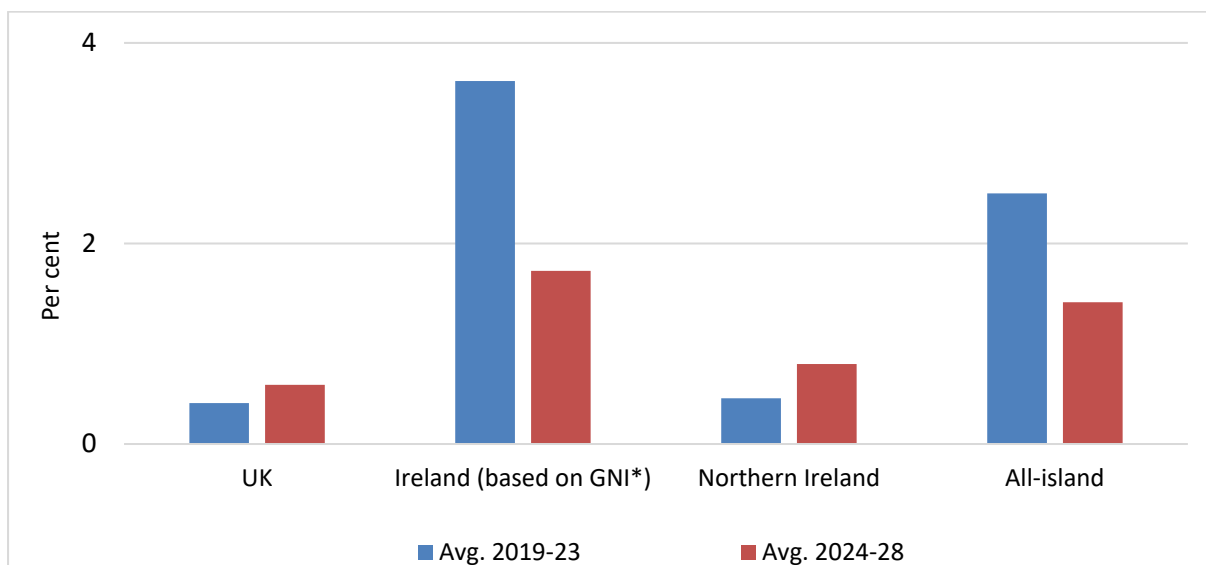
FIGURE 3.15 EXPORT GROWTH IN THE ALL-ISLAND ECONOMY, IRELAND, NORTHERN IRELAND AND THE UNITED KINGDOM



Source: Authors' analysis and ONS UK regional statistics.

In terms of productivity, Northern Ireland is expected to achieve slightly higher productivity growth than the UK over the next few years and, although the gap with the UK will narrow somewhat, Northern Ireland productivity will remain below the UK average. Continued productivity growth in Northern Ireland requires sustained productivity-enhancing investment in the economy. Productivity growth in Ireland is projected to be around 1.75 per cent over the medium term, driving the medium-term projection for all-island productivity growth of 1.6 per cent per annum.

FIGURE 3.16 PER CAPITA GDP GROWTH IN THE ALL-ISLAND ECONOMY, IRELAND, NORTHERN IRELAND AND THE UNITED KINGDOM



Source: Authors' analysis and ONS UK regional statistics.

CHAPTER 4

Simulations

4.1 INTRODUCTION

There is considerable uncertainty inherent in any forecast exercise and it is important to explore the potential impact and dynamics of various shocks that could alter the course of the economy over the short to medium term. Arguably, the main contribution of a macroeconomic model is its use in examining the potential impact of shocks and policy changes. This can contribute to a better understanding of what ultimately drives the economy in the medium term and the important factors that will impact that outturn. This can also help inform the debate on the potential impact of policy changes and external shocks as they arise. It can also allow for the comparison of the model results with those of comparable models or those predicted by economic theory.

A non-exhaustive list of standard simulations assessed using macroeconomic models includes fiscal shocks (e.g. changes in tax rates, government spending and investment), energy price shocks, interest rate shocks, external economic shocks impacting global demand, housing market shocks, etc. This section presents a range of simulations. Our approach to shocking the relevant variable(s) is to change them one at a time by a fixed amount. Then the model is simulated with this one change, holding all other exogenous variables unchanged at their baseline levels. The simulation results are then compared to the forecast baseline, isolating the effect of the change in the relevant variable. In general, when approaching how to model different events/scenarios, we need to identify the main channels of impact on the economy and then calibrate these shocks (i.e. define them in numerical terms). Often one shock will not cover every aspect. Further considerations to bear in mind are, at present, we cannot identify within-region impacts or differential impacts across sectors of production. For example, while we may have good reason to believe a particular shock may impact Dublin more/less than the rest of Ireland or Belfast more/less than the rest of Northern Ireland, the model cannot show that since it gives results at the country level.

The focus of the simulations is on the impacts for the Northern Ireland economy; however, in several cases, results are also shown for the United Kingdom for comparative purposes and for the all-island economy where appropriate. A range of separate shocks are considered relating to (1) income tax shocks consistent with more devolution in Northern Ireland, (2) an increase in Northern Ireland's block grant, (3) an interest rate shock, (4) a positive shock to demand in Ireland and its spillover effects on Northern Ireland and (5) an increase in global energy prices. These shocks and scenarios include a mix of policy shocks and external or

international shocks, and were chosen to illustrate the capabilities of the model and to highlight north-south, all-island, and east-west linkages.

It is important to state at the outset that these ‘what if’ scenarios are intended to illustrate the impact of different types of shocks on the Northern Ireland economy; they are not intended as policy recommendations or projections.

4.2 INCOME TAX SHOCKS

We examine a series of shocks related to income tax in Northern Ireland and the United Kingdom. While the ability to change income tax rates lies with the UK government, we develop a hypothetical scenario that is consistent with more devolution in Northern Ireland. For example,¹³ in Scotland, the Scottish Parliament has the power to change income tax rates and thresholds (with the exception of the personal allowances) and to create new bands and rates. While HMRC administers and collects the tax, the revenue is sent to the Scottish Government. Similarly, in Wales, income tax is devolved to the Welsh Senedd but with fewer powers than in Scotland.

We begin by examining the effect of a 1 percentage point increase in the effective income tax rate in Northern Ireland lasting for two years. We then apply the same shock to the United Kingdom as a whole for comparative purposes. Finally, we examine the hypothetical case where there is an increase in the effective income tax rate in Northern Ireland, and the Northern Ireland Executive receives the revenue which it can then use for additional government spending and/or investment.

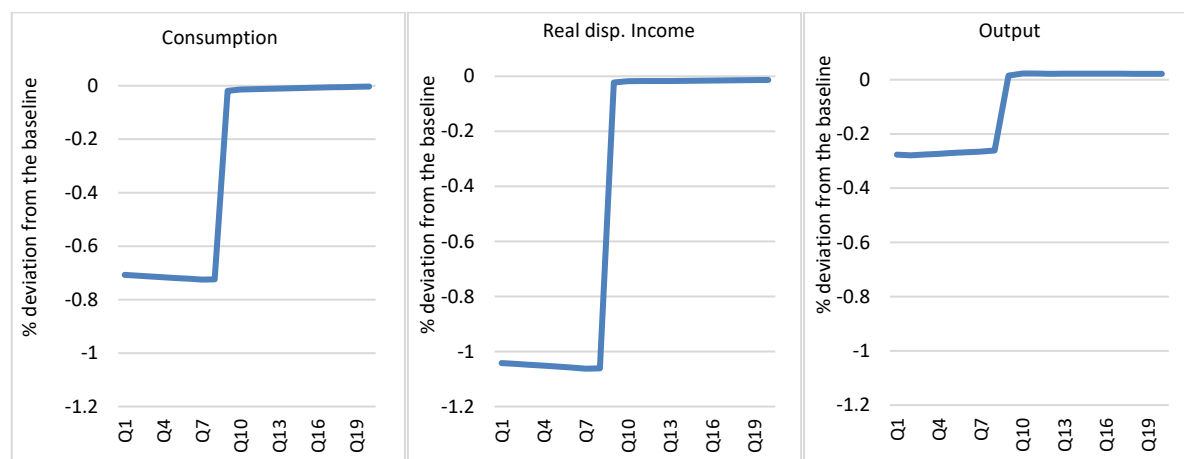
These scenarios are not intended to be prescriptive, but rather to reflect a hypothetical scenario whereby the Northern Ireland Executive could change the income tax rate and have the use of the revenue. Alternatively, these scenarios can be seen as a proxy for the Northern Ireland Executive raising taxes on Northern Irish households in ways that are currently available (e.g. the rates system).

Figure 4.1 presents the simulation results for a 1 percentage point increase in the effective income tax rate in Northern Ireland for two years, after which it reverts to the rate in the baseline. A higher income tax rate decreases real personal disposable income below the baseline (where it would have been in the absence of the shock). Consumption and savings both respond negatively to the decrease in income and domestic demand ends up below baseline. This has a small but negative impact on employment and wages. Overall, the level of output (GDP) ends

¹³ See <https://obr.uk/forecasts-in-depth/tax-by-tax-spend-by-spend/devolved-aspects-of-income-tax/> for more details.

up below baseline. The key macroeconomic variables shown in Figure 4.1 all return to their baseline levels after two years when the shock ends.¹⁴

FIGURE 4.1 RESPONSE TO A 1 PERCENTAGE POINT INCREASE IN THE INCOME TAX RATE IN NORTHERN IRELAND

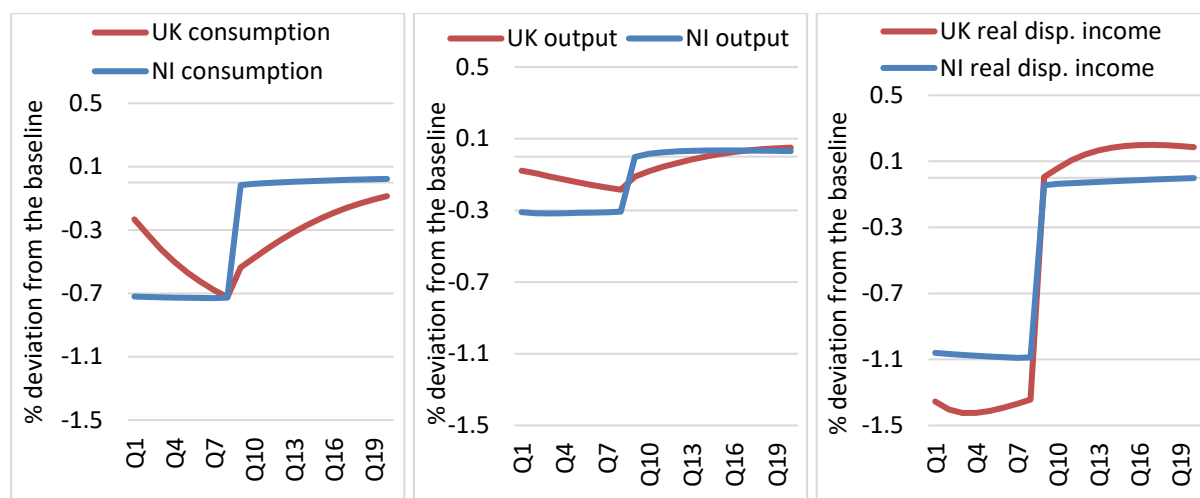


Source: Authors' analysis.

Figure 4.2 shows the impact of a 1 percentage point increase in the effective income tax rate in the United Kingdom for two years and compares it to the results for the Northern Ireland income tax rate shock above. While the overall impacts for the United Kingdom and Northern Ireland are broadly similar there are some differences. The impact on real personal disposable income is somewhat stronger in the UK shock than in the Northern Ireland-only shock, as overall wages are higher in the UK than in Northern Ireland. The simulation results also show that the impact on consumption of the UK-wide shock is more gradual and takes longer to return to baseline than in the Northern Ireland-only shock. This difference is due to differences in the estimated dynamics between the UK and Northern Irish consumption functions. Overall, the impact on output in the UK-wide shock is more muted in the short term and takes longer to return to baseline relative to the Northern Ireland-only shock. Comparing these simulation results highlights the advantage of having a Northern Irish model, estimated on data for Northern Ireland, as differences in the structures of the economies and in estimated behavioural relationships yield different impacts to the same shock.

¹⁴ The simulation results here show a quick reversion of macroeconomic variables to their baseline values. This occurs because the estimated short- and long-term coefficients on income in the consumption function are of similar magnitude. This suggests that households in Northern Ireland adjust their consumption relatively quickly in response to changes in disposable income, and so there is a relatively quick reversion to the baseline when the shock ends.

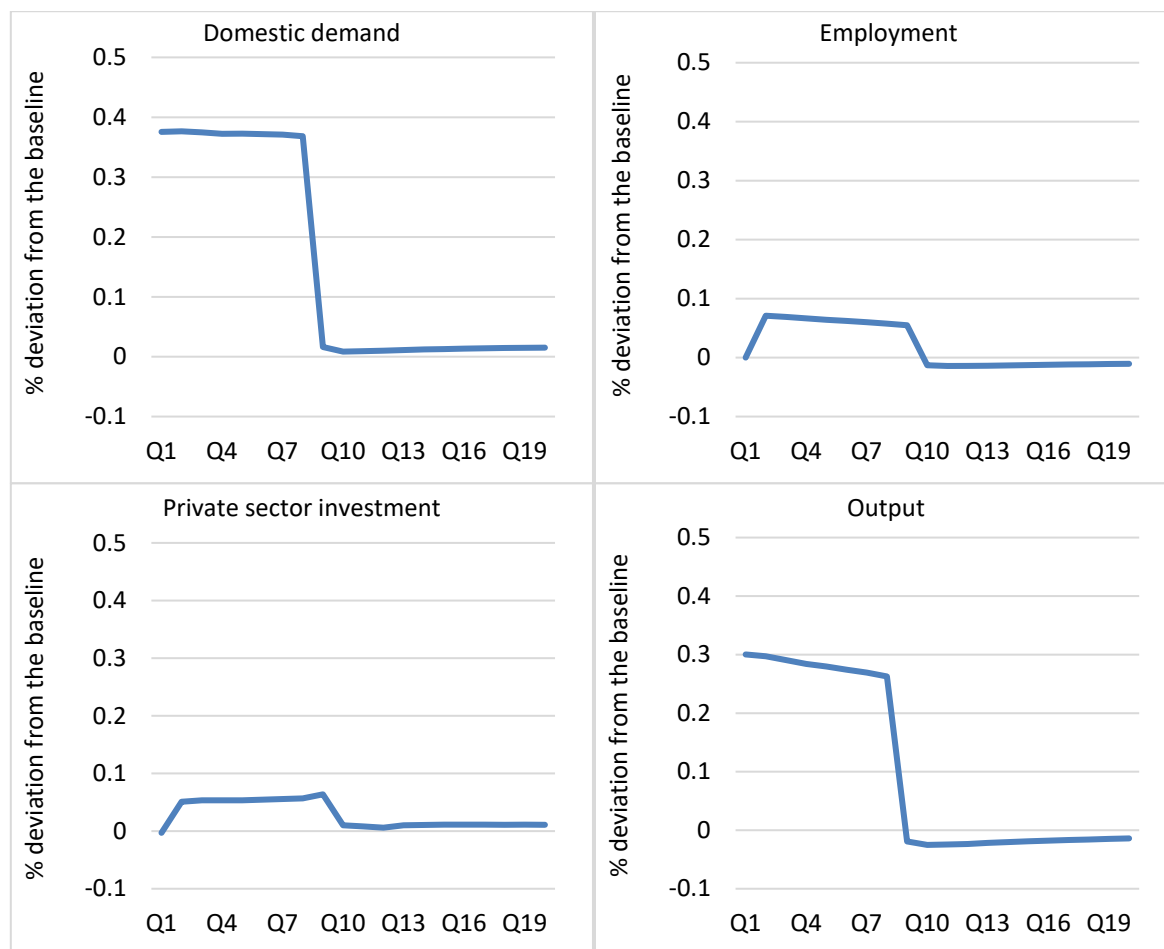
FIGURE 4.2 RESPONSE TO A 1 PERCENTAGE POINT INCREASE IN THE INCOME TAX RATE IN NORTHERN IRELAND COMPARED TO A 1 PERCENTAGE POINT INCREASE IN THE INCOME TAX RATE IN THE UNITED KINGDOM



Source: Authors' analysis.

In the next set of income tax scenarios, we examine what would happen if, in addition to the increase in the income tax rate in Northern Ireland, the associated revenue was available to the Northern Irish Executive for either government consumption spending or for government investment. Figure 4.3 shows the simulation results for when the revenue is used for government consumption and Figure 4.4 shows the results for when the revenue is used to increase government investment. In both cases, domestic demand ends up above baseline and the shock has a small but positive effect on overall employment and wages. Similarly in both cases, the overall impact is to raise output above baseline, in contrast to the shock shown in Figure 4.1 where the revenue is not available to the Northern Ireland Executive.

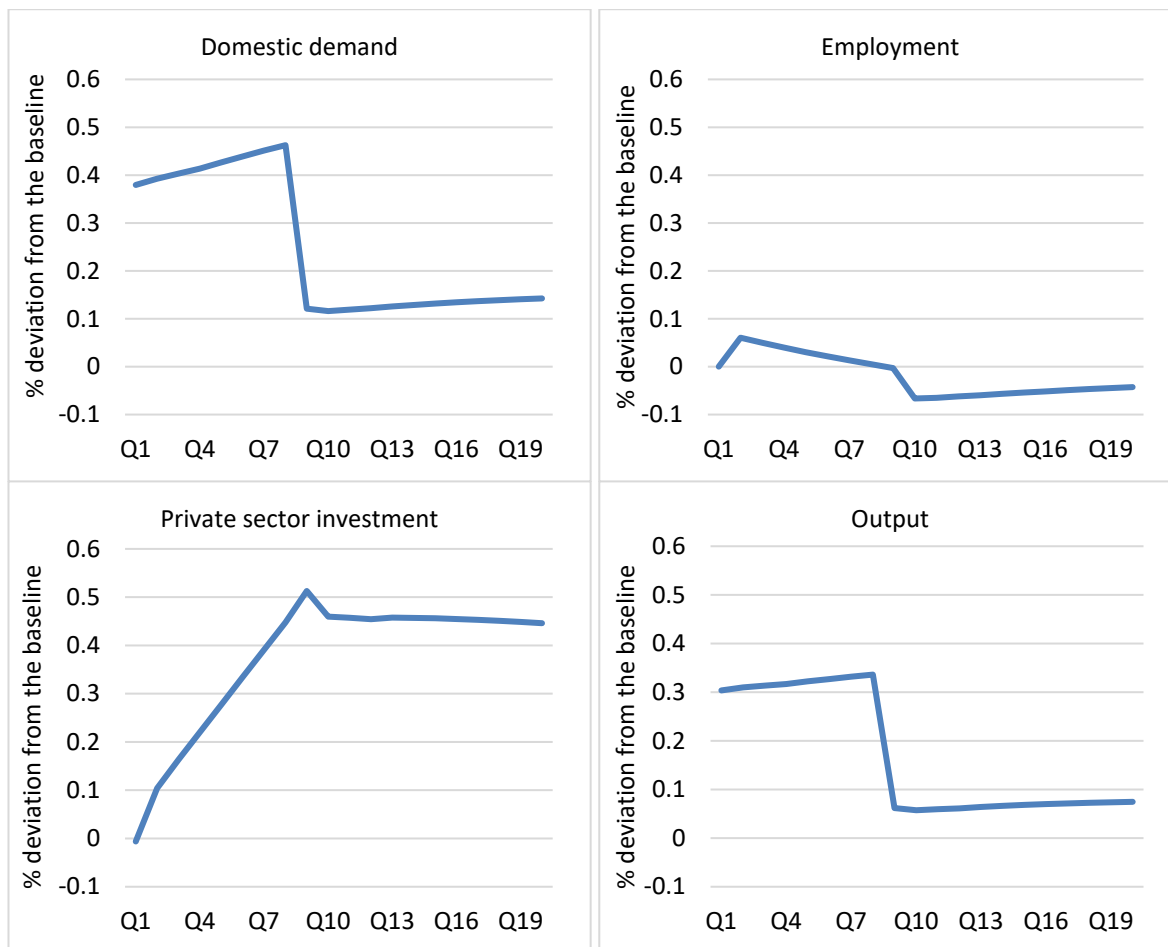
FIGURE 4.3 RESPONSE TO A 1 PERCENTAGE POINT INCREASE IN THE INCOME TAX RATE IN NORTHERN IRELAND WITH REVENUE USED TO INCREASE GOVERNMENT CONSUMPTION IN NORTHERN IRELAND



Source: Authors' analysis.

An increase in government consumption or investment may impact private sector investment, potentially in opposing directions. For example, it may raise the demand for loans and lead to higher interest rates on loans which may crowd out private investment as borrowing becomes more expensive. Alternatively, an increase in government consumption or investment can also stimulate private investment, known as 'crowding-in', through improved business confidence and creating opportunities in complementary sectors. In both scenarios – the increase in government spending or the increase in government investment – the model results suggest a crowding-in effect with higher levels of private investment. This is because interest rates in Northern Ireland are set by the Bank of England at the level of the United Kingdom and so will not respond to a relatively small shock in Northern Ireland.

FIGURE 4.4 RESPONSE TO A 1 PERCENTAGE POINT INCREASE IN THE INCOME TAX RATE IN NORTHERN IRELAND WITH REVENUE USED TO INCREASE GOVERNMENT INVESTMENT IN NORTHERN IRELAND



Source: Authors' analysis.

The model simulation results further indicate that this 'crowding-in' effect is stronger where the revenue is used for government investment rather than government consumption. In both scenarios, the overall impact on the level of Northern Irish output is positive but the impact is stronger and sustained (beyond the period of the shock) in the case of higher government investment, as this will increase the overall capital stock in the economy, implying higher output. The stronger and permanent impact on overall output in the case of higher investment compared to higher spending highlights the importance of how the revenue is spent.

In the scenario with higher government investment, while the positive output effect is sustained beyond the period of the shock, the impact on employment is temporary and employment ultimately ends up marginally below baseline in the longer term. This occurs as the increase in government investment and the boost to private sector investment make employment more productive, so more output can be produced without proportionally increasing labour demand.

4.3 INCREASE IN BLOCK GRANT TO NORTHERN IRELAND

Northern Ireland's fiscal spending is primarily funded through the Westminster Government's block grant, supplemented by local taxes and other revenues. Changes to the block grant are generally determined by the Barnett Formula. The Interim Fiscal Framework sets out new funding arrangements for Northern Ireland that includes a needs-based factor in the Barnett Formula. While the macro model is not an appropriate mechanism to evaluate the appropriateness or otherwise of the objective level of need in Northern Ireland, we can run simulations to assess the overall macroeconomic impact of changes in the resources available to the Northern Ireland Executive and, in particular, to examine the differential impacts depending on how the resources are used.

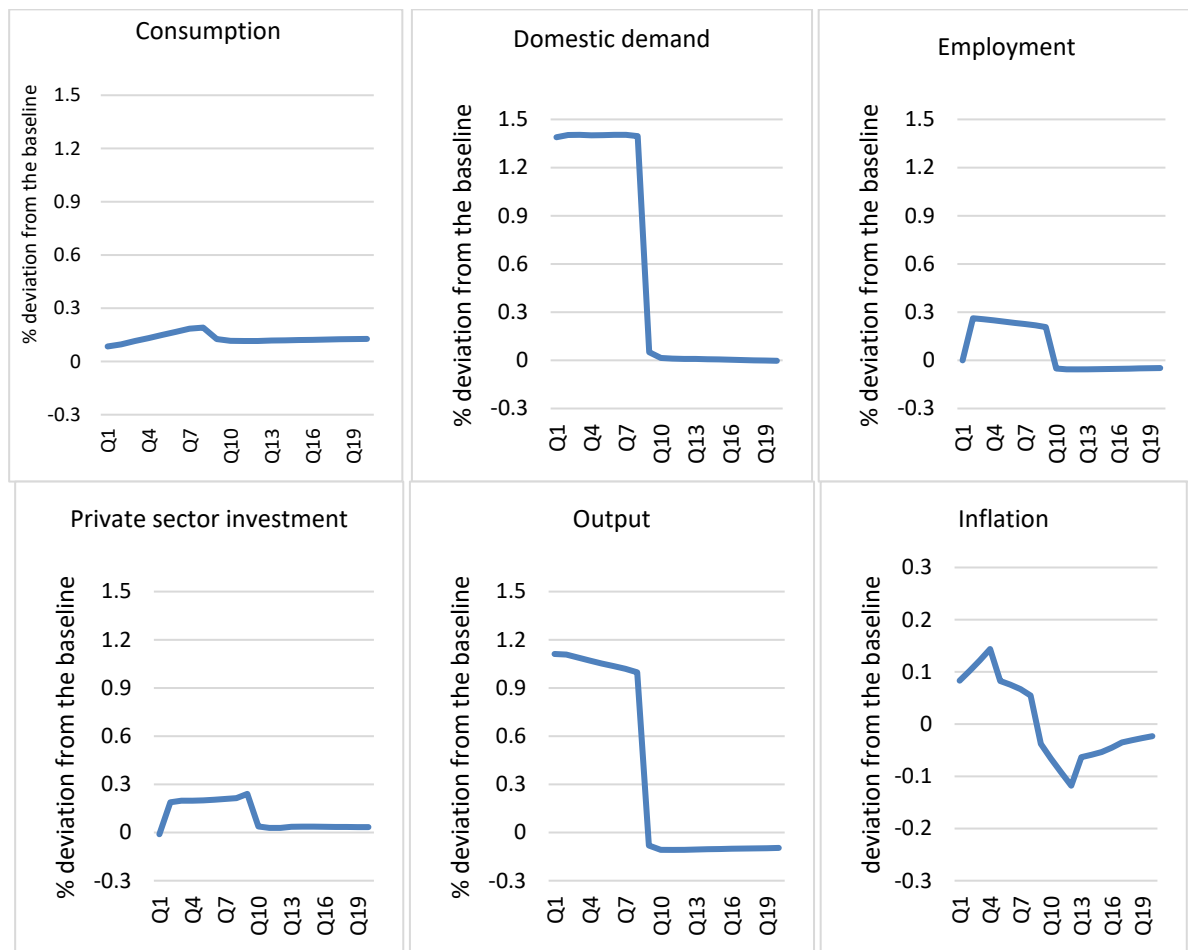
In the model, projections for the block grant for Northern Ireland are for it to grow in line with overall UK government consumption, adjusted for Northern Ireland's population share. We examine two scenarios where the block grant increases by 5 per cent above the baseline for two years, with the additional resources being used for either government consumption spending or government investment.¹⁵ The simulation results for additional government consumption spending are presented in Figure 4.5 and the results for additional government investment are shown in Figure 4.6.

In these simulations the channels through which the increase in government spending or investment (owing to the increase in the block grant) affects output are the same as those outlined above. Specifically, this positive shock to government consumption or investment serves to increase domestic demand. This leads to an increase in overall output which is amplified through the multiplier effect, where increased government spending increase incomes and has knock-on impacts for consumption and private sector investment. As before, the impact on private sector investment ('crowding-in' effect) is stronger when the extra resources are used for government investment rather than government consumption. Overall, in both scenarios, the higher level of demand in the Northern Ireland economy has a positive effect on employment.¹⁶ The higher level of demand also puts upwards pressure on prices and the inflation rate is around 0.1 percentage point above baseline for the duration of the shock in both scenarios but returns to baseline over the more medium term.

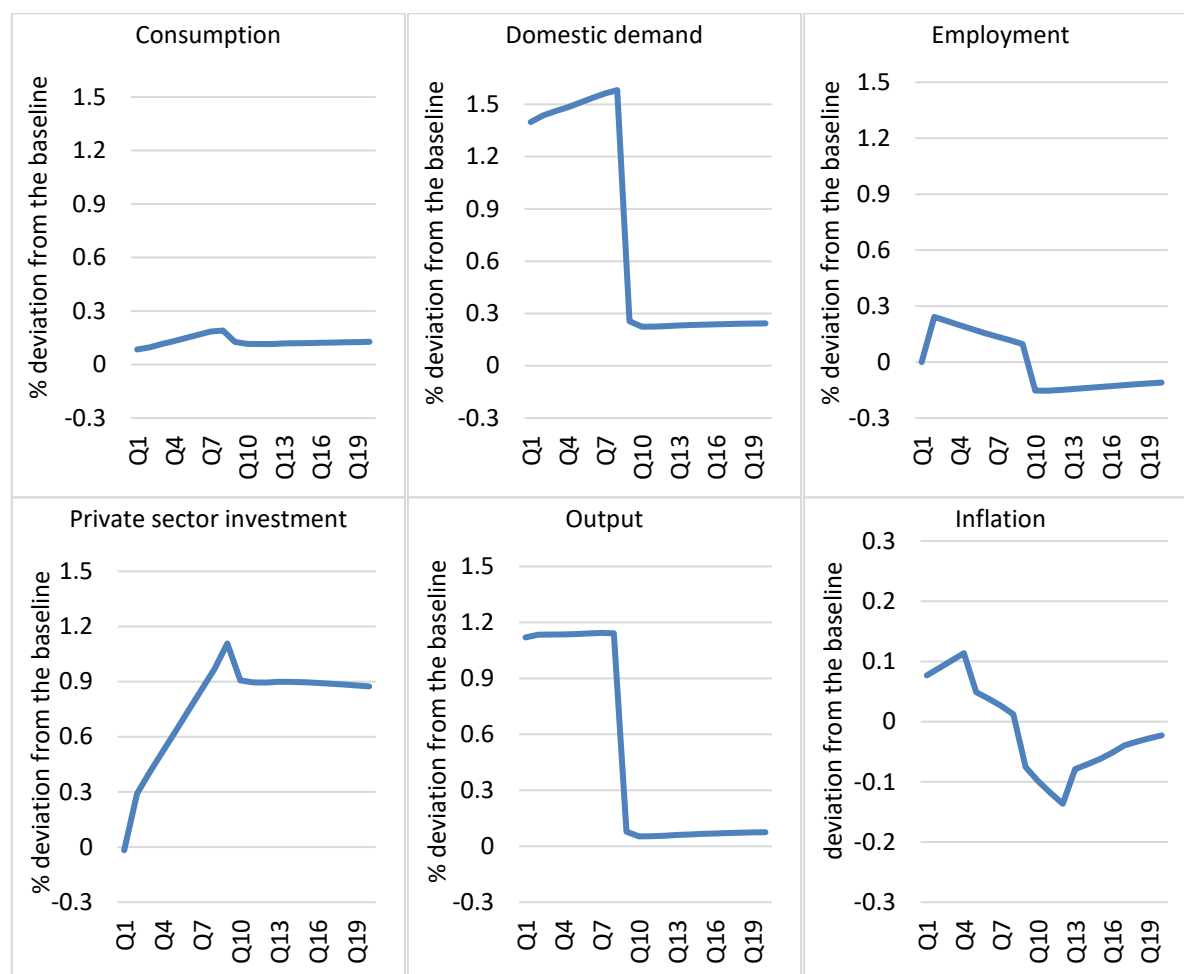
¹⁵ The additional revenue is equivalent to around 4 per cent of government consumption and just under 30 per cent of government investment.

¹⁶ In the scenario with higher government investment, the positive impact on employment is temporary and employment ultimately ends up marginally below baseline in the longer term, as investment is assumed to make employment more productive so more output can be produced without proportionally increasing labour demand.

FIGURE 4.5 5 PER CENT INCREASE IN BLOCK GRANT USED FOR ADDITIONAL GOVERNMENT SPENDING



Source: Authors' analysis.

FIGURE 4.6 5 PER CENT INCREASE IN BLOCK GRANT USED FOR ADDITIONAL GOVERNMENT INVESTMENT

Source: Authors' analysis.

Overall, the impact of the additional resources is to add over 1 per cent to the level of output in the Northern Irish economy. This impact is stronger when the additional resources are used for government investment rather than government consumption spending.

4.4 INCREASE IN INTEREST RATES

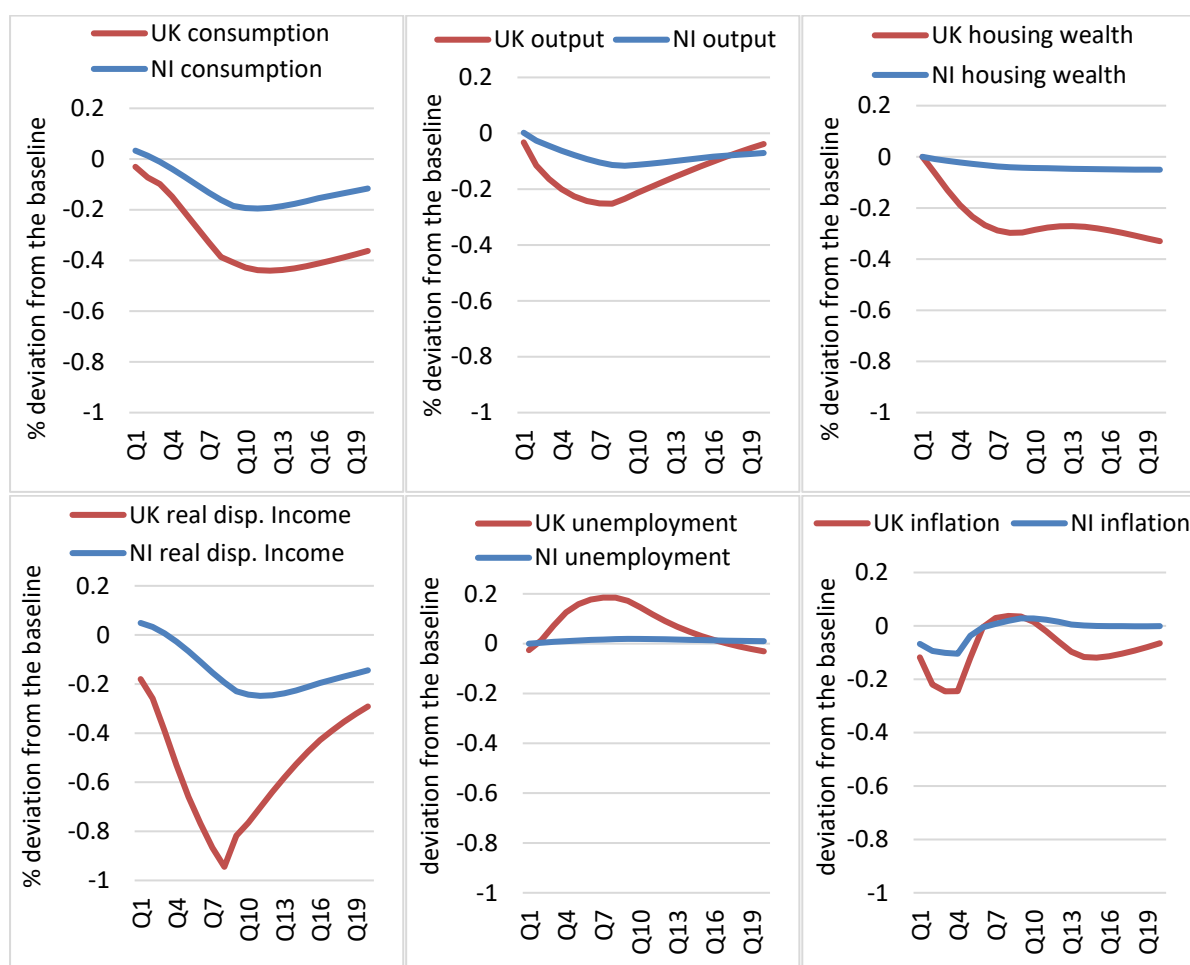
Here we consider a standard monetary policy shock, specifically a 50-basis point increase in the policy rate of the Bank of England for two years. The simulation results are presented in Figure 4.7 for both Northern Ireland and the wider United Kingdom. While the transmission of the shock is the same for both Northern Ireland and the United Kingdom as a whole, the model dynamics capture differential macroeconomic responses due to the different macroeconomic structures of the two economies captured by differences in the estimated relationships for various macroeconomic variables. Changes in the short-term interest rate influence the term structure of interest rates, thereby affecting long-term interest rates. The change in long-term rates impacts the financing costs for

households, firms, and governments, altering intertemporal incentives and subsequently affecting consumption, investment, price levels and output.

The increase in the short-term interest rate raises the long-term real interest rate, which in turn lowers house prices, housing wealth and household consumption. However, the estimates for Northern Ireland show housing demand is less responsive to changes in interest rates and so the decline in housing wealth is less pronounced compared to the United Kingdom as a whole. This could arise as more mortgages are on fixed-term rates in Northern Ireland relative to the wider United Kingdom. As a result, the impact on household consumption through the wealth channel will be smaller than for the United Kingdom as a whole.

The increased long-term interest rate also raises the cost of finance. The increase in the user cost of capital leads to a lower level of investment. The results show that Northern Irish investment is less sensitive to this increase in long-term interest rates¹⁷ and so falls by a smaller percentage than investment in the United Kingdom as a whole. As a result, the overall impact of the shock on the level of output or GDP is more muted for Northern Ireland than for the United Kingdom as a whole. The lower level of domestic demand and output leads to lower labour demand, and employment ends up below baseline. The unemployment rate rises above where it otherwise would have been although the increase in the Northern Irish unemployment rate is smaller than the increase in the wider UK unemployment rate. Lower levels of demand and employment following the policy rate increase put downward pressure on prices and wages. Again, the smaller impact on demand for Northern Ireland translates into a relatively smaller reduction in wages, and therefore income and consumption, relative to the United Kingdom as a whole. Overall, the inflation rate is lower in both Northern Ireland and the United Kingdom as a whole, although the impact on the Northern Ireland inflation rate is smaller than that for the wider United Kingdom.

¹⁷ The estimated equation for business investment for Northern Ireland indicates that it is less sensitive to interest rate changes/changes in the user cost of capital than UK business investment.

FIGURE 4.7 50 BASIS POINT INCREASE IN BANK OF ENGLAND POLICY RATE

Source: Authors' analysis.

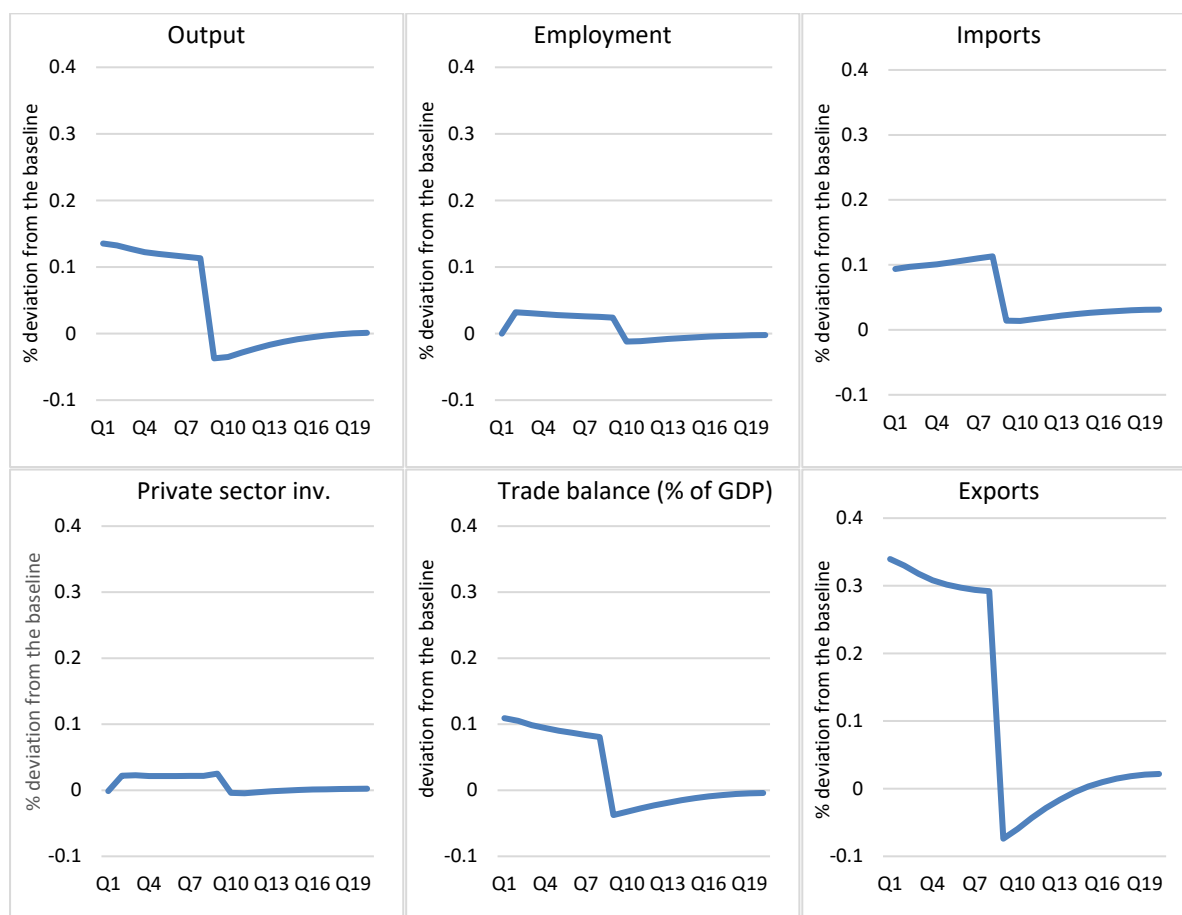
4.5 POSITIVE SHOCK TO IRISH EXPORTS – SPILLOVER EFFECTS TO NORTHERN IRELAND AND THE ALL-ISLAND ECONOMY

The next set of scenarios examines the possible spillover effects from improved growth prospects in Ireland on Northern Ireland. Specifically, we examine a scenario where exports in Ireland are 1 per cent higher for two years.¹⁸ This positive shock feeds through the trade channel and both exports and imports in Northern Ireland are boosted above their baseline levels.¹⁹ The impact on Northern Ireland exports is higher than for imports and the trade balance improves as a result of the shock (see Figure 4.8). The overall level of output in Northern Ireland ends up around 0.1 per cent above baseline. This has knock-on positive impacts for consumption and investment leading to higher demand in Northern Ireland, which also positively impacts employment.

¹⁸ This shock to Irish exports will impact other countries including Northern Ireland and can feed back to the Irish economy.

¹⁹ A positive shock to Irish exports will be spread across countries that import from Ireland. The positive shock to Irish exports also leads to higher incomes in Ireland which positively impacts Irish import demand from all countries, including Northern Ireland.

FIGURE 4.8 IMPACT OF A 1 PER CENT INCREASE IN IRISH EXPORTS ON THE NORTHERN IRELAND ECONOMY



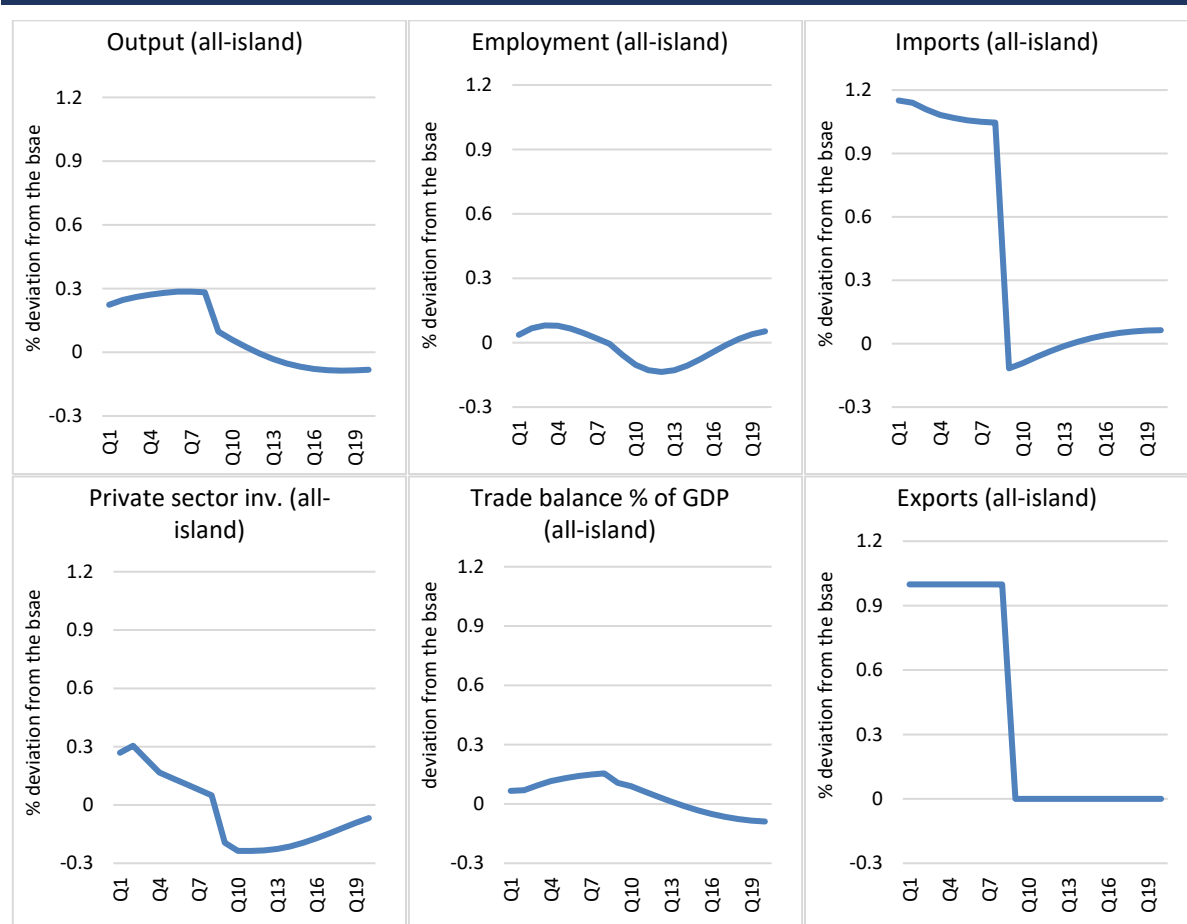
Source: Authors' analysis.

Figure 4.9 shows the impact on the all-island economy of a 1 per cent increase in Irish exports lasting for two years.²⁰ The impact of the shock on the all-island economy is more pronounced than the impact on Northern Ireland. All-island output increases by nearly 0.3 per cent above baseline, reflecting the strong boost in external demand and increased production to meet export demand. However, when the shock dissipates after two years and external demand reverts to baseline, all-island output also returns to baseline levels. Employment follows a similar pattern, with an initial surge as firms hire to meet the increased production demand, but as export growth returns to baseline the impact on employment also tapers off. Import demand also increases above baseline, driven by higher demand for inputs and consumer goods and services in response to the stronger economy, consistent with the rise in output and employment.

²⁰ The results for the all-island economy are generated using a weighted average of the effects on both Northern Ireland and Ireland in response to the Irish export shock. This approach allows us to reflect the relative size of each region within the all-island context.

Private sector investment increases above baseline initially, as firms respond to higher demand, but this effect is temporary. Finally, the trade balance improves in the short term and returns to baseline in the medium term as the effects of the temporary shock to Irish exports dissipate.

FIGURE 4.9 IMPACT OF A 1 PER CENT INCREASE IN IRISH EXPORTS ON THE ALL-ISLAND ECONOMY



Source: Authors' analysis.

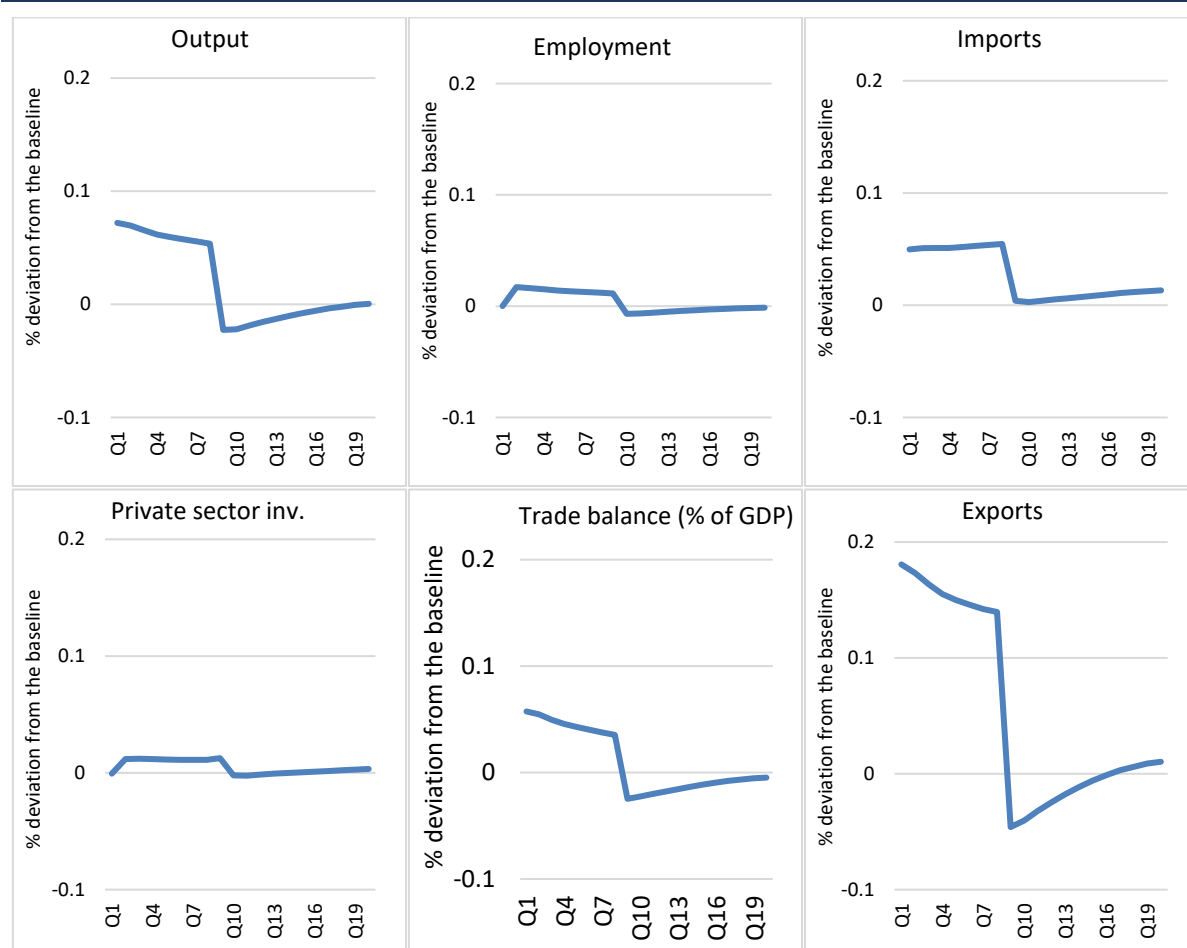
4.6 POSITIVE CONSUMPTION SHOCK IN IRELAND – SPILLOVER EFFECTS TO NORTHERN IRELAND AND THE ALL-ISLAND ECONOMY

Next, we examine the spillover effects of 2.5 per cent increase in Irish consumption over two years on the Northern Ireland economy (Figure 4.10). Similar to the previous shock, we explore how the rise in demand in Ireland impacts the Northern Irish economy, highlighting cross-border dynamics between the two regions.

The response of the Northern Ireland economy to the positive shock in Ireland is positive on impact, but these effects dissipate over time. Output and employment increase in Northern Ireland before returning to baseline. Imports also increase, reflecting greater demand. Private sector investment remains largely unchanged,

indicating that the shock in Ireland has limited spillover effects on Northern Ireland investment. Exports and the trade balance increase above baseline initially after the shock; however in later periods rising imports outpace exports, putting pressure on the trade balance.

FIGURE 4.10 IMPACT OF A 2.5 PER CENT INCREASE IN IRISH CONSUMPTION ON THE NORTHERN IRELAND ECONOMY



Source: Authors' analysis.

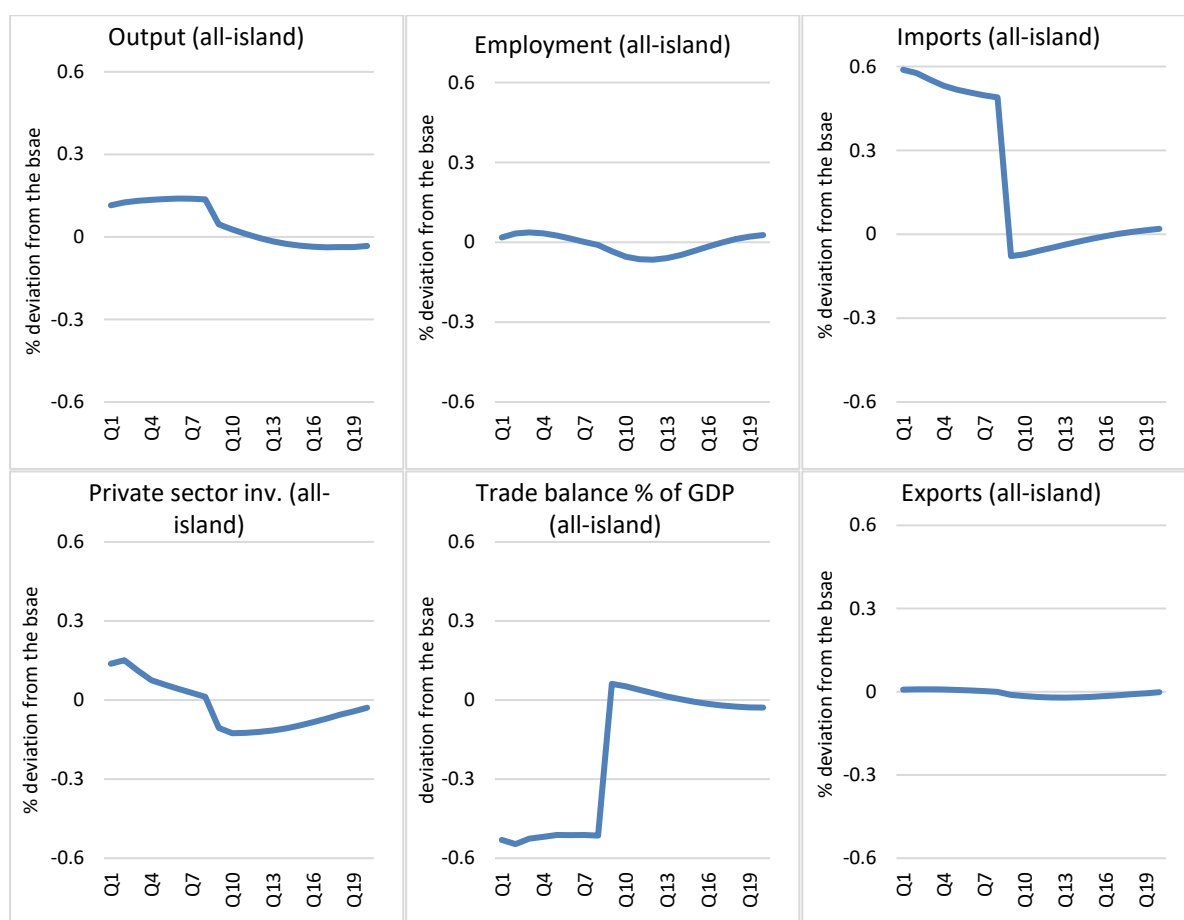
We further examine the effect of this shock on the all-island economy, observing a similar response. Output and employment rise initially as increased demand drives production and labour needs. Private sector investment grows as firms anticipate higher future returns. However, as the shock dissipates over time, all three variables gradually return toward or below their baseline levels.

Imports see a sharp increase in the early quarters after the shock, driven by higher demand for goods from abroad. This rise leads to a deterioration in the trade balance initially, as the increase in imports outpaces exports. However, the trade balance improves after a few quarters as imports fall below the baseline and the

economy adjusts to the shock. Exports remain largely unaffected throughout the period, as the shock primarily influences consumption rather than external demand. Overall, the consumption shock provides a temporary boost to the economy, but the effects are modest in the short and medium term.

Compared to Northern Ireland, the impact on the all-island economy is more muted. The all-island response, especially in trade, is more volatile. The effect of higher imports in Ireland dominates the impact on the all-island trade balance, which ends up below baseline for the duration of the shock.

FIGURE 4.11 IMPACT OF A 2.5 PER CENT INCREASE IN IRISH CONSUMPTION ON THE ALL-ISLAND ECONOMY



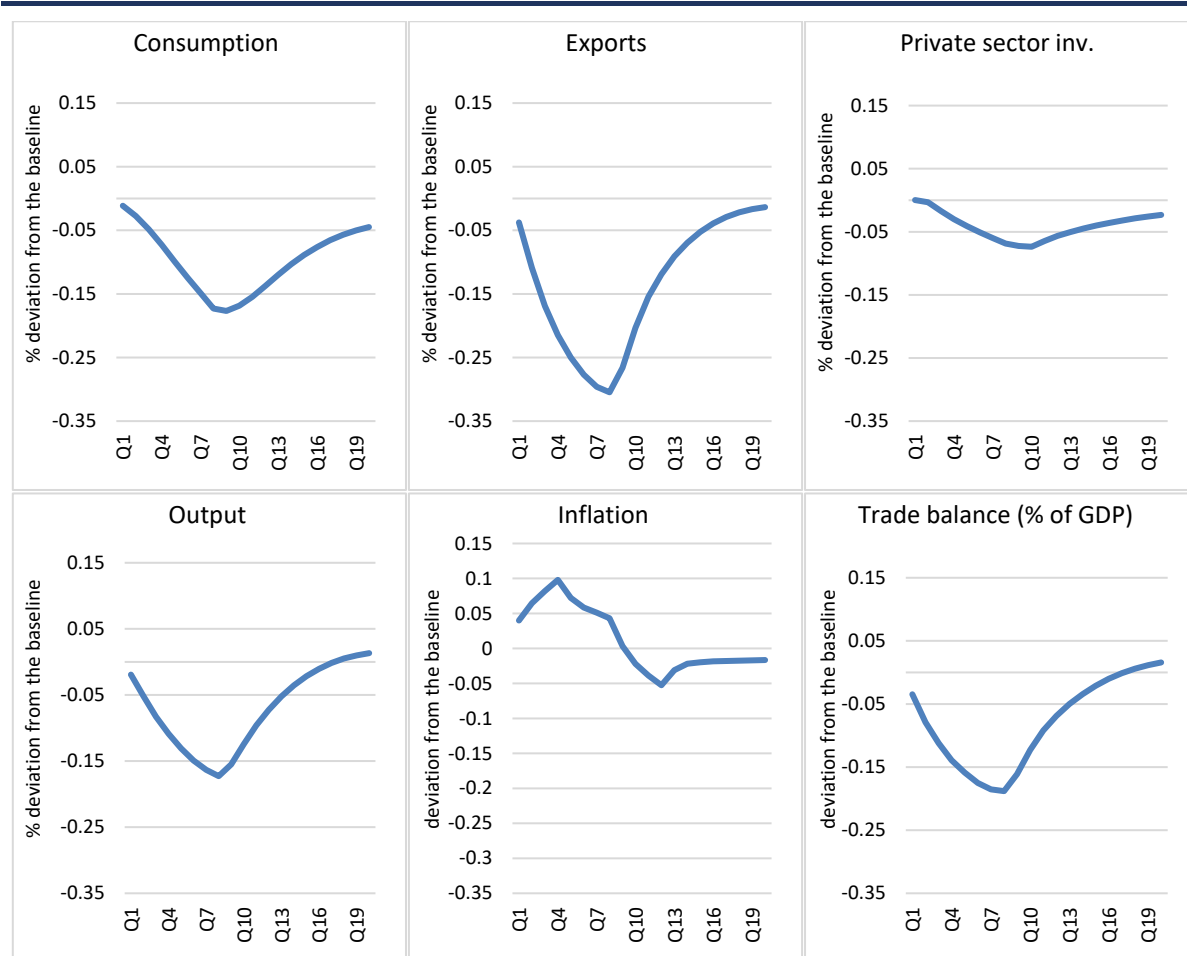
Source: Authors' analysis.

4.7 INCREASE IN GLOBAL ENERGY PRICES

Finally, we examine a scenario where global energy prices are 5 per cent higher for two years (Figure 4.12). This is implemented in the model as a 5 per cent shock to global oil and gas prices to capture the impact of a global energy price shock on the

Northern Irish economy.²¹ Positive energy price shocks generally lead to negative short-term impacts on the economy. Inflation is higher in the immediate aftermath of the energy price shock as higher energy prices feed into the overall price level of goods and services. However, the impact on inflation begins to decline as the initial impact of the shock fades, indicating that while the shock creates upward price pressure, inflationary effects do not persist over the medium term. A higher price level reduces real personal disposable income below baseline, with knock-on impacts for consumption.

FIGURE 4.12 RESPONSE TO A 5 PER CENT INCREASE IN WORLD OIL PRICE AND 5 PER CENT INCREASE IN WORLD GAS PRICE



Source: Authors' analysis.

Exports and the trade balance also decline below baseline, as firms have higher production costs. However, as the economy gradually adjusts and energy prices revert to baseline, exports begin to recover towards the baseline. Private sector investment is also negatively impacted, though the effect is less pronounced than

²¹ A global energy price shock will impact all countries. Here we focus on the impact on Northern Ireland capturing both the direct effects of higher energy prices but also the indirect impact on Northern Ireland from energy prices being higher elsewhere. In the shock, monetary authorities will adjust interest rates in response to higher energy prices.

for consumption and exports. Higher energy costs increase uncertainty and reduce profitability, leading to lower investment in the short term. However, the investment trajectory shows a slow but consistent improvement towards the baseline once energy prices recover. The overall impact on output is to reduce it below the baseline for the period of the shock, but it slowly adjusts back towards the baseline.

CHAPTER 5

Conclusions

In this report, we have discussed the model of the Northern Ireland economy that we have developed, together with the construction of a Northern Ireland database. We have shown how we can use this model to produce economic forecasts for Northern Ireland, Ireland, and the all-island economy. The framework allows us to examine the effects of economic policies and shocks – both emanating from within Northern Ireland and from the outside world – on Northern Ireland, Ireland, the all-island economy, the UK and the international economy. More generally, these exercises contribute to our wider understanding and knowledge of how the Northern Ireland economy functions within the context of the wider all-island economy, and the UK and global economies.

In Northern Ireland, GDP growth is expected to average around 1.2 per cent per annum over the medium term, similar to its longer-term historical trend, although it is expected to be somewhat higher in the short term. The challenge of relatively low productivity in Northern Ireland needs to be addressed through sustained productivity enhancing investment to improve long-term economic prospects and living standards. While expected growth in Northern Ireland is relatively modest compared to Ireland, it is slightly stronger than the wider UK, in part driven by stronger export growth bolstered by demand from Ireland and its relatively more favourable (than the UK) trading relationship with the European Union. With growth in Ireland expected to moderate in the coming years from previous extraordinarily high rates, our projections are for growth in the all-island economy to average around 2.2 per cent per annum over the medium term. With the period of high inflation rates over, real wage growth is expected to support increases in real personal disposable income in the all-island economy over the medium term.

The unemployment rate for the all-island economy is expected to average around 4.6 per cent over the medium term, the same average rate as the past five years. While the projected low unemployment rate is positive there are some potential challenges. For Northern Ireland, the challenge of higher rates of inactivity/lower rates of labour market participation remains. For Ireland, participation and employment rates are already at record highs indicating that inward migration will continue to be a key driver of labour supply in the future. However, infrastructure deficits in Ireland, particularly in areas such as housing, may result in Ireland being less attractive for international migrants.

The report also considers a range of shocks and policy scenarios. We develop a hypothetical scenario that is consistent with more devolution in Northern Ireland

where income tax rates are increased and where the Northern Ireland Executive receives the revenue which it can then use for additional government spending and/or investment. This can also be seen as a proxy for the Northern Ireland Executive raising taxes on Northern Irish households in ways that are currently available to it. In both scenarios, the overall impact on the level of Northern Irish output is positive but the impact is stronger and permanent in the case of higher government investment. The simulation results suggest that increased government spending leads to an increase (or 'crowding-in') of private sector investment which can enhance productivity. The stronger and permanent impact on overall output in the case of higher investment compared to higher spending highlights the importance of how the revenue is spent. In a similar vein, we examine scenarios where there is an increase in the block grant to Northern Ireland, which stimulates demand, employment and output with stronger impacts when the additional resources are used for government investment rather than government consumption spending.

We also examine a monetary policy shock, specifically an increase in the BoE interest rate, and the simulation results suggest that the Northern Ireland economy is less sensitive to interest rate changes than the wider UK. We also consider spillover effects from stronger growth in the Irish economy on the Northern Ireland economy and the impact on the all-island economy.

In the future, the model has significant potential for broader applications beyond the scenarios considered in this report. It can be adapted to assess the impact of various economic shocks or policy changes, such as changes in global trade or tariffs and other fiscal policy adjustments. Additionally, the model can be expanded to include different sectors such as construction, agri-food, energy and tourism, along with public service provision, to better capture the nuances of these sectors and so improve the capacity to model a more comprehensive range of economic interactions.

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APPENDIX

Detailed forecast tables for Northern Ireland

TABLE A.1 GROSS DOMESTIC PRODUCT AND COMPONENTS OF EXPENDITURE (GBP BILLION)

	Final consumption		Gross capital formation				
	H-Holds and NPISH	Gen Govt	Gross Fixed Inv	Exports	Imports	Net trade	GDP (Mkt prices)
2020	27.7	20.4	5.4	21.8	20.3	1.5	50.3
2021	28.4	19.3	5.3	25.4	21.1	4.3	54.3
2022	27.8	18.5	5.6	27.4	22.1	5.3	55
2023	27.7	19.2	5.9	27.6	22.7	4.9	55.7
2024	28	19.2	6.3	28	23.4	4.6	56.1
2025	28.5	19.2	6.6	29.1	24.3	4.7	57
2026	29	19.1	6.9	30.1	25.3	4.8	57.8
2027	29.5	19	7.2	30.9	26.2	4.7	58.5
2028	30	18.9	7.5	31.7	27.2	4.5	59.1
2029	30.4	18.9	7.8	32.5	28.3	4.2	59.6

Annual Growth Rates							
2020/2019	0.3	24.8	-16.8	-3.6	-3.8	-1.6	-8.7
2021/2020	2.5	-5	-2.1	16.5	4	184.8	7.9
2022/2021	-2	-4.2	5.5	7.8	4.7	23.2	1.3
2023/2022	-0.3	3.7	6.7	1.1	3.1	-7.5	1.2
2024/2023	1.1	-0.1	5.8	1.2	3	-7	0.7
2025/2024	1.6	-0.1	4.7	3.9	3.9	3.6	1.7
2026/2025	1.7	-0.6	4.5	3.4	3.9	1.1	1.4
2027/2026	1.7	-0.5	4.3	3	3.8	-1.6	1.2
2028/2027	1.7	-0.1	4.2	2.5	3.8	-5	1
2029/2028	1.4	0	3.9	2.6	3.8	-4.9	0.9

Source: Authors' calculations.

Notes: NPISH stands for Non-profit institutions serving households.

TABLE A.2 HOUSEHOLD SECTOR (GBP BILLION, 2019 PRICES)

	Average earnings	Employee Compensation	Total personal income	Gross disp. income	Real disp. income	Total H-Hold Exp	Saving ratio (%)	House prices 2019=100
2020	21.8	24.5	39.3	32.2	32	27.7	13.3	103.7
2021	21.6	25.6	41.8	33.6	32.7	28.4	13.1	112.5
2022	23.3	27.2	43.7	34.8	31.4	27.8	11.4	118
2023	24.8	29.1	46.1	36.9	31.1	27.7	10.9	123.7
2024	25.8	30.1	47.6	38.3	31.6	28	11.2	129.3
2025	26.9	31.4	49.5	39.8	32.1	28.5	11.3	135
2026	28.1	32.7	51.6	41.5	32.6	29	11.1	140.9
2027	29.3	34.2	53.7	43.2	33	29.5	10.8	147
2028	30.5	35.6	55.7	44.8	33.5	30	10.5	153.2
2029	31.7	36.9	57.6	46.1	33.8	30.4	10	159.4
Annual Growth Rates								
2020/2019	15.7	1.6	0.3	-0.4	-1	0.3	-7.4	3.7
2021/2020	-0.9	4.5	6.3	4.5	2.2	2.5	-1.8	8.5
2022/2021	8	6.3	4.5	3.6	-3.9	-2	-13.3	4.8
2023/2022	6.5	7	5.5	6.1	-0.8	-0.3	-3.7	4.9
2024/2023	3.9	3.5	3.2	3.6	1.4	1.1	2.3	4.5
2025/2024	4.2	4.1	4.1	4.1	1.7	1.6	0.7	4.4
2026/2025	4.4	4.4	4.1	4.1	1.6	1.7	-1.2	4.4
2027/2026	4.5	4.4	4.1	4.1	1.3	1.7	-2.7	4.3
2028/2027	4	4.1	3.8	3.8	1.3	1.7	-3.2	4.2
2029/2028	3.8	3.8	3.4	3	0.8	1.4	-4.8	4.1

Source: Authors' calculations.

TABLE A.3 FIXED INVESTMENT AND CAPITAL (GBP BILLION)

	Gross capital formation			Total	User Cost Cap, %	Private production	Capital stock
	Business investment	Private Housing	Gen Govt.				Public
2020	5.4	1.2	3	5.4	13.3	100.6	30.4
2021	5.3	1.4	2.7	5.3	11.8	99.7	31.1
2022	5.6	1.5	2.5	5.6	12.8	93.9	31.7
2023	5.9	1.5	2.6	5.9	16.6	92.3	32.3
2024	6.3	1.5	2.6	6.3	17	93.7	32.9
2025	6.6	1.6	2.7	6.6	16.4	97.2	33.4
2026	6.9	1.6	2.7	6.9	16.1	102.2	34
2027	7.2	1.6	2.7	7.2	16	108.5	34.6
2028	7.5	1.7	2.7	7.5	16	115.6	35.2
2029	7.8	1.7	2.8	7.8	16.1	123.6	35.7

Annual Growth Rates							
2020/2019	-16.8	-10.1	24.7	-16.8	-2.6	2.1	3.7
2021/2020	-2.1	16.5	-12.2	-2.1	-11.1	-0.8	2.1
2022/2021	5.5	6.3	-4.3	5.5	8.7	-5.9	1.9
2023/2022	6.7	2.4	1.4	6.7	29.5	-1.7	1.8
2024/2023	5.8	2	1.9	5.8	2.5	1.5	1.9
2025/2024	4.7	1.7	1	4.7	-3.5	3.7	1.8
2026/2025	4.5	1.8	1	4.5	-1.5	5.2	1.7
2027/2026	4.3	1.8	1.1	4.3	-0.8	6.1	1.7
2028/2027	4.2	1.8	1.3	4.2	0.2	6.6	1.7
2029/2028	3.9	1.8	1.2	3.9	0.2	6.8	1.6

Source: Authors' calculations.

TABLE A.4 THE LABOUR MARKET

	Total Employment' (‘000)	Labour Force (‘000)	Population of working age (‘000)	ILO Unemployment Rate, %
2020	847	875	1,189	3.1
2021	828	862	1,187	4
2022	854	878	1,191	2.8
2023	865	887	1,195	2.4
2024	873	899	1,200	2.9
2025	875	903	1,204	3.1
2026	877	906	1,208	3.2
2027	878	909	1,210	3.4
2028	881	911	1,213	3.4
2029	882	913	1,214	3.4
Annual Growth Rates				
2020/2019	-2.8	-2.4	0	15.5
2021/2020	-2.3	-1.4	-0.1	27.6
2022/2021	3.2	1.9	0.3	-30.7
2023/2022	1.3	0.9	0.4	-11.7
2024/2023	1	1.4	0.4	17.8
2025/2024	0.2	0.4	0.3	7.8
2026/2025	0.2	0.3	0.3	3.9
2027/2026	0.2	0.3	0.2	3.8
2028/2027	0.3	0.3	0.2	1.2
2029/2028	0.2	0.2	0.1	0.4

Source: Authors' calculations.



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