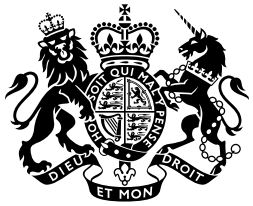
HM Government

Scotland analysis: Macroeconomic and fiscal performance

September 2013



Scotland analysis: Macroeconomic and fiscal performance

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Contents

Executive summary

In September 2014 people in Scotland will take one of the most important decisions in the history of Scotland and the whole of the United Kingdom (UK) – whether to stay in the UK, or leave it and become a new, separate and independent state. In advance of the referendum, the UK Government will ensure through the Scotland analysis programme that the debate is properly informed by analysis, and that the facts crucial to considering Scotland's future are set out.

This paper sets out the role of economic and fiscal integration in shaping Scotland's economic performance as part of the UK and describes some of the potential economic and fiscal consequences of independence. It follows the fourth paper in the Scotland analysis series, *Scotland analysis: Business and microeconomic framework,* which sets out how the UK's domestic market is a key part of Scotland's successful business environment.

The economic benefits of integration: shared opportunities, pooled risk

Integration is at the heart of the economic, fiscal and political union between Scotland and the rest of the UK and produces tangible benefits for Scotland's macroeconomic performance. The UK's domestic market allows for the free movement of goods and services, labour and capital to all parts of the UK. The freedom to trade goods and services across the UK supports greater productivity through knowledge sharing, specialisation and economies of scale. There are significant trade flows across the UK: in 2011 Scotland exported £36 billion worth of goods and services to the rest of the UK and imported £49 billion from the rest of the UK.[1]

Workers can easily move throughout the UK, helping to match individuals and jobs, and to alleviate unemployment in particular areas, in times of economic difficulty. In 2011, 33,000 people of working age moved from the rest of the UK to Scotland, and another 35,000 moved in the opposite direction, demonstrating the flexibility and ease of movement that the UK provides to people of working age.[2] Based on current data, it is estimated over half a million people born in England, Northern Ireland and Wales now live in Scotland, and over 700,000 people born in Scotland have moved to other parts of the UK.[3]

Integrated capital markets across the UK ensure the best and most profitable investments gain access to finance. Scottish holdings of assets in the rest of the UK diversifies risk, reducing the impact of a Scotland-specific downturn on incomes in Scotland. And Scotland is a more attractive place to invest because it is part of the UK domestic market, meaning companies

1 Scottish Government, Scottish National Accounts Project Quarterly National Accounts 2012 Q3.

2 General Register Office for Scotland.

3 2001 Census.

investing in Scotland have access to a large market and diverse and skilled labour force. Scotland was the most successful part of the UK outside London in attracting foreign direct investment in 2012.

Scotland's economic performance as part of the UK

The benefits of this deep economic integration can be seen in Scotland's economic performance as a part of the UK. The performance of the Scottish economy is similar to that of the UK as a whole. On average, a worker in Scotland produces almost exactly the same as a worker in the rest of the UK.[4] Scotland has the third highest economic output per person of all parts of the UK, behind only London and the South East of England.[5] While London's performance is very strong, it is in line with the stronger performing Scottish cities. The annual growth in the cash value of economic output per person from 1995 to 2011 was 4.9 per cent in London, 5.0 per cent in Glasgow City, and 4.4 per cent in both the City of Edinburgh and Aberdeen and Aberdeenshire. And Scottish output per person is closer to the overall UK average than any other part of the UK. Since 1963, growth in economic output per person has been slightly stronger in Scotland than in the UK, averaging 2.0 per cent in Scotland and 1.9 per cent in the UK overall.[6] Differences in employment rates between the UK and Scotland have narrowed over time: the latest data show that the employment rate in Scotland is now higher than the UK at 71.9 per cent compared with 71.4 per cent.[7]

Scotland has performed well relative to comparable independent countries: [8] Scotland has very slightly higher economic output per person than Denmark and Finland, significantly higher than Portugal and not far behind Austria, Ireland and Sweden. Having been weaker in the 1970s and 1980s, growth in output per person is above the median for comparable independent countries over the 1990s and 2000s.[9] Over the last 20 years, Scotland has maintained a significantly higher employment rate than the median of these countries.[10]

Scotland's economy has particular strengths in a number of sectors such as energy (including North Sea oil and gas) and finance. However, these sectors are comparatively vulnerable to economic shocks, which has a significant impact on Scottish economic and fiscal performance year-to-year. The integration of the Scottish economy into the larger and more diverse UK economy shields the Scottish economy from the damaging effects of economic volatility and limits the impact of global crises. Scotland's growth has avoided some of the volatility observed elsewhere in comparable European countries. A much more severe impact has been observed in smaller, open economies that are more exposed to economic volatility, the majority of which experienced deeper recessions than Scotland.[11]

Scotland's fiscal position as part of the UK

The similarity of Scotland's economic performance to the UK as a whole is reflected in the amount of tax that Scotland generates: Scottish onshore tax revenues per person have been only slightly lower than the UK average since devolution in 1998. Over the same time period,

4 ONS, Regional Labour Productivity.

5 ONS, Regional Gross Value Added.

6 Scottish Government, GDP Statistical Bulletin (2010 Q1 and 2013 Q1); ONS, UK Real GVA excluding North Sea oil and gas (KLH7 and UIZY); ONS Mid-year population estimates; General Register Office for Scotland.

7 ONS, Labour Market Statistics (July 2013), Labour Force Survey.

8 Austria, Denmark, Finland, Ireland, Luxembourg, Portugal and Sweden, as identified by the Scottish Government for their economic growth target.

9 OECD National Accounts Statistics, GVA at basic prices; Scottish Government, GDP Statistical Bulletin.

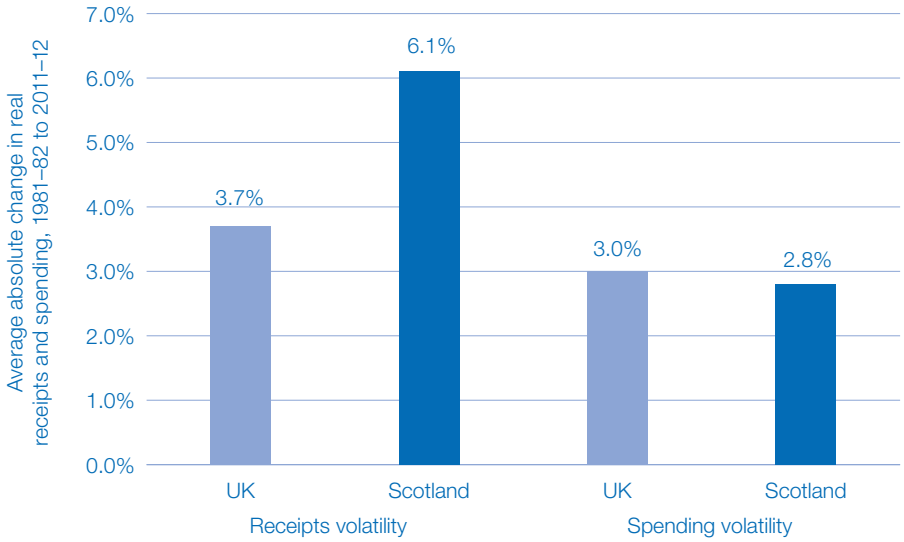
10 Eurostat, OECD, ONS Labour Market Statistics.

11 Eurostat, Scottish Government Quarterly GDP (2013 Q1).

public spending per person in Scotland has been around 10 per cent higher than the UK average. Therefore, Scotland's notional onshore fiscal balance has been considerably weaker than the UK's over the same timeframe. In the event of independence, the allocation of North Sea oil and gas revenues would be subject to negotiation. On the basis of a geographical apportionment, Scotland's notional fiscal balance for the period since devolution is very similar to the UK's public finances over the same period.[12]

North Sea oil and gas receipts are commonly one of the most volatile sources of revenue. Since devolution, Scotland's geographical share of North Sea oil and gas receipts has fluctuated between £2 billion and £12 billion, from 2.4 per cent to 8.3 per cent of Scottish GDP. Based on the earliest available data, Scottish receipts since 1981-82 have been almost twice as volatile as UK-wide receipts while Scottish public spending has been just as stable.[13]

Volatility in spending and tax revenues in Scotland and the UK



Source: Scottish Government, GERS; HM Treasury calculations

The UK's broader and more diverse tax base helps maintain the stability of public spending in Scotland and smooth the impact of volatile sources of revenue, such as North Sea oil and gas.The high degree of fiscal integration across the UK means that fiscal resources can easily be deployed in response to shocks in individual parts of the UK. For example, there is no requirement that spending on pensions in Scotland need fall if oil revenues fall.

This is the UK fiscal model in action: diffusing the volatility of Scottish receipts across the UK while providing stability and security on public spending. Through the pooling of major tax revenues across the UK, Scotland therefore contributes a volatile revenue stream from North Sea oil and gas in return for secure and stable funding from the UK Government.

The fiscal model protects Scotland from a more difficult set of fiscal choices. In the absence of shared public finances, in 2009-10 – in the aftermath of a halving of North Sea oil and gas revenues[14] – Scotland would have faced a choice between implementing immediate spending cuts of £6 billion (which equates to half Scotland's health budget), increasing other taxes by this amount or absorbing this volatility in its budget deficit. As a small independent country, Scotland would have less flexibility to absorb shocks of this kind in its budget deficit than the UK as it would be likely to pay higher borrowing costs.

[12] Scottish Government, GERS (for all figures in this paragraph).

[13] This is the impact of year-on-year volatility but, in addition, independent analysts expect North Sea oil and gas revenues to decline over time, which would require other taxes to increase by the same amount to maintain the same level of public spending.

[14] HM Revenue & Customs, Government revenues from UK oil and gas production.

The economic consequences of independence: the "border effect"

In the event of a vote for independence, Scotland would leave the UK, and a separate Scottish state would have to establish its own macroeconomic and institutional framework. Institutional and policy divergence between Scotland and the continuing UK would be likely to lead to a weakening of economic integration. And over the longer-term, some business networks might end as a result of economic, historical and cultural ties being weakened. Devolution would end, along with the pooling of fiscal risks across the UK, the stabilising role of fiscal transfers between different parts of the UK, and the ability to share costs and coordinate policies across the UK.

Collectively these changes would be expected to trigger a "border effect": international evidence shows that flows of trade, labour and capital are much larger between two regions of the same country than between two (otherwise similar) regions of two different countries. This effect occurs even when there is no physical border between countries and even where trade agreements and structures, such as the European Single Market, are in place. The most well known example of this effect is trade between the US and Canada. Independent academic evidence concludes that the border reduces trade between the US and Canada by 44 per cent.[15]

While historical and cultural ties between an independent Scottish state and the continuing UK are likely to prevent an immediate fall off in flows, evidence of previous separations points to the erosion of these ties as time passes. In the case of Czechoslovakia, the fall in trade shares between the two new states was very rapid. Combined with regulatory divergence, Scottish independence would lead to barriers to trade and obstacles to labour and capital mobility where there presently are none. The choice of currency for an independent Scottish state could also introduce a barrier to trade and the *Scotland analysis: Currency and monetary policy* paper established that the wider economic rationale for the continuing UK to enter a formal sterling union is not clear. Even if the Scottish Government's ambition of a common currency between an independent Scottish state and the continuing UK were to come to fruition, the long term effect of independence on trade flows and labour mobility could still be considerable.

If the relationship between Scotland the rest of the UK were to become similar to that between euro area countries, there would be headwinds to Scottish (and continuing UK) growth. On this basis, the analysis in this paper shows that as an impediment to trade flows, the border is likely to reduce the level of real income in the Scottish economy by around 4 per cent after 30 years, with the effect building over time. The rest of the UK would also suffer from reduced trade flows but the impact on incomes would be only 0.2 per cent of GDP as Scotland constitutes a smaller share of total trade for the rest of the UK. This analysis assumes Scotland and the UK would have the same levels of trade between them as seen between euro area countries, after allowing for differences in economic size, distance between countries and language. The euro area has been used as the basis for comparison as these countries are part of the Single Market and share a common currency. This analysis assumes however that an independent Scottish state and the continuing UK are also able to use a common currency by agreeing to form a formal sterling currency union; the *Scotland analysis: Currency and monetary policy* paper established that this is unlikely. An independent Scotland could look to new markets to offset this drag on growth but it is not clear whether this would be able to compensate for the effect on trade flows with the continuing UK.

[15] *Gravity with Gravitas: A solution to the border puzzle*, Anderson and van Wincoop (2003).

Managing volatility in the public finances: the case for an oil fund

In the event of independence, Scotland would be directly exposed to a narrower tax revenue base and more volatile fiscal position. An independent Scottish state could try to smooth its public finances and manage volatile oil and gas revenues by establishing an oil fund.

While the economic rationale for an oil fund is clear for a country of Scotland's size, establishing such a fund would affect the fiscal choices available to an independent Scottish state. Implementing an oil fund in a similar way to Norway would imply very significant tax increases or cuts to public spending, over and above the plans that have been set by the UK Government to repair the impact of the financial crisis. Based on forecasts of Scotland's fiscal position in 2016-17 by the Centre for Public Policy for Regions, for an independent Scotland to start an oil fund in 2016-17 from a balanced budget, additional fiscal consolidation of 5.1 per cent of GDP,[16] or £8.4 billion in real terms, would be needed. That implies nominal spending cuts of 13 per cent from current levels, or onshore tax rises of 18 per cent. Additional fiscal consolidation would then be required to begin making contributions to the fund.[17]

Even if an independent Scotland were able radically to adjust fiscal policy and implement an oil fund, this would not smooth all volatility in Scotland's public finances. It may take considerable time to build up a fund of adequate size to manage volatility in the public finances. Assuming an independent Scotland started a Norwegian-style oil fund in 2021-22, Scotland's oil fund after 20 years of contributions would reach less than a tenth of the current size of the Norwegian fund (after 17 years of contributions).[18] As part of the UK, Scotland achieves many of the benefits of an oil fund: the UK's integrated fiscal model provides a very stable flow of Scottish expenditure, without the need for Scotland to run the onshore fiscal position required for an oil fund.

Conclusion

Integration is at the heart of the UK's current economic and fiscal union, playing a central role in supporting economic performance and fiscal sustainability. Crucially it allows the free flow of goods, services, labour and capital. The performance of the Scottish economy has been strong as part of the UK and in comparison to a set of small independent countries. The fiscal model has allowed Scotland to maintain stable public spending per capita, while contributing a fair share to revenues through onshore taxes and the substantial, but volatile, revenues from North Sea oil and gas.

Independence would fundamentally transform and fragment this relationship. The pooling of fiscal resources and risk-sharing between Scotland and the rest of the UK would end immediately. And over the longer term, as the institutions and structures of the two economies diverged, the mutually beneficial flows of trade, labour and capital would be lower than if Scotland were to remain a part of the UK.

[16] Centre for Public Policy for Regions, Analysis of Scotland's Past and Future Fiscal Position (March 2013).

[17] Scottish Government, GERS.

[18] HM Treasury calculation based on data from the Office for Budget Responsibility, Economic and fiscal outlook (March 2013); Office for Budget Responsibility Fiscal sustainability report (July 2013); Norwegian Ministry of Finance website.

Introduction

The objective of the UK Government's Scotland analysis programme is to provide comprehensive and detailed analysis of Scotland's place in the UK and how that would be affected by independence. The outputs of the analysis will provide sources of information and aim to enhance understanding on the key issues relating to the referendum. As such, the programme should be a major contribution to the independence debate.

The 300 year union between Scotland and the rest of the UK has resulted in deep economic integration. Bringing this union to an end would have considerable implications for the economic relationship between an independent Scottish state and the continuing UK. The UK Government believes that Scotland is better off as part of the UK, and that the UK is stronger with Scotland as part of it.

This is the fifth paper in the Scotland analysis series. It sets out the role of economic and fiscal integration in shaping Scotland's economic performance as part of the UK and describes the potential macroeconomic impact of independence. It follows the fourth paper in the *Scotland analysis* series, *Scotland analysis: Business and microeconomic framework,* which sets out how the UK's domestic market is a key part of Scotland's successful business environment.

The first paper in the series, *Scotland analysis: Devolution and the implications of Scottish Independence*, examines the UK's constitutional setup and the legal implications of independence. Scotland would become an entirely new state. The remainder of the UK would continue as before, retaining the rights and obligations of the UK as it currently stands. As a new state, an independent Scotland would be required to apply to and/or negotiate to become a member of whichever international organisations it wished to join and would need to seek new institutional arrangements.

The second paper, *Scotland analysis: Currency and monetary policy*, shows how the current currency and monetary policy arrangements within the UK serve Scotland well. A move away from the current arrangements would require a set of decisions that would affect the wider management of the economy: not only the currency but also the setting of monetary and fiscal policy. The status quo would not be one of the options. The analysis in this paper concludes that all of the alternative currency arrangements would be likely to be less economically suitable for both Scotland and the rest of the UK.

The third paper, *Scotland analysis: Financial services and banking* shows that Scotland has a strong and vibrant financial services industry. As part of the UK, firms and individuals benefit from a world-leading financial services sector and a large, integrated domestic market for financial services, with clear and effective arrangements for protecting consumers. This position would be put at risk if Scotland were to become independent, fragmenting the market and the

bodies that have been put in place to protect customers.

The fourth paper, *Scotland analysis: Business and microeconomic framework* shows that effective common regulations and institutions, a unified labour market, a shared knowledge base and integrated infrastructures are central to the success of the unified domestic market. However much an independent Scottish state sought to stay aligned with regulations and institutions in the continuing UK, a single market between two separate states is not the same as a fully integrated domestic market. Divergence and fragmentation would be likely to lead to short-term and long-term costs, and prolonged uncertainties, for businesses and consumers.

Structure of the paper

Chapter 1 outlines the performance of the Scottish economy as part of the UK and investigates the role of economic integration in shaping Scotland's economic performance.

Chapter 2 describes the UK's single fiscal model and the role this plays in stabilising Scotland's public finances, maintaining public spending in Scotland and providing automatic transfers across the UK, especially in welfare and pensions spending.

Chapter 3 discusses the effects of creating an international border between an independent Scotland and the continuing UK on movements of trade, labour and capital between Scotland and the continuing UK.

Chapter 4 discusses the case for an independent Scotland establishing an oil fund and the fiscal implications of setting up such a fund.

Annex A describes Scotland's economic performance as part of the UK over the past four decades and assesses it against performance for the UK as a whole and for a set of independent comparable countries.

Annex B describes Scotland's public finances as part of the UK.

Annex C explains the approach that has been taken to modelling the potential impact of independence on trade, labour and capital flows and summarises the literature on the "border effect".

Chapter 1:
An integrated economic union

Over the past 300 years, the UK economy has become increasingly integrated and interconnected. Scottish growth has contributed to, and benefited from access to, the large and diverse UK economy. The UK provides a large, stable and diverse economic environment in which Scottish businesses have thrived and which is very attractive to foreign investors. A large domestic market is a crucial aspect of this environment and businesses and consumers benefit from the free flow of goods, services, labour and capital. The domestic market is supported by a UK-wide system of tax and regulation, as well as a single labour market, a common knowledge base and integrated infrastructure. This produces tangible benefits for Scotland's macroeconomic performance.

Economic integration has brought benefits to all parts of the UK, including Scotland. The performance of the Scottish economy is similar to that of the UK as a whole. Despite weaker performance in the 1970s and 1980s, output per person in the Scottish economy has grown faster than the median for comparable independent countries since 1990.

Integration with the UK economy also helps protect the Scottish economy from the damaging effects of economic volatility and the extremes of global financial crisis. A much more severe impact from the recent global recession has been observed in smaller, open economies that are more exposed to economic volatility. During the financial crisis, Iceland, Ireland and Cyprus were exposed to large banking sectors, which dwarfed their national wealth. And in the recession that followed the financial crisis, Spain and Italy were subject to volatile international financial markets, compounding a weakening of their public finances.

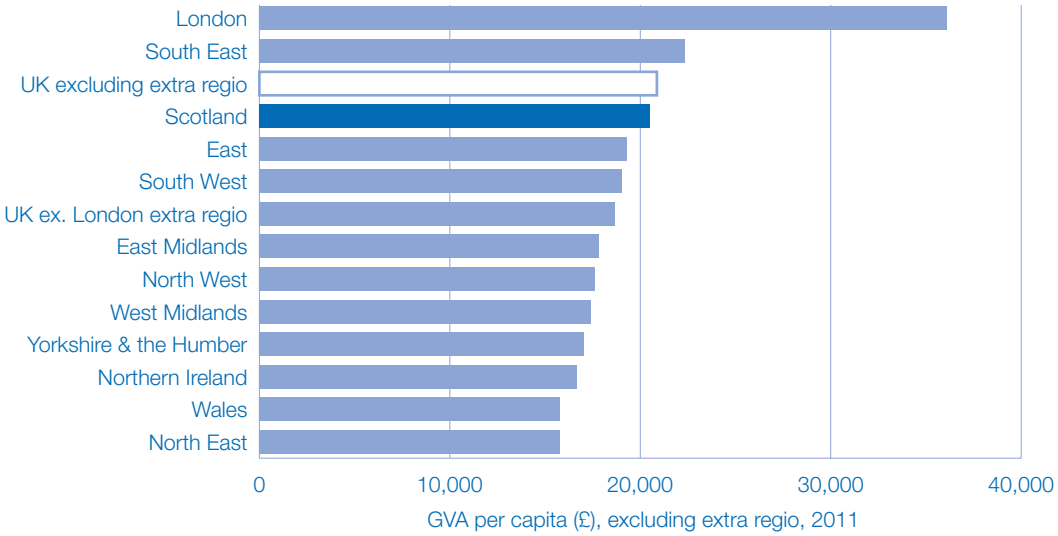
Economic alignment between Scotland and the rest of the UK

Scotland's economic performance

1.1 Across a range of measures, the performance of the Scottish economy is similar to the economy of the whole UK.[1] Economic output per head and output per worker are almost exactly equal to the UK average, and both the industrial structure and income distribution of output are very similar to those for the UK as a whole. Conditions in the Scottish labour market are also very well aligned with UK average conditions. Poorer economic growth in the 1970s and into the 1980s was reversed in the 1990s and 2000s: growth in output per head is above the median for a set of independent comparable countries over the 1990s and 2000s.

1.2 Scotland is one of the strongest performing parts of the UK. As shown in Chart 1A, in 2011, output[2] per person was £20,511 for Scotland, compared with an average of £20,873 across the UK,[3] and behind only London and the South East.

Chart 1A: Onshore economic output per head of nations and regions (2011)



Source: ONS, Regional Gross Value Added (December 2012); HMT calculation for UK excluding London

1.3 The outlying performance of London reflects its status as an international city and global financial centre. But as the *Scotland analysis: Financial services and banking* paper explained, Scotland's successful financial centre has also benefited from the 'cluster effect' of its location in the UK economy. Scotland's economic performance is superior to the rest of the UK when London is excluded. Further, while London's performance is very strong, Chart 1B shows that it is not out of line with the higher performing Scottish cities.[4] The annual growth in the cash value of economic output per person (known as nominal Gross Value Added (GVA))[5] between 1995 and 2011 was also similar between London and

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1 The analysis in this document is based upon data available up until 10 August 2013.

2 Excluding North Sea oil and gas.

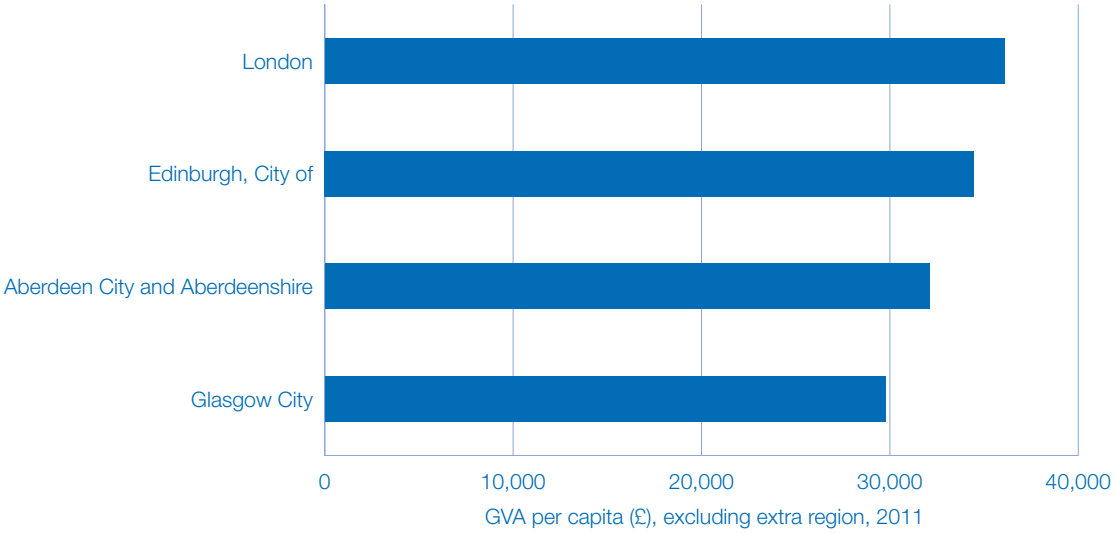
3 ONS, Regional Gross Value Added (December 2012). Extra-regio is the ONS category for output that cannot be assigned to a specific region. It includes offshore oil and gas activities.

4 The Nomenclature of Units for Territorial Statistics (NUTS) is a hierarchical classification of geographical areas. London (NUTS 1) is a larger area than the Scottish cities (NUTS 3).

5 GVA is a measure of economic output. Nominal means that it is not adjusted for inflation.

Scottish cities: 4.9 per cent in London, 5.0 per cent in Glasgow City, and 4.4 per cent in the City of Edinburgh and Aberdeen and Aberdeenshire.[6]

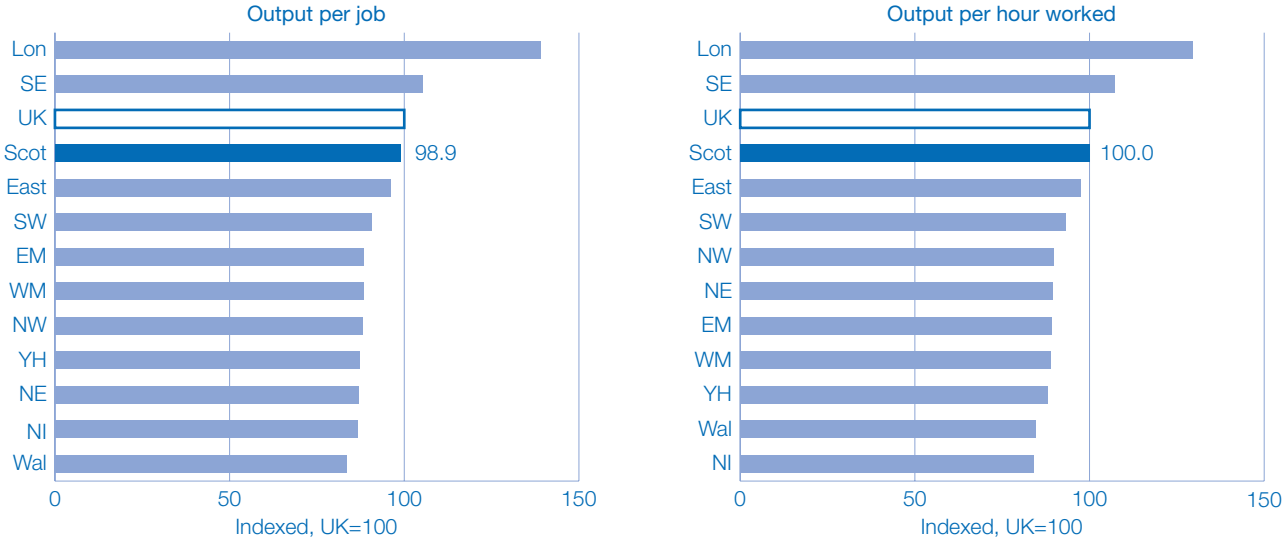
Chart 1B: Economic output per head of London and Scottish cities (2011)



Source: ONS, Regional Gross Value Added (December 2012)

1.4 The strength of the Scotland's economic performance is underpinned by the productivity of its workforce. As Chart 1C shows, Scottish productivity levels are also extremely close to the UK average whether measuring each person employed or by the hour worked.[7] On average a worker in Scotland produces almost exactly the same as a worker in the rest of the UK.

Chart 1C: Labour productivity (2011)



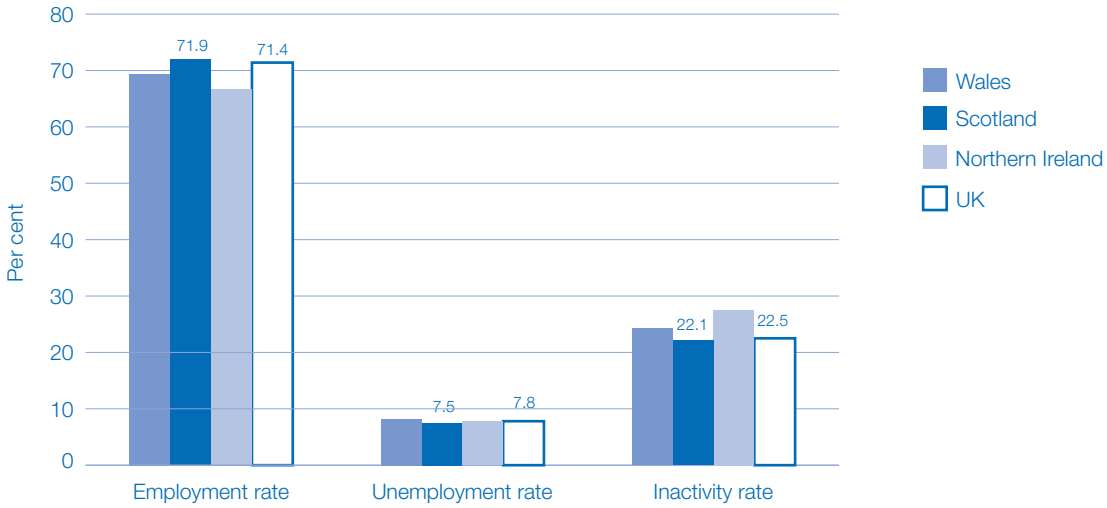
Source: ONS, Regional Labour Productivity (June 2013)

6 ONS, Regional Gross Value Added (December 2012).

7 ONS, Regional Labour Productivity (June 2013).

1.5 Conditions in the Scottish labour market are well aligned with the UK. In the three months to May 2013, Scotland had a higher employment rate and a lower unemployment rate than the UK.

Chart 1D: Labour market in the three months to May 2013



Source: ONS, Labour Market Statistics (July 2013), Labour Force Survey

Scottish economic performance over time

1.6 Long-term trends in the Scottish economy have been very similar to UK trends, and the impact of the global financial crisis is comparable. Chart 1E below compares annual growth in the volume of economic output per head for Scotland and the UK as a whole (excluding North Sea oil and gas) between 1963 and 2012. Scottish data are published by the Scottish Government as a National Statistic, which means they meet the UK Statistics Authority's quality standards. The current publication goes back to 1998. The longer series back to 1963 has not been updated since 2010.

1.7 Cycles in Scotland's onshore economy have been broadly in line with the rest of the UK, contracting in similar periods, most notably in the mid 1970s, in the early 1980s and in 2008-09. As was set out in *Scotland analysis: Currency and monetary policy*, the Scottish economy is well synchronised with the UK average. The correlation in output growth rates is over 80 per cent from 1963 to 2012. The correlation in the claimant count rate between Scotland and the UK average is over 95 per cent between 1984, when data starts, and 2012. Both these factors demonstrate that Scotland's growth and employment record is strongly aligned with the rest of the UK.

1.8 Growth in Scotland's onshore economy has been similar to the UK average over this period, after adjusting for the differential in population growth. Average annual growth in onshore GVA per head from 1963 to 2012 was 2.0 per cent in Scotland compared with 1.9 per cent in the UK. This is the main difference between the figures presented here and those presented by the Fiscal Commission Working Group, who do not adjust growth rates for changes in population.[8] Dividing economic output by population gives a basic measure of standards of living. Similarly, it is important to adjust the growth in economic output for changes in population. If economic growth is in line with population growth, standards of living have not improved on this measure. Table 1A shows onshore growth rates per head for Scotland and the UK for 1963 to 2012 and broken down by decade.

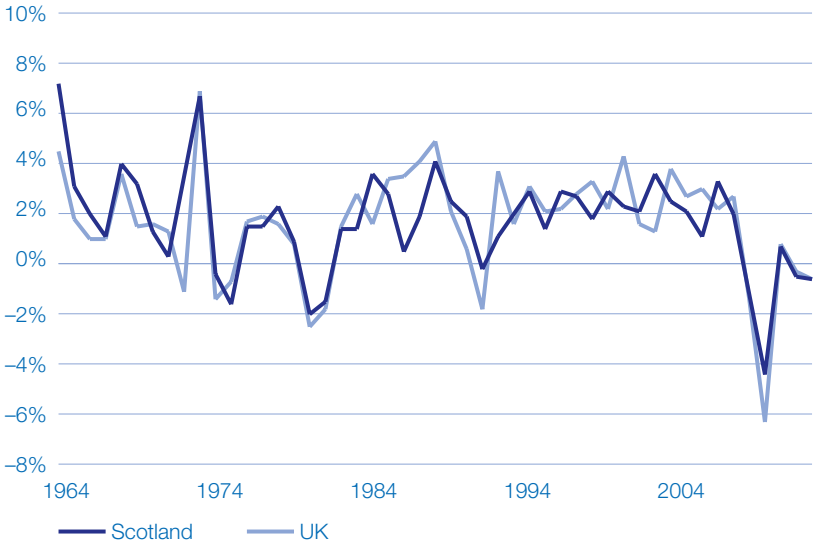
[8] *Fiscal Commission Working Group, First Report, Macroeconomic Framework*, The Scottish Government, 2013.

Table 1A: Onshore economic growth in Scotland and the UK

	Growth in GVA per head					
	1963-2012	1963-1970	1970-1980	1980-1990	1990-2000	2000-2012
Scotland	2%	3.4%	1.6%	2.1%	2.3%	1.1%
UK	1.9%	2.4%	1.5%	2.5%	2.2%	1.1%

Source: Scottish Government, GDP statistical bulletin (2010Q1 and 2013Q1); ONS, UK real GVA excluding North Sea oil and gas (KLH7 and UIZY); ONS mid-year population estimates; General Register Office for Scotland

Chart 1E: Growth in onshore activity per head, Scotland and the UK



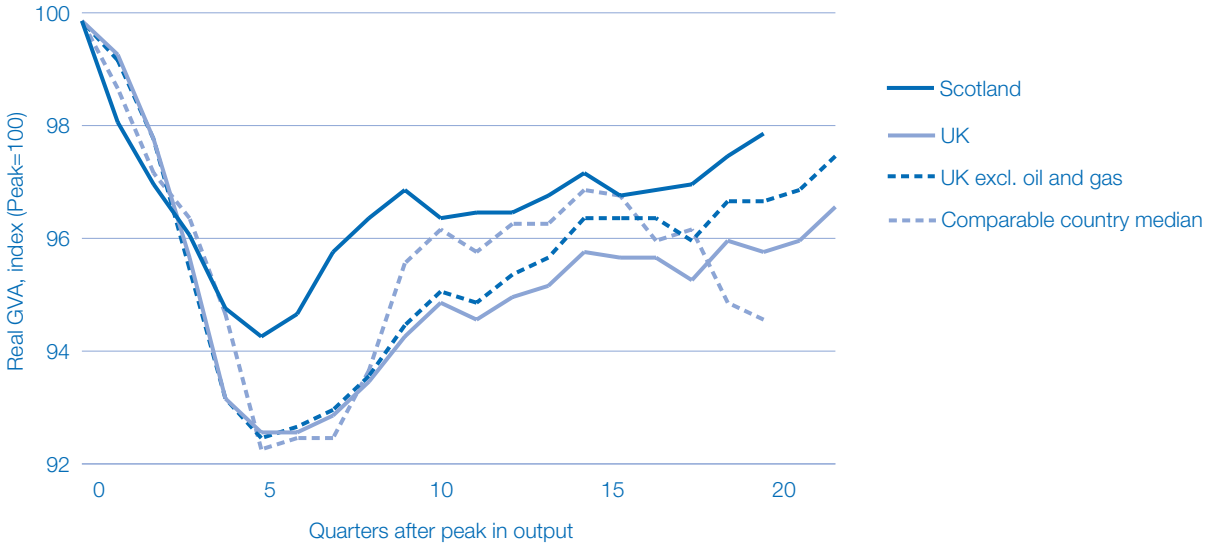
Source: Scottish Government, GDP statistical bulletin (2010Q1 and 2013Q1); ONS, UK real GVA excluding North Sea oil and gas (KLH7 and UIZY); ONS mid-year population estimates; General Register Office for Scotland

Performance during the financial crisis

1.9 The recent financial crisis has highlighted serious issues in the UK economy: a highly indebted economy, a poorly regulated financial system, unbalanced growth across regions and an export base that is too reliant on Europe and the US. UK and Scottish onshore GVA fell by -7.4 per cent and -5.6 per cent respectively (peak to trough). UK economic institutions continue to evolve in response to the financial crisis: the UK's macroeconomic framework provides clear governance and accountability that facilitates rapid crisis resolution. This macroeconomic framework provides the underpinnings for future sustainable economic growth for both the UK and Scotland. The OECD commented in its 2013 Economic Survey of the United Kingdom that the UK benefitted from a "strong institutional framework".[9] Scotland has also outperformed the majority of comparitor countries. The recession was larger in Ireland, Denmark, Finland, Luxembourg, Portugal and Sweden.

[9] *Economic Survey of the United Kingdom 2013*, OECD.

Chart 1F: Impact of the recession



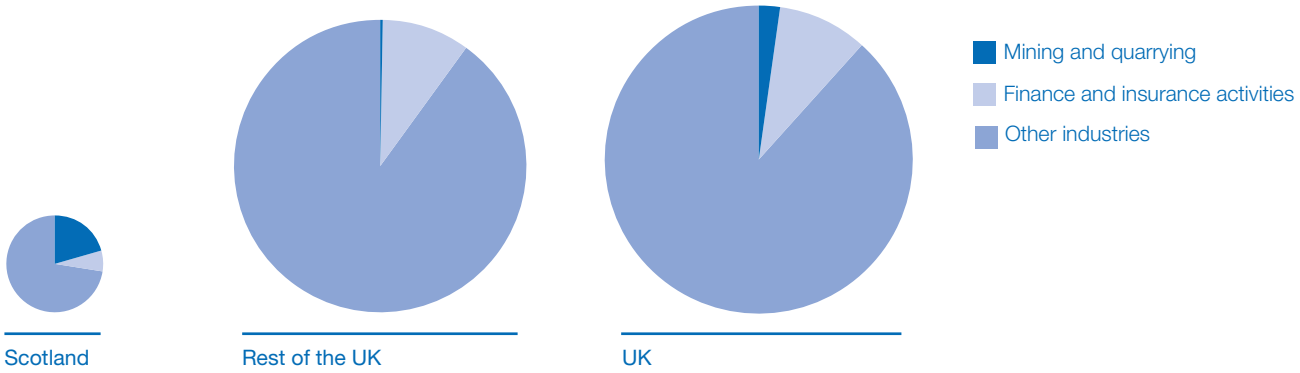
Source: Scottish Government, GDP statistical bulletin (2013Q1); ONS, Gross Domestic Product, Preliminary Estimate (2013Q2); Eurostat

1.10 Given the similarities in economic structures and cyclical position, it is likely that the Scottish economy will recover from the recession on a similar trajectory to that forecast for the UK. Recent economic data show that the UK recovery is strengthening, with broad based growth across all sectors of the economy. Long-term economic trends are also expected to be comparable, although faster population ageing in Scotland is likely to weigh on long-term growth by restricting the growth in labour supply.

Including North Sea oil and gas

1.11 Including offshore production, there is a clear structural difference between the Scottish economy and the economy of the rest of the UK.

Chart 1G: Size and composition of the Scottish and UK economies



Source: ONS, Regional Gross Value Added (December 2012); Workplace based GVA by industry groups at current basic prices; Scottish shares of extra regio GVA used for these calculations: 90% of mining and quarrying GVA and 8% of public administation and defence GVA

1.12 In the event of independence, the allocation of the UK's oil and gas reserves would have to be negotiated between a separate Scottish state and the continuing UK. The Scottish Government produces estimates of the contribution of a geographical share of North Sea oil and gas to the value of Scottish output. According to these estimates, North Sea oil and gas has contributed between 9 per cent and 18 per cent of total Scottish output between 1998 and 2012. Under this assumption, Scottish output per capita would be above the UK average. However, as discussed in Box 1A, as much of North Sea oil and gas profits are remitted abroad, Scottish residents do not benefit from the total output of North Sea oil and gas.

Box 1A: The impact of North Sea oil on economic performance: GDP versus GNI

Allocating to Scotland a geographic share of North Sea oil and gas output increases measures of economic output. However it is not clear how much of the extra income from North Sea oil and gas actually contributes to the wealth of Scottish households and businesses as opposed to foreign investors.

This distinction is captured in the difference between Gross Domestic Product (the total income generated in Scotland regardless of where, or to whom, this income flows) and Gross National Income (the total income generated by residents of Scotland). GNI is therefore a better measure of living standards for Scottish residents. The inclusion of North Sea oil and gas in output figures will not increase GNI by as much as GDP. Scotland is likely to be further down international rankings of economic performance when assessed on GNI.

For countries with significant amounts of foreign ownership there can be a large difference between these measures of output. For example, Irish GDP is 20 per cent higher than Irish GNI because of the degree of foreign ownership in Ireland. In 2011, Ireland ranked 8th in the OECD on the basis of GDP per capita but to 16th on the basis of GNI per capita.[1]

No GNI estimate is currently produced for Scotland. However there are reasons why GNI could well be lower than GDP in Scotland, as identified by the Centre for Public Policy for Regions (CPPR).[2] Large parts of the whisky and financial services sectors are internationally owned. There would also be a large difference between GNI and GDP when considering North Sea oil and gas production. HM Treasury analysis shows that over two thirds of North Sea oil and gas is produced by international companies (or subsidiaries of such companies).[3] As North Sea activity is mostly internationally owned and the vast majority of output is received as capital rather than labour income, a large majority of total North Sea post-tax income that is not reinvested in North Sea oil and gas production is sent abroad in the form of profits on foreign investment. Where this is the case it will benefit GDP but not GNI.[4]

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1 OECD statistics. 2011 data has been used as GNI data for some countries is not available for 2012. New Zealand, Turkey and Canada excluded from the calculation due to missing data.

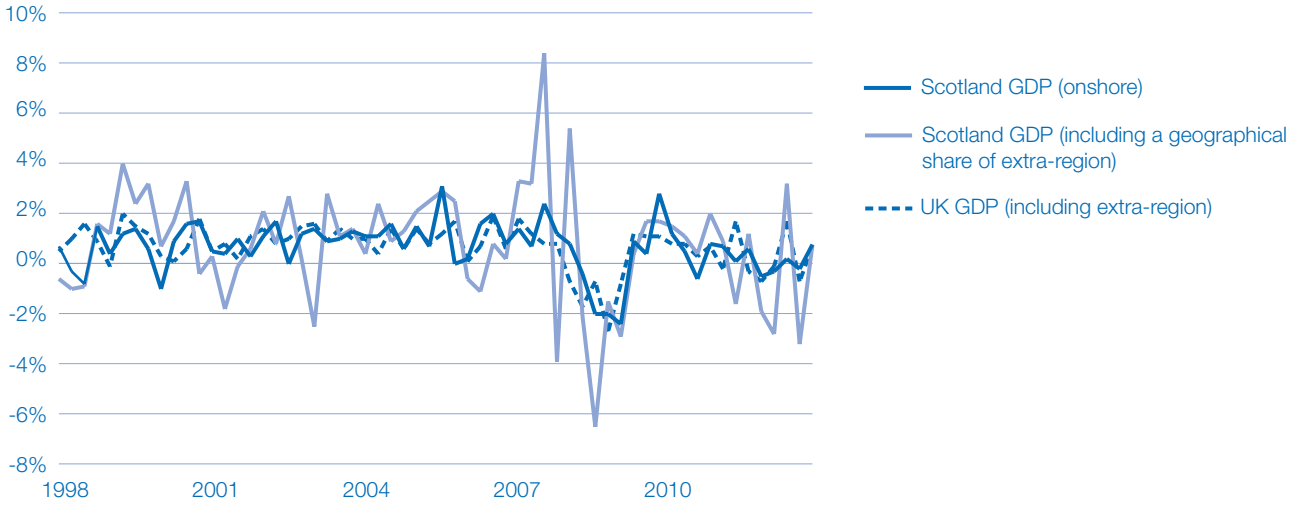
2 CPPR http://www.gla.ac.uk/media/media_275906_en.pdf "Measuring a independent Scotland's economic performance" Reform Scotland "Scotland's economic future"

3 HM Treasury analysis of Wood Mackenzie data on UK oil and gas production in 2012.

4 It should be noted that where internationally owned companies have Scottish shareholders, some of the profits sent abroad would flow back into Scotland via these shareholders. However, in a similar way, where UK owned companies have international shareholders, some of the profits will flow abroad.

1.13 As a result of a higher dependence on the North Sea, Scottish output would be much more volatile, as oil and gas volumes of production and prices fluctuate substantially; and the depletion of North Sea reserves and progressive decline in production would be a drag on growth and put pressure on Scotland's fiscal position. Both oil and gas prices and production can add significant volatility to Scottish output: the impact of price fluctuations is exemplified by price changes during 2008, when the oil price fell from a high of £67 per barrel to a low of £27 per barrel in just six months. DECC forecast that oil production (MTOE) will halve between 2013 and 2030. Valuing the remaining North Sea oil and gas reserves is discussed in Box 1B.

Chart 1H: Quarterly Scottish nominal GDP growth



Source: ONS; Scottish Government, Scottish National Accounts Project (2012Q4)

Box 1B: Valuing remaining North Sea reserves

The North Sea remains a hugely valuable resource to Scotland and the whole of the UK, providing employment and revenues. There are a variety of approaches to quantifying the value of remaining reserves. The Scottish Government has suggested that "economic benefits [of remaining oil and gas reserves] total around £1.5 trillion."[1] This box explores the assumptions underpinning that calculation.[2] The £1.5 trillion figure is based on:

- An assumption that remaining reserves are in line with the most optimistic scenario estimated by Oil and Gas UK;
- An assumption that oil and gas can be extracted from the seabed costlessly. Capital and operating costs are large, and reflecting that fact in the valuation of remaining reserves would reduce the figure significantly. More than £1 trillion (in today's prices) is likely to be needed to extract the remaining oil and gas resources assumed by the Scottish Government;
- The oil price is assumed to apply to *both* oil and gas. However, in recent years, gas, which accounts for roughly 40 per cent of forecast UK oil and gas production, has sold for little more than half as much as the equivalent volume of oil; and
- The figure is not calculated in "net present value" terms, the standard approach recommended by international statistical frameworks for the quantification of environmental assets.

A recent Office for National Statistics (ONS) publication offers an independent, alternative approach to valuing remaining UK Continental Shelf oil and gas reserves.[3] According to the ONS paper, the monetary value of UK oil and gas reserves is £120 billion as of 31 December 2011, 12 times lower than the Scottish Government estimate. The ONS methodology is based on the United Nations' *System of Economic and Environmental Accounts*, consistent with the System of National Accounts. It is therefore in line with statistical best practice. The estimate reflects the independent Office for Budget Responsibility's central projection of oil and gas production and prices, operating and capital expenditure, and decommissioning costs. The figure is discounted at the social discount rate to reflect the true long-term value of reserves across current and future generations.

Since UK oil and gas production peaked at the turn of the century, official forecasts have consistently overestimated production, demonstrating the importance of applying realism in forecasts. As the CPPR comment, Scottish Government claims that UK Government forecasts are too pessimistic *"seem odd when juxtaposed with this evidence of repeated over-prediction of production by DECC and OBR in recent years."*[4]

Only the tax of the profits made from North Sea oil and gas production would flow into the UK Exchequer. And as explained in Box 1A, a large majority of total North Sea post-tax income that is not reinvested in North Sea oil and gas production is sent abroad in the form of profits on foreign investment.

[1] Scottish Government evidence to House of Commons Energy and Climate Change Committee, 17 April 2012.

[2] As set out in an answer to a Parliamentary Question (S4W-06988, answered by Fergus Ewing on 16 May 2012).

[3] Office for National Statistics (2013), *Monetary valuation of UK continental shelf oil & gas reserves*. Available at http://www.ons.gov.uk/ons/rel/environmental/uk-environmental-accounts/2013/stb-ukea-2013.html#tab-background-notes

[4] CPPR (2013) "Reflections on the latest Oil and Gas related analysis by the Scottish Government and the Office for Budget Responsibility."

Scottish economic performance compared to similar small advanced economies

1.14 Scotland as part of the UK has performed as well as a comparable group of independent countries.[10] Scotland has a slightly higher economic output per head than Denmark and Finland, significantly higher than Portugal and not far behind Austria, Ireland and Sweden. While Scotland's performance had been weaker in the 1970s and 1980s, growth in onshore output per head of population is close to or above the median for independent comparable countries in the 1990s and 2000s. Volatility of annual growth in Scotland is below that of most other comparable countries over the same period. Over the last 20 years, the time period for which data is available, Scotland has maintained a significantly higher employment rate than the median across comparable independent countries.

1.15 The overall output impact of the global financial crisis (from peak in output to the latest data, in 2013Q1) remained more moderate in Scotland than in a majority of independent comparable countries. While the financial crisis has badly affected the Scottish economy, with output falling by 5.6 per cent from peak to trough, the depth of the recession was shallower than all but one of the independent comparable countries. The recession was twice as large in Ireland, which required an IMF/EU assistance programme. The recession was also larger in Denmark, Finland, Luxembourg, Portugal and Sweden.

1.16 Many small countries are successful but they experience a different set of challenges to larger countries: they need to overcome barriers to trade and face reduced flexibility in their set of fiscal and monetary policy choices. Alesina (2003) argues that country size is a trade-off between the benefits of size and the costs arising from reduced ability to tailor policies to the preferences of the population. A number of factors make larger countries more efficient: economies of scale for the provision of government services, such as infrastructure, economies of scale for private companies if international borders inhibit market size, (Chapter 4 argues that they will, over time, in the event of Scottish independence) and the provision of insurance in the form of fiscal transfers should

[10] Independent comparable countries are Austria, Denmark, Finland, Ireland, Luxembourg, Portugal and Sweden. For its economic growth target, the Scottish Government compares Scotland with these 7 EU Member States.

economic shocks be uneven across regions. Further, smaller countries tend to be more volatile, possibly as a result of greater exposure to international markets.[11] Independence could therefore create greater swings in GDP and employment.

1.17 Country size is not the only determinant of economic performance: the richest and fastest growing countries in the world include a number of small countries, such as Norway, Switzerland and Singapore. However, small countries are generally constrained in their choices of fiscal and monetary policy. One way in which countries can overcome these challenges is to trade more extensively with other countries. Success in this area will be important in mitigating the substantial effects the creation of an international border is likely to have. It is unclear whether the border effect can be fully offset by reorientation to other markets. Small countries can also maintain tax and regulatory alignment with other trading partners: small countries need to balance flexibility in adjusting policy settings and the risk of undermining economic integration. Managing that risk implies that their ability to adopt markedly different policy settings is constrained.

1.18 Small countries tend to run relatively prudent fiscal policy. In many cases running fiscal surpluses to build up reserves to ensure they are resilient to external shocks and to maintain access to international capital markets when needed. Even then, prudent fiscal policy has proved insufficient in some smaller euro area Member States to prevent funding problems in the recent financial crisis. It would take time for Scotland to adjust its policy settings: there would likely be significant costs for Scotland in both shifting to a position of fiscal surplus and in managing economic volatility, in particular in the years following independence. Smaller countries also generally have to place a much higher consideration on managing volatility when considering currency regime: fixed or pegged exchange rates would provide low transactions costs which could help Scotland to overcome a border effect but this could be at the cost of flexibility needed to manage economic volatility. An independent Scotland's currency choices are discussed more fully in *Scotland analysis: Currency and monetary policy*.

1.19 Annex A provides further detail on how economic outcomes in Scotland compare with those in the rest of the United Kingdom.

Benefits of economic integration for economic performance

1.20 Over the past 50 years, groups of countries have gone to great lengths to reinforce their economic integration with one another in order to support economic growth and stability. This can be seen in Europe, starting with the creation of the European Economic Community in 1957 and continuing in the expansion of the European Union today; in South America, with the creation of the Mercosur in 1991; in South East Asia, with the creation of the ASEAN in 1967; and, in North America with the signature of NAFTA in 1994. The euro area countries continue to integrate further with a fiscal compact and a banking union.

1.21 In June 2013 the European Commission and the United States announced that they would start negotiating a trade agreement to facilitate further the ease with which their respective producers can trade with each other. Given the low average tariffs (under 3 per cent), these negotiations will focus on tackling non-tariff barriers. These consist mainly of customs procedures and behind the border regulatory restrictions. Such non-tariff barriers come from divergent regulatory systems (notably standards definitions), but also other non-tariff measures, such as those related to certain aspects of security or consumer protection.

[11] *Business cycle volatility and country size: evidence for a sample of OECD countries*, Fuceri, D. and Karras, G., 2008.

1.22 While these are associations of states, the direction of travel is clear, to reduce barriers to economic integration, rather than create them. These agreements all involve pooling aspects of sovereignty in order to generate greater economic integration. The global trend is to find ways to support greater economic integration rather than less.

Scotland's integration with the rest of the UK

1.23 The level of economic integration is one of a number of factors that contributes to the achievement of high levels of productivity and hence of living standards. Differences in income levels across countries depend primarily on the strength of the business environment, which in turn depends on a wide variety of factors, including the institutional and legal infrastructure, transport infrastructure, and the skills of the workforce. Differences in these factors affect firms' willingness and ability to build complex supply chains that enable them to reap the full benefits of specialisation. They help to explain why some large countries remain poor, and why a number of small, mainly European, countries number among the richest countries in the world.[12]

1.24 As part of the UK, Scotland benefits from common regulations, a unified labour market, and integrated infrastructure, and the absence of border controls. These are described in detail in *Scotland analysis: Business and microeconomic framework.* In addition, the 300 year history of the United Kingdom has enabled the effects of shared institutions and policies to accumulate over time. Businesses have been able to plan their investment and build their supply chains with a high level of confidence in the integrity of the political union between Scotland and the rest of the United Kingdom. In the event of independence the level of integration between a separate Scottish state and the continuing UK would, by definition, diminish.

1.25 There are many aspects to economic integration: this paper assesses economic integration as being measured by the degree of trade, labour and capital flows between the UK and Scotland:

- Trade integration is a measure of the degree to which different countries or regions trade goods and services;
- Labour market integration is a measure of the degree to which workers move between different regions or countries; and
- Capital flows are the cross border movements of money or assets.

1.26 These and other measures of economic integration are discussed in *Scotland analysis: Business and microeconomic framework* and *Scotland analysis: Financial services and banking*.

[12] Henrekson et al. (1997) find evidence for permanent growth effects of European integration (increasing growth by 0.6 to 1.3 percentage points per annum). Badinger (2000) finds evidence of a 'considerable' levels effect: if no integration had taken place since 1950, GDP per capita would be a fifth smaller today. Conversely, Landau (1995) obtains no effect of EC-membership.

Trade

1.27 Economic integration implies that producers are willing and able to engage with a wide range of suppliers. This allows individual producers to specialise in those activities where they are most efficient, and to do so through buying in the goods and services that other suppliers can produce more efficiently than they can. Scotland's most famous economist, Adam Smith, identified these mechanisms, which he termed the division of labour, as an important determinant of the Wealth of Nations.[13]

1.28 Productivity levels will tend to be higher among countries that specialise in the production of the goods and services that they can produce most efficiently, and who trade their surplus production for goods and services that can be produced more efficiently in the rest of the world. Empirical evidence confirms that those countries that trade freely with the rest of the world have higher productivity levels and living standards than those where the barriers to trade are high.

1.29 Frankel and Romer (1999) conclude that a one percentage point increase in the trade to GDP ratio raises real income per capita by around one per cent. A later study by Frankel and Rose (2002) suggests that the impact may be smaller, but still positive, at around 1/3 of a per cent. HM Treasury's *EMU and trade*[14] publication in 2003 concluded that a one percentage point increase in the trade to GDP ratio would increase real income per capita by one third of a per cent. These estimates should be interpreted as indicative rather than definitive, given the broad range of factors that affect the rate of economic growth and, as the authors acknowledge, the sensitivity of these results to the measure of openness. Nonetheless, they suggest that lower barriers to cross border trade support higher rates of economic growth.

1.30 There is close trade integration between Scotland and the rest of the UK. Experimental data from the Scottish Government[15] show that in 2011 Scotland "exported" £36 billion worth of goods and services to the rest of the UK and "imported" £49 billion from the rest of the UK or nearly 30 per cent and 40 per cent of Scottish GDP respectively. This is a growing proportion of Scottish trade: from 1998 to 2011 annual trade growth between Scotland and the rest of the UK has averaged 2.7 per cent per year compared to 2.2 per cent annual growth in trade with the entire rest of the world. In 2009, across all industries exports to the rest of the UK account for approximately 24 per cent of total final demand. The sectors with the highest exports to the rest of the UK as a percentage of Total Final Demand are Mining and Quarrying (86 per cent), Professional and Support Activities (61 per cent) and Energy and Supply (42 per cent). [16]

1.31 Across all industries approximately 60 per cent of inputs are sourced from within Scotland, 30 per cent from the rest of the UK and 10 per cent from the rest of the World. Thus in terms of inputs into the supply chain, Scotland is much more integrated with the rest of the UK than with the rest of the World. The source of inputs varies dependent upon the industrial sector. For example the agriculture sector is the most integrated with the rest of the UK, 37 per cent of inputs come from the rest of the UK. Manufacturing (34 per cent), financial, insurance and real estate (33 percent), and professional and support activities

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[13] *An inquiry into the Nature and Causes of the Wealth of Nations*, Smith, Adam.

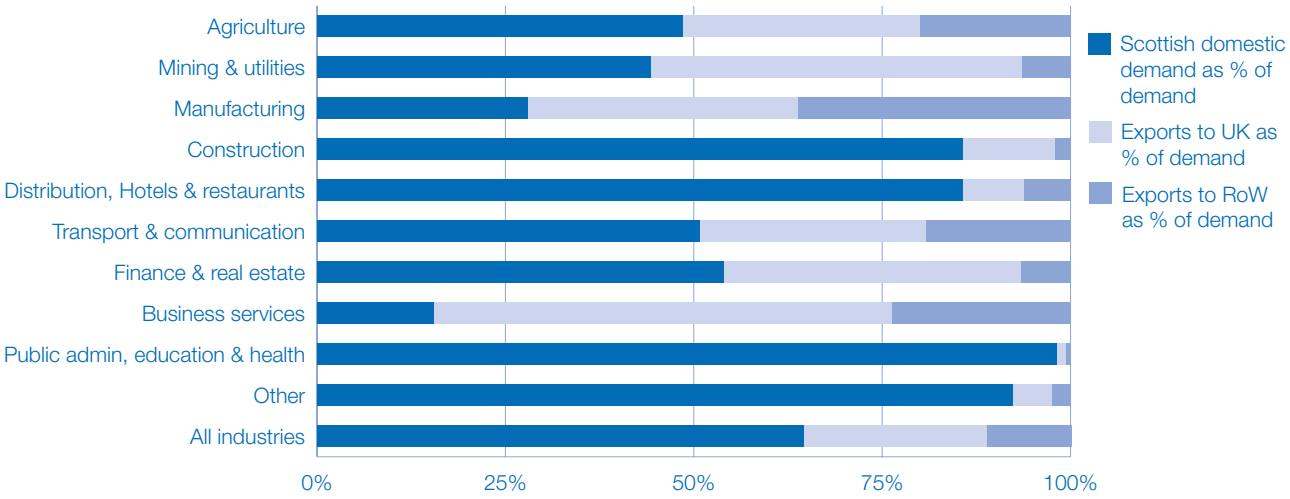
[14] *EMU and Trade*, HM Treasury, 2003.

[15] Scottish Government, Scottish National Accounts Project (SNAP), Quarterly National Accounts 2012Q3. Other export data is available from the Global Connections Survey but SNAP data is used for both imports and exports for consistency.

[16] Scottish Government, Input-Output Tables, 2009.

(33 per cent) are the other sectors with the highest source of inputs from the rest of the UK.[17] These sectors are currently benefiting from the best of both worlds: targeted help from the Scottish Government but access to the UK domestic market.

Chart 1I: Scottish exports to the rest of the UK and Rest of World as a share of demand



Source: Scottish Goverment, Input-Output Tables, 2009

Labour

1.32 There can be both static and dynamic gains from migration. Static gains arise if migrants have a higher propensity to be employed than native workers or earn higher wages. Some of these benefits will spill over to the wider economy in the form of taxes and returns to other factors of production, such as capital, especially if migrants fill shortage occupations. Dynamic benefits of migration could increase the trend rate of growth, for example by increasing innovation, by bringing new skills or aptitudes that could spillover to non-immigrants, increasing competition in labour or product markets or by improving trade links back to their origin countries. There can also be costs in the form of higher public spending, pressure on limited resources such as housing and social cohesion. Borjas suggests that there is evidence that immigration can have negative economic impacts on groups such as low-skilled workers.[18] Not all migrants are as economically beneficial: high skilled migrants and those who fill shortage occupations, for example, are likely to generate greater benefits and possibly lower costs. The predictions from economic models are mixed (Drinkwater, Levine, Lotti and Pearlman (2003)) and depend on a variety of assumptions about, for example, the skill composition of migrants, capital mobility and the existence of economies of scale in the host economy.[19]

[17] Scottish Government, Input-Output Tables, 2009.

[18] Increasing the Supply of Labour through Immigration: measuring the Impact on Native-born Workers: G Borjas, Centre for Immigration Studies May 2004.

[19] Fic et al (2011) estimate a small positive impact from migration on the UK economy. A study by Poot, Nana and Philpott (1988) for New Zealand found that a net inflow of 15,000 people increases GDP per capita by 0.2 percent per year and GDP per worker by 0.15 per cent per year. For the U.S., Borjas (1995) estimates the economic gains of immigration accruing to natives to be relatively small, of the order of 0.1 percent of GDP while Barro and Sala-i-Martin's (1992) results suggest that a 1 percentage point higher net migration rate in the U.S. is associated with a 0.1% higher growth rate.

1.33 Labour integration between Scotland and the rest of the UK is high. This is shown through high migration flows. In total it is estimated over half a million people born in England, Northern Ireland and Wales now live in Scotland, and over 700,000 people born in Scotland have moved to other parts of the UK.[20] In 2010-11, nearly 44,000 people moved from Scotland to the rest of the UK, of which more than 35,000 were of working-age; and nearly 41,000 moved from the rest of the UK to Scotland, of which about 33,000 were of working age (or about one per cent of the Scottish population of working age).[21] There is also a high degree of commuting across the border. In 2011 there were 30,000 individuals who lived and worked on different sides of the border;[22] 13,000 of whom lived in Scotland and worked in the North of England.[23] This is higher than movements within other closely integrated European economies. For example, in 2008 17,000 people moved from Austria to Germany and 22,000 from Germany to Austria.[24]

Capital

1.34 Flows of capital across regions and states have a positive effect on the level of economic growth in an economy. As a single domestic market, the financial system operates to provide capital to businesses and households at low prices. Scotland may also be more attractive as part of the union for other flows of capital, such as Foreign Direct Investment (FDI). As set out in *Scotland analysis: Financial services and banking*, a more localised Scottish financial industry following independence may face more challenges in providing capital, at least the same range of products at the same cost, to households and businesses. Costs could increase due to higher funding costs and the costs of operating in a smaller market. The fragmentation of the domestic industry would make it harder to promote competition and address barriers to competition as they arise. It is possible that, as the Scottish and continuing UK markets diverge, Scotland could become a less attractive location for FDI. There is evidence that FDI brings benefits to the domestic economy. Foreign owned firms tend to have higher productivity and higher levels of investment than domestic firms, particularly compared with domestic non-multinationals. Whilst evidence is more limited, higher productivity may also spillover into the domestic economy e.g. through technology transfer.[25]

1.35 If independence reduces capital flows, it would be expected to impact on economic performance. At a microeconomic level, capital flows can enhance the efficiency of resource allocation, the competitiveness of the domestic financial sector and support technology transfer. The evidence on the effect of capital flows on economic growth is mixed. Earlier studies such as Rodrick (1998) find no effect of capital flows on economic growth. However, more recent studies such as that by Kose, Prasad and Terrones (2008) find that financial flows increase the growth of productivity in an economy. Two possible reasons why the evidence is not conclusive is the volatility of capital flows, which may have the effect of negating any potential benefits; and that the flows have gone to countries which do not have the capacity to absorb the flows they are receiving. This could be because they may not have a highly skilled workforce, lack infrastructure or do not have

[20] 2001 Census.

[21] General Register Office for Scotland, Migration between Scotland and the Rest of the UK (retrieved May 2013) http://www.gro-scotland.gov.uk/statistics/theme/migration/mig-stats/scotland-rest-of-uk.html.

[22] Annual Population Survey, January to December 2011.

[23] The North of England is defined as the following English regions: North East, North West, Yorkshire and the Humber.

[24] Eurostat, Immigration by sex, age group and country of previous residence, July 2013.

[25] See, for example, *Foreign ownership and Productivity: New Evidence from the Service Sector and the R&D Lab*, Griffith, Redding and Simpson (2004).

developed financial markets. Despite this according to the IMF (2006), "the weight of the evidence seems to be gradually shifting towards finding positive marginal effects on growth."

1.36 These flows allow for capital to move to its most profitable use, ensuring the best investments gain access to finance. There are more limited data on flows of capital between Scotland and the rest of the UK. However, *Scotland analysis: Financial services and banking* showed the extent that financial services are provided across the whole of the UK. For example, 51 per cent of Scottish mortgage and 70 per cent of Scottish pension products are supplied by non-Scottish firms. Scottish Financial Enterprise (SFE) report that 90 per cent of its members' customers are based in the rest of the UK.[26]

Integration and economic stability

1.37 A further benefit of integration is that it helps to create larger and more diverse markets. Economies that are part of a larger market are less susceptible to economic shocks and hence have less volatile economic growth. Furceri and Karras (2008) and Down (2007) both find evidence to suggest that the larger economies are less volatile. For example, Scotland has avoided the very large negative impacts of the financial crisis that some other small economies have experienced. The recession was twice as large in Ireland, which required an IMF/EU assistance programme. The recession was also significantly larger in Denmark, Finland and Sweden.

1.38 Smaller economies, which are more specialised, and as a result more volatile, can compensate for smaller domestic markets by being more open to international trade and orientating domestic production and consumption towards larger, more stable international markets in order to mitigate some of the volatility. However, Down (2007) concluded that the benefits of diversification through international trade openness cannot fully compensate for the smaller size of the domestic market.

1.39 Economic stability is an important aspect of economic performance. Many studies have argued that higher levels of volatility have negative effects on average growth in output for example. In one of the first studies, Ramey and Ramey (1995) found a negative relationship between volatility and growth for a sample of 92 countries as well as in a sample of OECD countries. This could be because, for example, entrepreneurs are discouraged from investing when the path of economic growth is more uncertain.

1.40 Scottish integration with the rest of the UK, as part of the large UK domestic market, has played an important role in explaining the performance of the Scottish economy. Scottish independence would have important implications for economic integration between Scotland and the rest of the UK, which are discussed in the following chapter.

[26] Speech by Owen Kelly, Chief Executive of Scottish Financial Enterprise at the Scotsman Conference, *A Question of Independence: The Economics of Independence*, June 2012.

Chapter 1 Conclusion

1.41 Across a range of measures, the performance of the Scottish economy is similar to the economy of the whole UK:

- Output per head and output per worker in Scotland are almost exactly equal to the UK average.
- Output growth over the last 40 years has grown at almost exactly the same rate as it has in the UK.
- The employment and unemployment rates in the UK and Scotland are very similar.

1.42 Scotland's economic performance is comparable to a range of small independent countries:

- Scotland's economic output is within the range of comparable countries, higher than Portugal, Denmark and Finland.
- While Scotland's performance has been weaker in the 1970s and 1980s, growth in output per head of population is above the median for independent comparable countries over the 1990s and 2000s.
- Scotland has maintained a consistently higher employment rate than most of the comparable countries.
- Scotland suffered a considerably less severe recession than most comparator countries.

1.43 High levels of economic integration between Scotland and the UK, in particular flows of goods and services, labour and capital, have underpinned Scotland's economic performance and helped to reduce economic volatility.

Chapter 2:
The UK's integrated fiscal model

The UK's integrated fiscal model supports Scotland's economic performance and delivers funding for public services. The UK's broader tax base helps maintain the stability of public spending in Scotland and smooth the impact of volatile, and declining, sources of revenue, such as North Sea oil and gas. Fiscal transfers are automatic across the UK, which supports higher welfare and pensions spending in Scotland.

Scotland's notional onshore fiscal balance is considerably weaker than the UK's onshore public finances.[1] This reflects a slightly lower level of onshore tax revenue and public spending that is consistently 10 per cent higher than the UK average. In the event of independence, the allocation of North Sea oil and gas revenues would be subject to negotiation. If North Sea oil and gas revenues are allocated on a geographical basis, Scotland's notional fiscal balance since devolution is very similar to the UK's public finances.

However, North Sea oil and gas receipts are one of the most volatile sources of revenue. Since devolution, Scotland's geographical share of North Sea oil and gas receipts has fluctuated between £2 billion and £12 billion, from 2.5 per cent to 8.3 per cent of Scottish GDP.[2] As a result, total receipts in Scotland are more volatile than for the UK as a whole. Based on the earliest available data, comparing receipts and spending demonstrates that Scottish receipts since 1981-82 have been almost twice as volatile while Scottish public spending has been just as stable as across the UK as a whole.[3]

This is the UK's fiscal model in action: diffusing the volatility of Scottish receipts across the UK while providing stability and security for public spending. Through the pooling of major tax revenues across the UK, Scotland contributes a volatile revenue stream from North Sea oil and gas in return for secure and stable funding from the UK Government.

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1 Scottish Government, GERS 2011-12 and historical series, March 2013.

2 Scottish Government, GERS 2011-12 and historical series, March 2013.

3 This is the impact of year-on-year volatility but, in addition, independent analysts expect North Sea oil and gas revenues to decline over time, which would require other taxes to increase by the same amount to maintain the same level of public spending.

The UK's fiscal model protects Scotland from a more difficult set of fiscal choices. In the absence of shared public finances, in 2009-10 – in the aftermath of a halving of North Sea oil and gas revenues – Scotland would have faced a choice between implementing immediate spending cuts of nine per cent (or £6 billion, which equates to half of Scotland's health budget), increasing other taxes to offset the sharp fall in North Sea oil and gas revenues, or absorbing this volatility in its budget deficit. As a small independent country, Scotland would be likely to have less flexibility to absorb shocks of this kind than the UK as it would be likely to pay higher borrowing costs.

A clear benefit of the current fiscal framework is that the Scottish Government is able to take long-term decisions on the allocation of significant areas of public spending that have been devolved, and do this secure in the knowledge that funding levels will remain stable irrespective of the volatility of Scottish receipts.

The Scottish Parliament's budget for devolved public services is separate and predictably certain, and is not affected by changes in demand for welfare. Automatic welfare provision at the UK level means that if the number of welfare recipients or pensioners increases in Scotland then the Scottish Government does not need to adjust its budget. The latest IFS figures[4] show that UK Government spending on benefits and pensions for people in Scotland is now around two per cent per head higher than the UK average, having converged in recent years. This is £340 million higher each year than what Scotland would receive based on a population share.

A large and diversified tax base allows all parts of the UK to pool risks such as volatile tax revenues and to borrow at a lower cost to maintain public services. By spending taxpayers' money on a UK-wide basis for certain services, the UK limits public costs through economies of scale (for example, in defence, tax collection and overseas representation), while also supporting integration in the domestic market (for example, through unified social security and common regulators).

An integrated tax system works well for business and individuals, providing a simple and efficient way to collect tax revenues across the UK. The same taxes and rates apply across most of the UK, ensuring the overall coherence of the tax system. But as part of this integrated system, the UK Government has devolved certain tax powers to the Scottish Parliament through the Scotland Act 2012, which will make the Scottish Parliament more accountable for funding its spending and enable greater tax and spending flexibility within Scotland.

Independence would put an end to devolution as it would create a separate, independent Scottish state. This would also put an end to the pooling of fiscal risks across the UK, the stabilising role of fiscal transfers between different parts of the UK, and the ability to share costs and coordinate policies. An independent Scotland would therefore be directly exposed to a more narrow and volatile tax base, resulting in a more difficult set of tax and spending choices.

[4] Institute for Fiscal Studies, Government spending on benefits and state pensions in Scotland, July 2013.

2.1 In addition to close economic integration, examined in Chapter 1, the UK is characterised by a high degree of fiscal integration combined with substantial devolution of spending policy powers.

2.2 As well as being a fully integrated economic and political union with a sovereign parliament, the UK is a fiscal union with a fully integrated tax and spending system. Public spending in the UK is funded through taxation, with shortfalls in tax revenues supplemented by borrowing. This enables all nations and regions of the UK to pool fiscal resources, benefit from economies of scale in public spending, share fiscal risks and borrow as a single and credible participant in international financial markets. The UK's integrated fiscal model supports Scotland's economic performance – and the economic performance of all parts of the UK – and ensures that funding for Scotland's public services remains stable.

2.3 Figures for Scotland's tax and spending, published by the Scottish Government, therefore reflect Scotland's position as part of the UK, integrated within the UK economy and supported by the UK's fiscal model. They do not show tax and spending for an independent Scotland no longer benefitting from the economic or fiscal integration with the rest of the UK.

2.4 Since the Scotland Act 1998, the UK Government has devolved responsibility for some 60 per cent[5] of Scotland's public spending to the Scottish Parliament and, following the Scotland Act 2012, the Scottish Parliament will be responsible for funding around one-third of its spending.[6] Fiscal devolution is taking place while retaining the overall coherence and integration of the UK's tax and spending system. Independence would mean an end to the UK's fiscal model, and an independent Scottish state would need to establish its own tax system and fund all public spending commitments, including through borrowing in international financial markets when necessary.

Fiscal alignment between Scotland and the rest of the UK

2.5 Just as Scotland's strong economic performance as part of the UK is closely aligned to the UK's overall performance, the Scottish Government estimates that Scottish onshore tax revenues per person are very slightly lower than the UK average since devolution in 1998, as shown in Chart 2A. This reflects the fact that the performance of Scotland's onshore economy closely mirrors the performance of the UK's onshore economy, as highlighted in Chapter 1, and the fact that people and businesses across the UK are subject to the same levels of taxation, as the UK has a largely unified tax system.

[5] Scottish Government, GERS 2011-12, March 2013. The Scottish Government and Local Authorities were responsible flor almost £39 billion of Scotland's £64 billion spending in 2011-12.

[6] Commission on Scottish Devolution, final report, June 2009.

Chart 2A: Comparison of Scotland and UK onshore tax revenues per head

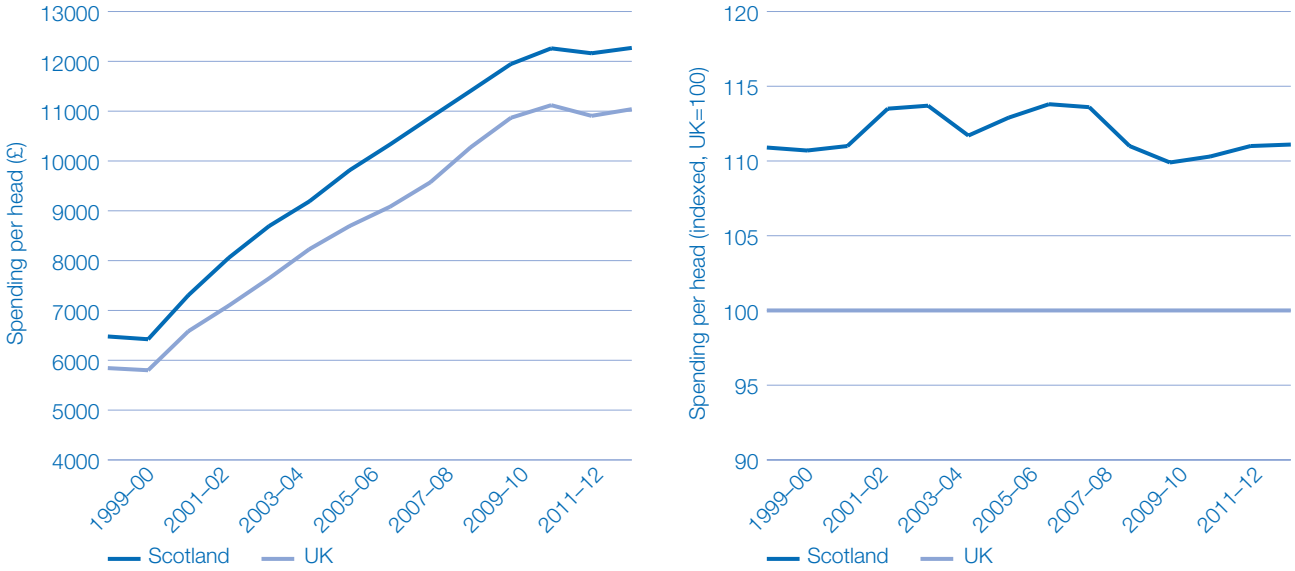
Source: Scottish Government, GERS 2011–12 and historical series (all figures to 2011–12); ONS/HM Treasury, Public Sector Finances (UK figures for 2012–13 excluding the one-off Royal Mail Pension Scheme asset transfer); HM Treasury estimates (Scotland's share of 2012–13 UK totals, based on the 2011–12 share)

2.6 Onshore revenues are the levels of taxation that people and (onshore) businesses in Scotland actually pay. Irrespective of the offshore revenues attributed to Scotland, this demonstrates that people and (onshore) businesses in Scotland are making roughly the same contribution to the UK's tax revenues as the UK (onshore) average.

2.7 Scotland's notional onshore balance therefore reflects the levels of taxation people in Scotland face and the levels of public service they receive. While Scotland's onshore revenues are slightly lower than the UK average, public spending per person in Scotland has been around ten per cent higher than the UK average since devolution.[7] This is currently equivalent to almost £1,200 per head, as shown in Chart 2B below. Had Scotland instead received its population share of spending then it would have received some £74 billion less since devolution or £6 billion less each year (in real terms), which is equivalent to around half Scotland's health budget. An allocation of the UK's spending based on a share of onshore tax revenues would have further decreased Scotland's spending.

[7] Scottish Government, GERS 2011-12 and historical series, March 2013.

Chart 2B: Comparison of Scotland and UK spending per head

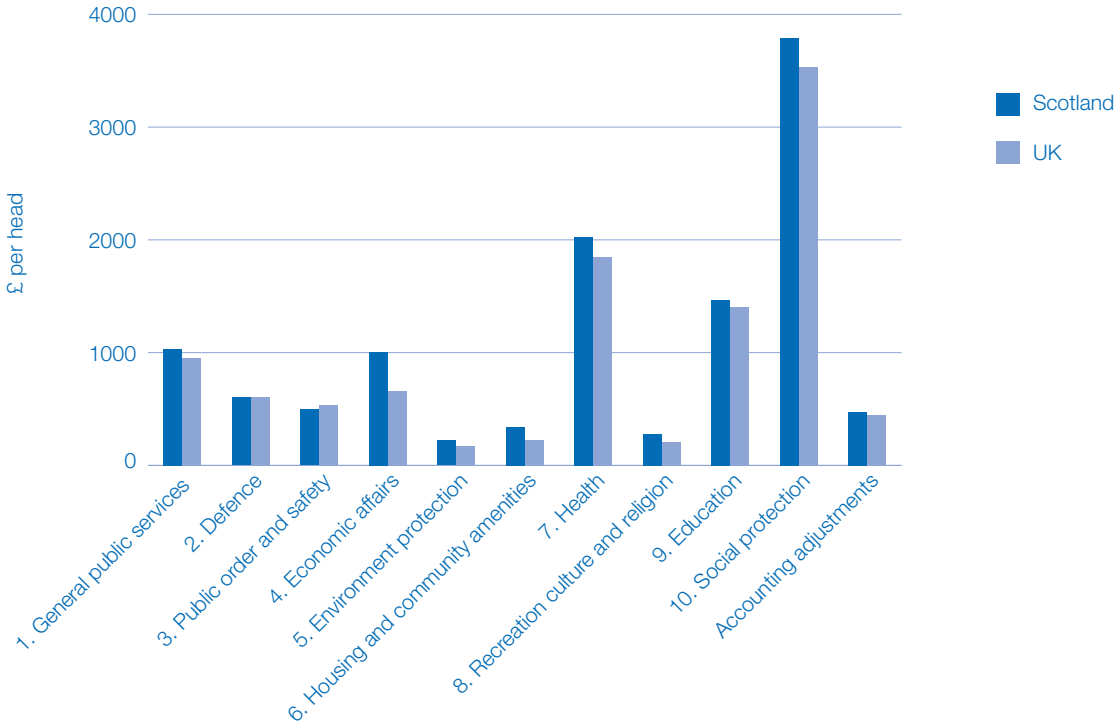


Source: Scottish Government, GERS 2011–12 and historical series (all figures to 2011–12); ONS/HMT, Public Sector Finances (UK figures for 2012–13 excluding the one-off Royal Mail Pension Scheme asset transfer); HMT estimates (Scotland's share of 2012–13 UK totals, based on the 2011–12 share)

2.8 As shown in Chart 2C, Scotland's significantly higher public spending per person compared to the UK as a whole is driven by:

- spending on social protection, which is largely reserved (the main exception being social care) and determined by need, and which is around £260 per head higher in Scotland than the UK average; and
- other largely devolved areas of spending, in particular: economic affairs (which includes transport and agriculture) is £350 per head higher in Scotland than the UK average, health is £180 per head higher, and housing and community amenities is £120 per head higher.

Chart 2C: Breakdown of Scotland and UK spending per head



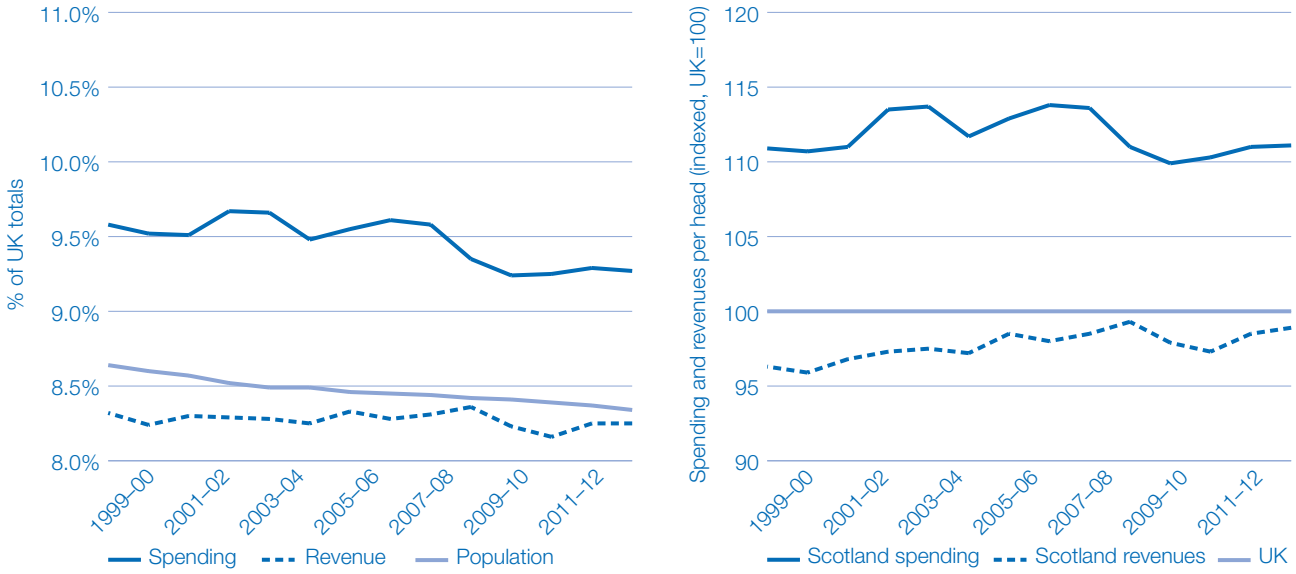
Source: Scottish Government, GERS 2011–12, March 2013 (average of the five years 2007–08 to 2011–12)

2.9 It should be noted that the spending numbers presented in Government Expenditure and Revenue Scotland (GERS) reflects the spending that is determined to benefit people in Scotland or that was incurred on their behalf. It does not necessarily reflect spending that actually took place in Scotland.[8]

2.10 For example, all parts of the UK are considered to benefit equally from spending on defence, security and foreign representation even though the location of the spending may be concentrated in certain areas of the UK or overseas. Similarly, some spending that takes place in Scotland (for example administering tax and benefits) actually benefits people in other parts of the UK. While this is explained further in Annex B, the key point to note is that GERS shows the spending that Scotland benefits from as part of the UK and not what Scotland's spending would need to look like as an independent country.

2.11 Combining Scotland's onshore revenues and public spending allocation in Chart 2D below shows that, relative to the UK raising and spending £100, Scotland generates £98 and spends £112. Scotland's notional onshore fiscal balance has therefore been considerably weaker than the UK's onshore fiscal position in the period since devolution.

Chart 2D: Scotland's onshore tax and spending compared to the UK average



Source: Scottish Government, GERS 2011–12 and historical series (all figures to 2011–12); ONS/HMT, Public Sector Finances (UK figures for 2012–13 excluding the one-off Royal Mail Pension Scheme asset transfer); HMT estimates (Scotland's share of 2012–13 UK totals, based on the 2011–12 share)

Including North Sea oil and gas

2.12 In the event of independence the allocation of the UK's oil and gas reserves would have to be negotiated between a separate Scottish state and the continuing UK.

2.13 For illustrative purposes the Scottish Government presents both a "geographical share of North Sea oil and gas" and a "per capita share of North Sea oil and gas".[9] Consistent with the economic analysis in Chapter 1, the rest of this section includes a geographical share of North Sea oil and gas within Scotland's overall revenues. This does not reflect any UK Government position in the event of independence, rather by allocating the largest share of resources to Scotland it ensures that the subsequent analysis represents the 'best case' for an independent Scotland.

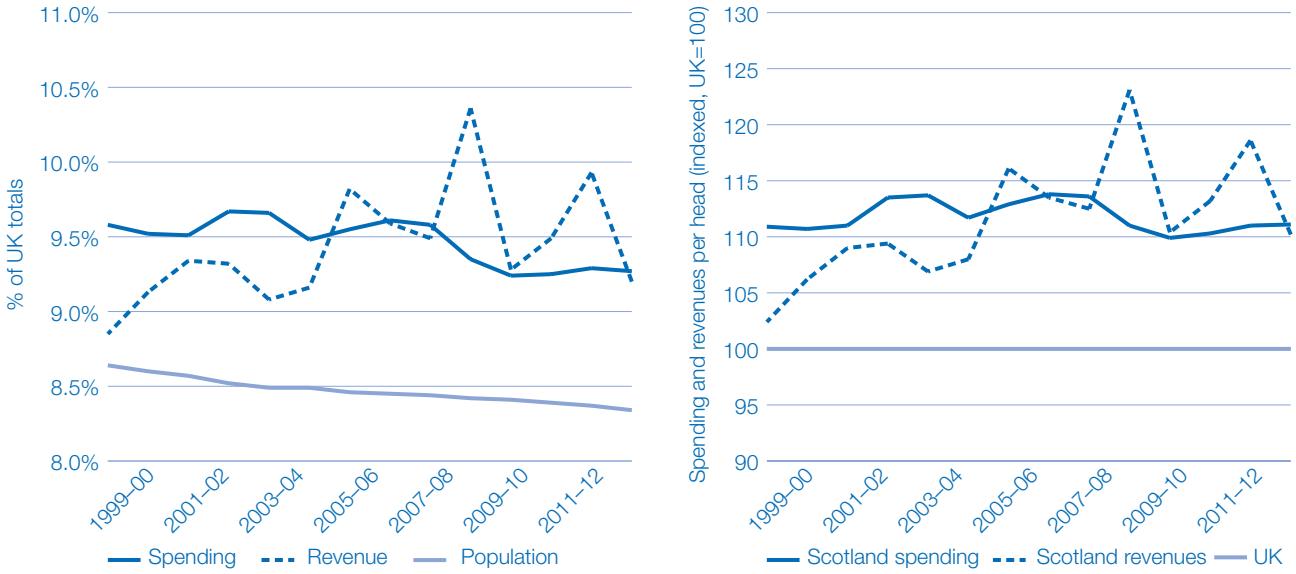
[8] The spending methodology is set out in Annex B of GERS.

[9] Scottish Government, GERS 2011-12, March 2013.

2.14 Any allocation of North Sea oil and gas receipts to Scotland's onshore tax revenues has the effect of increasing Scotland's contribution to UK tax revenues. The geographical allocation used by the Scottish Government would see Scotland's contribution to UK tax revenues substantially increased.

2.15 On this basis Scotland's notional fiscal balance as part of the UK is very similar to the UK's fiscal position over the period since devolution, albeit Scotland's revenues and spending both average around 10 per cent higher than the UK. This is illustrated by Chart 2E below, which demonstrates that there is no consistent fiscal surplus in Scotland compared to the UK.

Chart 2E: Scotland's overall tax and spending compared to the UK average



Source: Scottish Government, GERS 2011–12 and historical series (all figures to 2011–12); ONS/HM Treasury, Public Sector Finances (UK figures for 2012–13 excluding the one-off Royal Mail Pension Scheme asset transfer); HMRC, Government revenues from UK oil and gas production (North Sea revenues for 2012–13); HM Treasury estimates (Scotland's share of 2012–13 UK totals, based on the 2011–12 share)

2.16 Moreover, as is shown by the fluctuation of total Scottish revenues, North Sea receipts are among the most volatile sources of government funding. Since devolution, Scotland's geographical share of North Sea oil and gas receipts has fluctuated between £2 billion in 1999-2000 and £12 billion in 2008-09, from 2.5 per cent to 8.3 per cent of Scottish GDP.[10]

Pooling of resources

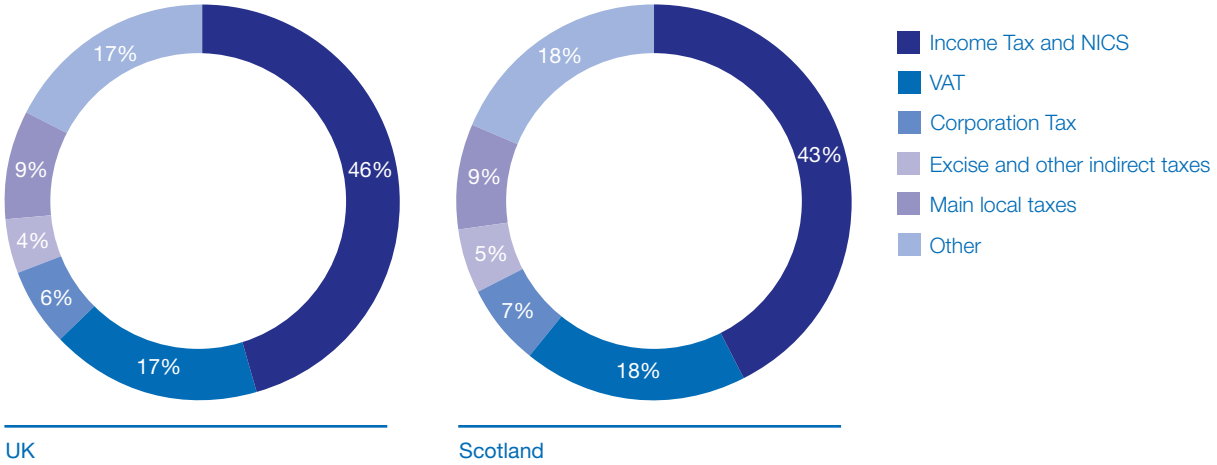
Stability of receipts

2.17 The pooling of most tax revenues across the UK – in particular volatile revenues such as corporation tax and North Sea taxes – provides greater stability and certainty for policy makers, firms and households. This creates a more favourable environment to develop tax and spending policies.

2.18 At an aggregate level Scotland's onshore tax mix is similar to the UK's onshore tax mix, as shown in Chart 2F. This is perhaps unsurprising given the high level of integration of the two economies and given that (with some limited exceptions) it is the same tax system, with the same rates, that is in operation across the whole of the UK.

[10] Scottish Government, GERS 2011-12, March 2013.

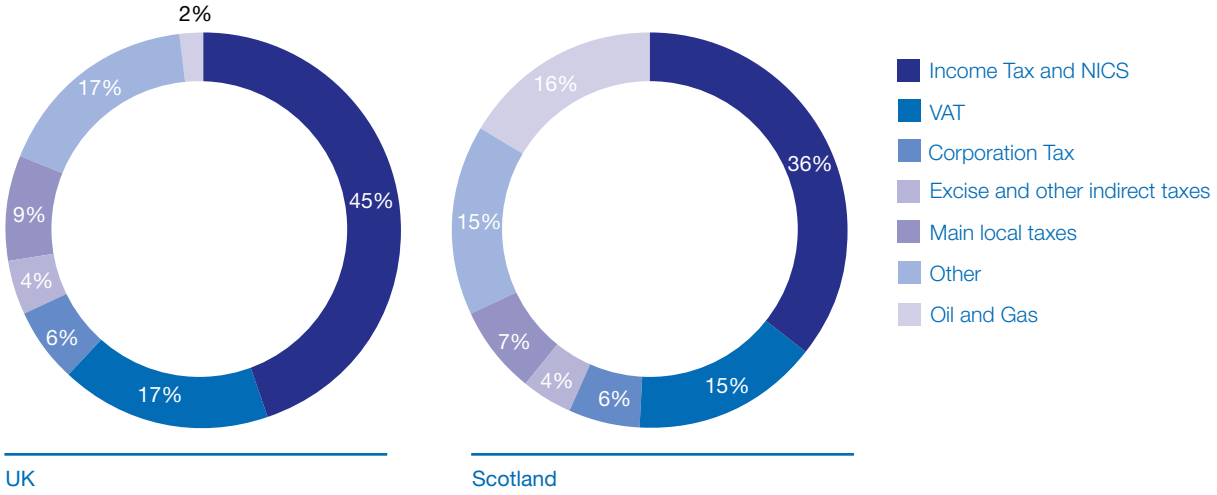
Chart 2F: Onshore tax mix in Scotland and the UK



Source: Scottish Government, GERS 2011–12 (average of the five years 2007–08 to 2011–12)

2.19 Chart 2G shows Scotland's tax mix including a geographic share of North Sea revenues, alongside the UK's tax mix also including North Sea revenues. A geographical share of North Sea oil and gas significantly changes the Scottish tax mix compared to that across the UK as a whole.

Chart 2G: Tax mix in Scotland and the UK including North Sea revenues



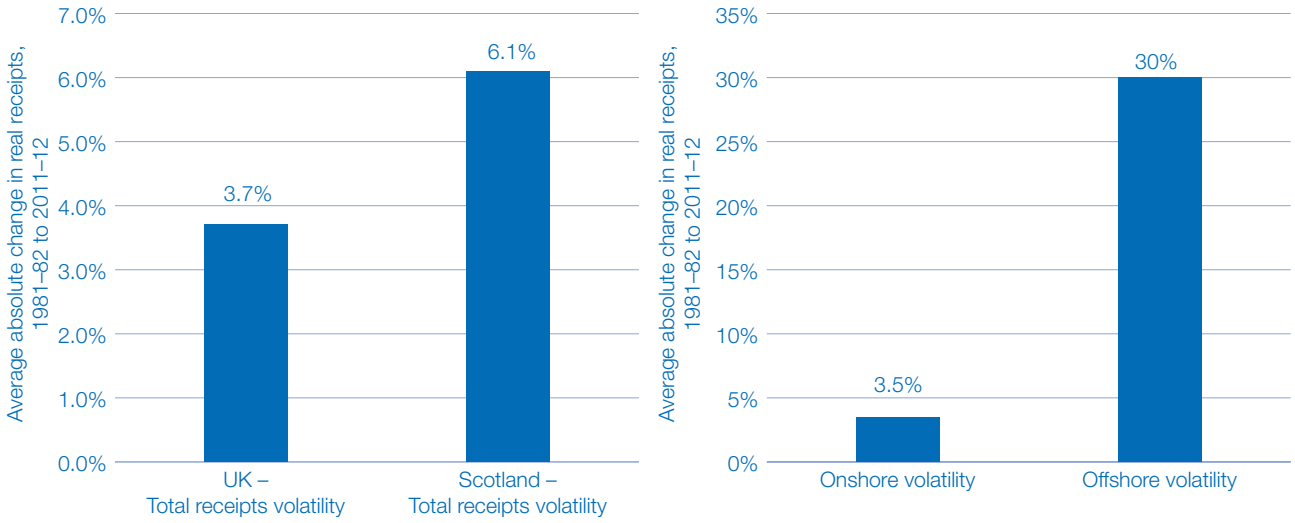
Source: Scottish Government, GERS 2011–12 (average of the five years 2007–08 to 2011–12)

2.20 Specifically, while total North Sea revenues average 1.7 per cent of UK revenues in the past five years, attributing a geographical share to Scotland would mean that this averages 16.3 per cent of Scotland's revenues.

2.21 Total receipts in Scotland are therefore more volatile than for the UK. Based on earliest available data, Scottish receipts have varied up or down by an average of 6.1 per cent each year.[11] For the UK as a whole, the average annual variation in receipts is significantly lower, at 3.7 per cent. The driver of higher volatility in Scotland is offshore revenues from North Sea oil and gas, as shown in Chart 2H. This implies Scottish receipts vary by around £670 per head each year (in 2013-14 prices), while total UK receipts vary by around £330 per head each year.

[11] Over 1981-82 to 2011-12; in real terms.

Chart 2H: Volatility in UK and Scottish receipts



Source: Scottish Government, GERS 2011–12 and historical series; HM Treasury calculations

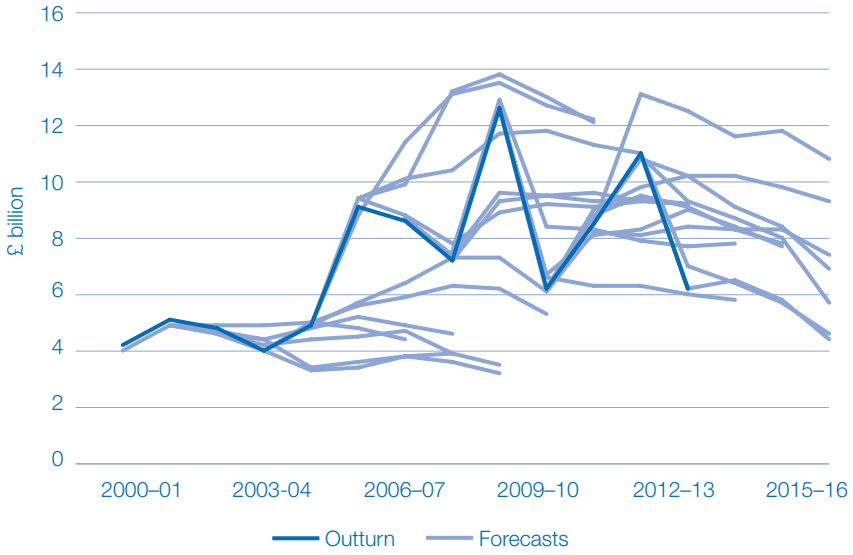
2.22 North Sea oil and gas receipts are among the most volatile sources of revenue. On average, real-terms offshore receipts vary by 30 per cent from year to year, as Chart 2H shows. That means there are "boom" years (e.g. 2005-06 when revenues rose by over 75 per cent), but also "bust" years such as 2009-10 when revenues halved.

2.23 If revenues were volatile but predictable, the challenge for fiscal planning might be eased. But they are not. North Sea revenues have a critical dependence on a range of external and interrelated factors that are difficult to predict. These factors include world oil and gas prices, exchange rates, production and outages, investment levels and the nature and stability of the policy regime, in particular for taxation and decommissioning.

2.24 While there are examples of small countries managing the volatility of revenues from natural resources (notably Norway) this is largely due to the existence of an oil fund. The ability and necessity for an independent Scotland to create an oil fund is considered in Chapter 4.

2.25 As Chart 2I illustrates, the volatile path of outturn offshore revenues makes them difficult to predict, despite the fact that forecasts are based on prices derived from market expectations, and production estimates informed by the industry's projections.

Chart 2I: Successive official forecasts of UK offshore revenues



Source: HM Treasury and Office for Budget Responsibility forecasts from Budget 2002 to Budget 2013, including Pre-Budget Reports and Autumn Statements; ONS outturn.

2.26 This shows how difficult it is to forecast North Sea revenues. A further example is provided by the Scottish Government's recent Oil and Gas bulletin,[12] published in March 2013. Although published towards the very end of 2012-13 and including a range of scenarios, the least optimistic forecast of Scotland's geographic share in 2012-13 (other than the forecast based on OBR assumptions) turned out to be £400 million higher than the UK's total offshore revenues and £800 million higher than Scotland's geographic share (assuming the same share as 2011-12). Annex B explains in more detail the interactions between the range of factors that affect North Sea production and the impact on revenues.

2.27 If peaks and troughs in North Sea oil and gas revenues could be aligned to counterbalance the onshore economic cycle, the challenge of how to plan fiscal policy to mitigate the volatility of North Sea oil and gas might be eased. But the most severe volatility tends to be caused by external factors. For example, the significant increase in revenues in 2005-06 was largely driven by oil prices almost doubling during 2005 from £21 per barrel to £36 per barrel, while a fall from £67 per barrel to £27 per barrel during just six months in 2008 resulted in revenues halving between 2008-09 and 2009-10.[13]

2.28 This final trough in 2009-10 was the largest single-year fall in offshore revenues since the early 1990s. It coincided with the financial crisis and recession, the associated shortfalls in onshore receipts, and the fiscal costs of intervening in the financial sector. Collectively these factors put historic pressure on the public finances. The UK's fiscal model pooled the shortfall in offshore revenues to better withstand the impact.

2.29 Within the UK, most public sector receipts are pooled, allowing this exceptional source of volatility to be managed. Since devolution, offshore oil and gas receipts amounted to around 1.5 per cent of total UK receipts. For Scotland, North Sea revenues would have been almost 14 per cent of the total. Shortfalls in North Sea revenues would need to be offset by borrowing in financial markets (to avoid spending cuts or tax rises). Markets may demand higher interest rates on this borrowing particularly for a newly-formed small independent state. There are therefore clear risks from depending on such a volatile source of revenue for such a large proportion of tax revenues, and clear benefits to pooling volatile sources of revenue across the UK as a whole.

[12] Scottish Government, Oil and Gas bulletin, March 2013.

[13] World Bank, Dated Brent monthly oil prices.

Stability of spending

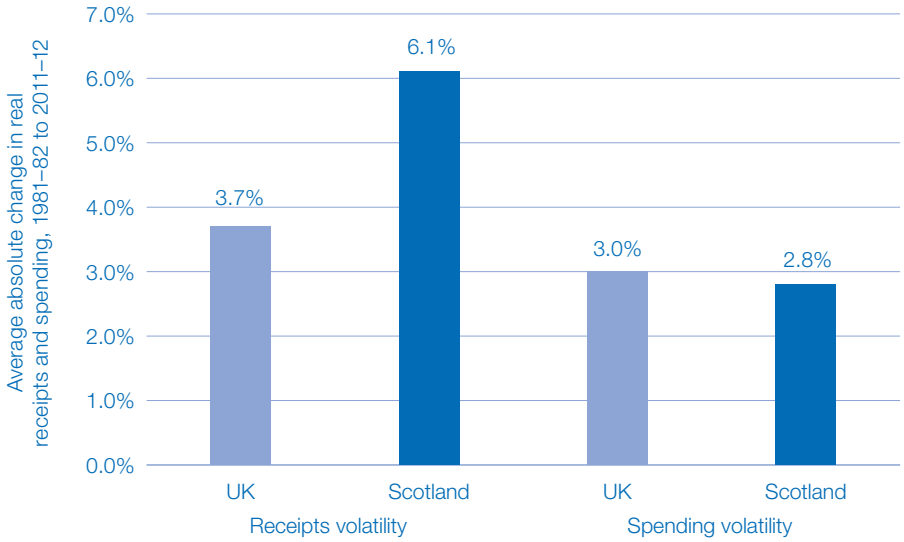
2.30 The analysis above shows Scottish tax receipts are almost twice as volatile as revenues across the UK as a whole. In the absence of wider fiscal risk-sharing, a more volatile revenue base would imply sharp annual changes in the affordable level of spending. But thanks to the UK's integrated fiscal model, Scotland has access to stable and secure funding regardless of the fluctuating level of North Sea oil and gas receipts.

2.31 The UK and Scottish Governments generally set public service spending plans over multiple years. This gives Scotland the ability to plan spending efficiently over the medium term. The stability of firm multi-year plans enables sound value-for-money decisions to be taken for Scotland and all parts of the UK, maximising public service outcomes for a given funding envelope.

2.32 Based on the earliest available data, public spending in Scotland has varied up or down by an average of around 2.8 per cent each year.[14] That is very similar to the equivalent UK average of 3.0 per cent. This implies that public spending in Scotland varies by £350 per head each year, in 2013-14 prices and population. The UK figure is very similar.

2.33 Chart 2J compares receipts and spending volatility to demonstrate that, while Scottish tax receipts are more volatile, Scottish spending is just as stable as that of the UK as a whole.[15] This is the UK fiscal model in action: diffusing receipts volatility across the UK while giving Scotland stability and security on public spending.

Chart 2J: Volatility in UK and Scottish receipts and spending



Source: Scottish Government, GERS 2011-12 and historical series; HM Treasury calculations

2.34 The fiscal model protects Scotland from a more difficult set of fiscal choices. In the absence of shared public finances, in 2009-10 – in the aftermath of a halving of North Sea oil and gas revenues[16] – Scotland would have faced a choice between implementing immediate spending cuts of nine per cent (or £6 billion, which equates to half Scotland's health budget), increasing other taxes to offset the fall in North Sea revenues, or absorbing this volatility in its budget deficit. As a small independent country, Scotland is likely to have less fiscal flexibility to absorb shocks of this kind within its deficit than the UK as it would be likely

[14] Over 1981-82 to 2011-12; in real terms.

[15] This result is also robust over a shorter time period, such as the last two decades (albeit with a smaller magnitude of difference). Receipts and spending are deflated using the UK GDP deflator.

[16] HM Revenue & Customs, Government Revenues from UK oil and gas production, June 2013.

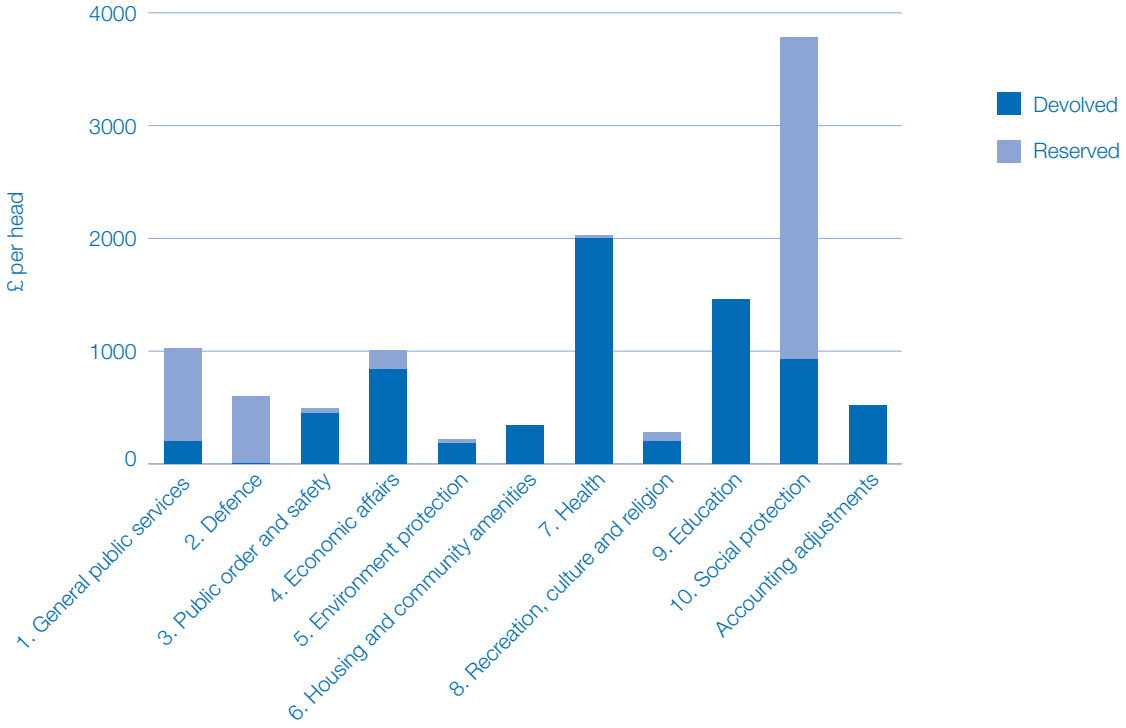
to pay higher borrowing costs. For the UK, the fall in offshore receipts that year was 0.5 per cent of GDP – a still significant but more manageable pressure.

2.35 Through the pooling of major tax revenues across the UK, Scotland therefore contributes a volatile revenue stream from North Sea oil and gas, and benefits from secure and stable funding from the UK Government. As will be explored in forward-looking analysis later in the Scotland analysis series, oil and gas revenues remain extremely uncertain. The only outcome that forecasters predict with any confidence is that the reserves in the North Sea will ultimately decline.

Policy flexibility within an integrated fiscal model

2.36 The UK's integrated fiscal model provides stable and secure funding across the UK, including for Scotland. As a result of devolution, the Scottish Government is responsible for many key public services in Scotland and has complete flexibility to determine how to use its funding for devolved public services. This reflects that decisions in some areas are judged to be better taken locally by the Scottish Government. But at the same time, services that benefit from being delivered consistently on a UK-wide basis are provided by the UK Government and the UK Parliament. The split between devolved and reserved functions is shown in Chart 2K.

Chart 2K: Devolved and reserved spending for Scotland



Source: Scottish Government, GERS 2011–12 (average of the five years 2007–08 to 2011–12)

Note that reserved 'general public services' includes international development, foreign affairs, tax collection and debt interest. 'Economic affairs' includes transport and agriculture.

2.37 The UK Government and the UK Parliament are responsible for those areas that are essential to the integrity of the state and where all people across the UK benefit from a common approach. Key areas of responsibility reserved to the UK Parliament include defence and national security, macro-economic policy, foreign affairs, immigration, social security and pensions. Not only does this mean that the public benefits from the same levels of service across the UK, strengthening the UK's union, but it also enables the UK to benefit from economies of scale in relation to spending. This is explored further in Box 2A.

Box 2A: The UK Government's spending for Scotland

The UK Government is responsible for around £26 billion[17] of Scotland's annual spending. Welfare spending (including benefits, state pension and tax credits) accounts for almost two thirds (or £16 billion) of reserved spending for Scotland. The remaining £10 billion of UK Government spending for Scotland is allocated across a range of reserved functions and responsibilities.

Welfare – UK Government spending on benefits and pensions for people in Scotland is now around 2 per cent per head higher than the UK average,[18] having converged in recent years. This is £340 million higher each year than what Scotland would receive based on a population share.

Foreign policy – The UK has influence with international institutions and in world affairs to represent the interests of people and businesses in Scotland.

Defence – The UK Government spends around £40 billion[19] a year on defence to guarantee the safety and security of all UK citizens.

Tax collection – As highlighted in the recent paper *Scotland analysis: Business and microeconomic framework*, Scotland's share of the UK's tax collection costs are estimated by the Scottish Government at around £300 million per year. This compares to the Scottish Government's estimates for tax collection costs in an independent Scotland of between £575 million and £626 million, which is around double the current cost.

Scotland's spending policy flexibility

2.38 The Scottish Government is responsible for many of the key public services that are provided to people in Scotland. It can therefore take decisions that are more specifically related to Scottish circumstances. Its devolved responsibilities include many of the key levers relating to economic growth such as education, skills and infrastructure investment, as well as other key public services such as health, social care, policing, justice and housing.

2.39 The balance between reserved and devolved functions continues to evolve – additional responsibilities for public services (most notably railways) have been transferred to the Scottish Government since devolution, while the Scotland Act 2012 represents the biggest transfer of fiscal (tax and borrowing) powers from the UK Parliament in 300 years. Matters currently devolved comprise around 60 per cent[20] of Scotland's spending.

2.40 As part of the UK, the Scottish Government can rely on stable and secure levels of funding but has the flexibility to determine how services are provided in Scotland and how much of their budget is allocated to each area. This means that the Scottish Government has significant scope to determine the shape of Scotland's public services.

[17] Scottish Government, GERS 2011-12, March 2013. This is the total of identifiable and non-identifiable UK Government spending for Scotland in 2011-12.

[18] Institute for Fiscal Studies, Government spending on benefits and state pensions in Scotland, July 2013.

[19] UK Government, PESA 2013, July 2013.

[20] Scottish Government, GERS 2011-12, March 2013. The Scottish Government and Local Authorities were responsible for almost £39 billion of Scotland's £64 billion spending in 2011-12.

2.41 This policy flexibility allows the Scottish Government to focus on different priorities. For example the Scottish population is dispersed more widely and so transport spending tends to be relatively higher. Similarly, as fisheries form a larger part of Scotland's economy, spending in this area is higher. And Scottish Water is part of the public sector in Scotland whereas water services have been privatised in England and Wales. It is also as part of the UK that the Scottish Government is able to provide certain universal services free at the point of access. Box 2B examines some of these policy differences in greater detail.

Box 2B: Examples of the Scottish Government's spending policy choices

The allocation of public spending to the services under the control of the Scottish Government is for the Scottish Government to determine. This means that the Scottish Government is afforded significant flexibility to decide what policies to pursue and how to prioritise spending on these services.

In some of the examples below, the Scottish Government elected either to forego revenue from fees and charges, or to use its funding in a different way to other parts of the UK, making offsetting savings in other areas funded by the block grant.

Policing

The Police and Fire Reform (Scotland) Act 2012 brought together Scotland's eight regional police forces, the Scottish Police Services Authority and the Scottish Crime and Drug Enforcement Agency into a single Police Service of Scotland. At the same time, the eight fire and rescue services across Scotland were amalgamated into a single, new Scottish Fire and Rescue Service. This contrasts with the regional fire and policing structure in England and Wales.

Prescriptions and eye tests

In 2006, the Scottish Government elected to fund free eye tests for Scottish residents in an attempt to improve public health. In 2011, the Scottish Government abolished prescription fees. This followed successive reductions in prescription charges by Scottish Ministers in the three years preceding the abolition. The decision to end prescription charges brought Scotland in line with the approach previously adopted by the Welsh Government and Northern Ireland Assembly.

Education

Although the devolution of higher education in 1999 saw tuition fee regimes in Scotland and the rest of the UK develop differently, the decision by the Scottish Government to abolish the graduate endowment scheme that had existed since 2001 saw the reintroduction of free higher education in Scotland in 2008. However, while the UK Government has protected schools spending in England since 2010, the Scottish Government has not made this commitment.

Social care

Free personal care is available in Scotland for over 65s who have been assessed as needing care. Scotland is the only part of the UK to offer free personal care in care homes and in people's own homes.

The UK's integrated tax system

2.42 There are significant benefits to business and individuals of the UK's integrated tax system, as they can operate or live/work across the UK without having to deal with a number of separate systems and institutions. It also provides a robust and comparatively efficient way for the Government to collect tax, avoiding unhelpful tax competition within the UK and helping to minimise the opportunities for tax evasion and avoidance.

2.43 While the UK's integrated tax system is substantially unified, with the same taxes and rates largely applying across the whole of the UK, the devolution of certain tax powers (while retaining the integration and coherence of the overall system) can empower and enhance the accountability of devolved governments.

2.44 Under devolution it is possible to decide which tax powers to devolve in order to enhance accountability of the devolved administrations and bring economic benefits to the UK as a whole. There are no rules about which tax powers should be reserved and which devolved, but the UK Government has indicated that it will proceed with tax devolution only where this is supported by evidence, gains cross-party support, and would not be to the detriment of the rest of the UK. As with spending, the challenge is therefore to find the right balance between devolved and reserved responsibilities – and this balance can clearly evolve over time.

2.45 The Scottish Parliament is already responsible for council tax and non-domestic (business) rates, which usually fund slightly more than 10 per cent of the spending for which it is responsible (i.e. the spending by the Scottish Government and Scottish local authorities). The UK Government and Scottish Parliament established the Calman Commission in 2007 to consider, as one part of its remit, how to increase the financial accountability of the Scottish Government.

2.46 The Calman Commission's report highlighted the current benefits of the UK's unified tax system and the risks associated with having separate tax systems within the UK:

> "Were different tax systems to operate in Scotland compared to the rest of the United Kingdom, an overall increase in the governments' total administrative costs would be created as two tax systems would have to be operated. It would also create new compliance costs to individuals and businesses operating across both tax jurisdictions as they would have to separate and determine their liabilities in those two tax systems. In other words, a unified UK tax system represents an existing administrative efficiency. The evidence is that the administrative costs associated with the tax system in the UK compare favourably with international competitors."

2.47 Similar observations have been made by the Institute of Chartered Accountants Scotland (ICAS)[21] as well as in an Ernst and Young corporate tax survey[22] of Scottish business leaders, while for ease of paying taxes the World Bank[23] ranked the UK ahead of every G8 country except Canada, and every EU country except Luxembourg, Denmark and Ireland.

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[21] Institute of Chartered Accountants of Scotland, Scotland's tax future; the practicalities of tax devolution, November 2012.

[22] Ernst and Young's Scotland corporate tax survey report "Grasping the thistle".

[23] World Bank's 2012 'Doing Business' survey.

2.48 The Calman Commission's recommendations therefore balanced the existing strengths of the UK's unified tax system against the potential benefits of devolving tax powers. The report considered where devolving tax policy might substantially increase revenue-raising responsibility and/or be an effective additional fiscal lever in existing devolved spending areas, taking into account the mobility of taxes in relation to the risk of tax competition and avoidance, as well as the administrative impact on business, individuals and government.

2.49 Following a rigorous assessment of the report, virtually all of the key recommendations were included in a Scotland Bill and are now being implemented following the Scotland Act 2012. This will increase the autonomy and financial accountability of the Scottish Government and Scottish Parliament while ensuring that the UK's tax system remains integrated and coherent.

2.50 For example, the partial devolution of income tax, whereby the Scottish rate of income tax remains within the UK's income tax system, provides the Scottish Government with the ability to affect overall tax and spending in Scotland but minimises costs and complexity. In particular, the income tax structure (such as personal allowances and thresholds) remains consistent across the UK, which avoids businesses running separate payroll systems and limits additional tax collection costs.

2.51 The two fully devolved taxes (stamp duty land tax and landfill tax) apply to transactions or activities that relate to policy responsibilities of the Scottish Parliament (housing and planning, and waste management respectively) and have a clear location associated with them. This also keeps it simple for business and individuals and minimises any increased risk of tax evasion and avoidance, which helps to avoid the need for higher government spending on compliance.

2.52 This is a key difference between devolution and independence. While selected taxes can currently be devolved in a way that benefits Scotland without adversely affecting the UK as a whole, independence would ultimately lead to two completely separate and potentially competing tax systems.

Scotland's tax policy flexibility introduced with the Scotland Act 2012

2.53 The Scotland Act 2012 transfers significant tax powers to the Scottish Parliament. Alongside these tax powers, the Act also provides the Scottish Government, for the first time, with commensurate capital borrowing powers to support further investment in infrastructure. A summary of all the Scotland Act 2012 fiscal powers is provided in Box 2C.

2.54 The Scotland Act 2012 includes full devolution of stamp duty land tax (SDLT) and landfill tax as they apply in Scotland and partial devolution of income tax. Full devolution means that the Scottish Government will be responsible for determining the tax base and the rates. Or in other words, they will be responsible for determining when the tax applies and how much will be paid, as they already are in relation to council tax and business rates. Partial devolution gives the Scottish Government the responsibility for rate-setting, with the tax base (such as income tax bands) remaining the responsibility of the UK Government.

2.55 In terms of the value of revenues raised, the income tax powers are by far the most significant. The OBR estimates that the Scottish Government will raise £5.0 billion in the first year of operation (2016–17) compared to a combined £0.6 billion from SDLT and landfill tax. As part of the Scotland Act 2012, an element of income tax is being devolved to the Scottish Parliament from April 2016. Specifically, each of the UK rates (basic, higher and additional) is to be reduced by 10p in the pound for Scottish tax-payers, and will be replaced by a Scottish rate of income tax set annually by the Scottish Parliament. Setting the Scottish rate at 10p would lead to overall income tax rates in Scotland remaining aligned with the rest of the UK, while a rate of 11p or 9p would lead to higher or lower rates, respectively, being paid in Scotland.

2.56 This replaces (and extends) the Scottish variable rate (SVR), which gave the Scottish Government the power to vary the basic rate of income tax in Scotland by up to three pence in the pound. While this provided the Scottish Government with the ability to vary overall levels of tax and spending in Scotland better to reflect Scottish circumstances, the power was never used. However, there are a number of advantages in the design of the new system. In addition to requiring the Scottish Government pro-actively to set the Scottish rate each year, these new powers are being implemented in such a way that the Scottish Government's funding will be linked to the performance of the Scottish economy.

2.57 Specifically, even if the Scottish Government decides to leave overall income tax rates aligned with the rest of the UK, Scotland will benefit (compared to current arrangements) if the income tax base in Scotland grows faster than in the UK, but will be less well off if this tax base grows more slowly. This further incentivises the Scottish Government to create the conditions for growth in the economy, while continuing to shield Scotland from UK-wide shocks that the UK Government is better placed to manage.

2.58 In advance of income tax powers being devolved, stamp duty land tax and landfill tax are being fully devolved to the Scottish Parliament from April 2015. HMRC will therefore disapply these UK taxes in Scotland, with the Scottish Parliament responsible for deciding whether, and if so how, to legislate for replacement Scottish taxes.

2.59 While the revenues generated by these taxes are relatively modest (particularly in comparison with the devolved income tax powers) they will provide the Scottish Government with new fiscal levers in areas of policy responsibility that are already devolved (housing and planning, and waste management respectively). This will enable the Scottish Government to balance, for example, environmental priorities against revenue raising, thereby increasing their accountability.

Box 2C: The Scotland Act 2012 tax and borrowing powers

From Royal Assent:

- Existing UK-wide taxes can be devolved and/or new Scottish taxes can be created by order-making process in both the UK and Scottish Parliaments.

From April 2015:

- full devolution of **stamp duty land tax** and **landfill tax**;
- **borrowing powers for capital spending** set at an additional 10 per cent of the Scottish Government's capital DEL budget each year (which equates to capital borrowing of £296 million in 2015-16 as set out in the recent Spending Round) within an overall limit of £2.2 billion;
- the Scottish Government can utilise a **cash reserve** if devolved tax receipts are lower than forecast. In addition to using an element of devolved tax revenues to build up the reserve, the Scottish Government can also make discretionary payments from their existing budgets (from June 2011 to June 2016) in order to support the transition to the new system;
- **borrowing powers for current spending** if devolved tax receipts are lower than forecast and there are insufficient funds in the cash reserve to cover the shortfall. This is limited to £200 million per year up to an overall limit of £500 million.

From April 2016:

- **Income tax** will be partially devolved. Each of the UK rates (basic, higher and additional) is to be reduced by 10p in the pound for Scottish tax-payers, and will be replaced by a Scottish rate of income tax set annually by the Scottish Parliament. There will be a two or three year transitional period during which the UK Government will retain the forecasting risk.

2.60 To help the Scottish Government manage variation between devolved tax forecasts and actual receipts, a cash reserve can be built up in good years and utilised when tax revenues are lower than forecast. If there are insufficient funds in the cash reserve to deal with any shortfall, the Scottish Government also has access to limited borrowing powers for current spending.

2.61 Alongside the introduction of these fully devolved taxes in April 2015, the Scottish Government will also gain borrowing powers for capital spending to support infrastructure projects.

2.62 This package of new powers mean that the Scottish Government will have the ability to vary the levels of tax and day-to-day spending in Scotland, as well as having more flexibility to decide when and how much to invest in capital projects. While the majority of public services are currently devolved (health, education, transport, housing, policing etc) the Scottish Government is currently delivering public services within a fixed budget.

2.63 The devolution of tax powers in the Scotland Act 2012 will mean that the Scottish Government will be taking decisions over both tax and spending, which therefore empowers the Scottish Parliament while making the Scottish Government more accountable for raising funds as well as for spending them.

2.64 As part of that enhanced accountability, under the arrangements set out in the Scotland Act 2012, the Scottish Government will be able to decide whether they want to retain the same level of existing public services (essentially by setting similar rates of tax to the rest of the UK) or to vary this by increasing or decreasing certain taxes. This therefore enables the Scottish Government to further shape Scotland's tax and spending to reflect the needs and requirements of the people in Scotland.

Chapter 2 Conclusion

2.65 Scotland's tax and spending is supported by the UK's integrated economy and fiscal model:

- the Scottish economy generates slightly lower per capita onshore tax revenues than the UK average, while Scotland benefits from public spending that is consistently 10 per cent higher than the UK average;
- while Scotland's onshore fiscal balance is therefore weaker than the UK's onshore public finances, the allocation of a geographical share of North Sea tax revenues closes this gap. However, there is no consistent fiscal surplus in Scotland compared to the UK as a whole.

2.66 The pooling and redistribution of tax revenues across the UK enables Scotland to exchange volatile North Sea revenues for stable and secure levels of funding:

- on average Scottish tax receipts including a geographic share of the North Sea have varied up or down by 6.1 per cent each year while, for the UK as a whole, the average annual variation in receipts is significantly lower, at 3.7 per cent. This increased volatility in Scotland is driven by offshore revenues, which on average have varied by 30 per cent from year to year;
- through pooling and redistributing these revenues across the UK, public spending in Scotland (in addition to being around 10 per cent higher than the UK average) has varied by around 2.8 per cent each year, which is similar to the equivalent UK average of 3.0 per cent.

2.67 Within this integrated fiscal model, Scotland benefits from UK-wide services provided by the UK Government while the Scottish Government has significant policy flexibility to deliver devolved services:

- the UK Government and the UK Parliament are responsible for those areas that are essential to the integrity of the state and where all people across the UK benefit from a common approach, such as defence and national security, macro-economic policy, foreign affairs, immigration, social security and pensions;
- the Scottish Government has significant policy responsibility for many of the key levers relating to economic growth (such as education, skills and infrastructure investment) and for other key public services such as health, social care, policing, justice and housing. The Scottish Government also has complete flexibility over how it uses its funding to deliver devolved services;
- through the implementation of the Scotland Act 2012, new tax and borrowing powers are being devolved to the Scottish Parliament. This will enable the Scottish Government to further vary the overall levels of tax and spending in Scotland.

Chapter 3:
The Border Effect

In the event of a vote for independence, an international border would be created between an independent Scottish state and the continuing UK. Over time this is likely to lead to differences in tax and welfare policy, and regulatory and administrative regimes. Over the longer-term, some business networks might end as a result of economic, historical and cultural ties being weakened.

Collectively these changes would be expected to trigger a "border effect": international evidence shows that flows of trade, labour and capital are much larger between two regions of the same country than between two (otherwise similar) regions of two different countries. This effect occurs even when there is no physical border between countries and even where trade agreements and structures, such as the European Single Market, are in place. While historical and cultural ties between Scotland and the continuing UK will prevent an immediate fall off in flows, evidence of previous separations points to the erosion of these ties as time passes. Combined with regulatory divergence, Scottish independence would lead to barriers to trade and obstacles to labour and capital mobility. Even if the Scottish Government's ambition of a formal sterling union between an independent Scotland and the continuing UK were to come to fruition, the long term effect of this arrangement on trade flows and labour mobility could still be considerable.

Replacing the current relationship between Scotland and the rest of the UK with a relationship similar to that of euro area Member States would create significant headwinds to Scottish growth. Estimates suggest that the movement of people between Scotland and the rest of the UK could fall below 10,000 per annum in both directions, compared with average rates of over 40,000 people per annum in recent years. As an impediment to trade flows, the border is likely to reduce the level of real income in the Scottish economy by four per cent after 30 years. While Scotland can look to new markets to offset this drag on growth, it is not clear whether this would compensate for the decline in trade with the continuing UK.

The "border effect": impact of independence on economic integration

Characterising the potential border between an independent Scottish state and the continuing UK

3.1 In the event of Scottish independence, an international border would be created between an independent Scottish state and the continuing UK. This would create barriers to cross-border transactions and lead to increased costs for businesses and households operating or travelling across the border. These effects would cumulate across the economy and trigger a "border effect" – the barrier to flows of trade, labour and capital created by the weakening of economic integration.

3.2 The extent of these barriers and costs, and their overall impact on the economy, would depend on the exact nature of the international border that would be created between an independent Scottish state and the continuing UK. Characterising this border is complicated by the fact that many aspects of the relationships between an independent Scottish state and the continuing UK would be subject to policy choices and negotiations, and cannot be known prior to the referendum. As described in the benefits of integration in Chapter 1, countries try to mitigate the effects of borders by pooling aspects of sovereignty in order to generate greater economic integration. A recent example is the mutual recognition of travel visas between the UK and Ireland. These same incentives to reduce the effect of the border would exist for an independent Scotland and the continuing UK although their ability to do so may be limited. However, the creation of a border would still create barriers to economic integration that do not currently exist and would require policy choices in order to mitigate these barriers.

3.3 The Scottish Government's ambition is that an independent Scotland would be a member of the European Union, the European Single Market and of the Common Travel Area[1] and that it would continue to use sterling as part of a formal currency union with the continuing UK. But a range of uncertainties exists around the feasibility of these ambitions and the time-frame over which they could be achieved. As discussed in *Scotland analysis: Devolution and the implications of Scottish independence,* in the event of a vote in favour of leaving the UK, in the eyes of the world and in law, Scotland would become an entirely new and separate state. The details of the currency issue were discussed in *Scotland analysis: Currency and monetary policy*; questions around membership of the European Single Market and of the Common Travel Area will be discussed in forthcoming publications.

3.4 This analysis uses the Scottish Government's ambition as the baseline for characterising the potential effects of the border between an independent Scottish state and the continuing UK. In practice the UK Government considers it unlikely that the proposals would be agreed and could be made to work. It is important to stress that, of all the potential scenarios that could materialise in the event of Scottish independence, the conclusion of successful negotiations with the continuing UK and the EU to deliver these proposals would provide a model for independence that is one of the closest to existing conditions within the UK. Any further changes would be likely to create additional costs

[1] The Common Travel Area (CTA) is the free movement zone that allows people to travel between the UK, the Republic of Ireland, the Isle of Man and the Channel Islands without internal borders for immigration purposes. The Scottish Government's position is that an independent Scottish state would join the European Union. All members of the European Union are legally obliged to join the Schengen Area unless they negotiate an opt-out (the UK and Ireland are the only EU members with an opt-out from the Schengen agreement). It is not clear whether an independent Scottish state would manage to secure such an opt-out. Membership of the Schengen Area is not compatible with membership of the CTA.

to households and businesses, such as transaction costs from using a different currency, as described in Box 3A. As such, the baseline scenario assumed for the purposes of this chapter has a more limited impact on economic integration. The potential effects on the flows of trade, labour and output set out in this chapter should therefore be thought of as being at the lower end of likely outcomes in the event of independence.

Box 3A: Currency options and transaction costs

The effects outlined above are likely to be relevant no matter which format Scottish independence takes. However, as noted in *Scotland analysis: Currency and monetary policy*, there are a variety of currency regimes which could be adopted. Any one of these options could be subject to a form of exchange rate risk if markets lack confidence in the regime. This could raise the cost of capital in Scotland relative to that in the rest of the UK. If Scotland issued a new currency, then a further effect is likely to present itself through exchange-rate volatility. Dell'Ariccia (1999) finds exchange rate uncertainty has a small but significant negative effect on international trade between 15 EU states and Switzerland: the estimates find that total elimination of exchange rate variability in 1994 could have increased bilateral trade among these countries by between five and 12 per cent.[1]

[1] *Exchange rate fluctuation and trade flows: evidence from the European Union*, Dell'Ariccia (1999).

3.5 Regardless of the main characteristics of an independent Scottish state, all possible models of independence would constitute a fundamental change in the economic relationship between Scotland and the rest of the UK. The UK Government's *Scotland analysis: Business and microeconomic framework* paper explained that independence would create new costs and barriers to transactions (trade, labour and capital flows) between an independent Scottish state and the continuing UK. Box 3B highlights some of the costs identified in the *Scotland analysis: Business and Microeconomic framework* paper.

Box 3B: Administrative and transaction costs of independence – Summary from the *Scotland analysis: Business and microeconomic framework*

Administrative and Transaction costs: Trade

The UK domestic market guarantees a free flow of goods and services. Companies which operate across the UK are generally subject to the same regulations and requirements. This ensures a level playing field and further reduces the costs of intra-UK trade. The creation of a border could impose costs on firms and also consumers which are likely to reduce trade across the border significantly.

For example: Scottish firms who sell or buy their products in the rest of the UK do not incur additional costs typically associated with exporting abroad, such as the cost of custom procedures. However, if procedures similar to the EU are introduced there could be an increase in costs for firms of trading across the border. For example, in the EU where trade exceeds £250,000 per annum businesses need to complete a monthly Intrastat declaration.

Administrative and Transactions Costs: Labour

A single regulatory framework between Scotland and the rest of the UK creates a unified national labour market and a more transparent and efficient allocation of resources. Workers, employees and employers across the UK are ensured a common set of rights and responsibilities, which aids labour mobility and ability of the UK to respond to economic shocks. Independence would pose a risk to this labour mobility. For example:

- Differences in labour market regulations in an independent Scotland could reduce labour market mobility, which in turn would reduce the efficiency of the labour market to the detriment of Scotland and the rest of the UK's macroeconomic performance; and
- An independent Scotland may choose or be obliged to join the Schengen area as a condition of EU membership. Membership of the Schengen area would require the removal of border controls between an independent Scotland and other members of that area; and the establishment of border control with other EU Member States that were outside Schengen. The Scottish Government has indicated that it would wish to remain in the CTA,[1] rather than join the Schengen area. The UK Government's paper, *Scotland analysis: Devolution and the implications of Scottish independence* notes that membership of the CTA would be subject to negotiation with the continuing UK and all existing CTA members and that membership of the Schengen area is not compatible with membership of the CTA. Should an independent Scottish state become part of either the CTA or the Schengen area, it would need to align its migration policy in certain aspects with the other members of those areas. These issues will be considered in a future paper in the Scotland analysis series.

[1] Deputy First Minister Nicola Sturgeon's statement to Scottish Parliament on an independent Scotland's continuing membership of the EU, 13 December 2012.

Administrative and Transactions Costs: Capital

Scotland is a favourable location for Foreign Direct Investment (FDI). In 2012 it attracted the second most FDI projects in the UK and would have ranked twelfth in Europe, above all the comparable independent countries except Ireland. This attractiveness is enhanced by being part of the UK. It expands Scotland's domestic market and improves its access to skilled labour. The Ernst and Young 2013 International Executive Survey provides a detailed analysis of the relative attractiveness of the UK:

- Within the UK, 84 per cent of international investors surveyed thought the stable political environment was attractive, placing it as the second highest rated aspect after quality of life, diversity, culture and language; and
- The UK's market size generally emerged as highly influential in a ranking of the most important factors for international investors when evaluating the UK as a potential investment location. Some foreign investors might be deterred from investing in an independent Scotland if they judge that independence had increased the costs of supplying the wider UK market.

Assessing the impact of a border on economic integration between Scotland and the rest of the UK

Evidence of the "border effect"

3.6 International evidence shows that flows of trade, labour and capital are much larger between two regions of a same country than between two (otherwise similar) regions of two different countries. The most well known example of this effect is trade between the US and Canada. After controlling for the effects of differences in regional incomes and distance between the various regions in the two countries, McCallum (1995)[2] concluded that Canadian provinces traded around 20 times more with each other than with US states of a similar size and proximity. The size of this result prompted further studies, which reduced the size of the estimated effect, but the one of the most widely cited study concludes that the border between the US and Canada reduces trade by 44 per cent.[3] This is the border effect – the clear tendency to trade more *within* countries rather than *across* borders.

3.7 This finding has since been replicated many times and is a well established phenomenon in global trade patterns. The empirical estimates vary in size but are typically large, suggesting that trade within a region or state can be anywhere between two and 22 times larger than trade across an international border. More recent estimates are nearer the lower end of this range but still significant. For example, *Anderson and van Wincoop (2003)*[4] conclude that borders reduce trade by a factor of 5.4, in other words the analysis suggests that we should expect to see a trade fall of around 80 per cent when comparing trade across a border to trade without the border. Box 3C summarises the evidence for the border effect.

3.8 The border effect is not limited to trade flows and has also been shown to reduce labour and capital flows. The empirical estimates are again very large. For example, migration is found to be one hundred times more likely within Canada than it is from the USA to Canada (Helliwell 1997).[5] Iwamoto and van Wincoop (2000)[6] investigate the border effect in the context of capital flows. They note that issues such as transaction costs, regulatory

[2] *National borders matter: Canada-US regional trade patterns*, McCallum (1995).

[3] *Gravity with Gravitas: A solution to the Border Puzzle*, Anderson and van Wincoop (2003).

[4] *Gravity with Gravitas: A solution to the Border Puzzle*, Anderson and van Wincoop (2003).

[5] *National Borders, Trade and Migration*, Helliwell (1997).

[6] *Do borders matter? Evidence from Japanese Regional net Capital flows*, Iwamoto and van Wincoop (2000).

differences, language barriers and different accounting practices all reduce the incentive to take on foreign assets.

Box 3C: Estimates of the "border effect" on trade

McCallum (1995)[1] made the original contribution to the border effect literature by looking at the trading patterns of US states and Canadian provinces using a model of trade flows (explained in detail in Annex C). The size of the estimated effects in McCallum's study gave rise to a large number of research papers which have looked to estimate the effect of international borders on trade.

Wei (1996)[2] looked at a panel of OECD countries to identify the effect of home bias. His central estimate implied that an OECD country trades two and half more times with itself than with a trading partner controlling for distance and size. Using the 11 EU states and the same approach Nitsch (2000)[3] found intra-country trade to be 10 times larger than inter-country trade.

Further Wolf (2000)[4] found that the border effect does not limit itself to the borders between sovereign states. When looking at whether there was a bias in intra-state trade relative to inter-state trade in the US, he found intra-state trade was around three times higher than interstate trade.

Anderson and van Wincoop (2003)[5] argue that McCallum's estimates fail to take account of the fact that relative as opposed to absolute trade costs are what matter for trade between regions. The intuition being that it is more attractive to trade with a country or region that has low trade costs relative to the average trading costs across all countries and regions (including regions in the same country). Taking this into account they found that international borders reduce trade by a factor of 5.4. More recent studies include an industry level study in Spain, by Llano and Requena (2008)[6] who found that intra-regional trade in Spain exceed intra-national trade by a factor of 30 and furthermore, that intra-national trade in Spain exceeds international trade by a factor of 10. Coughlin and Novy (2012)[7] perform a similar analysis for the USA comparing intra-state trade with inter-state trade and then comparing that with international trade. They find a similar result that there is a larger border effect for trade between states than for trade between states and other countries. Pacchioli (2011)[8] considers the extent of home bias in EU trade, finding that internal trade in EU Member States is three to four times greater than internal trade in US states.

Head and Mayer (2013)[9] find the average border effect to be a multiple of around seven, implying that trade within a country is around 85 per cent higher than trade across an international border between countries.

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1 *National borders matter: Canada-US regional trade patterns*, McCallum (1995).

2 *Intra-national versus International trade. How stubborn are nations in Global Integration*, Wei (1996).

3 *National Borders and International Trade: Evidence from the European Union*, Nitsch (2000).

4 *Intranational Home Bias in Trade*, Wolf (2000).

5 *Gravity with Gravitas: A solution to the Border Puzzle*, Anderson and van Wincoop (2003).

6 *The border effects in Spain, an industry-level analysis*, Requena and Llano (2006).

7 *Is the International Border Effect Larger than the Domestic Border Effect? Evidence from U.S. Trade*, Coughlin and Novy (2012).

8 *Is the EU internal market suffering from an integration deficit? Estimating the 'home-bias effect'*, Pacchioli (2011).

9 *Gravity Equations: Workhorse, Toolkit and Cookbook*, Head and Mayer (2013).

What happens when a border is created? Understanding the transition effects

3.9 These estimates of the border effect are in many cases based on countries that have had a long separate history, but they give a clear indication of the likely result as the effects of independence begin to emerge. Indeed, the evidence suggests that the strong links that currently exist between Scotland and the rest of the UK would be likely to erode over time in the event of independence. Reorientation towards new markets would be important in ensuring the effect of the border on trade flows is minimised.

3.10 In the short term, historical and cultural ties between Scotland and the rest of the UK may mean that flows initially remain similar to the pre-independence level. In the event of Scottish independence, it would take time for the close business networks and cultural and historical links that currently exist between Scotland and the rest of the UK to dissolve, and for the full impact of introducing an international border between the two partners to materialise. Proximity, language and cultural links are likely to be important for the trade of goods that depend critically on relationships between customers and firms as all these factors make trading across a border simpler.[7] While this is likely to dampen any effect of the border over a shorter horizon, changes that have a material effect on the ability of Scottish and the rest of the UK's businesses to trade with each other (see, for example, the discussion in Box 3B) would make it more likely that the existing networks would dissolve as time passes.

3.11 Experience of previous separations can help assess the process of erosion of existing trade links. A study by Head, Ries and Mayer (2010)[8] found that trade flows between countries with strong historical and cultural ties (for example, colonial links) which had been severed, remained buoyant in the short run but reduced by 65 per cent in the four decades between 1948 and 2006, providing initial evidence of the effect of time on strong historical and cultural ties.

3.12 International experiences of country separation – such as the dissolution of Czechoslovakia in 1993 and the independence of the Irish State in 1922 – can help shed light on this transition process although it is important to recognise that no two separations are the same:

- The dissolution of Czechoslovakia happened at the same time as the transition from a planned economy to a market economy, implying important changes to patterns of trade for both countries. There were also marked differences in living standards and productivity between Slovakia and the Czech Republic, which were an important causes of the collapse of the monetary union and resulted in Slovakia experiencing a long period of catching up with the Czech Republic over the 1990s and the 2000s. See Box 3D for further details; and
- In 1922, Ireland's GDP per capita was around half that of the UK as a whole. and was largely agriculture, Independence also took place prior to an important wave of trade intensification, globally and at the European level. See Box 3E for further details.

3.13 Importantly for Scotland, these two case studies provide further evidence that institutional and regulatory divergence as well as the dissolution of business networks and historical links can happen when a separation occurs, with negative consequences for economic integration and bilateral flows of capital, labour and trade. A weakening of the large and dynamic flows that currently exist between Scotland and the rest of the UK would create risks for Scotland, given its current exposure to trade with the rest of the UK.

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[7] *The Institutional Determinants of bilateral trade patterns*, De Groot et al (2004). This is built on an argument focussed on networks first described by Rauch. See: *Business and Social Networks in International Trade*, Rauch (2001).

[8] *The erosion of colonial trade linkages after independence*, Head, Mayer and Ries (2010).

Box 3D: Case study of Czechoslovakia

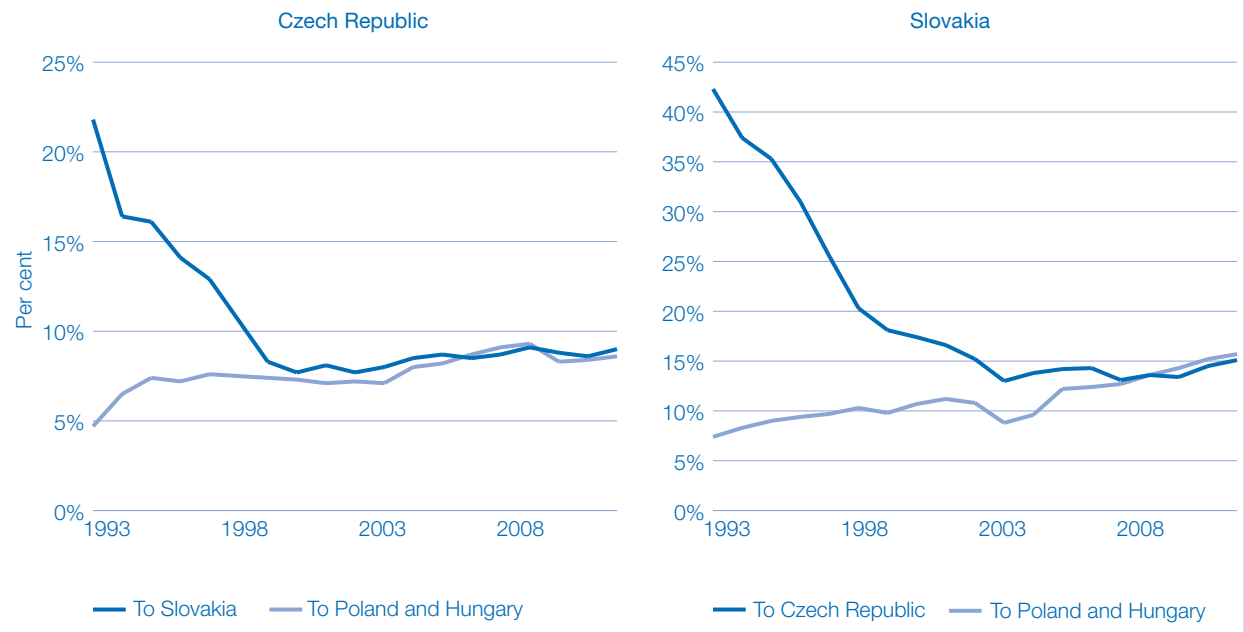
On 1 January 1993, Czechoslovakia split into two separate states, the Czech Republic and Slovakia. The immediate aftermath of the split was characterised by two key choices. First, the Czech and Slovak Customs Union (CSCU) was formed to minimise the economic cost of a decline in economic ties between the countries. Second, the states attempted to preserve monetary and economic union.

Monetary union was conditional, either side could withdraw if fiscal deficits or transfers of private capital between the two countries exceeded preset limits, or the shared monetary policy committee failed to agree a common policy. But with an uncertain political commitment and no fiscal transfers, the currency union lacked credibility. Thirty-three days after independence the monetary union failed.

Trade data for the Czech Republic and Slovakia show that the share of bilateral trade in total trade has fallen dramatically for both countries in the first decade following the dissolution of Czechoslovakia.[1] Between 1993 and 2003, the share of total Czech exports going to Slovakia fell from 22 to eight per cent, and the share of total Slovakian exports going to the Czech Republic fell from 42 to 13 per cent. The value of bilateral trade remained broadly flat for both countries over the same period.

Central and Eastern European economies experienced fundamental reforms through the 1990s, abandoning the Council for Mutual Economic Assistance and transitioning from a planned economy to a market economy, and these trends in trade are likely to capture other effects, most notably the opening to trade with the rest of the world. However, as shown in the chart below, the share of trade with other neighbours from the Eastern bloc held up much better, suggesting that opening to trade with Western economies was only part of the explanation for the collapse in the share of bilateral trade between the Czech Republic and Slovakia.

Share of total exports

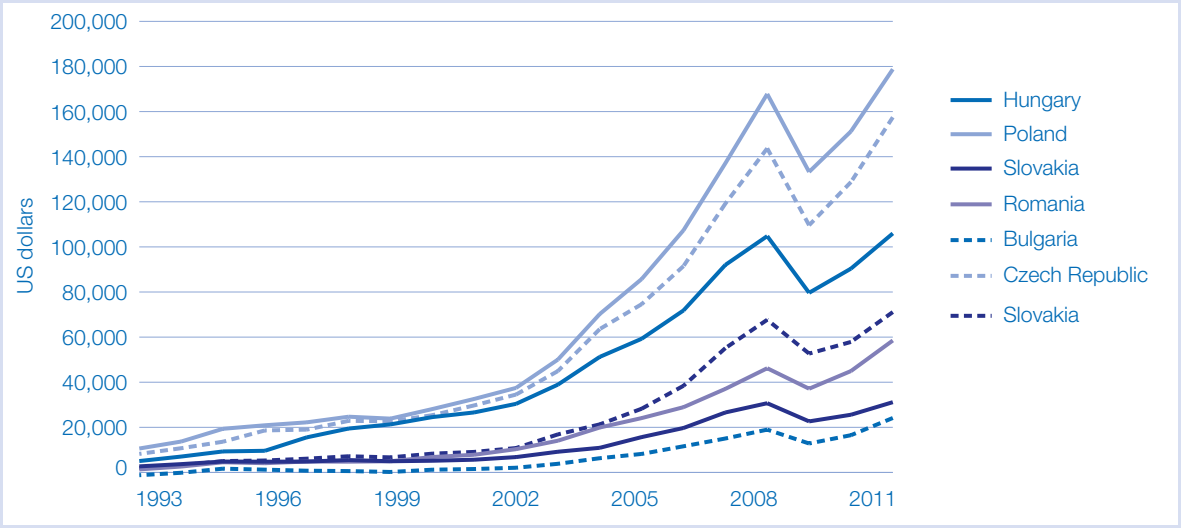


Source: International Monetary Fund, Direction of Trade Statistics (IMF dots)

[1] From the IMF Direction of Trade Statistics, starting in 1993.

Furthermore, the chart below shows that since 1993, the increase in trade in the Czech Republic and Slovakia has not been markedly different from the trade performance of other Eastern European states, all experiencing strong growth from a low level in 1993.

Value of exports to the rest of the world for selected Eastern European countries



Source: International Monetary Fund, Direction of Trade Statistics (IMF dots)

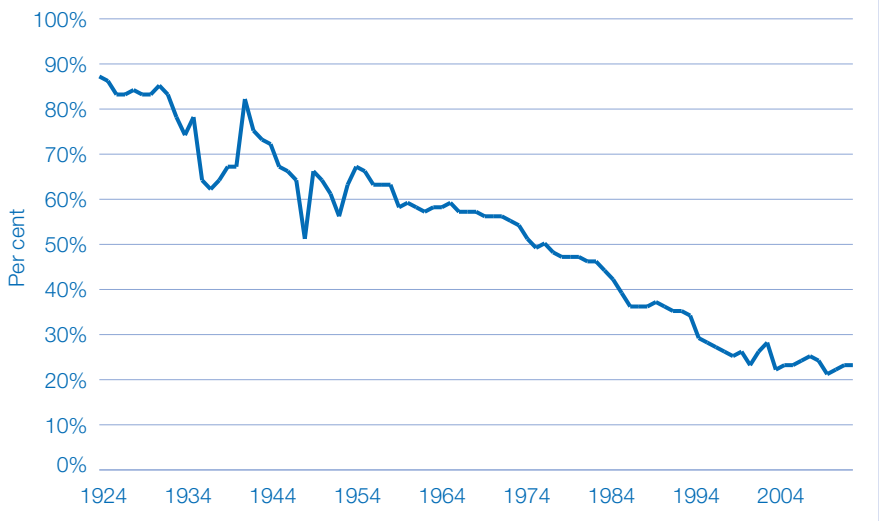
Kaminski and Smarzynska (2003)[2] note that a number of new obstacles to trade were created along with the creation of two states – separate currencies, administrative procedures required to control origin of traded goods, and "creeping-in" of different technical standards. The quick disappearance of monetary union exacerbated the decline in trade, as did the devaluation of the Slovak koruna against the Czech koruna and the establishment of a complicated payment system. Faced with a large deficit, Slovakia introduced other barriers to imports from the Czech Republic, including import taxes, quotas on imports of non-alcoholic beverages and beer, and burdensome technical certification procedures.

[2] *Never too late to get together again: Turning the Czech and Slovak Customs Union into a stepping zone to EU Integration*, Kaminski and Smarzynska (2003).

Box 3E: Case study of Ireland

In 1922 the 26 counties of the Irish Free State gained political independence, having been part of the UK since the 1800 Act of Union. At that time, Ireland traded almost exclusively with the UK – 90 per cent of Ireland's total trade was with the UK.[1] This continued to be the case in the first few years following independence. However, the "economic war" in which Ireland introduced protectionist measures saw the UK's share of total Irish trade drop rapidly from around 90 per cent to 65 per cent (see chart below). After rebounding to near pre-protectionist levels after 1938, the UK's share of Ireland's trade has since been in long-term decline, despite a UK-Irish free trade agreement being signed in 1965.[2] This decline may have accelerated slightly after 1973 when both the UK and Ireland entered the European Economic Community causing Irish trade to further divert to other European countries. The breaking of the punt-sterling link in 1979 did not appear to have any significant effect on the pattern of trade between the UK and Ireland.[3] For comparison, the share of Scottish exports accounted for by the rest of the UK is approximately 60 per cent.

UK Share of Irish Trade



Source: Thom & Walsh, 2001

Irish independence is also likely to have reduced Irish trade with the UK, first through the consequences of the initial economic war, and then through the progressive divergence between the Irish and UK economies, despite institutional links such as the Anglo-Irish free trade agreement. Thom and Walsh (2001)[4] point to the gradual weakening of social and cultural ties as well as the emergence of differences in legal systems both contributed to the decline of trade between Ireland and the UK.

Further evidence on how the passage of time has weakened the ties with the UK comes from Fitzsimmons, Hogan and Neary (1999)[2] who model trade flows between Northern Ireland and the Republic of Ireland. While they find trade between the two remains higher than is predicted by their model, trade between Northern Ireland and the Republic of Ireland is of a magnitude lower than that estimated for Scotland by the model in this paper.

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1 *The effect of a common currency on trade: Ireland before and after the Sterling link*, Thom and Walsh (2001).

2 *The effect of a common currency on trade: Ireland before and after the Sterling link*, Thom and Walsh (2001).

3 *The effect of a common currency on trade: Ireland before and after the Sterling link*, Thom and Walsh (2001).

4 *The effect of a common currency on trade: Ireland before and after the Sterling link*, Thom and Walsh (2001).

5 *'A Gravity model for North-South Trade'*, Fitzsimmons et al (1999).

How big could the border effect be?

3.14 One way to estimate the likely effect of establishing an international border between Scotland and the UK is to compare current levels of trade and migration with the levels of trade and migration between euro area Member States. The relationships between euro area countries have many of the same characteristics as the Scottish Government's proposed model of Scottish independence and its relationship with the continuing UK: they are members of the EU's single market, with a free movement of people, share a common currency, and in a number of cases a common border and language, and social and cultural links are often strong.

3.15 As already discussed, earlier Scotland analysis papers have already established that such an outcome is unlikely. In particular, the *Scotland analysis: Currency and monetary policy* paper explained that the economic rationale for the UK to agree to enter into a formal sterling union with a separate state is not clear. But even if the continuing UK were to agree to a formal sterling union, trade and migration flows between an independent Scotland and the continuing UK might be expected over time to resemble the flows between euro area Member States. A summary of the approach used to calculate the border effect is described in Box 3F with a more detailed explanation set out in Annex C. In brief, the approach is to look at the effect of replacing the current relationship between Scotland and the rest of the UK with a relationship similar to that of euro area Member States, after allowing for differences in economic size, distance to markets and language.

3.16 The results presented in this paper are based on the lower end of estimated effects to reflect the huge uncertainty around the future path of Scotland as an independent economy as well as the close cultural and social ties between Scotland and the UK. Taking these factors into account, the results remain in line with those obtained in other empirical studies. Actual outcomes will depend critically on how policies adopted by the two states affect the ease of trading across the border, and hence the rate at which current high levels of integration might be eroded.

3.17 Taking the lower end of the estimates suggests that exports from an independent Scotland to the continuing UK would be 83 per cent lower after 30 years than if Scotland were to remain a part of the UK. Exports from the rest of the UK to Scotland would be 77 per cent lower. Migration flows could fall below ten thousand per annum in both directions, compared with average rates of over 40,000 people per annum in recent years.

Box 3F: Estimating the trade and migration effects if Scotland and the rest of the UK were to adopt a euro area-like relationship – an empirical study

The first step is to identify how the patterns of trade and migration between different euro area Member States are influenced by the characteristics of any pair of euro area partners. This is done by estimating a "gravity" model of trade. Put simply, these models estimate trade flows based on the economic size of the countries involved, the distance between them and other factors relevant to trade, such as the use of a common language.

The estimated effects of each characteristic are then applied to Scotland and the rest of the UK (given their size, proximity and common language) to calculate what trade and migration flows could be if the relationship were similar to that between euro area Member States. A more detailed explanation of the methodology can be found in Annex C.

The calculated flows can then be compared with those currently observed between Scotland and the rest of the UK. The difference between the flows gives an idea of the possible order of magnitude of the effect of the border under the current proposals from the Scottish Government.

Results from estimating the trade gravity equation

	Pooled Ordinary Least Squares
(1) Range of Predicted Values for Scottish Exports to rUK 2002-2011 (£ billion)	4.5-5.5
(2) Actual Value of Scottish Exports to rUK 2002-2011 (£ billion)	32.5
1-[(1)/(2)] Range of Implied Border Effect	83%-86%
(1) Range of Predicted Values for rUK Exports to Scotland 2002-2011 (£ billion)	8.0-10.0
(2) Actual Value of rUK Exports to Scotland 2002-2011 (£ billion)	42.6
1-[(1)/(2)] Range of Implied Border Effect	77%-81%

Note: Equation fully specified in the Annex
Source: HMT calculations

Results from estimating the migration gravity equation

	Pooled Ordinary Least Squares
(1) Range of Predicted Values for Scottish Migration to rUK 2002-2010	4,292-8,158
(2) Actual Value of Scottish Migration to rUK 2002-2010	43,809
1-[(1)/(2)] Range of Implied Border Effect	81%-90%
(1) Range of Predicted Values for rUK Migration to Scotland 2002-2010	2,346-4,555
(2) Actual Value of rUK Migration to Scotland 2002-2010	52,195
1-[(1)/(2)] Range of Implied Border Effect	91%-96%

Note: Equation fully specified in the Annex
Source: HMT calculations

The effect on living standards

3.18 Barriers to the flow of goods and labour between economies are likely to reduce a country's level of output and lower living standards (see Box 3G). This means that the potential effect of changes in trade levels due to the creation of an international border between Scotland and the rest of the UK can be translated into an effect on real income (Arkolakis, Costinot and Rodriguez-Clare (2012)[9] suggest a straightforward framework). Employing this methodology, the loss of trade implied by the analysis in this paper suggests a reduction in real income in Scotland of around four per cent after 30 years.[10] Applying the same methodology to the UK implies a reduction in real income of around 0.2 per cent. The reason for the contrasting results rests on Scotland's dependence on trade with the continuing UK which accounts for around 60 per cent of total Scottish exports, compared to Scotland accounting for just 13 per cent of continuing UK exports.[11]

3.19 There is a great deal of uncertainty over the time period which this effect is likely to occur and the extent to which the loss of trade between Scotland and the continuing UK may be offset by the reorientation of trade towards other parts of the world. Head et al (2010)[12] use a period of four decades to estimate the fall in trade from the breaking of colonial links while evidence presented from the case study of Czechoslovakia shows that the erosion of trade links may happen over a shorter timescale. Further evidence on *integration* effects on sovereign states forming a currency union suggests a period of 20 years (Bun and Klassen (2002)).[13] The table below summarises the link between changes in trade and real incomes, including the impact on growth rates over 30 years.

Table 3C: Impact of Scottish Independence on output and growth in Scotland and the continuing UK

	Scotland	Continuing UK
Fall in bilateral exports (per cent)	**83-86**	**77-81**
Total Effect on real income (percentage points)	-4	-0.2
Effect of the growth rate of real income over 30 years (percentage points)	-0.13	-0.02

[9] *New Trade models, Same old Gains?*, Arkolakis et al (2012).

[10] The details of this analysis are set out in Annex C.

[11] The global connections survey has the rest of the UK accounting for 66 per cent of Scottish exports in 2011 whilst the Scottish National Accounts Project 2012Q3 has the rest of the UK accounting for 58 per cent of Scottish exports in 2011

[12] *The erosion of colonial trade linkages after independence*, Head, Mayer and Ries (2010).

[13] *Has the Euro increased trade?*, Bun and Klassen (2002).

Box 3G: The effect on real incomes from declining trade flows: alternative Scenarios based on European Countries

Another way of gauging the impact of a reduction in trade flows on real income in Scotland is to compare the share of expenditure on domestic goods with a range of small European countries.

Countries gain from trade through sourcing goods from other countries with lower production costs. That way, a country benefits from more advanced technology and productivity abroad, via imports. A reduction in gross trade flows, all else being equal, implies that a country will spend a higher proportion of its income on domestic goods.

Using the Arkolakis et al (2012)[1] methodology, Table 3D highlights that if the share of expenditure on domestic goods in Scotland increased in line with other small independent countries in Europe, there would be a reduction in real income. While the results below are also consistent with the fall in trade between Scotland and the continuing UK estimated using the gravity model, the size of the reduction depends importantly on how and to what extent Scotland may be able to offset the expected decrease in trade with the UK through trade with other countries.

Table 3D: Effect of decline in trade flows on real income

Share of expenditure on domestic goods		Difference with Scotland's share of expenditure on domestic goods in 2011	Effect on real income
Austria in 2009	81%	+11ppt	-2.9%
Denmark in 2009	85%	+15ppt	-3.8%
Finland in 2009	87%	+17ppt	-4.3%
Ireland in 2007	83%	+13ppt	-3.3%
Portugal in 2006	83%	+13ppt	-3.3%
Sweden in 2008	82%	+12ppt	-3.1%

Source: Latest available data from OECD STAN indicators, Rev.3, 2011 and Scottish National Accounts Project Tables from 2012Q3

The methodology is described in more detail in Annex C

[1] *New Trade models, Same old Gains?*, Arkolakis et al (2012).

Conclusion

3.20 Evidence suggests that international borders reduce economic integration, impeding flows of goods, capital and labour, even where countries are members of single markets with low formal barriers to trade: the so called "border effect". Empirical estimates suggest that even if an independent Scottish state was part of the European Single Market with the continuing UK and the Scottish Government was able to achieve its aims of a formal sterling currency union, Scottish exports to the continuing UK could be reduced by around 80 per cent. Migration flows could fall below 10,000 per annum in both directions, compared with average rates of over 40,000 people per annum in recent years. As an impediment to trade flows, the border is likely to reduce the level of real income in the Scottish economy by four per cent over a 30 year period. While Scotland can look to new markets to offset this drag on growth, it is not clear whether this would compensate for the decline in trade with the continuing UK. Even if Scotland did increase trade with other countries the income lost in the intervening period would not be regained.

Chapter 4:
Managing volatility in the public finances

In the event of independence, Scotland would be directly exposed to a narrower tax revenue base and more volatile fiscal position. A stabilisation mechanism to smooth the public finances is likely to be required. An independent Scottish state could try to smooth its public finances as a small country and manage declining oil and gas reserves by establishing an oil fund.

While the economic rationale for establishing one is clear, an oil fund would come at a price. Scotland is currently far from having the sustainable fiscal position that would make such a fund viable. Implementing an oil fund in a similar way to Norway would imply very significant cuts to public spending or tax increases, over and above the plans that have been set by the UK Government to repair the impact of the financial crisis. Based on forecasts by the Centre for Public Policy for Regions, for an independent Scotland to start an oil fund in 2016-17 from a balanced budget, additional fiscal consolidation of 5.1 per cent of GDP (£8.4 billion in real terms) would be needed. That implies spending cuts of 13 per cent from current levels, or onshore tax rises of 18 per cent. To then begin contributing to the fund, more fiscal consolidation would be required on top of that.

It would take considerable time to build up a fund of adequate size to manage volatility in the public finances. Assuming an independent Scotland started a Norwegian-style oil fund in 2021-22, Scotland's oil fund after 20 years of contributions would reach less than a tenth of the current size of the Norwegian fund (after 17 years of contributions).

Scotland achieves many of the benefits of an oil fund within the UK. The UK's integrated fiscal model provides a very stable flow of Scottish expenditure, without Scotland having to run the very tight fiscal policy required for an oil fund.

4.1 Chapter 2 explained that, firstly, Scotland benefits from the more diverse UK stabilising the Scottish fiscal position and the volatile nature of its revenue base, in particular North Sea oil and gas. Secondly, Scotland benefits from the UK's broader tax base, which allows stable public spending to be resourced across a wider and more diverse set of revenue streams.

4.2 There would be two fundamental fiscal consequences if Scotland became an independent country:

- an immediate end to Scotland's inclusion within the UK's fiscal model, which would lead to the end of risk-sharing through pooled and redistributed tax revenues (fiscal

transfers). Scotland would therefore rely on a narrower and more volatile tax base to fund spending on public services; and

- the break-up of the UK's integrated tax system, with a completely separate tax system being implemented in Scotland. This could lead to implications for business, individuals and both governments.

The case for an oil fund and its implications

4.3 In the event of independence, Scotland's reliance on oil and gas revenue would leave its public finances vulnerable to fluctuations in prices and production, and a declining stock of oil over time. Managing the challenge of a narrower and more volatile revenue base is essential to ensuring fiscal sustainability. A stabilisation mechanism is likely to be required. The Scottish Government's Fiscal Commission Working Group recommended that it "should seek, in principle, to establish a stabilisation fund such as an Oil Fund".[1]

4.4 Many small and emerging countries with similar reliance on revenues from commodities have established some form of stabilisation fund. Funds vary in their transparency, but the largest appear to be those of Norway, Saudi Arabia, the United Arab Emirates, Kuwait, Qatar and Russia. The Norwegian oil fund is most often cited as a model for Scotland to follow. More detail on the Norwegian experience is set out in Box 4A.

4.5 Only a small share of UK total revenue comes from oil and gas, and the UK has a broad tax base overall, meaning the UK does not require an oil fund to manage volatility in oil revenues. Oil and gas receipts have averaged 1.5 per cent of overall UK revenue, fluctuating within a range of 1.5 percentage points, compared with average oil and gas receipts of 13.5 per cent for Scotland since devolution, fluctuating within a range of 15 percentage points.[2] The merits of an oil fund were considered by the UK Government when North Sea oil and gas was discovered in the 1970s, but the government of the day decided not to set up such a fund. Other large developed economies have chosen not to set up national oil funds, including the United States and Canada, despite being the second and sixth largest oil producers in the world, and receiving revenues at the federal level.[3]

Economic rationale for an oil fund

4.6 The concept of an oil fund is to divert oil revenues from a government's finances to a standalone fund that generates income. The income can be withdrawn now or in the future to improve the government's onshore fiscal position. Economically, the principle behind setting up an oil fund is to maintain the nation's capital stock by creating a financial asset above ground to offset the depletion of oil below ground. By maintaining the nation's capital stock an oil fund can transfer resources between generations. It allows future generations to benefit from the future financial market value of the fund, thus providing them compensation for the depletion of oil by the current generation.

4.7 An oil fund can also provide an economic stabilisation function to lessen the impact of changes in oil production and oil price volatility on the wider economy. In a country heavily reliant on oil exports, volatility in the international oil price can have significant negative

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1 The Scottish Government (2013), *Fiscal Commission Working Group, First Report, Macroeconomic Framework*, page 20.

2 Scottish Government, GERS, HM Revenue & Customs, Government Revenues from UK oil and gas production. Assuming a geographical share of North Sea oil and gas revenues.

3 International Energy Agency (2012), *Key World Energy Statistics.*

effects on wider prices in the economy and the exchange rate. As is discussed in *Scotland analysis: Currency and monetary policy* (see Box 1C, page 35),[4] an increase in oil prices or production can lead to an appreciation of the real exchange rate (when exchange rates are flexible) and/or higher domestic inflation. This can have a negative impact on the non-oil export sector, by making it uncompetitive ("Dutch disease").[5] This can have long-term negative costs for the economy, especially if the non-oil export sector provides wider benefits to the economy (e.g. from knowledge spillovers). Volatility in the real exchange rate of the non-oil sector can also discourage investment.

4.8 Although the outcome of any negotiations that would be required over the split of oil and gas reserves in the event of independence is uncertain, an independent Scottish state will be much more exposed to the oil and gas sector than the UK economy as a whole. The real exchange rate of an independent Scottish state would be expected to be much more directly influenced by changes in the price or production of oil and gas. An oil fund could help mitigate these effects, regardless of the currency arrangement: in a monetary union, either with sterling or the euro, an oil fund could provide a useful counter for occasions when a one-size-fits-all monetary policy is not appropriate for an independent Scotland; if an independent Scotland had its own currency an oil fund could help to dampen the negative effects on non-oil export sector competitiveness (Dutch disease) through oil fund investments abroad.

Fiscal implications of an oil fund

4.9 While the economic rationale for establishing one is clear, an oil fund would come at a price. Currently, revenues from oil and gas fund public spending in Scotland (and across the UK). If any government in an independent Scotland wished to establish an oil fund, it would need to divert oil and gas revenues from the government's finances to a standalone fund: the money cannot be spent twice. That implies raising onshore tax revenues or cutting spending, in order to maintain the government's level of fiscal deficit/surplus. An independent Scottish state is unlikely to be able to contribute significantly to an oil fund without taking radical action to put its public finances in a much stronger position. As the Centre for Public Policy for Regions (CPPR) comment: "the Scottish Government would need to rely on most, or all, of the tax revenues from the North Sea simply to attain the current, implicit, level of annual fiscal deficit. This would mean that no such revenues would be available to build up a Sovereign (Oil) Fund, or at least not without tax increases or budget cuts."[6]

4.10 Even phased over a number of years, once the current challenges in the public finances have been addressed, the fiscal adjustment required is very large. How much fiscal policy would need to be tightened over the medium term to afford an oil fund would depend on the evolution of Scotland's economy and public finances. The analysis below sets out the potential scale of the challenge.

[4] HM Government (2013) "Scotland analysis: currency and monetary policy."

[5] "Dutch disease" is named after the economic crisis that affected the Netherlands in the 1960s following the discovery of North Sea gas and the sharp appreciation in the Dutch guilder.

[6] Centre for Public Policy for Regions (2013) "Reflections on the latest Oil and Gas related analysis by the Scottish Government and the Office for Budget Responsibility".

Box 4A: Norway's oil fund

Until the mid-1990s, a large proportion of Norwegian oil revenues were used to improve the government's finances. In 1990 Norway chose to establish an oil fund, now known as the Government Pension Fund Global (GPFG), to ensure that the economy would not remain dependent on this non-renewable resource. The first net contribution of revenues to the fund took place in May 1996. By the end of 2012, the market value of the GPFG was over £400 billion using current exchange rates (NOK 3,816 billion; over 150 per cent of GDP). By 2019, the fund is forecast to be worth over £675 billion (NOK 6,410 billion).[1]

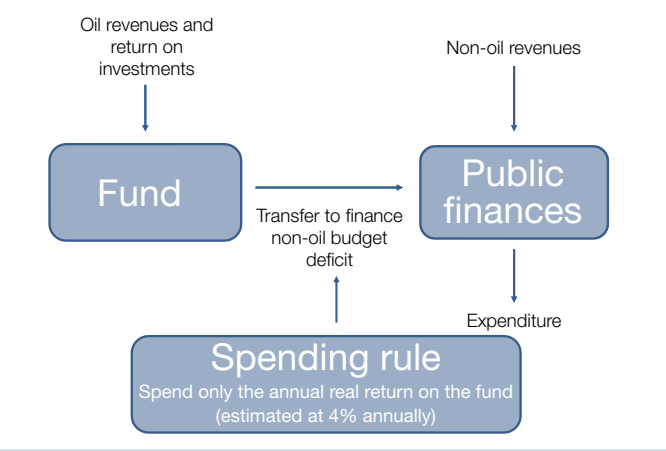
Under a mandate set by the Ministry of Finance, the GPFG is managed by Norges Bank Investment Management (NBIM). As NBIM set out, "the fund was set up to give the government room for manoeuvring in fiscal policy should oil prices drop or the mainland economy contract. It also served as a tool to manage the financial challenges of an ageing population and an expected drop in petroleum revenue. The fund was designed to be invested for the long term, but in a way that made it possible to draw on when required. The fund was called the Petroleum Fund until 2006 when it was renamed the Government Pension Fund Global. The change highlighted the fund's role in saving government revenue to finance an expected increase in future public pension costs. Despite its name, the fund has no formal pension liabilities."[2]

The fund's capital inflow consists of all government oil revenue, net of government expenditure on petroleum activities. The capital is invested internationally, to avoid overheating the Norwegian economy. 60 per cent of the fund is invested in equity, 35 to 40 per cent in fixed-income markets, and the remainder in property.

Norway only contributes to the fund when the overall budget, including oil revenues, is in surplus. For the first years of the fund, from 1990 to 1996, the public finances were in deficit so no contributions were made. This fiscal position was relatively unusual for Norway, which since the Second World War has generally run a budget surplus of two-four per cent of GDP.[3]

The government can make transfers back from the fund each year to improve the public finances, which partly offset the oil revenues that flow into the fund. In 2001, the government set a spending rule that no more than the expected return of the fund, estimated at four per cent of the fund's capital in real terms, should be returned to the government's finances each year. Fiscal policy is set in line with that. On a cyclically-adjusted basis, the non-oil deficit is set to broadly match the four per cent return over time, while allowing for some flexibility around this. Figure 1 set outs the flow.

Norwegian oil fund mechanism



The GPFG has been described as a model for other natural resource exporters, and there is a broad consensus in Norway and internationally on its strengths, including from the IMF. However, like any policy, it is not a panacea. In its assessment of the Norwegian economy, the IMF sets out three issues for the future.[4]

- the expected real return assumption of four per cent per year might prove too optimistic. The average return to date has been below four per cent;
- Norway's long-run health, pension, and other costs associated with an aging population are "far in excess of what could be financed from the GPFG". The IMF's assessment is that in the long term Norway will need to raise taxes (from already-high levels), cut other expenditure sharply, or take other measures, to contain age-related pressures; and
- if oil prices were to enter a prolonged decline during the remaining years of near-peak production, the total assets of the GPFG could be significantly lower than expected. If fiscal transfers from the fund did not reduce in line with this, the fund would be further depleted.

1 Norwegian Ministry of Finance (available at www.regjeringen.no/en/dep/fin; Norges Bank Investment Management (available at www.nbim.no/en)

2 www.nbim.no/en/About-us/Government-Pension-Fund-Global/

3 Martin Skancke (2003), "Fiscal policy and petroleum fund management in Norway" in Jeffrey M. Davis (ed) *Fiscal Policy Formulation and Implementation in Oil-Producing Countries*. Washington DC: International Monetary Fund.

4 International Monetary Fund (2013), *Concluding Statement of IMF Article IV Mission to Norway*.

4.11 As an accepted model for developed resource-exporting countries, the Norwegian experience offers several important lessons for an independent Scottish state in setting up an oil fund. As set out in Box 4A, Norway only contributes revenues to the fund when its overall public finances are in surplus. Despite creating the fund in 1990, it was not until May 1996 that any contributions were made, reflecting the fact that Norway ran a budget deficit over this period.

4.12 If an independent Scottish state were to adopt the Norwegian model and only contribute to a fund when it has a budget surplus, it would face a difficult set of fiscal choices. Scottish Government figures show that after the oil peaks of the 1980s, Scotland has run a fiscal surplus only once. The average position from 1999-00 to 2011-12 is a deficit of 3.7 per cent of GDP, even assuming a geographical share of oil revenues.[7]

4.13 The gap that Scotland faces to achieve fiscal balance (neither surplus nor deficit) and start a fund can be quantified in various ways:

- as set out above, Scotland's average fiscal position since devolution is a deficit of 3.7 per cent of GDP, or £5.2 billion.[8] A fiscal consolidation of £5.2 billion equates to reducing public spending in Scotland by fully eight per cent from current levels. Or, equivalently, increasing onshore tax revenues by 11 per cent; and
- the Centre for Public Policy for Regions (CPPR) has produced medium-term projections for the Scottish public finances as part of the UK. In 2016-17, they project a deficit for Scotland (including a geographic share of oil revenues) of 5.1 per cent[9]

7 Scottish Government, GERS.

8 In real terms: 2011-12 prices, calculated using the UK GDP deflator outturn and forecast.

9 Centre for Public Policy for Regions (2013), "Analysis of Scotland's Past and Future Fiscal Position".

of GDP, or £8.4 billion in real terms.[10] That implies spending cuts of 13 per cent from current levels, more than three-quarters of what the Scottish Government spent on health last year, or onshore tax rises of 18 per cent.

4.14 For context on the level of spending adjustments required, under the UK's current fiscal consolidation programme Scotland's total departmental spending is set not to fall, in cash terms, but *increase* by around one per cent from 2010-11 to 2015-16.

4.15 The implied spending cuts or tax rises are very large, and difficult to imagine without fundamental shifts in the shape of Scotland's public sector and society. It is important to be clear that fiscal consolidation on this scale is what is required just to be in a position to start contributing to an oil fund, as Norway was in 1996. The spending cuts or tax rises set out above are what is needed *before* the first revenues flow into the oil fund. To build up an effective fund, Scotland would of course need to divert a significant proportion of its oil revenues from the public finances. To do that, and maintain a balanced budget, would require further consolidation.

4.16 In 2016-17, the independent Office for Budget Responsibility forecasts that UK oil and gas revenues will be around £4.8 billion,[11] or £4.4 billion in real terms (2011-12 prices). An independent Scottish state's share of these revenues is far from clear, but if revenues were split geographically as of 2011-12, Scotland's share would amount to around £4.1 billion in real terms. If, in 2016-17, Scotland chose to allocate these revenues to a fund it would require further fiscal consolidation of this amount, on top of the spending cuts or onshore tax rises set out above, in order to maintain a balanced budget. Based on the CPPR forecast for the underlying deficit, that takes the total spending cuts or tax rises required by 2016-17 to £12.5 billion in real terms. In total, spending would have to fall by 19 per cent from current levels, or onshore taxes rise by 27 per cent. It is very difficult to see how changes of this magnitude would be credible for a newly-formed Scottish state.

4.17 So an independent Scottish state may well choose to see contributing to an oil fund as a long-term ambition rather than a realistic near-term possibility – as acknowledged by the Fiscal Commission Working Group.[12] That might give more time to phase in a fiscal adjustment. However, it would come at the cost of spending rather than saving the declining oil revenues in the meantime, diminishing the total size and effectiveness of the eventual fund. And, importantly, the fiscal challenge will not necessarily become any easier to tackle after the current programme of consolidation is complete. An independent Scottish state is likely to face a significant burden of age-related fiscal pressures, and higher debt servicing costs as a proportion of national income than it currently pays as part of the UK. Future Scotland analysis work will explore these issues in more detail.

4.18 Even if an independent Scotland were able radically to adjust fiscal policy and implement an oil fund, it would not resolve Scotland's fiscal challenges. And while Norway's fund has brought it great benefits, comparisons with the hypothetical fund of an independent Scotland should be made with caution:

- comparisons with the wealth of Norway's fund should take into account the very different resource positions of the two countries. The Norwegian area of the North Sea has substantially more oil remaining than the UK's. It is estimated that Norway has around 47 billion barrels of oil equivalent (boe) remaining, while up to 20 billion boe are

[10] In real terms: 2011-12 prices, calculated using the UK GDP deflator outturn and forecast.

[11] Office for Budget Responsibility (March 2013), *Economic and fiscal outlook.*

[12] "In the near term [an independent Scottish state] would therefore have to use North Sea revenues to fund current public services and reduce public sector borrowing." Page 167, Scottish Government (2013), *Fiscal Commission Working Group, First Report, Macroeconomic Framework.*

estimated to remain in the UK Continental Shelf.[13] Norway's remaining reserves are therefore at least double the UK's, of which the reserves of an independent Scottish state would form a proportion;

- an independent Scottish state may well find that even a very large oil fund proves insufficient on its own to tackle future fiscal costs. Like most developed countries, Norway faces a challenging demographic profile. The IMF set out that, despite the oil fund's vast size (over 150 per cent of GDP), healthcare, pension and other ageing costs will still be "far in excess of what could be financed from the [fund]";[14]
- as the CPPR set out: "the government of an independent Scotland would be more reliant than Norway on using tax revenues from the North Sea to balance its budget.", "at present (2012-13) levels of expected UK North Sea tax revenues Scotland would need to use all such funds just to compensate for the loss in (higher) spend per head on public services as a result of leaving the UK."[15] Therefore, it would take considerable time for an independent Scotland to build up an oil fund of significant size, so the fund is unlikely to be in a position to smooth fiscal volatility for several years; and
- assuming revenues are invested in a portfolio of assets, the fund itself is exposed to volatility in the value of the underlying investments. Over time, this should be substantially lower than that of oil revenues. But, like any investment, an oil fund is not a risk-free proposition, and the more ambitious the expected investment returns are, the more risky it is likely to be.

4.19 The analysis of receipts and spending volatility within the UK in Chapter 2 shows how Scotland achieves many of the key benefits of an oil fund simply by remaining within the UK. The UK's integrated fiscal model has provided a very stable flow of Scottish expenditure, without the need for Scotland to run the fiscal surpluses required for an oil fund.

4.20 Alongside its recommendation for Scotland to establish an oil fund, the Fiscal Commission Working Group set out an alternative option for a stabilisation fund – a "deficit-funded oil fund". In this model, Scotland would contribute oil revenues into a fund even while running a fiscal deficit. When oil revenues exceed forecasts, the difference ("upside surprise") could be transferred. Whilst this is technically possible, unlike the Norwegian fund, this model would imply increasing government borrowing, and it is a not a model commonly associated with sovereign states operating oil funds, for the reasons described below:

- if only upside surprises on oil revenues were used, building a fund of an effective size is likely to take a very long time, given no contributions would be made in the average year. Modelling later in this section finds that a stabilisation fund would reach only a little over 2 per cent of GDP after a decade, and little over 3.5 per cent of GDP by 2040-41 – far beneath the level required to provide effective stabilisation in a fiscal crisis;
- establishing such a fund eliminates the benefit of upside surprises to the budget from oil and gas revenues coming in above forecast. That is equivalent to increasing the

[13] Available at Norwegian Petroleum Directorate website www.npd.no (converted into barrels of oil equivalent); Available at Department for Energy & Climate Change website www.gov.uk/government/organisations/department-of-energy-climate-change.

[14] International Monetary Fund (2013), *Concluding Statement of IMF Article IV Mission to Norway*.

[15] CPPR (2013) "Reflections on the latest Oil and Gas related analysis by the Scottish Government and the Office for Budget Responsibility".

central expected path of borrowing since, whilst upside surprises are diverted from the budget, downside surprises (revenues undershooting forecasts) would need to be financed by higher borrowing. As Martin Skancke commented in an IMF publication: "from an asset management point of view [contributing to an oil fund whilst running a budget deficit] would hardly make sense" since "the government would be forced to borrow money to cover allocations to the fund."[16] Moreover, markets may demand higher interest rates on this borrowing. And the extra borrowing adds to debt, and comes with a debt interest cost (even without higher interest rates). This would reduce the room for spending on public services; and

- finally, because contributions to the oil fund in this manner would add to borrowing and debt, it is far from clear that the oil fund would be able to play an effective stabilisation role during a fiscal crisis.

4.21 So the option of a "deficit-funded oil fund" is unlikely to escape fully the requirement for significant fiscal tightening to achieve an oil fund of a meaningful size and effectiveness.

4.22 The scale of the fiscal challenge reinforces the fact that the task of smoothing volatility in oil revenues is far better served by the UK's integrated fiscal model. As set out in Chapter 2, by pooling tax receipts the UK has delivered stable and secure Scottish spending, without the need for the very tight fiscal policy required to start an oil fund.

Modelling an oil fund for an independent Scottish state

4.23 The section above has set out the radical scale of the spending cuts or tax rises needed for an independent Scottish state to be able to contribute to an oil fund. This section quantifies what such an oil fund might look like, if an independent Scotland chose to undertake that level of spending cuts and tax rises.

4.24 As set out above in Box 4A, Norway's fund is a potential model for Scotland. Norway contributes all of its offshore revenues to its oil fund, and withdraws the real-terms return of the investments in the fund each year to benefit the public finances. Norway assumes that the long-term average real return of the fund is 4 per cent, and withdraws approximately that amount per year.

4.25 What might such a fund look like for an independent Scottish state? The key variables are: the future path of oil revenues; the year in which the fund is started; what percentage of revenues flows into the fund each year; what percentage of returns are withdrawn each year; and the investment return of the fund.

4.26 The future path of oil revenues reflects the independent Office for Budget Responsibility's central forecast, as set out in the 2013 *Fiscal sustainability report*. According to the OBR there is an equal probability of revenues coming in higher or lower. An independent Scottish state's share of these revenues is far from clear, but for the purposes of this modelling, revenues are split geographically. The Scottish share of UK revenues is assumed to remain at the 2011-12 percentage (94 per cent). All oil revenues flow into the fund, and the real return of the fund is withdrawn each year, following the Norwegian model. As per the Norwegian fund, the real return over time is assumed to be four per cent. This may be optimistic: the IMF note that actual returns have fallen short of four per cent historically.[17]

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[16] Martin Skancke (2003), "Fiscal Policy and Petroleum Fund Management in Norway" in Jeffrey M. Davis (ed) *Fiscal Policy Formulation and Implementation in Oil-Producing Countries*. Washington DC: International Monetary Fund.

[17] "The average rate of return over the life of the GPFG has been below 4 percent, and experience with similar asset portfolios over longer periods indicates that returns are likely to be lower." International Monetary Fund (2013), *Concluding Statement of IMF Article IV Mission to Norway*.

4.27 The assumptions set out above for modelling a Norwegian-style oil fund for Scotland, and the steps to calculate the estimated increase in the value of the fund in a given year, are set out in the table below.

Modelling a Norwegian-style oil fund for Scotland: assumptions and methodology

Steps to calculate estimated increase in the nominal value of the oil fund in a given year of operation	Source
UK oil revenue forecast for that year	OBR 2013 *Fiscal sustainability report*
multiplied by ...	
Scottish geographical share of revenues in 2011-12 (94 per cent)	Scottish Government, *Government Expenditure and Revenue Scotland 2011-12*
equals ...	
Notional Scottish geographical oil revenue forecast in that year	Calculation
plus ...	
Nominal annual return on the fund (4% real return per year + GDP deflator)[a]	HM Treasury calculation using: annual real return of 4 per cent, consistent with assumptions of Norwegian fund; GDP deflator from OBR 2013 *Fiscal Sustainability report*
minus ...	
Withdrawal in that year (equal to an assumed 4% real return on the value of fund at the end of that year)[b]	HM Treasury calculation
equals ...	
Net increase in the nominal value of the fund in that year	Calculation

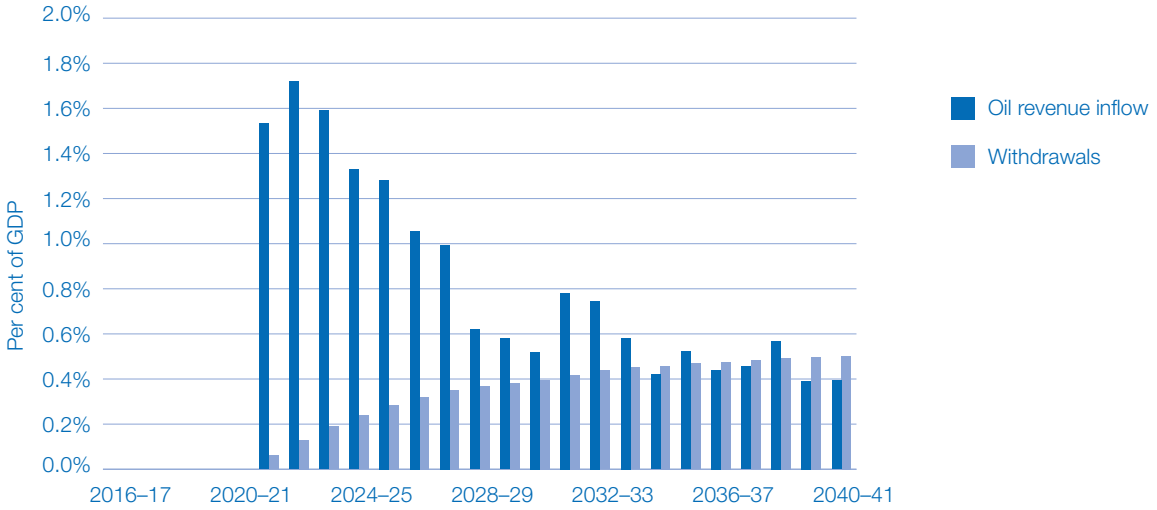
a In each year, the notional nominal annual return on the fund is calculated by multiplying the nominal rate of return – 4 per cent in real terms (consistent with real return assumed in Norwegian fund), plus the GDP deflator of 2.2% from 2021-22 used in the OBR 2013 Fiscal sustainability report – by the nominal value of the fund at the end of the previous year plus the oil revenue inflow in the current year, gross of withdrawals. This is the most favourable assumption for the calculation of returns; in fact, oil revenue is more likely to flow in over the course of the year, and withdrawals may not be at the end of the fiscal year. Both of these effects would serve to reduce actual returns.

b In each year, the withdrawal is calculated by multiplying the real rate of return – 4 per cent in real terms (consistent with real return assumed in Norwegian fund) – by the nominal value of the fund at the end of the current year (i.e. the nominal value of the fund at the end of the previous year plus the oil revenue inflow in the current year).

4.28 As set out above, the fiscal consolidation needed to start an oil fund in 2016-17 and contribute all oil revenues is a massive £12.5 billion in real terms, implying 19 per cent lower public spending or 27 per cent higher onshore taxes. So the central scenario modelled in this paper assumes that an oil fund is started five years later, in 2021-22. Starting later would still require an extremely challenging fiscal consolidation, not least as demographic pressures on the public finances will be starting to bite.

4.29 Chart 4A models an oil fund for Scotland. Some commentators have focussed on the total size of the fund. But the annual withdrawal to benefit the public finances is a better measure of the benefits of an oil fund across generations.

Chart 4A: Oil fund including all oil revenues starting in 2021–22



Source: OBR Fiscal sustainability report (July 2013); OBR Economic and fiscal outlook (March 2013); HM Treasury calculations

4.30 If all offshore revenues were contributed to an oil fund, it could be expected to provide a real return of 0.5 per cent of GDP a year from 2033-34 to 2040-41 to benefit the Scottish public finances (equal to the four per cent real return assumed on the fund). In 2011-12 prices, that averages around £1 billion per year. Following the Norwegian rule, that would allow Scotland to run an onshore deficit of around 0.5 per cent of GDP in those years.

4.31 By 2030-31, the total size of the fund would reach around 10 per cent of GDP (almost £20 billion, in 2011-12 prices). By 2040-41, almost two decades after it was started, the fund would reach almost 13 per cent of GDP (£32 billion, in 2011-12 prices).

4.32 On the face of it, the total size of the fund may appear large. But, put in context, it is in fact unlikely that an oil fund would be large enough meet any of the needs of an independent Scottish state:

- In principle, an oil fund may improve the public finances and smooth volatility. However, a return of only around 0.5 per cent of GDP a year in the long term is very small in the context of Scotland's overall public finances;
- In the early years, when oil revenues are larger and hence volatility has a bigger impact, the return of the fund would be even smaller, averaging just 0.2 per cent of GDP over the first five years. Since devolution, North Sea revenues have varied up or down by around 1.4 per cent of onshore GDP each year. This suggests that, in the medium term, returns on an oil fund would be far from sufficient to counter volatility to the public finances from oil revenues; and
- An oil fund may also be used to save for future fiscal costs, such as demographic pressures. The IMF judges that Norway's fund, at over 150 per cent of GDP after 17 years of contributions, is not nearly sufficient to its tackle future fiscal costs. And Scotland's oil fund, after 20 years of contributions, would reach less than a tenth of the current size of the Norwegian fund. Moreover, a report on demographics from the Scottish Parliament Finance Committee shows that Scotland is likely to face substantially more acute demographic pressures than Norway.[18]

[18] Scottish Parliament Committee (2013), "2nd Report, 2013 (Session 4): Demographic change and an ageing population."

4.33 Box 4B sets out two alternative scenarios: one in which an independent Scottish state chose to undertake the unprecedented spending cuts or tax rises required to start a fund in 2016-17. And a second in which Scotland establishes a "stabilisation fund" while continuing to run a deficit, as suggested by the Fiscal Commission Working Group.

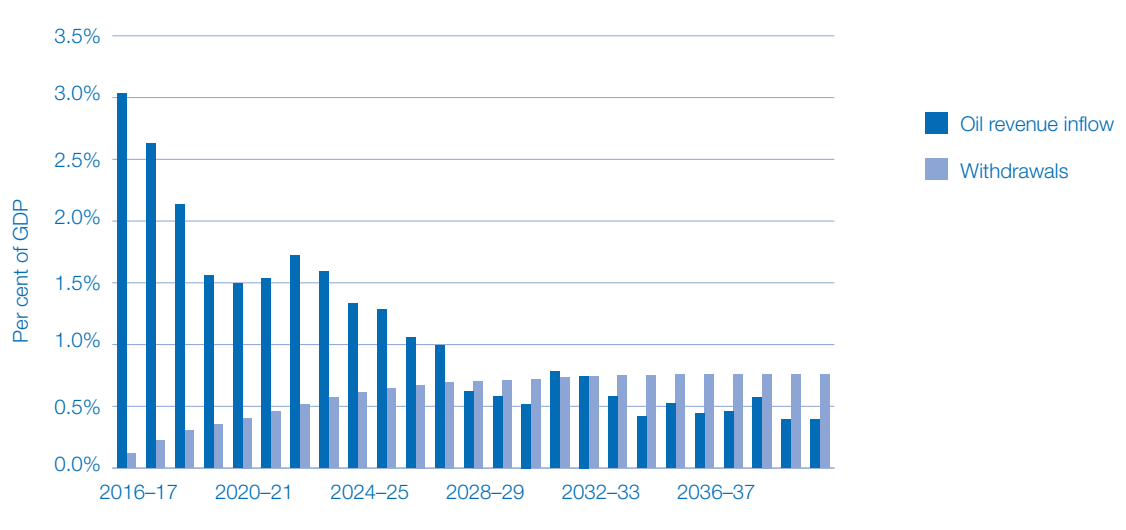
4.34 This analysis shows that not only does an oil fund require substantial fiscal consolidation, under a realistic forecast of oil revenues and investment returns the benefits to Scotland's long-term public finances are relatively small. As set out earlier in this chapter, the objectives of establishing an oil fund to smooth volatility, spread offshore revenues over time, and save for future fiscal costs are all valid. But each is far better served by Scotland remaining within the UK's integrated fiscal model.

Box 4B: Alternative scenarios for a Scottish oil fund

Starting a Norwegian-style oil fund in 2016-17

Although it is difficult to imagine in practice, it is possible that an independent Scottish state could choose to undertake the unprecedented spending cuts or tax rises required to balance the onshore fiscal budget and start an oil fund in 2016-17. Given the benefit of contributions in earlier years when oil revenues are higher than the long-term average, the total size of the fund and its returns would of course be larger the earlier the fund started. The fund would return 0.7-0.8 per cent of GDP a year between 2026-27 and 2040-41, allowing Scotland to run an average onshore fiscal deficit of that level in those years. The total size of the fund would peak at 19 per cent of GDP in the late 2030s, after over 20 years of contributions, compared with the Norwegian fund which currently stands at over 150 per cent of GDP (after 17 years of contributions), and then fall gradually as a percentage of GDP, reflecting declining oil revenue inflows. As set out earlier, a Scottish fund of that magnitude is still insufficient to meet any of the challenges that an oil fund may be expected to solve.

Oil fund including all oil revenues starting in 2016–17



Source: OBR Fiscal sustainability report (July 2013); OBR Economic and fiscal outlook (March 2013); HM Treasury calculations

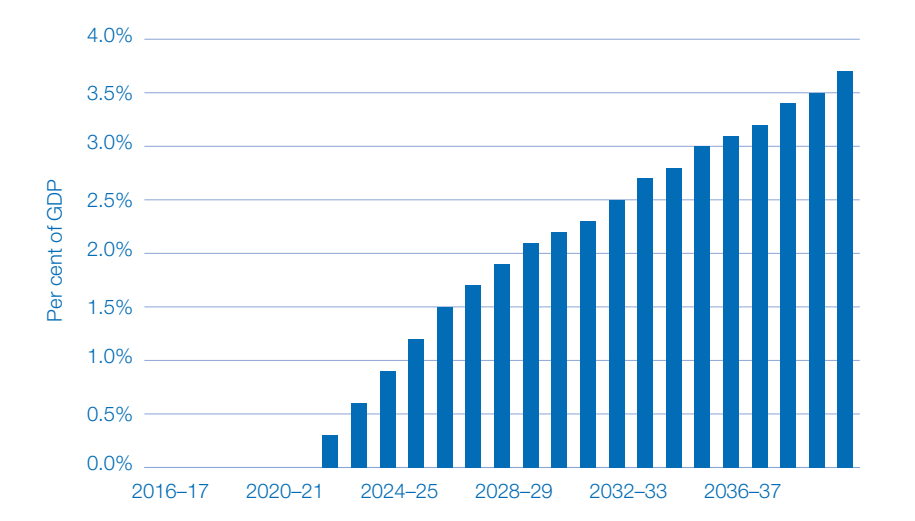
A "deficit-funded oil fund": the Fiscal Commission Working Group model

As set out earlier in Chapter 4, the Fiscal Commission Working Group (FCWG) set out an alternative option for a stabilisation fund. In this model, Scotland would contribute oil revenues into a fund even while running a deficit. When oil revenues exceed forecasts, the difference ("upside surprise") could be transferred. Unlike the Norwegian fund, this model would imply increasing government borrowing as higher revenue than forecast would be diverted into the fund, whilst lower revenues than forecast would need to be funded from higher borrowing. There are a number of challenges associated with this approach, both in principle and practice.

The chart below addresses the specific question of what size such a fund could reasonably be expected to grow to. After a decade of contributions starting in 2021-22, the fund would only reach around 2 per cent of GDP. Even by 2040-41, the fund would be just over 3.5 per cent of GDP. This assumes that there are no withdrawals and that all returns are reinvested in the fund. And that there are no crises over the two decades out to 2040-41 which require the fund's capital to be drawn down.

This is vastly below the size of an effective stabilisation fund. Just in an average year, Scotland's deficit as part of the UK has been 3.7 per cent since devolution, almost double the size of the fund after a decade's contributions. In a crisis requiring stabilisation, or a significant unexpected drop-off in revenues, the deficit would be vastly larger. It is difficult to imagine a stabilisation fund of 2-3.5 per cent of GDP being up to the challenge of tackling any fiscal crisis, however small.

Total value of "deficit-funded oil fund"



Source: OBR Fiscal sustainability report (July 2013); OBR Economic and fiscal outlook (March 2013); HM Treasury calculations

The analysis assumes that:

- Forecasts are made on a three-year ahead basis, in line with the FCWG suggestion that spending plans would be set based on a medium-term forecast. If outturn exceeds the forecast made three years previously, the difference is transferred to the fund.
- All returns are reinvested, and no withdrawals are made. The fund returns 4 per cent per year in real terms.
- In line with the performance of UK forecasts for the 2004-05 to 2011-12 period, outturns exceed forecasts 50 per cent of the time. When that happens, the average "upside surprise" is around 38 per cent of total revenues. That implies that in the average year, 19 per cent of total revenues (50 per cent multiplied by 38 per cent) is transferred to the stabilisation fund. If forecast accuracy improved in future, contributions to the fund would reduce, and the fund would be even smaller.

Because this alternative model implies raising the deficit to contribute to a fund, borrowing would be higher each year by the size of contributions to the fund, 0.2 per cent of GDP in the average year, with higher debt and debt interest consequences compounding this further.

Conclusion

4.35 In the event of independence, Scotland would be directly exposed to a narrower tax revenue base and more volatile fiscal position. An independent Scottish state could try to smooth its public finances as a small country and manage declining oil and gas reserves by establishing an oil fund.

4.36 While the economic rationale for establishing one is clear, an oil fund would come at a price. Scotland is currently far from having the sustainable fiscal position that would make such a fund viable. Implementing an oil fund in a similar way to Norway would imply very significant cuts to public spending or tax increases, over and above the plans that have been set by the UK Government to repair the impact of the financial crisis. To then begin contributing to the fund more fiscal consolidation would be required on top of that. It would take considerable time to build up a fund of adequate size to manage volatility in the public finances.

4.37 Scotland achieves many of the benefits of an oil fund within the UK. The UK's integrated fiscal model provides a very stable flow of Scottish expenditure, without Scotland having to run the very tight fiscal policy required for an oil fund.

Chapter 5: Conclusion

5.1 Over the past 300 years economic integration across the UK has strengthened, to the benefit of all nations and regions. The performance of the Scottish economy is strikingly similar to that of the UK as a whole. On average, a worker in Scotland produces almost exactly the same as a worker in the rest of the UK. Scotland has the third highest economic output per person of all the nations and regions of the UK (behind only London and the South East of England). And Scottish output per person is closer to the overall UK average than any other nation or region of the UK. Since 1963, growth in economic output per head of population has been slightly stronger in Scotland than in the UK, averaging 2.0 per cent in Scotland and 1.9 per cent in the UK overall. Differences in employment rates between the UK and Scotland have narrowed over time: the latest data show that the employment rate in Scotland is now higher than the UK at 72.2 per cent compared with 71.5 per cent.

5.2 The similarity of Scotland's economic performance to the UK as a whole is reflected in its fiscal position: Scottish onshore tax revenues per person have been very close to the UK average since 1998. Over the same time period, public spending per person in Scotland has been around 10 per cent higher than the UK average. Therefore, Scotland's notional onshore fiscal balance has been considerably weaker than the UK's over the same timeframe. In the event of independence, the allocation of North Sea oil and gas revenues would be subject to negotiation. On the basis of a geographical apportionment, Scotland's notional fiscal balance for the period since devolution is very similar to the UK's public finances over the same period.

5.3 The best independent academic models show that international borders reduce trade. The analysis in this paper shows that as an impediment to trade flows, the border is likely to reduce the level of real income in the Scottish economy by around four per cent, with the effect building over time. The rest of the UK would also suffer from reduced trade flows but the impact on incomes would be less as Scotland constitutes a smaller share of total trade for the rest of the UK.

5.4 In the event of independence, Scotland would be directly exposed to a narrower tax revenue base and more volatile fiscal position. An independent Scottish state could try to smooth its public finances and manage volatile and declining oil and gas revenues by establishing an oil fund. Implementing an oil fund in a similar way to Norway would imply very significant tax increases or cuts to public spending, over and above the plans that have been set by the UK Government to repair the impact of the financial crisis. Based on CPPR forecasts of Scotland's fiscal position in 2016-17, to start an oil fund in 2016-17 from a balanced budget, additional fiscal consolidation of 5.1 per cent of GDP (£8.4 billion in real terms) would be needed. That implies spending cuts of 13 per cent from current levels, or onshore tax rises of 18 per cent. Additional fiscal consolidation would then be required to begin making contributions to the fund.

5.5 This would be a profound change. Independence would fundamentally transform the relationship between Scotland and the rest of the UK. As the historical links between the two countries weaken, an independent Scottish state would have to adapt to a new and more challenging environment as a small independent country. This would be expected to have deep implications for its economic and fiscal models.

Annex A: Scotland's economic performance as part of the UK

A.1 This annex sets out a comprehensive picture of the Scottish economy as part of the UK to help inform the debate on independence. Various statistical sources are available when looking at Scotland's economic performance, produced and published mostly by the Office for National Statistics (ONS) and by the Scottish Government, as described in Box 2A. This annex uses these various sources to understand how Scotland has performed as part of the UK, relative to the UK as a whole and to comparable countries.

A.2 This annex is structured in three parts:

- a snapshot of the Scottish economy today compared with the UK, including the distinction between onshore and offshore activity;
- historical trends in the Scottish economy including the impact of the recent recession; and
- international comparisons of the Scottish economy with other independent comparable countries.

A picture of Scotland's economic place in the UK

The Scottish economy today: Similarities with the UK average

A.3 Across most key economic indicators, the Scottish onshore economy is currently strikingly similar to the UK average.

Economic performance

- Scotland's GVA per head is 98 per cent of the UK average and Scotland has the third highest GVA per head of all regions. See Chart A.A.
- A number of Scottish cities, Edinburgh in particular, have similar income levels to London. See Chart A.B.
- Scotland's productivity is almost exactly equal to the UK average, and also third highest of all UK regions and devolved countries. See Chart A.C.

Structure of the economy

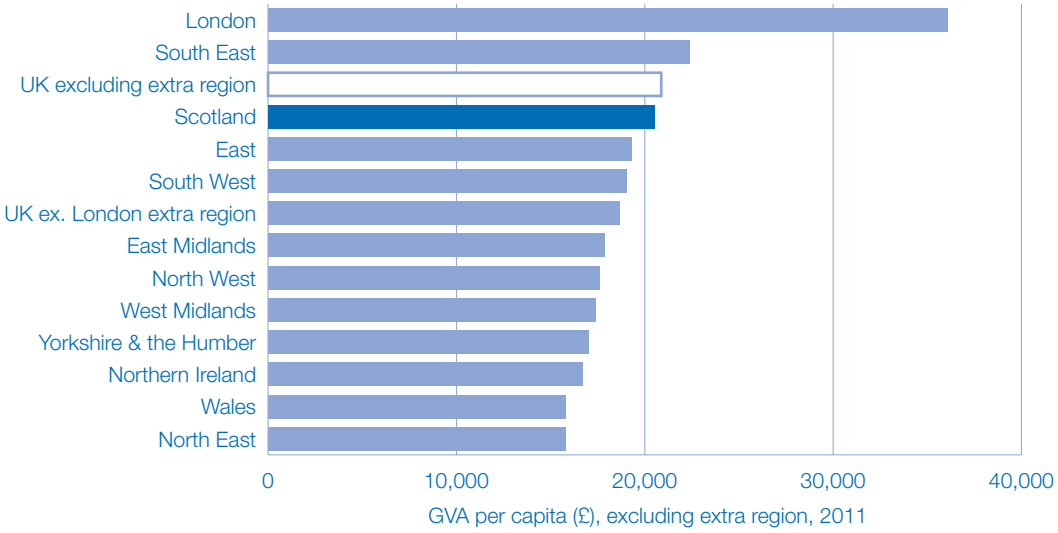
- The industrial composition of Scottish output is very similar to the UK average (excluding extra regio). The correlation of industrial composition across the 20 industries of the Standard Industrial Classification 2007 (SIC07) is nearly 95 per cent. See Table A.A.

- Distribution of income from output between labour (in the form of compensation of employees) and capital (in the form of gross operating surplus and mixed income) is also very similar between Scotland and the UK average. See Chart A.D.
- The composition of domestic demand, between household final consumption, Government's consumption and gross capital formation, is relatively similar to the UK. See Chart A.E.
- Scotland exported nearly half of its GDP in 2011 (compared with less than a third for the UK as a whole) and the value of imports represented around 55 per cent of total nominal GDP (compared with less than 35 per cent for the UK as a whole).[1] Of total Scottish trade, a majority was made with the rest of the UK (around 60 per cent of exports and 70 per cent of imports according to the same source). See Chart A.E.

Labour market

- Conditions in the Scottish labour market are very similar to the UK average. In the latest data (three months to May 2013), Scottish employment and unemployment rates have been a little better than the UK average. See Chart A.F.
- Median gross earnings were £498 per week in Scotland in April 2012, or 98.6 per cent of median gross weekly earnings for the UK as a whole (£506 per week). See Chart A.G.
- Reflecting the similarities in the composition of output, the composition of Scottish employment is very close to the UK average. See Table A.B.

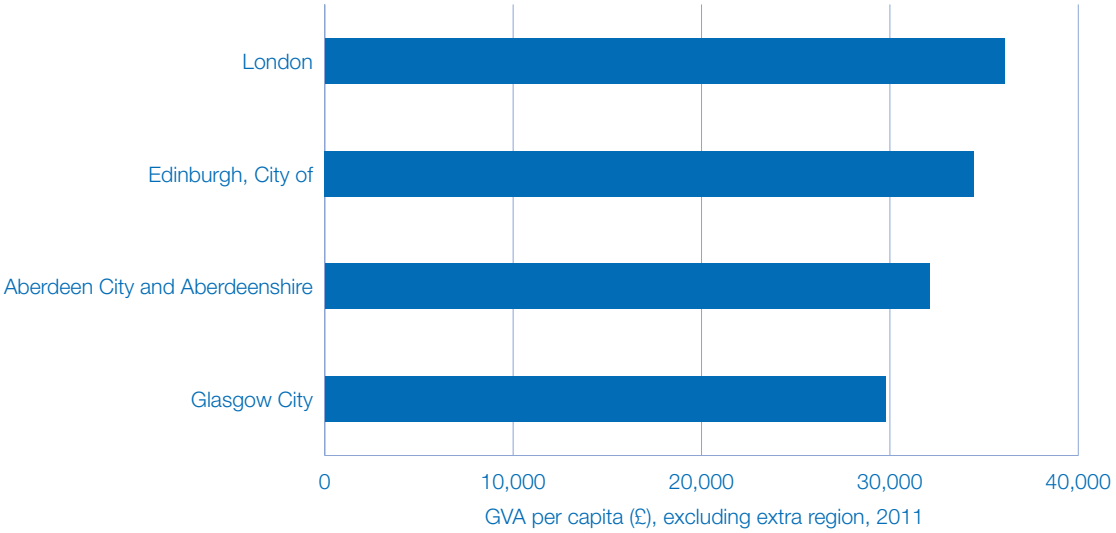
Chart A.A: Output per head of regions and devolved countries (2011)



Source: ONS, Regional Gross Value Added (December 2012)

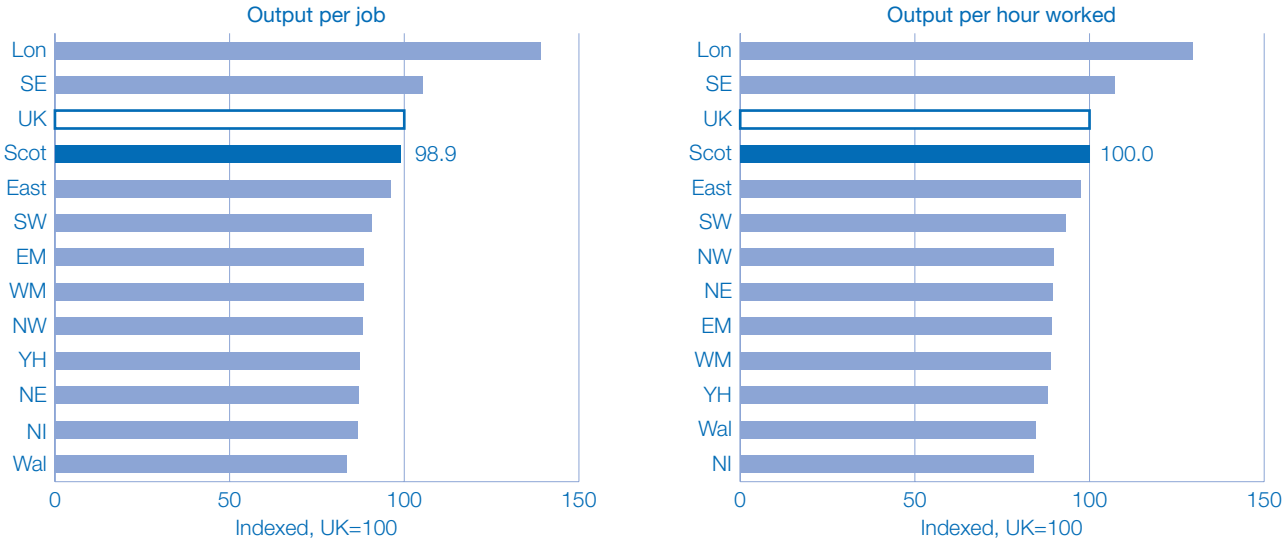
[1] Note that Scottish data are for the onshore economy only, while UK data include North Sea oil and gas. In particular, they exclude Scottish exports of North Sea oil and gas and are therefore likely to overestimate UK exports as a share of GDP compared with Scottish exports. In 2011, according to the UK Balance of Payments published by the ONS, UK exports of crude oil contributed around £17 billion to a total of £493 billion (or around 3.5 per cent of total exports). Excluding crude oil exports would reduce the UK ratio of exports to GDP from around 34 per cent to around 33 per cent.

Chart A.B: Economic output per head of London and Scottish cities (2011)



Source: ONS, Regional Gross Value Added (December 2012)

Chart A.C: Labour productivity (2011)



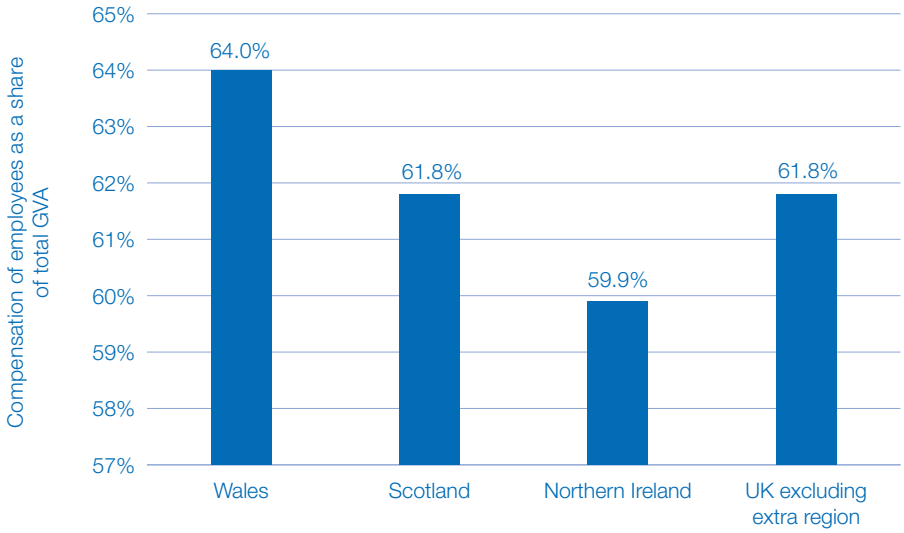
Source: ONS, Regional Labour Productivity (June 2013)

Table A.A: Composition of output in UK and devolved countries (2010)

	UK excl. extra regio	Wales	Scotland	Northern Ireland
Agriculture	0.7%	0.4%	0.7%	1.2%
Mining and utilities	3.3%	4.3%	7.5%	2.6%
Manufacturing	11.1%	16.4%	11.6%	15.1%
Construction	6.5%	7.3%	7.2%	6.9%
Distribution; Hotels and restaurants	14.5%	14.8%	13.6%	16.3%
Transport and communication	10.6%	7.1%	8.5%	6.7%
Finance	9.6%	4.8%	8.3%	4.3%
Real estate	8.2%	8.3%	7.3%	7.9%
Business services	11.9%	7.4%	10.0%	7.0%
Public admin., education and health	20.2%	26.1%	22.3%	29.0%
Others	3.5%	3.2%	3.1%	2.9%
Correlation with UK excl. extra regio		0.89	0.95	0.89

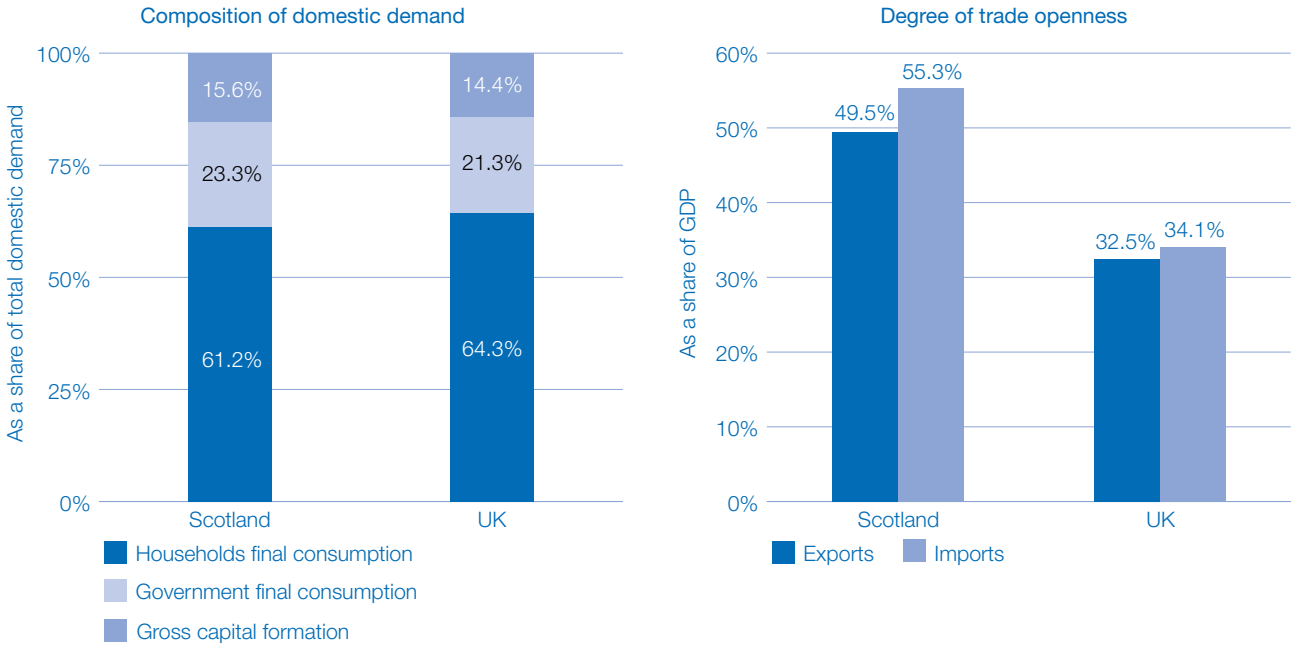
Source: ONS, Regional Gross Value Added (December 2012)

Chart A.D: Labour share of output (2011)



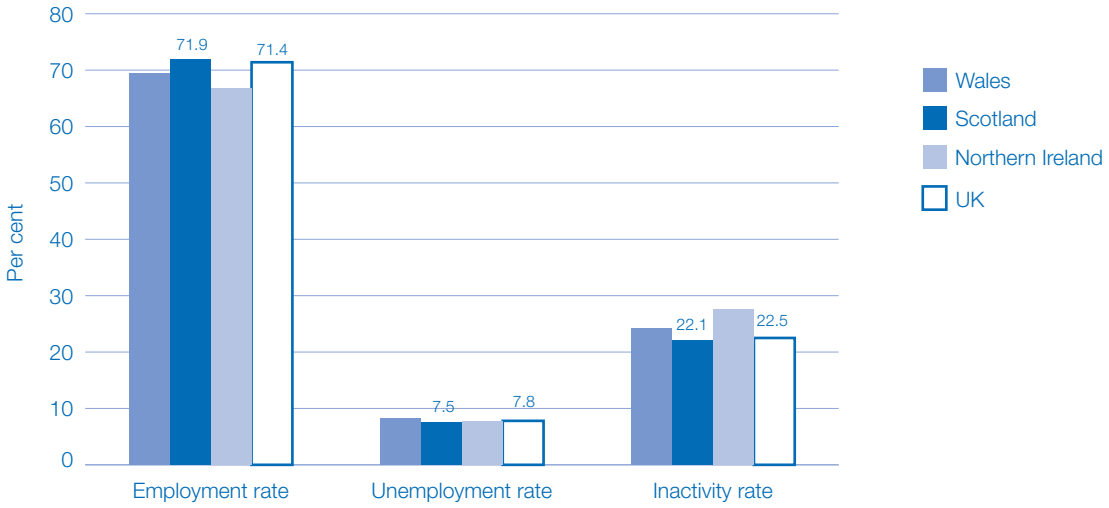
Source: ONS, Regional Gross Value Added (December 2012)

Chart A.E: Expenditure decomposition of output (2011)



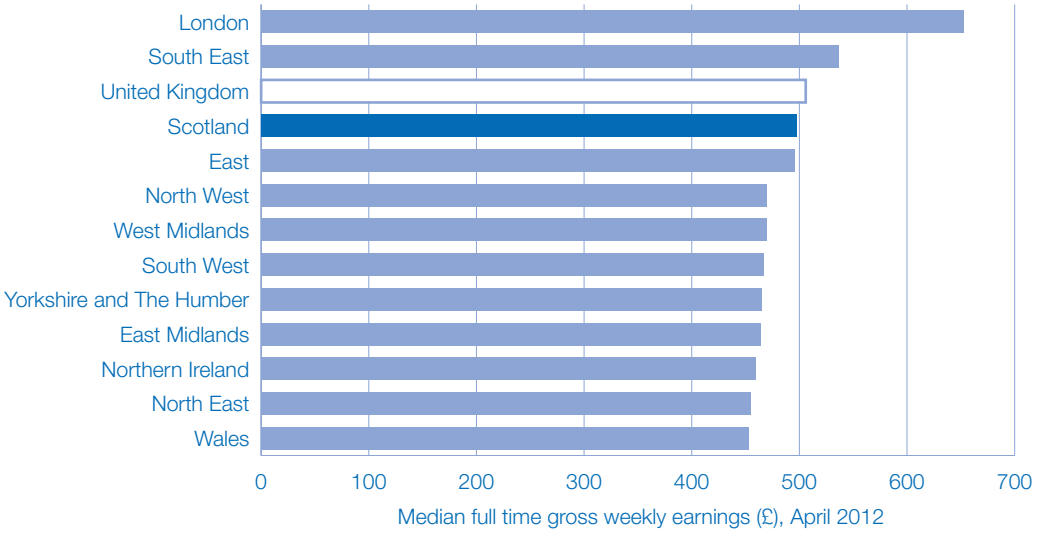
Source: ONS, Quarterly National Accounts (2013Q1); Scottish Government, Scotland National Account Project (2012Q3 and 2012Q4)

Chart A.F: Labour market in the three months to May 2013



Source: ONS, Labour Market Statistics (July 2013), Labour Force Survey

Chart A.G: Median earnings in UK regions and devolved countries (2012)



Source: ONS, Annual Survey of Hours and Earnings (ASHE), 2012 provisional results

Table A.B: Industrial composition of jobs

	Wales	Scotland	Northern Ireland	UK
Agriculture	2.3%	1.9%	4.0%	1.3%
Mining and utilities	1.5%	2.6%	1.0%	1.2%
Manufacturing	10.5%	7.2%	9.9%	8.1%
Construction	6.9%	6.7%	7.2%	6.5%
Distribution; Hotels and restaurants	22.5%	21.4%	22.8%	21.6%
Transport and communication	6.0%	7.3%	5.9%	8.6%
Finance	2.2%	3.6%	2.3%	3.6%
Real estate	1.0	1.2%	1.0%	1.3%
Professional business services	4.5%	7.2%	4.3%	7.7%
Administrative and support services	6.0%	7.5%	5.5%	7.8%
Public administration	6.3%	5.9%	7.4%	5.3%
Education	9.7%	7.7%	9.0%	8.7%
Health and social work	15.2%	14.2%	15.0%	12.8%
Others	5.3%	5.6%	4.8%	5.7%
Correlation with UK	*0.95*	*0.99*	*0.94*	

Source: ONS, Workforce jobs by region and industry (December 2012)

Performance over time relative to the UK – long-term trends and the impact of the recession

A.4 Looking back to past developments in the Scottish economy relative to the UK, there has been volatility in the data between Scotland and the UK average, but long-term economic trends have been broadly similar.

Growth

- The growth in Scotland's onshore GVA per head has been slightly above the UK average for the onshore economy between 1963 and 2012 (2.0 per cent a year, compared with 1.9 per cent a year). See Table A.C for onshore economic growth and population statistics.
- Real growth, not adjusted for population growth, in Scotland's onshore economy has lagged slightly behind the UK average between 1963 and 2012 with annual growth averaging 2 per cent compared with 2.2 per cent on average across the UK. This is explained by faster population growth in the UK.
- Annual population growth in Scotland between 1963 and 2012 was 0.0 per cent, lower than the 0.3 per cent growth in the UK. Scotland's population fell for most of the last two decades of the 20th century, declining from a peak of 5.24 million in 1974 to 5.05 million at its trough in 2002. The population in Scotland has increased since 2002.
- Since devolution, annual onshore growth in Scotland's GVA per head has been the same as the UK at 1.4 per cent.
- Growth, not adjusted for population changes, in Scotland's onshore economy has lagged slightly behind the UK between 1998 and 2012 with annual growth averaging 1.7 per cent compared with 2.0 per cent on average across the UK. This is accounted for by differences in population growth.
- Although the Scottish population has started to increase since 2002, population growth has still been lower than the UK. Annual population growth in Scotland between 1998 and 2012 was 0.3 per cent, lower than the 0.6 per cent growth in the UK.
- Cycles in the Scotland's onshore economy have been broadly in line with the rest of the UK; contracting in similar periods, most notably in the mid 1970s, in the early 1980s and in 2008-09. See Chart A.H.
- During the financial crisis, the volume of onshore output in Scotland peaked in the second quarter of 2008, a quarter after the peak in total UK output (first quarter of 2008). Output then fell for five consecutive quarters, reaching a trough in the third quarter of 2009 for Scotland and the second quarter of 2009 for the UK as a whole. The initial decline (from peak to trough) was more limited in Scotland (-5.6 per cent) than for the UK as a whole (-7.4 per cent). See Chart A.I.

Labour market and productivity

- Employment rates between Scotland and the whole UK have converged. Between 1993 and 2012, the employment rate in Scotland (among those aged 16 to 64) increased by nearly 5 percentage points.[2] The increase was more moderate for the UK as a whole: just above 3 percentage points. The employment rate in Scotland is now just above the UK, at 71.9 per cent compared to 71.4 per cent. The unemployment rate has risen but is below the UK average at 7.5 per cent compared to 7.8 per cent. See charts A.J and A.K.
- Prior to the recession (between 1993 and 2007), the employment rate in Scotland increased by more than 7 percentage points. The increase was more moderate for the UK as a whole: just above 4 percentage points. By 2007, the employment rate in Scotland was nearly 2 percentage points above the UK average.
- Scotland's unemployment rate has also converged towards the UK average, falling more rapidly through the second half of the 1990s and prior to the 2008-09 recession.
- Scottish productivity growth (as measured by growth in real output per worker) has grown broadly in line with the UK average from 1993 to 2012, increasing by 1.7 per cent a year on average, compared with 1.8 per cent for the UK as a whole. Productivity growth lagged behind the UK average prior to the recession but has been stronger since. See Chart A.L.

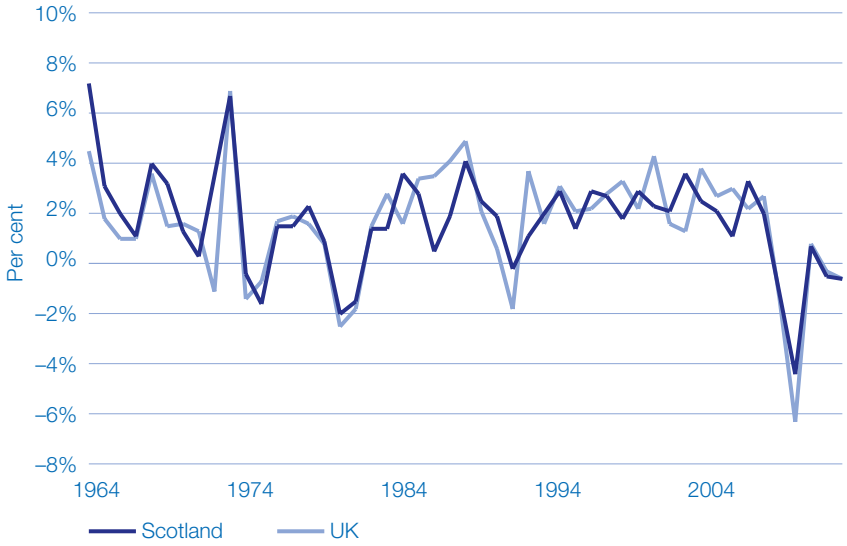
Table A.C: Onshore economic growth in Scotland and the UK

		1963-2012	1998-2012
Scotland	GVA growth	2.0%	1.7%
	Population growth	0.0%	0.3%
	GVA per head growth	2.0%	1.4%
UK	GVA growth	2.2%	2.0%
	Population growth	0.3%	0.6%
	GVA per head growth	1.9%	1.4%

Source: Scottish Government, GDP statistical bulletin (2010Q1 and 2013Q1); ONS, UK real GVA excluding North Sea oil and gas (KLHZ and UIZY); ONS mid-year population estimates; General Register Office for Scotland

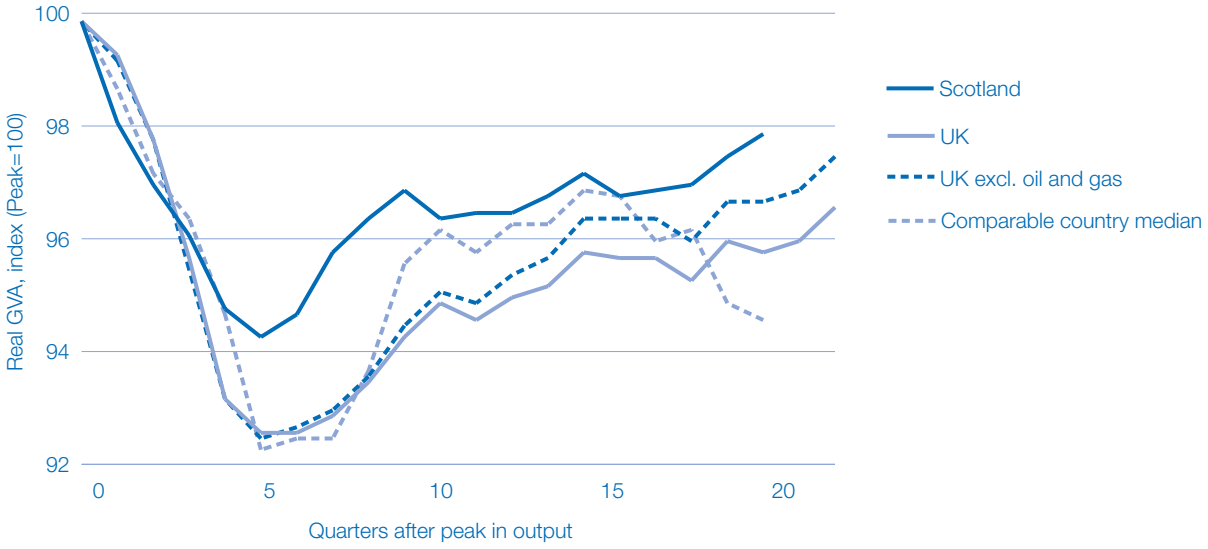
[2] Employment data for Scotland are only available from 1993. Productivity data has been constructed using this employment data.

Chart A.H: Annual growth in onshore economic activity per head



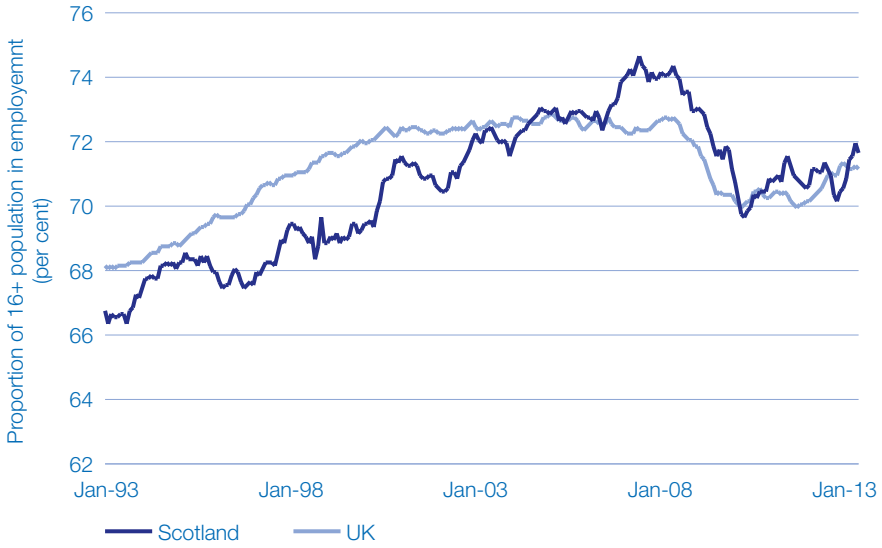
Source: Scottish Government, GDP statistical bulletin (2010Q1 and 2013Q1); ONS, UK real GVA excluding North Sea oil and gas (KLHZ and UIZY); ONS mid-year population estimates; General Register Office for Scotland

Chart A.I Impact of the recession



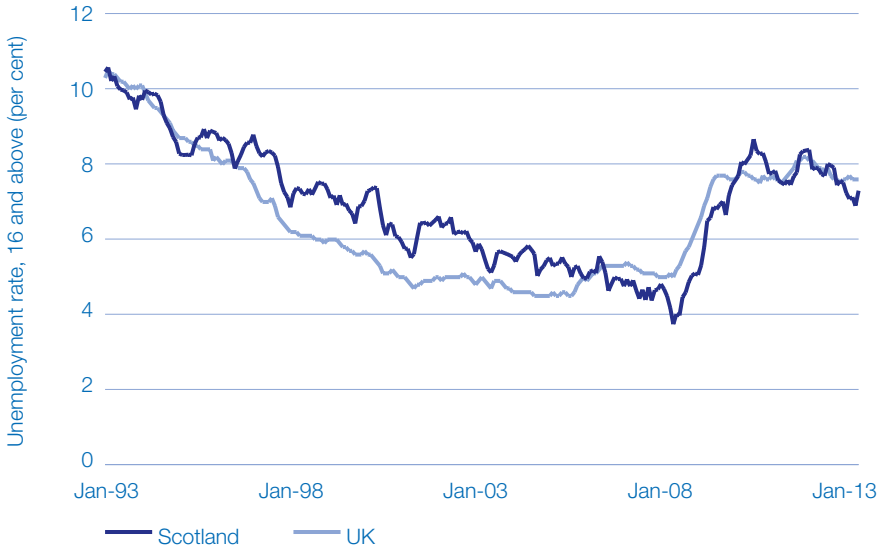
Source: Scottish Government, GDP statistical bulletin (2013Q1); ONS, Gross Domestic Product, Preliminary Estimate (2013Q2); Eurostat

Chart A.J: Employment rate (proportion of the population aged 16 to 64 in employment)



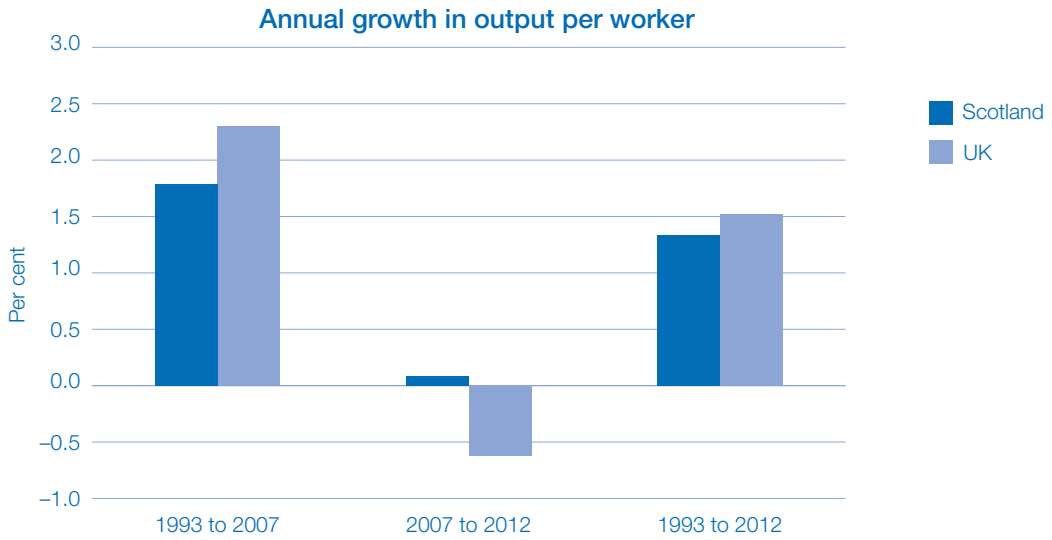
Source: ONS, Labour market statistics (July 2013)

Chart A.K: Unemployment rate (unemployment as a proportion of the population aged 16 and above)



Source: ONS, Labour market statistics (July 2013)

Chart A.L: Productivity growth



Source: Scottish Government, GDP statistical bulletin (2013Q1); ONS, Gross Domestic Product, Preliminary Estimate (2013Q1); ONS, Labour market statistics (July 2013); HMT calculations

Scotland's economic performance relative to comparable independent countries

A.5 Having considered Scotland's performance relative to the UK average, this section turns to its relative performance against other comparable independent countries. For its economic growth target, the Scottish Government compares Scotland's economic performance against seven EU Member States: Austria, Denmark, Ireland, Finland, Sweden, Portugal and Luxembourg. Not of all of these countries are similar in size to Scotland, for example Luxembourg has a population of only approximately 500,000. However, for consistency, this analysis uses the same set of countries.

A.6 There are a number of different indicators of economic performance. This section focuses on the growth in output per head, volatility of output and labour market performance.

A.7 The long-term historical comparison of Scotland's growth performance uses the annual series for Scottish onshore GVA at constant basic prices back to 1963 published by the Scottish Government. The OECD provides historical series for GVA at constant basic prices for the majority of comparable countries (excluding Ireland) back to 1970.[3] The Scottish Government also publishes quarterly data for Scotland onshore GVA at constant basic prices for the period 1998Q1 to 2012Q4. Quarterly GVA at constant basic prices for comparable independent countries is available from Eurostat.[4]

A.8 This analysis of performance focuses on Scotland's peformance as part of the UK. It therefore focuses on onshore GVA. This measure is more directly comparable with the independent countries chosen for this comparison (none of which had a large oil and gas sector). In addition, whilst offshore activity (North Sea oil and gas) is impacted by economic policy choices, it will ultimately be driven by the natural resources remaining and global trends in demand and supply. Offshore activity is also highly volatile and can have a large impact on headline output measures, masking changes in the onshore economy.

Scotland's performance relative to independent comparable countries

A.9 Scotland is a prosperous country with high levels of income and employment rates. Scotland's growth performance over the last 20 years has been stronger than the median of comparator countries, but was weaker in the 1970s and 1980s. Scotland has achieved higher employment rates than the median of comparator countries. Scotland experiences lower volatility in its growth rate than most of the comparator countries and the recession was milder in Scotland than all but one of the seven comparator countries.

Output

- Compared with the seven comparator countries, Scotland ranks 5th out of 8 in the level of output per head. In 2012, it was just above the level of Denmark and Finland and considerably higher than Portugal. Luxembourg is the outlier: it started from a higher level of income than Scotland in 1970 and has grown quickly. This could in part be due to the cross border movement of labour, such as German and French residents increasingly travelling to Luxembourg to work, increasing GVA whilst not

[3] OECD National Accounts Statistics, Gross value added at basic prices, national currencies, OECD base year. GVA (at constant basic prices) is available for Ireland back to 1995; growth in GDP (at constant market prices, also from the OECD) is used to extend for the period 1971 to 1995.

[4] Eurostat, Economy and finance, Quarterly National Accounts, GDP and main components (volume), Eurostat does not publish GVA (at constant basic prices) for Sweden or Ireland. Growth in GDP (at constant market prices, also from Eurostat) is used as a proxy.

increasing the population of Luxembourg. Chart A.M below shows GVA per head levels from 1970 to 2012 for Scotland and the comparator countries.

- In terms of growth rates between 1970 and 2012, Scotland's performance has been poorer but still within the range of comparator countries. Output per head in Scotland has grown faster than Denmark since 1970 and roughly the same as Sweden, although still slower than other comparator countries.
- Annual growth in Scotland's onshore real GVA per head averaged 1.8 per cent between 1970 and 2012. The median growth rate per head across the seven comparator countries was 2.3 per cent over this same period. As can be seen in Chart A.M and Table A.D, some of this is due to catch-up in countries that started from a lower base, for example Ireland and Portugal.
- However, this long run average masks an improving trend in Scotland's economic performance. During the 1990s, Scotland's output per head growth was equal to the median of comparator countries: it ranked joint 4th out of 8. In the period 2000 to 2012, Scottish output growth per head was superior to Denmark, Finland, Ireland, Luxembourg and Portugal, equal to Austria and behind Sweden. It ranked joint 2nd out of these countries.
- Scotland's poorer performance during the 1970s explains the majority of the difference in performance over the whole period. If the 1970s are excluded, Scotland was firmly in amongst the comparator group of countries, only outperformed by Luxembourg and Ireland over 1980 to 2012. A similar pattern of improving performance over these decades is evident in the UK, further illustrating Scotland's economic integration.

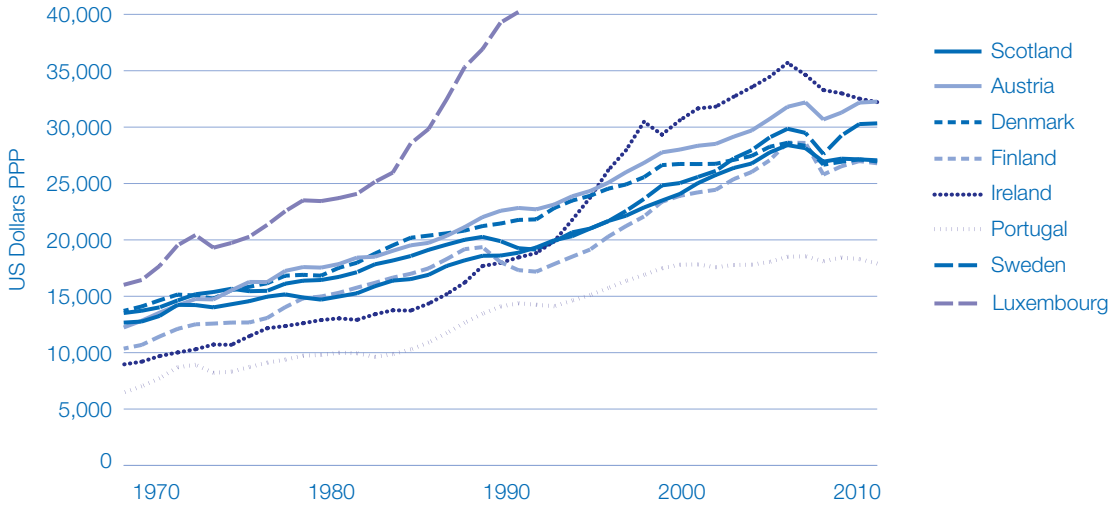
Volatility

- As discussed, Scotland's economic integration with the rest of the UK helps to reduce economic volatility. This can be seen in the stability of Scotland's growth per head over time relative to the comparator countries. Along with Austria, Scotland had the lowest standard deviation in growth per head over the period 1970 to 2012. The median level of volatility in growth rates across the seven comparator countries for this period was 60 per cent higher. See Chart A.N.
- Perhaps the best example of how being part of a well integrated union can reduce volatility is Scotland's experience during the most recent recession. Scotland has performed significantly better than most of the comparator countries, as shown in Table A.E and Chart A.O. While the financial crisis has badly affected the Scottish economy, with output falling by 5.6 per cent from peak to trough, the depth of the recession was shallower than all but one of the independent comparable countries. The recession was twice as large in Ireland, which required an IMF/EU assistance programme. The recession was also larger in Denmark, Finland, Luxembourg, Portugal and Sweden.
- The overall output impact of the global financial crisis (from peak in output to the latest data, in 2013Q1) remained more moderate in Scotland than in a majority of independent comparable countries. While Scottish output remained below its peak by 2.0 per cent in the fourth quarter of 2012, output losses in Denmark, Finland, Ireland, Luxembourg and Portugal all remain larger than that observed for Scotland.

Labour Market

- Overall Scotland's employment rate compares very favourably with that of the comparator countries and its unemployment rate is similar to the median of comparator countries. See Chart A.P and Chart A.Q. The Scottish employment rate was 71.1 per cent in 2012, compared with 69.4 per cent for the median of independent countries.
- As a whole, the median employment rate across independent comparable countries has increased slightly more rapidly than the Scottish employment rate between 1992 and 2012 (by 2.8 percentage points and 2.4 percentage points) but starting from a lower base and remaining below Scotland's employment rate.
- In line with other measures of performance, Scotland's unemployment rate has improved in the 15 years prior to the 2007 recession and is now in line with the performance of the independent comparable countries. The unemployment rate steadily decreased from 9.5 per cent in 1992 to 4.8 per cent in 2007 and 2008, catching up and overtaking the unemployment rate of the median comparable country.
- The 2008 recession has had a similar negative impact on the unemployment rate in all of the independent comparable countries. Scotland had a very slightly larger rise compared to the median of independent comparable countries: unemployment was 8 per cent in Scotland in 2012, slightly higher than the median of 7.7 per cent.
- Scotland has avoided the worst of the volatility in the unemployment rate amongst the independent comparable countries. Ireland and Finland had unemployment rates above 15 per cent in 1993 and Ireland and Portugal have had unemployment rates above 15 per cent at some point during 2012.

Chart A.M: Historical comparison of Scotland's output performance per head



Source: OECD National Accounts Statistics, Gross value added at basic prices, national currencies, OECD base year; Scottish Government, GDP statistical bulletin (2010Q1 and 2013Q1), HMT calculations

Table A.D: Growth Rates in GVA per head

	1970 to 2012	1970 to 1980	1980 to 1990	1990 to 2000	2000 to 2012
Austria	2.3%	3.5%	2.2%	2.3%	1.2%
Denmark	1.6%	2.0%	2.2%	2.2%	0.1%
Finland	2.2%	3.4%	2.6%	1.8%	1.1%
Ireland	3.2%	3.3%	3.3%	6.2%	0.8%
Portugal	2.3%	3.8%	3.1%	2.5%	0.2%
Sweden	1.9%	1.9%	2.1%	2.0%	1.6%
Luxembourg	3.1%	3.8%	4.5%	3.8%	0.8%
Median of comparator countries	2.3%	3.4%	2.6%	2.3%	0.8%
Scotland	1.8%	1.6%	2.1%	2.3%	1.2%

Source: OECD National Accounts Statistics, Gross value added at basic prices, national currencies, OECD base year; Scottish Government, GDP statistical bulletin (2010Q1 and 2013Q1), HMT calculations

Chart A.N: Standard deviation of annual growth per head

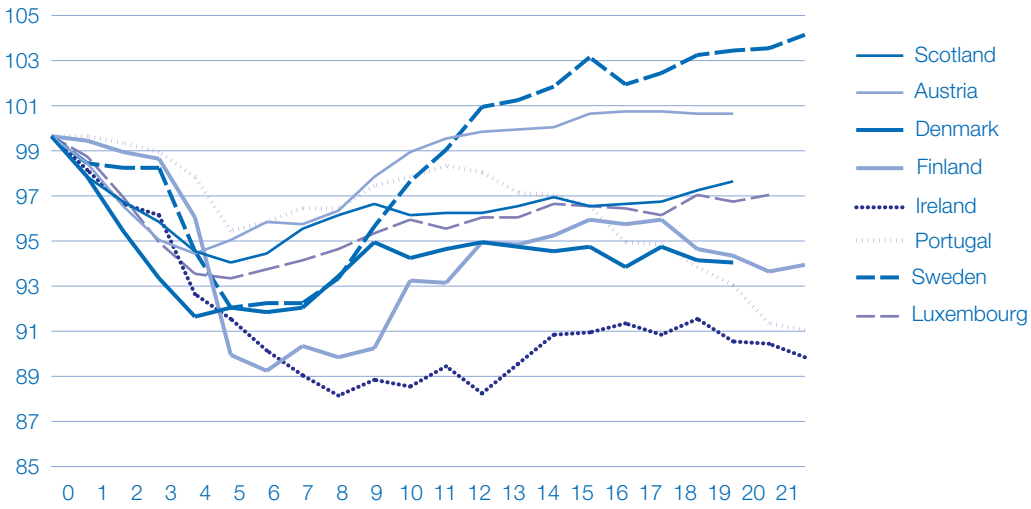
Source: OECD National Accounts Statistics, Gross value added at basic prices, national currencies, OECD base year; Scottish Government, GDP statistical bulletin (2010Q1 and 2013Q1), HMT calculations

Table A.E: Impact of the recent global financial crisis

	Timing of the recession			Output impact of the recession		
	Quarter of peak	Quarter of trough	Duration (peak to trough)	Peak to trough	Trough to 2013Q1	Peak to 2013Q1
Austria	2008Q2	2009Q2	4	-5.2%	6.5%	1.0%
Denmark	2008Q2	2009Q2	4	-8.0%	2.6%	-5.6%
Finland	2007Q4	2009Q2	6	-10.4%	5.2%	-5.7%
Ireland	2007Q4	2009Q4	8	-11.5%	2.0%	-9.8%
Luxembourg	2008Q1	2009Q2	5	-6.3%	3.9%	-2.6%
Portugal	2007Q4	2013Q1	21	-8.6%	0.0%	-8.6%
Sweden	2007Q4	2009Q1	5	-7.6%	13.1%	4.5%
Median of comparable countries	2007Q4	2009Q2	6	-8.0%	3.9%	-5.6%
Scotland	2008Q2	2009Q3	5	-5.6%	3.8%	-2.0%

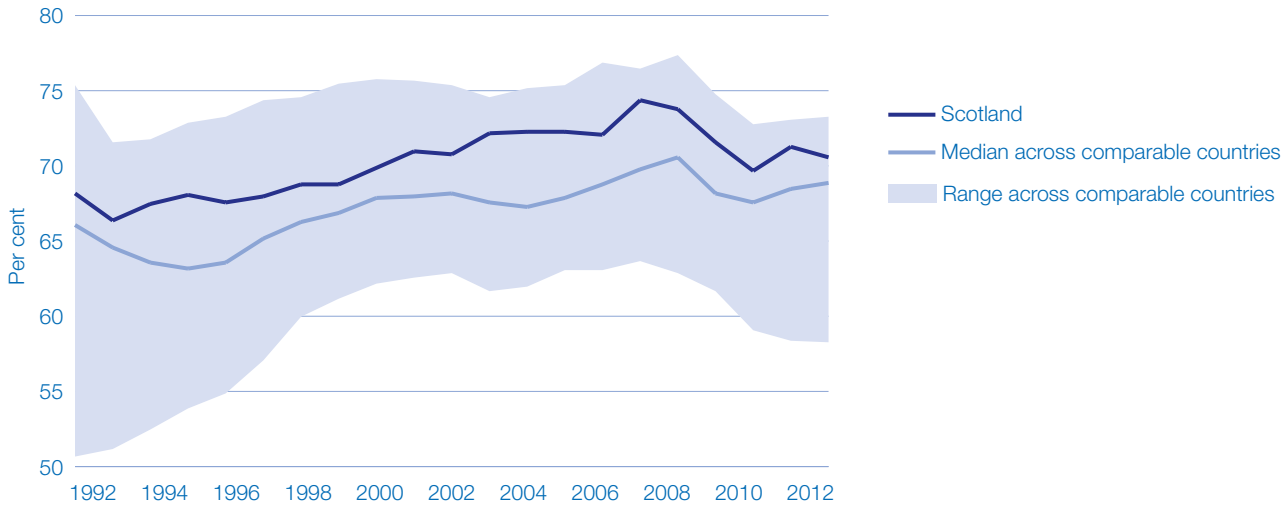
Source: Eurostat, Scottish Government, GDP statistical bulletin (2013Q1)

Chart A.O: Output growth, pre-recession peak=100



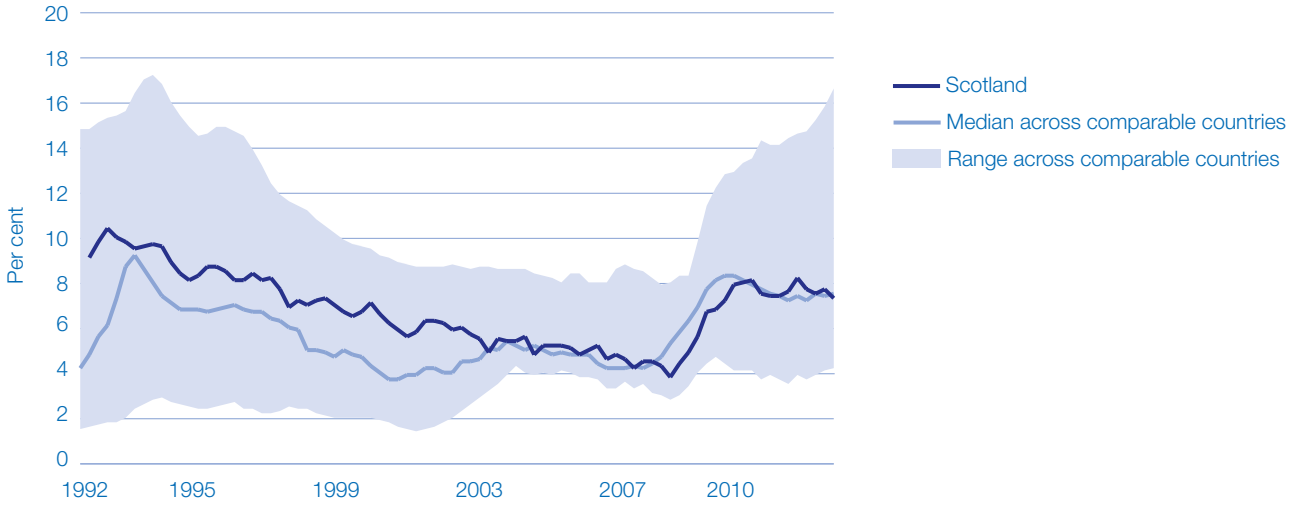
Source: Eurostat, Scottish Government Quarterly GDP (2013Q1)

Chart A.P: Scotland's employment rate relative to comparable countries



Source: Eurostat, OECD, ONS Labour market statistics

Chart A.Q: Scotland's unemployment rate relative to comparable countries



Source: Eurostat, OECD, ONS Labour market statistics

Box A.A Sources for Scotland's economic statistics

There are a number of different sources of data on the Scottish economy. This analysis draws on a wide range of these sources.

Data on Scottish output are published by both the Scottish Government and the ONS. Real GVA for the onshore economy is published quarterly by the Scottish Government as a National Statistic, which means that it is considered to meet the UK Statistics Authority's rigorous production and quality standards. The current publication is to 1998Q1. The longer term series to 1963 was last published in 2010.

A more extensive set of data for nominal GVA and GDP is published quarterly by the Scottish Government in the Scottish National Accounts Project (SNAP). This includes a spilt for onshore and the Scottish share of extra-regio output. These statistics are currently classified as experimental, i.e. methodologies are still being developed and tested, so estimates may be subject to more frequent and significant revision.

The ONS also publishes annual regional GVA for all the regions and devolved countries as a national statistic.

Data on the labour market is published monthly by the ONS in the regional labour market release as a national statistic. Data on labour productivity is published quarterly by the ONS in the regional labour productivity release as a national statistic. Data on population is published by the ONS as mid-year population estimates.

Data on trade is from three main sources. The annual Global Connections Survey provides a detailed breakdown of Scottish exports. SNAP provides data for Scottish imports and exports. The latest SNAP release does not include a split between imports and exports. Instead a balancing item has been published. Therefore the previous release has been used when considering Scottish imports and exports as the latest available data. The Scottish input-output tables also provide very detailed data on Scottish imports and exports. All of these statistics are currently classified as experimental.

Data on migration between Scotland and the rest of the UK is published quarterly by the General Register Office for Scotland as a national statistic.

Annex B: Scotland's tax and spending as part of the UK

B.1 This annex provides more detail on Scotland's tax and spending as part of the UK since devolution. The analysis in this annex is largely based on estimates published by the Scottish Government in Government Expenditure and Revenue Scotland (GERS) and Historical Fiscal Balance Calculations:

- GERS is a National Statistics publication, which means that it is considered to meet the UK Statistics Authority's rigorous production and quality standards. It is published annually and provides estimates of Scotland's tax and spending for the latest five year period; and
- the Historical Fiscal Balance Calculations publication provides a longer series of tax and spending data, but is currently badged by the Scottish Government as experimental. I.e. methodologies are still being developed and tested, so estimates may be subject to more frequent and significant revision.

B.2 The focus on the period since devolution in this annex is therefore partly because this is the period for which the more reliable data is available, but it also reflects the fact that the choice facing Scotland is between devolution and independence.

B.3 These publications provide estimates of Scotland's historical tax and spending as part of the UK. The figures do not represent the fiscal position of a hypothetical independent Scotland nor, more obviously, what this might look like in the future. Given the UK (and therefore Scotland) derives significant economic and fiscal benefits from integration, the fiscal position of an independent Scotland could therefore be substantially different from Scotland's position as part of the UK presented in GERS.

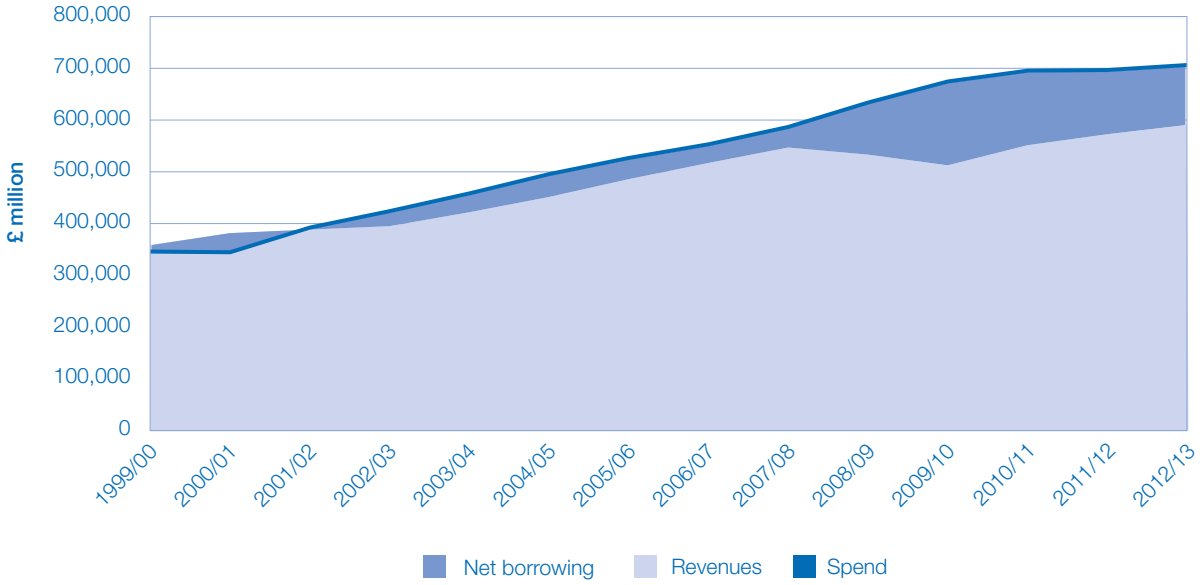
B.4 This annex is structured around three main areas:

- the approach to assessing Scotland's tax and spending as part of the UK;
- Scotland's public spending as part of the UK;
- Scotland's revenues as part of the UK, including the distinction between onshore and offshore revenues.

Assessing Scotland's tax and spending as part of the UK

B.5 Public spending in the UK is funded through taxation, with shortfalls in tax revenues supplemented by borrowing as shown in Chart B.A. The UK's fiscal model collects and pools tax revenues from across the UK and redistributes these to fund spending based on a combination of need, population, opportunity, formula and history. Since devolution the UK has funded 90 per cent of spending from tax revenues and 10 per cent from borrowing.

Chart B.A: How the UK's public spending is funded



Source: ONS/HM Treasury, Public Sector Finances (as used in GERS 2011-12 in March 2013)

B.6 A geographical breakdown of the UK's public spending is published in the Treasury's Country and Regional Analysis (CRA). The principles defined in this publication provide a framework for identifying the regional distribution of public spending across the UK. The fundamental principle is to identify the people who benefit from public spending, or for whom public spending is undertaken, rather than necessarily where the spending takes place. The key details are set out in Box B.A.

Box B.A: Identifying Scotland's spending as part of the UK

The fundamental principle is to identify the people who benefit from public spending, or for whom public spending is undertaken.

For most areas of spending it is relatively straightforward to produce geographical estimates consistent with this principle. Considering some of the larger areas of public spending, most health spending benefits people living in the country/region where the money is spent; the recipients of benefits and pensions payments can be readily identified; and local authority spending is assumed to benefit the residents.

Moreover, even for spending areas where it is less straightforward, methodologies consistent with this 'who benefits' principle have been developed and tested over many years (although are still subject to regular review and refinement where necessary). For example, the administrative costs associated with paying benefits are assumed to follow the same pattern as the benefits payments themselves – so if 10 per cent of benefits are paid to Scotland, it is considered that 10 per cent of the associated administrative costs are also incurred on behalf of Scotland.

The spending presented in the CRA also reflects the ONS definition of which organisations are part of the public sector. The CRA therefore reflects the size of the public sector in each country/region as well as spending on comparable public services. As the shape of the public sector is largely consistent across the UK, this has little impact on the aggregate public spending numbers presented in the CRA.

However, it is worth noting that water has been privatised in England and Wales while it is part of the public sector in Scotland and Northern Ireland. Public spending is therefore slightly higher in Scotland and Northern Ireland than if water was privatised, although revenues in Scotland are correspondingly higher as water rates are treated as public sector receipts. Specifically, Scotland's tax and spending are both increased by around £500 million per year, which is most significant when considering the distribution of public spending across public services in Scotland.

The spending presented in GERS uses the CRA publication as its main input. The one key divergence is in the presentation of spending that is considered to benefit the whole of the UK equally (for example spending on defence or foreign representation). Specifically, while the CRA shows all this non-regional (or 'non-identifiable') spending in a separate category, a population share (or similar) is allocated to Scotland in GERS. This differing approach largely reflects the fact that GERS is additionally attempting to estimate Scotland's overall fiscal balance, while the CRA limits its focus to a geographical breakdown of the UK's public spending.

B.7 There is currently no similar overarching framework for attributing tax revenues to the countries and regions of the UK. This is partly due to the difficulty in attributing certain taxes geographically, but it also reflects the fact that the pooling and redistribution of most revenues means that the location where taxes accrue hasn't been an important feature of tax collection (beyond the fact that it accrued within the UK). However, HMRC will be publishing a country breakdown of tax revenues for the first time in October 2013. This publication, like GERS, will estimate tax revenues generated by Scotland as part of the UK rather than as an independent country.

B.8 While the assessment of the UK's fiscal position is based on all UK tax and spending, for an analysis of Scotland it is necessary to consider one extension – the treatment of North Sea tax revenues. Consistent with the approach taken by the Scottish Government, and other external commentators (notably the Centre for Public Policy for Regions), this assessment considers Scotland's onshore contribution before examining the impact of attributing a share of North Sea tax revenues.

Scotland's public spending as part of the UK

B.9 Scotland's spending in this paper is based on the 'who benefits' principle. It therefore includes spending on functions that are devolved to the Scottish Parliament, such as health, social care, education, transport, policing and housing, as well as spending by the UK Government on reserved functions, such as welfare and defence. It is presented consistent with the National Accounts framework used by the ONS and the OBR to assess the UK's public finances.

Devolved spending

B.10 The vast majority of Scottish Government spending is determined to benefit Scotland, while all spending by Scottish local authorities is assumed to benefit Scotland (which is a simplifying assumption that the CRA makes for all local authorities throughout the UK). All spending by Scottish public corporations (notably Scottish Water) is also currently considered to benefit Scotland.

B.11 The devolved administrations are largely funded via the Barnett formula, whereby a population share of any increase (or decrease) in comparable spending in England is added to their baseline funding. This is commonly referred to as the block grant. The Scottish Government determines how much of the block grant to allocate to each devolved function, including allocations to local authorities. The policy flexibility that this provides was set out in Chapter 2.

B.12 In addition to the block grant, certain areas of Scottish Government spending are funded by the UK Government through Annually Managed Expenditure (AME). Spending funded through AME is essentially limited to those programmes that are particularly large and volatile, so are not reasonably subject to multi-year budgets. While most AME programmes are reserved (such as benefits and tax credits) the payment of Scotland's public service pensions, for example, is funded through Scottish Government AME. Increases in spending on these programmes do not need to be offset by reductions in spending on other devolved services.

B.13 Both the Scottish Government and local authorities can augment their funding through sales of goods, services and assets. In addition to this, local authorities obtain further funding through council tax and business rates, while the revenue-raising responsibility of the Scottish Government is being enhanced through the ongoing implementation of the Scotland Act 2012. As well as increasing their financial accountability, this will mean that the Scottish Government will have the ability to vary the overall levels of tax and spending in Scotland rather than just being responsible for allocating a fixed budget.

Reserved spending

B.14 The spending analysis in this paper also includes spending reserved to the UK Government that is undertaken on behalf of the people of Scotland. There are three approaches taken to determine the share of reserved spending that benefits Scotland:

- **administrative data** – many of the most significant areas of reserved spending (such as benefits, state pension payments, tax credits etc) can be identified to Scotland according to detailed administrative information;
- **relevant indicators** – a second subset includes spending that is geographically diverse, but where the precise beneficiary cannot always be identified. In these cases (e.g. research programmes, museums and galleries etc) relevant indicators are used to determine the share of spending that is undertaken on behalf of the people of Scotland; and
- **equal benefit** – thirdly, there are certain areas (such as defence and foreign affairs) where everyone across the UK is considered to benefit equally. While the Treasury's CRA publication uses the concept of 'non-identifiable' for this category, GERS attributes a population share (or similar) to Scotland.

B.15 It is important to note that this doesn't necessarily reflect the spending that actually takes place in Scotland. I.e. the purpose is to identify the spending that benefits the people of Scotland rather than the economic impact of spending in Scotland (e.g. on jobs). Some spending that takes place in Scotland is therefore considered by the CRA (and therefore GERS) to benefit other parts of the country while some spending that takes place in other parts of the UK is determined to benefit Scotland.

B.16 For example the Department for International Development (DfID) has significant numbers of staff in Scotland working on behalf of the UK as a whole – much of the spending, although in Scotland, is therefore undertaken on behalf of other parts of the UK and so does not form part of Scotland's spending. Conversely, a share of DfID's spending overseas is undertaken on behalf of Scotland and therefore allocated accordingly. Similar arrangements apply in a number of other departments, notably HM Revenue and Customs (HMRC), the Department for Work and Pensions (DWP), the Ministry of Defence (MOD) and the Department for Energy and Climate Change (DECC).

B.17 This further reinforces that GERS provides a view of Scotland's spending (as well as Scotland's tax) as part of the UK, rather than what it might look like as an independent country.

Scotland's funding as part of the UK

B.18 As part of the UK, Scotland's spending is currently funded through local taxes (council tax and non-domestic rates) plus pooled and redistributed national taxes and a share of UK borrowing.

B.19 While as part of the UK it isn't necessary to determine how Scotland's funding is split between redistributed taxes and borrowing, there are at least three logical ways to do so:

- assume that the UK borrows the same amount per person. I.e. Scotland's share of UK borrowing would mirror its population share, which averages around 8.5 per cent since devolution;
- as the UK funds part of its spending through borrowing it could be assumed that Scotland's share of UK borrowing is the same as its share of spending, which is 9.4 per cent since devolution; or
- Scotland could be considered to be funded by the tax revenues that it generates, with borrowing filling any gap between this and the level of spending.

B.20 The next section of this paper considers this further, starting with an assessment of revenues generated by Scotland's onshore economy.

Scotland's onshore revenues

B.21 In addition to taxes raised locally (currently council tax and non-domestic rates) the revenues considered in this section are those that can be attributed to people and (onshore) businesses in Scotland. As explained earlier in this annex, this is based on statistical methodologies rather than reflecting actual revenues generated by Scotland.

B.22 It should be noted that onshore revenues, as presented in GERS, includes all the income tax (and other taxes) paid by people who work offshore. The only taxes that are excluded are those that are specific to the oil and gas companies operating in the North Sea. I.e. petroleum revenue tax, North Sea corporation tax (including the supplementary charge) and licence fees (which have now been phased out).

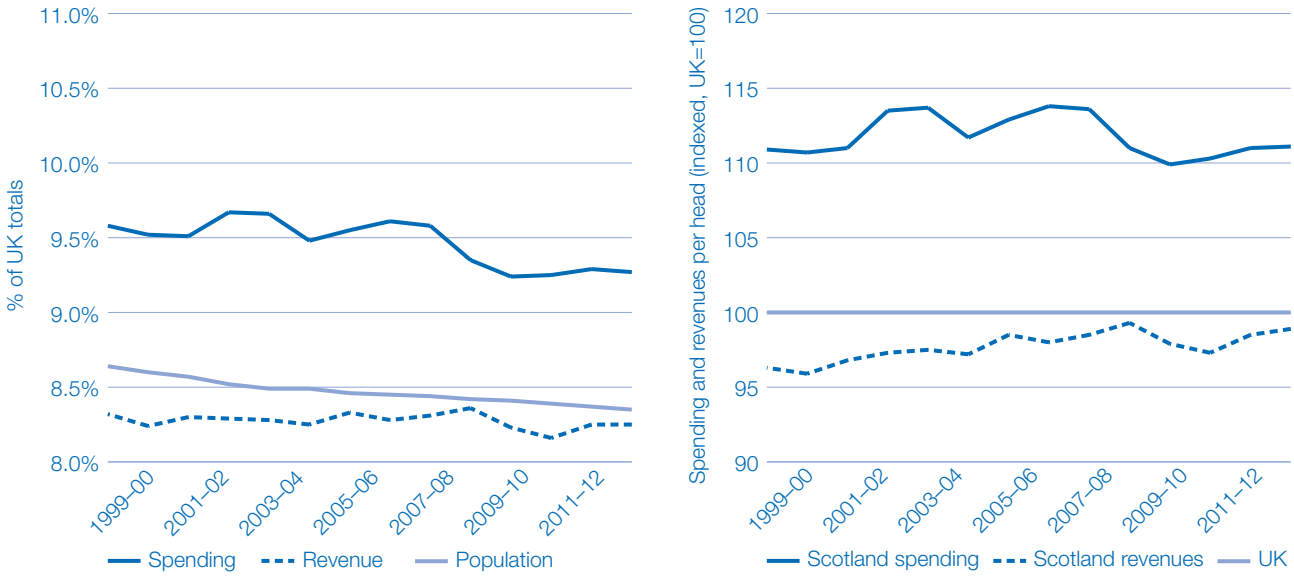
B.23 Estimates of Scotland's onshore tax revenues per head are slightly lower than the UK average. This reflects the fact that the performance of Scotland's onshore economy closely mirrors the performance of the UK's onshore economy (as highlighted earlier in this paper) and the fact that people and businesses across the UK are subject to the same levels of taxation (as the UK has a largely unified tax system).

B.24 Chart B.B shows Scotland's share of the UK's spending, onshore revenues and population since devolution. It also shows Scotland's spending and onshore revenue indexed against the UK average. Throughout this period Scotland has benefitted from relatively high levels of public spending while generating similar levels of taxation. The British Academy and Royal Society of Edinburgh[1] recognised Scotland's simultaneous low tax/high spend position as part of the UK and the challenge of maintaining this as an independent country.

[1] British Academy and the Royal Society of Edinburgh, Scotland and the United Kingdom, 2012.

B.25 Specifically, since devolution, Scotland's onshore economy has generated 8.3 per cent of the UK's receipts, which is slightly lower than a population share (which averaged 8.5 per cent over this period). At the same time, Scotland has received an average of 9.4 per cent of UK public spending. Relative to the UK generating and spending £100, this means that Scotland's onshore economy has generated £98 while Scotland's spending is £112.

Chart B.B: Scotland's onshore tax and spending compared to the UK average



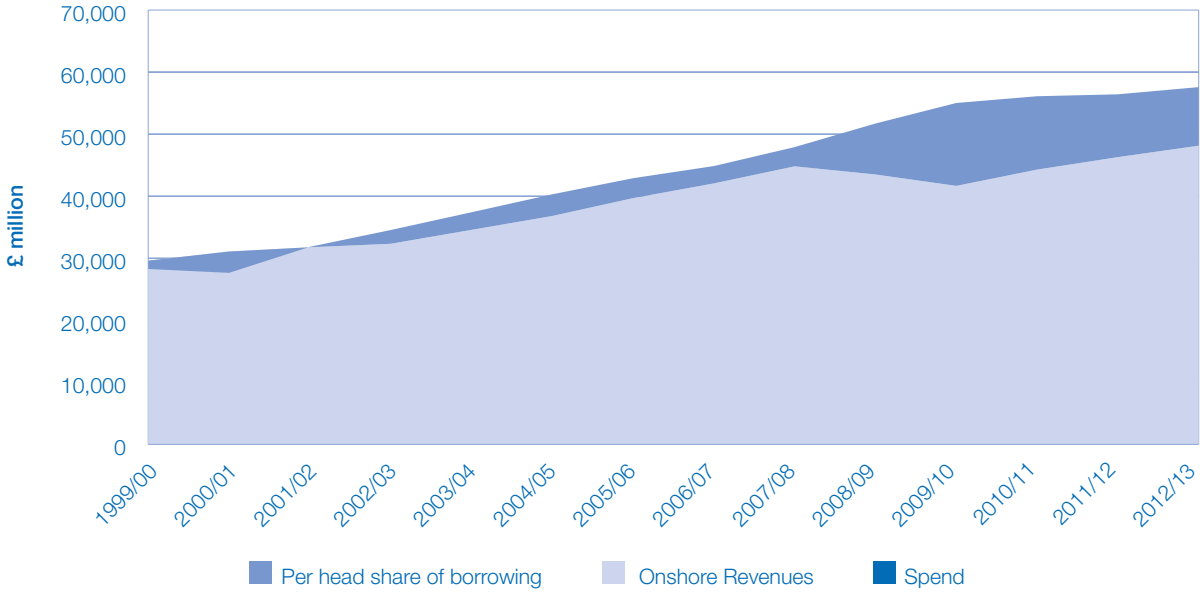
Source: Scottish Government, GERS 2011–12 and historical series (all figures to 2011–12); ONS/HM Treasury, Public Sector Finances (UK figures for 2012–13, excluding the one-off Royal Mail Pension Scheme asset transfer); HMRC, Government revenues from UK oil and gas production (North Sea revenues for 2012–13); HM Treasury estimates (Scotland's share of 2012–13 UK totals, based on the 2011–12 share)

B.26 This highlights the significant fiscal gap that exists between Scotland's onshore revenues and spending. Had Scotland instead received its population share of spending then it would have received some £74 billion less since devolution, or around £6 billion less (in real terms) each year. An allocation of the UK's spending based on a share of onshore revenues would have further decreased Scotland's spending.

B.27 However, it is worth reiterating that public spending is allocated across the UK according to a combination of need, population, opportunity, formula and history. Higher spending in Scotland than the UK average is therefore the result of a range of factors and, like every other region of the UK, doesn't depend solely on population or on the share of tax revenues generated.

B.28 But clearly this means that there is a significant gap between Scotland's share of UK spending and onshore revenues. And as shown in Chart B.C, there is a funding gap of £95 billion since devolution even after a per capita share of the UK's borrowing is included.

Chart B.C: Scotland's spending and funding (excluding North Sea revenues)



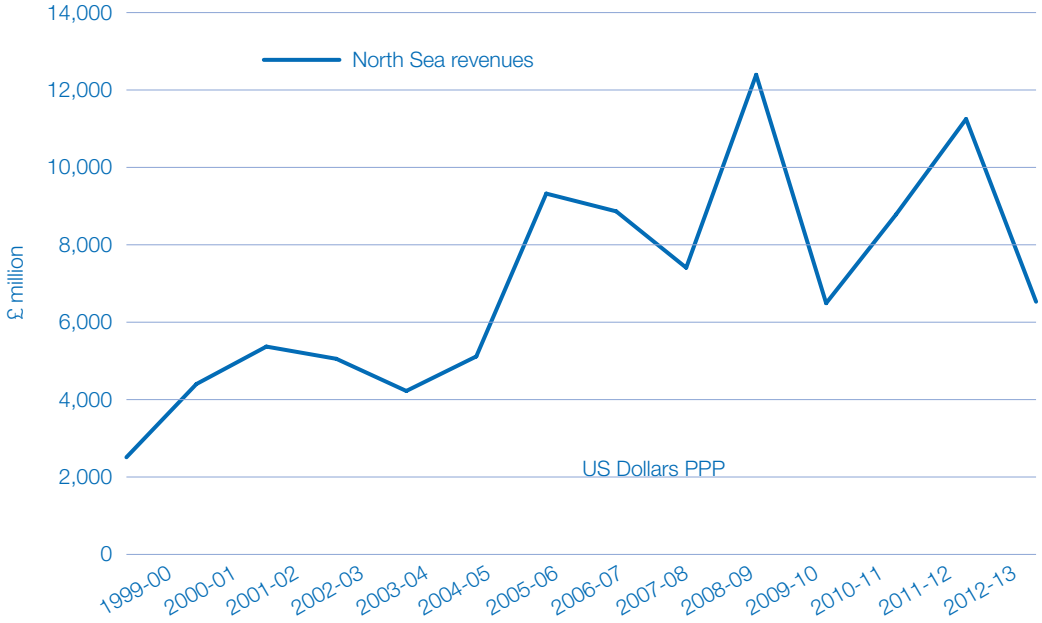
Source: Scottish Government, GERS 2011–12 and historical series (all tax and spend figures to 2011–12); ONS/HM Treasury, Public Sector Finances (UK figures for 2012–13, excluding the one-off Royal Mail Pension Scheme asset transfer); HMRC, Government revenues from UK oil and gas production (North Sea revenues for 2012–13); HM Treasury estimates (Scotland's population share of UK borrowing in all years and Scotland's share of 2012–13 UK tax and spend based on the 2011–12 share)

Scotland's revenues including North Sea tax revenues

B.29 North Sea oil and gas is a hugely important resource for the UK, both in terms of its impact on the UK economy and the contribution it makes to UK tax revenues.

B.30 Total North Sea tax revenues have averaged £7.1 billion a year since devolution in 1999. This corresponds to around 1.5 per cent of the UK's total revenues during this period. However, as highlighted in Chart B.D, these revenues have been volatile – they have ranged from £2.6 billion in 1999-00 to £12.9 billion in 2008-09, which equates to between 0.7 per cent and 2.4 per cent of the UK's revenues. The largest year-on-year change is a fall of more than £6 billion following the 2008-09 peak, which corresponds to a reduction in UK revenues of just over 1 per cent.

Chart B.D: North Sea tax revenues



Source: HMRC, Government revenues from UK oil and gas production

B.31 As many external commentators have identified, including the Institute for Fiscal Studies (IFS)[2] and the Centre for Public Policy for Regions (CPPR)[3], North Sea revenues have essentially filled the gap between Scotland's onshore revenues (and share of UK borrowing) and Scotland's spending.

B.32 Specifically, while Chart B.C identifies a £95 billion onshore fiscal gap since devolution, North Sea tax revenues have totalled £99 billion.[4] Therefore, as part of the UK, this suggests that Scotland is already benefitting from the vast majority of North Sea tax revenues (in addition to the economic benefits surrounding the oil and gas industry).

B.33 But the advantage of these revenues being pooled and redistributed to Scotland (alongside other UK-wide taxes) is that the volatility of North Sea revenues is smoothed. As demonstrated in Chart B.C, and as discussed earlier in this paper, Scotland has enjoyed steady and secure levels of spending as part of the UK rather than spending that mirrors the volatility of North Sea revenues in Chart B.D. I.e. Scotland has effectively exchanged a volatile source of funding (a share of North Sea revenues) for a stable one (in the form of the block grant paid from pooled UK taxes).

Factors affecting North Sea tax revenues

B.34 There are a number of factors affecting North Sea tax revenues, including production levels, oil and gas prices, industry investment and operating costs, and the government's fiscal regime. Not only does this make revenues volatile, but as explained in Chapter 2 it also makes them unpredictable. These factors, and their impact on revenues, are examined below.

North Sea production levels

B.35 As shown in Chart B.E, since peaking around the turn of the century, oil and gas production has declined substantially – both are now at around a third of peak levels, reflecting that extraction is becoming more difficult and aging infrastructure is leading to more frequent unplanned maintenance and temporary field closures.

B.36 For example in March 2012 Total shut its Elgin platform due to a gas leak. It remained shut until March 2013, which is significant as Elgin and two nearby fields account for almost 8 per cent of North Sea gas production. The impact of the Elgin shutdown on UK tax revenues, taking into account the effect of the shutdown on the nearby Franklin field, is estimated at £750 million in 2012 and £500 million in 2013.

B.37 Everything else being equal, and as demonstrated in the above example, lower production corresponds to lower profits and therefore lower tax revenues.

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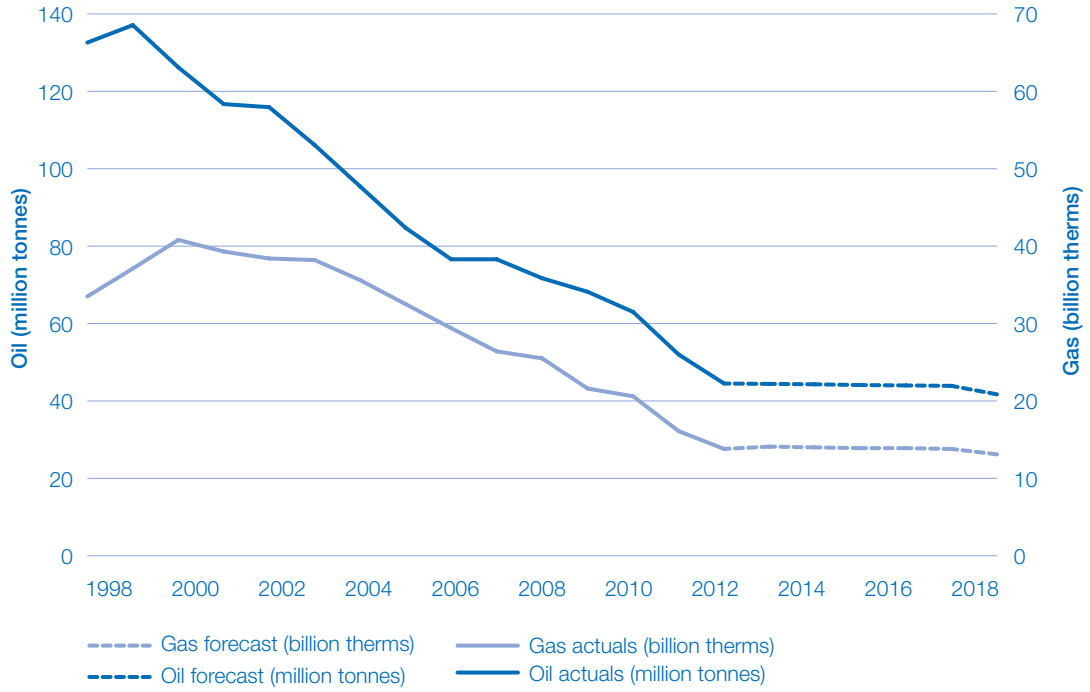
[2] Institute for Fiscal Studies, 'Scottish independence: the fiscal context', November 2012.

[3] The Centre for Public Policy for Regions have published a series of papers on Scotland's economic and fiscal performance.

[4] HMRC, Government revenues from North Sea oil and gas production, June 2013.

Chart B.E: North Sea oil and gas production



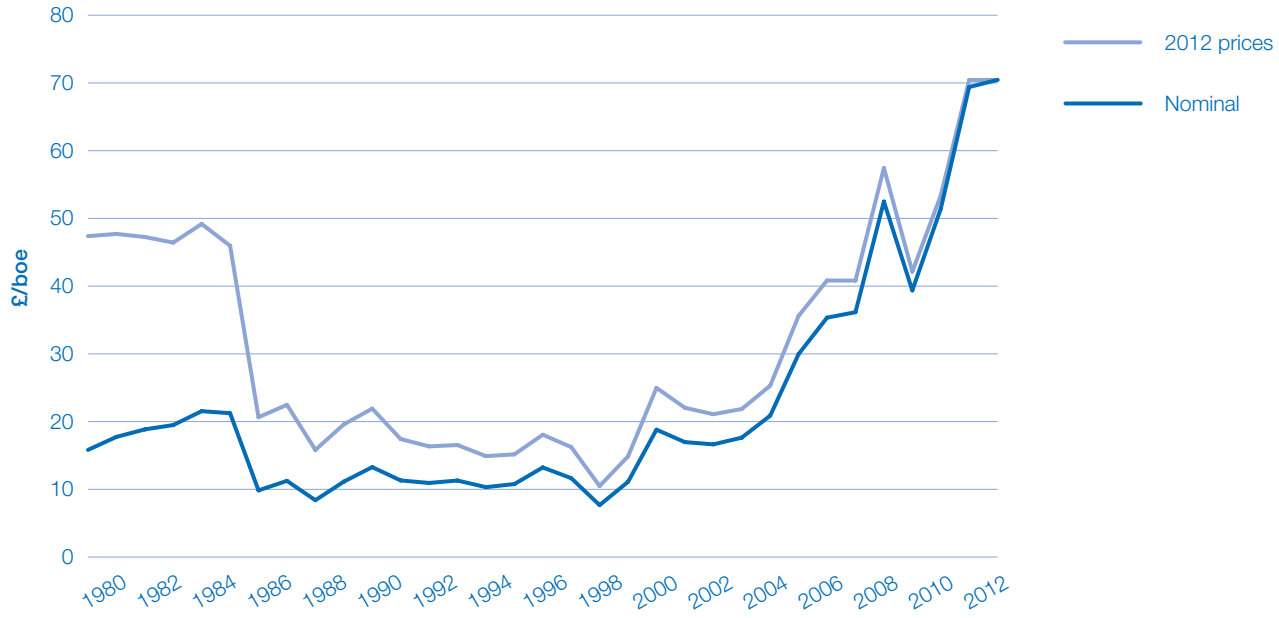
Source: DECC, oil and gas UK field data

Oil and gas prices

B.38 High prices in the first half of the 1980s were followed by low prices until the end of the 1990s. The period since devolution has seen an upwards trend in the price of oil and gas, alongside significant volatility, both of which have fed through into tax receipts. The price of a barrel of oil is shown in Chart B.F. For North Sea tax revenues, the trend increase in price since devolution has essentially offset the decline in production.

B.39 However, the impact of price fluctuations is exemplified by price changes during 2008, when the oil price fell from a high of £67/barrel to a low of £27/barrel in just 6 months. As noted above, UK oil and gas receipts halved during this period from nearly £13 billion in 2008-09 to £6.5 billion in 2009-10. It should also be noted that as oil is traded in dollars, the pound/dollar exchange rate produces a further effect on tax revenues.

Chart B.F: Oil prices



Source: BP, statistical review of world energy 2013

The Government's North Sea fiscal regime

B.40 The Government's fiscal regime is designed to encourage the investment needed to fully exploit remaining reserves as extraction becomes more difficult, while ensuring a fair return for the tax payer.

B.41 In addition to recent announcements of new field allowances for large shallow water gas fields and brown fields, the Government's commitment to extending the productive life of the North Sea basin is reflected in the decision to provide industry with long-term decommissioning tax relief certainty (worth upwards of £20 billion) through the introduction of contracts (Decommissioning Relief Deeds) with oil and gas companies.

B.42 This has encouraged vital new investment that creates jobs and growth in the short-term, and is expected to extend the productive outputs of many fields in the longer-term. The Government's recent announcements have already been credited with helping to secure a range of new investment in the North Sea. Following the announcement of the large shallow water gas allowance, for example, £1.4 billion of investment was sanctioned in the Cygnus gas development which is expected to create 1,200 jobs. Many fields will also benefit from the introduction of the brown field allowance, including the Thistle oil field where an incremental project is expected to safeguard 500 existing jobs and create almost 1,000 new ones across the UK.

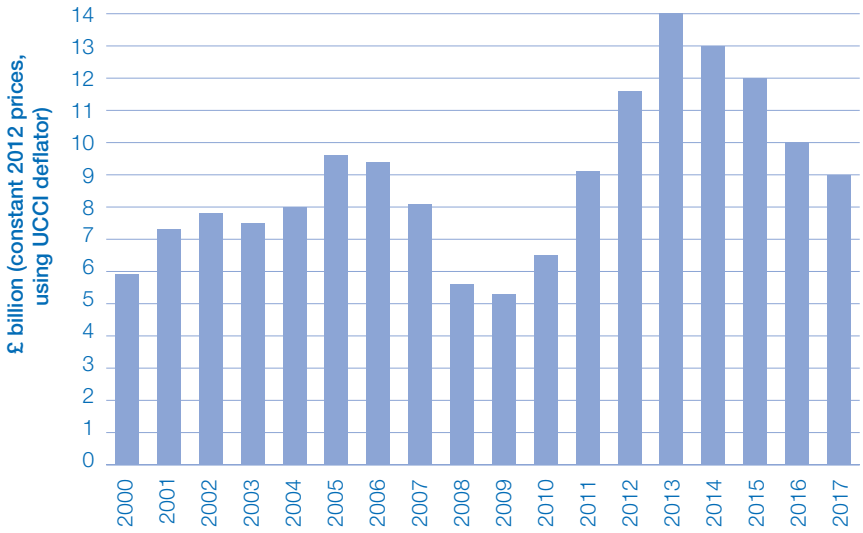
B.43 However, it is important to note that the immediate impact of higher investment is to reduce short-term tax revenues, as investment is subject to tax relief. The Government can afford to take these long-term decisions, even at the expense of short-term revenues in the current fiscal climate, because of the size and diversity of the UK economy, and the importance of making the most of remaining reserves in the long-term.

Industry investment and operating costs

B.44 Industry expenditure has a significant impact on tax revenues. As explained above, investment is subject to tax relief and so increased investment lowers short-term tax revenues. Chart B.G below shows that while investment was relatively stable in the first ten years following devolution, the impact of increasing oil prices and the Government's recent announcements has been to encourage a significant increase in investment from 2009 onwards. This is most significant in relation to the forecasts of tax revenues over the next five years, and is one of the key factors highlighted by the OBR for their forecast of lower tax revenues during this period.

B.45 Although less significant, increased operating costs (as extraction becomes more difficult) reduce profits for a given level of production, which in turn reduce tax revenues.

Chart B.G: North Sea Investment



Source: DECC, oil and gas UK field data

B.46 Further to the above, Box B.B provides a summary of the impacts of these key factors on the levels of North Sea tax revenues.

Box B.B: Summary of the impact of key factors on North Sea tax revenues

As explained above, it is the combined impact of production levels, prices, industry expenditure and the government's fiscal regime that determines the level of tax revenues generated by the North Sea.

The key impacts and interactions are as follows:

- decreasing/increasing production will lead to lower/higher tax revenues, everything else being equal;
- decreasing/increasing prices (or equivalent exchange rate effects) will lead to lower/higher tax revenues, everything else being equal;
- decreasing/increasing operating costs will lead to higher/lower tax revenues, everything else being equal;
- tax revenues from the North Sea are volatile as they are dependent on volatile oil and gas prices and production levels (which can be significantly affected by unplanned maintenance and temporary field closures);
- industry investment is encouraged by the Government's fiscal regime (through tax relief) and therefore reduces short-term government revenues. Recent government announcements, particularly on long-term decommissioning certainty, have contributed to significant increases in planned investment. While investment is expected to slow the decline in production, it will actually contribute to the reduction in short-term revenues.

Annex C: Modelling the Effect of the Border

C.1 There is a large body of literature which attempts to model the effect of a border on international trade flows. One method which has been widely employed is a gravity model, which seeks to capture the degree by which trade between regions is higher than trade across an international border. A review of this literature as well as wider trade literature would suggest that the creation of a border is likely to be detrimental to the performance of the Scottish economy. However, there is great uncertainty over the magnitude of this effect. The methodology in this paper has therefore adapted the well-known framework, which has the benefit of being both parsimonious and transparent, in order to provide *illustrative* estimates of how both the flow of goods and labour might be affected by the creation of an international border.

Estimating the border effect on trade and migration for Scotland

C.2 The lack of a physical border between the rest of the UK and Scotland requires a departure from the methodology used in the empirical gravity equation literature. With a historical border in place, studies tend to use a dummy variable which is equal to one when trade crosses the border and equal to zero when trade occurs within a region. Performing an analysis of the counterfactual does not permit this approach.

C.3 Instead, the methodological approach is to estimate a gravity equation for migration and trade within the Eurozone, using this to *predict* the flows of goods and labour between Scotland and the continuing UK if they were in a monetary union with fiscal independence – the current macroeconomic policy framework within the Eurozone. *The difference between the prediction and the actual data is considered to be the estimated effect of a border.*

C.4 The difference between the two numbers is unlikely to be solely due to the effect of a border, with other unobservable characteristics creating the discrepancy (see below). Furthermore, it is likely to overestimate the effect of the creation of a border between Scotland and the rest of the UK especially in the short term. This is a result of the fact that the historical ties create hysteresis effects within the trade flows. As such, any estimates presented in this paper should be considered long term estimates of the potential effect on the flow of goods and labour.

Data

C.5 The data used comes from a variety of sources. The data on bilateral migration flows comes from Eurostat. The trade statistics come from the IMF DOTS database and the GDP figures come from Eurostat. The information about distance, contiguity and colonial history comes from a dataset used by other authors in similar studies which has been published by the CEPII. The data runs from 2002-2011 in order to capture the date at which the banknotes and coins came into circulation.

Specification

C.6 The basic specification of the trade model is given below:

$$ln(X_{ijt}) = \alpha_0 + \alpha_1 ln(Y_{jt}) + \alpha_2 ln(Y_{it}) + \alpha_3\, ln(Dist_{ij}) + \alpha_4 ComLang_{ij} + \varepsilon_{ijt}$$

C.7 This equation represents a double-log specification where i and j denote countries, t denotes time and the variables are defined as follows:

- (X_{ijt}) is exports from region i to region j;
- (Y_i) and (Y_j) are the gross domestic products of countries i and j;
- $(Dist_{ij})$ is the distance from i to j
- $(Comlang_{ij})$ is a dummy variable equal to one if the countries share the same language.

C.8 In the case of migration the equation takes the following form:

$$ln(Migr_{ijt}) = \alpha_0 + \alpha_1 ln(POP_{jt}) + \alpha_2 ln(POP_{it}) + \alpha_3\, ln(Dist_{ij}) + \alpha_4 ComLang_{ij} + \alpha_5\, ln(rely_{ijt}) + \varepsilon_{ijt}$$

C.9 In this equation, the variables are defined as follows:

- $(Migr_{ijt})$ is migration from region i to region j;
- (Pop_i) and (Pop_j) are the populations of countries i and j and
- $(Rely_{ijt})$ is the ratio of destination to source per capita incomes. This picks up the main driver of migration in labour market models which suggest that the attractive force between immigrant source and destination countries is the difference between labour incomes in the two countries.

C.10 This equation represents a baseline specification which can be used to run a pooled OLS regression. As set out in a variety of papers, there are econometric issues which arise from doing this:

- **Omitted Variable Bias**: There are a variety of variables which may be omitted from the specification above. For example, Anderson and van Wincoop (2003)[1] argue that the concept of 'multilateral resistance' (see box C.A) needs to be addressed in order to create a specification consistent with micorfounded economic theory.
- **Heteroskedasticity and Autocorrelation**: In order to be the best linear unbiased estimator (BLUE) the OLS estimator assumes constant variance of residuals (homoskedasticity). Heteroskedasticity in the residuals is likely to occur where the scale of the dependent variable varies across the cross-sections. Autocorrelation is likely to occur if the time series dimension of the data causes it to display 'memory'.

[1] *Gravity with Gravitas: A solution to the Border Puzzle*, Anderson and van Wincoop (2003).

- **Cross sectional correlation**: this assumption is likely to be violated in gravity models for trade because countries are facing similar global developments (e.g. world business cycle, oil price, etc.). Furthermore, cross-sectional correlation plays a much more important role for trade data because the development of bilateral trade reflects the economic situation of both the home and foreign economies.

Box C.A: Multilateral Resistance

Anderson and van Wincoop (2003)[2] derive the following equation to explain trade flows:

$$x_{ij} = \frac{y_i y_j}{y^w}\left(\frac{t_{ij}}{P_i P_j}\right)^{1-\sigma}$$

This equation gives exports from country i to j, (x_{ij}), as a function of the combined income of the two countries relative to the rest of the world (y); bilateral trade barriers (t_{ij}) relative to the multilateral trade barrier of each country (P) and the elasticity of substitution between all goods ($\sigma>1$). In other words bilateral exports depend on the bilateral trade barrier relative to the average trade barrier with all trading partners.

One of the implications of this equation is that trade barriers reduce size-adjusted trade *between* large countries more than between small countries. Furthermore, trade barriers raise size adjusted trade within small countries more than within large countries.

A simple illustration of the former implication is as follows: for a large country, (P) contains a larger proportion of internal barriers all of which are unaffected by an increase in the trade barrier. Therefore an increase in (t_{ij}) increases (P) for both countries but this increase accounts for a smaller proportion of (P) so the ratio in the brackets increases by more than it does for a small country. As ($\sigma>1$) bilateral trade falls in response to the increase in the relative trade barrier between the two countries.

Alternative estimation

C.11 To assess the robustness of the estimates, it is possible to exploit the panel data structure, to control for unobservables which may create bias some of the coefficients in the OLS regression. Two different methodologies are presented here:

- **Fixed Effects**: The fixed effects estimator allows for the specification of invariant effects across either the cross-section or time. A variety of papers starting with Anderson and van Wincoop (2003)[3] and more recently Head and Mayer (2013)[4] argue that in order to estimate a gravity model which is consistent with economic theory, time-varying importer and exporter fixed effects should be specified to capture the multilateral resistance terms.

- **Random Effects**: The random effects estimator assumes that all time-invariant unobserved factors can be modelled by incorporating a random error term. The individual effect is therefore assumed to be drawn independently from a distribution. Coughlin and Novy (2012)[5] use this estimator in their study of the intranational and international border effect in the USA.

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[2] *Gravity with Gravitas: A solution to the Border Puzzle*, Anderson and van Wincoop (2003).

[3] *Gravity with Gravitas: A solution to the Border Puzzle*, Anderson and van Wincoop (2003).

[4] *Gravity Equations: Workhorse, Toolkit and Cookbook*, Head and Mayer (2013).

[5] *Is the International Border Effect Larger than the Domestic Border Effect? Evidence from U.S. Trade*, Coughlin and Novy (2012).

C.12 The results of both the fixed and random effects regression give similar coefficients on distance and common language to those obtained under the OLS regressions. Using the estimated coefficients from the random effects regression illustrates the effect of the border is broadly similar to that estimated in the OLS regressions, although the uncertainty around the estimate is wider.[6]

Table C.A: Results from estimating the trade gravity equation

	Pooled Ordinary Least Squares	Random Effects	Fixed Effects
Exporter GDP	1.109 ***	1.094 ***	-
	(0.013)	(0.034)	
Importer GDP	0.857 ***	0.852***	-
	(0.011)	(0.029)	
Distance	-1.194 ***	-1.200***	-1.225 ***
	(0.028)	(0.083)	(0.030)
Common Language	0.309 ***	0.312*	0.411***
	(0.062)	(0.177)	(0.078)
Constant	-22.358 ***	-21.824 ***	28.704***
	(0.545)	(1.437)	(0.293)
Range of Fitted Values for Scottish Exports to rUK 2002-2011 (£bn)	4.5-5.5	3.7-6.7	-
Average Value of Scottish Exports to UK 2002-2011 (£bn)	32.5	32.5	-
Range of Implied Border Effect	83%-86%	79%-89%	-
Range of Fitted Values for rUK Exports to Scotland 2002-2011 (£bn)	8.0-10.0	6.3-12.2	-
Average Value of rUK Exports to Scotland 2002-2011 (£bn)	42.6	42.6	-
Range of Implied Border Effect	77%-81%	71%-85%	-

Robust Standard Errors in Parenthesis. *Significant at the 10% level; **Significant at the 5% level; ***Significant at the 1% level

Exporter GDP, Importer GDP and distance in logs

Source: HMT calculations

[6] An estimate of the border effect based on the fixed effects estimation is not possible as no dummy variables for Scotland and the continuing UK have been estimated.

Table C.B: Results from estimating the migration gravity equation

	Pooled Ordinary Least Squares	Random Effects
Source Population	0.683 ***	0.743 ***
	(0.025)	(0.067)
Destination Population	0.951 ***	0.985 ***
	(0.029)	(0.072)
Distance	-0.758 ***	-0.723 ***
	(0.060)	(0.150)
Common Language	1.583 ***	1.413 ***
	(0.181)	(0.453)
Relative Incomes	0.431 ***	0.782 ***
	(0.056)	(0.187)
Constant	-15.622 ***	-17.331 ***
	(0.879)	(2.205)
Range of Fitted Values for Scottish migration to rUK 2002-2011	4,292-8,158	2,257-11,581
Average Migration Scotland to rUK 2002-2011	43,809	43,463-43,809
Range of Implied Border Effect	81%-90%	74%-95%
Range of Fitted Values for rUK migration to Scotland 2002-2011	2,346-4,555	1,370-7,104
Average Migration rUK to Scotland 2002-2011	52,195	52,195
Range of Implied Border Effect	91%-96%	86%-97%

Robust Standard Errors in Parenthesis. *Significant at the 10% level; **Significant at the 5% level; ***Significant at the 1% level

Exporter GDP, Importer GDP and distance in logs

Source: HMT calculations

Calculating Welfare Effects

C.13 Arkolakis, Costinot and Rodriguez-Clare (2012)[7] demonstrate that a range of trade models allow gains from trade to be computed as follows:

$$\Delta W = \frac{W'}{W} = \left(\left(\frac{\lambda'}{\lambda}\right)^{\frac{1}{\varepsilon}} - 1\right) * 100$$

C.14 In this equation, the variables are defined as follows:

- ΔW is the country's change in real income W
- λ is the share of a country's expenditure devoted to domestic goods
- ε is the elasticity of imports with respect to variable trade costs

C.15 The OECD STAN indicators dataset, Rev. 3, 2011, contains comparable import penetration ratios, which are computed as follows:

$$imports_i/(production_i - exports_i + imports_i)$$

[7] *New Trade models, Same old gains?*, Arkolakis et al (2012).

C.16 Import penetration ratios for Scotland are computed in the same way using the Scottish National Accounts 2012, Quarter 3 data on gross output, imports and exports.

C.17 The elasticity ε can be estimated from a model of trade flows on trade costs. As discussed by Arkolakis, Costinot and Rodriguez-Clare (2012)[8] this may be done using a gravity equation where the parameter on the relative trade costs between two countries is ε.

C.18 A review of the literature shows that trade elasticity estimates differ across trade models and individual specifications. Eaton and Kortum (2012, p.77)[9] recommend using an elasticity of -4 obtained by Simonovska and Waugh (2011)[10]. A more recent paper by Simonovska and Waugh (2012)[11] comparing elasticities obtained using different trade models finds elasticities in the range of -2.8 to -5.2. Having undertaken a meta-analysis of 32 papers, Head and Mayer (2013)[12] take the view that the elasticity with respect to trade costs is -5.03, which forms the basis of estimates in this paper.

Conclusion

C.19 The analysis in Chapter 3 is designed to be illustrative. Taking a well-known approach in trade analysis, it captures what could happen to goods and labour flows as well as real income, if in the long-run the relationship between Scotland and the continuing UK looked similar to countries in the euro area. In the short-run any costs of economic disintegration are likely to be small as a result of the strong cultural and historical ties between Scotland and the continuing UK, while in the estimate for the long-run effect of the border is in line with the literature.

[8] *New Trade models, Same old gains?*, Arkolakis et al (2012).

[9] *Putting Ricardo to Work*, Eaton and Kortum (2002).

[10] *The Elasticity of Trade: Estimates and Evidence*, Simonovska and Waugh (2011).

[11] *Different Trade Models, Different Elasticities?*, Simonovska and Waugh (2012).

[12] *Gravity equations: Workhorse, Toolkit, and Cookbook*, Head and Mayer (2013).

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