# SCOTTISH BUDGET - DRAFT BUDGET 2017-18 DEVOLVED TAXES FORECAST METHODOLOGY

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**SCOTTISH BUDGET - DRAFT BUDGET 2017-18**
**DEVOLVED TAXES FORECAST METHODOLOGY**

# Contents

**Executive Summary**

This paper sets out the methodology and assumptions relating to the devolved tax forecasts which underpin the 2017-18 Scottish Budget. A medium-term assessment of devolved tax revenues is also provided with forecasts over a 5-year period to 2021-22. The overall aim of the paper is to show how each of the forecasts have been arrived at to provide greater transparency on how devolved tax forecasts influence the Scottish Budget for 2017-18. This is particularly important as it comes at a time of significantly increased tax revenues being devolved to Scotland.

Forecasting future tax revenues or wider economic variables are, by their nature, subject to margins of error. Assumptions that are built into forecasts - based on the best available information at the time - often prove to be too optimistic or pessimistic as new economic events continuously unfold.  Such uncertainty is particularly high in the current economic climate. The outcome of the EU referendum, coupled with the lack of clarity on the UK Government's timetable for leaving the EU, or the new relationship they wish to secure, inevitably increases the economic uncertainty faced in Scotland and in turn the future path of tax revenues.

The forecasts for the devolved taxes and their underlying methodology and assumptions, and the forecasts of the economic determinants of NDRi have been scrutinised by the Scottish Fiscal Commission (the Commission) over the course of the year in a series of 12 'challenge' meetings. Their conclusions on our forecasts are outlined in their Report on Draft Budget 2017-18.[1] Since the publication of the Draft Budget 2016-17, the Scottish Government has taken steps to improve the approach taken to existing forecasts in response to the Commission's scrutiny. These include incorporating newly published data into the forecasts; further assessing the appropriateness of all data used; and adjusting and updating the forecast methodologies as required.  This is the final year of the Commission's scrutiny of the Scottish Government devolved tax forecasts. From 1 April 2017, Commission itself will take on responsibility for the forecasts that will appear in Draft Budgets for 2018-19 onwards.

**Outturn for 2015-16 and 2016-17**

Chapter 2 reports that, for 2015-16, the fully devolved taxes, Land and Buildings Transaction Tax (LBTT) and Scottish Landfill Tax (SLfT) raised a total £572 million. LBTT raised £425 million of this total which was £44 million above forecast. SLfT raised the remaining £147 million which was £30 million above forecast.  The revenue surplus has enabled Scottish Ministers to place £74 million into the Cash Reserve at the end of 2015-16.

For 2016-17, we have seven  months of LBTT data and one quarter of SLfT revenue data. Total revenues received to end October 2016 are £269 million.  LBTT residential revenues in particular (excluding the Additional Dwelling Supplement) have slowed in 2016-17 in response to a lower than expected growth in residential transactions and house prices.  Non-residential LBTT revenues have shown some volatility and it is too

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[1] http://fiscal.scot/reportspublicationsandcorrespondence/

soon to draw conclusions on the likely final outturn for 2016-17 especially given wider economic uncertainties. SLfT revenues are currently on track though data is only published for the first quarter of 2016-17. Tax revenues over the remainder of the year will ultimately depend on the performance of both the residential and non-residential property markets and trends in landfill volumes between now and 31 March 2017.

In terms of the economic determinants of non-domestic rates income (NDRi), the Draft Budget 2015-16 used March 2014 OBR forecasts of September 2014 RPI of 2.5%. The actual outturn was slightly lower at 2.3%. After the publication of the Draft Budget 2015-16, the uplift in poundage was capped at 2.0% rather than increasing in line with September RPI. An error of 0.2 percentage points would typically result in an error in the poundage assumption of 0.1 pence – which is equivalent to around £5 – 6 million in NDRi terms. Outturn buoyancy in 2015-16 was 1.3%, marginally above the forecast for that year of 1.25%. The impact on 2015-16 NDRi of this forecast error was around £1 million. Draft Budget 2016-17 was presented in December 2015 and used the September 2015 RPI of 0.8% that was known at the time the forecast was made. Scottish Assessors have the full year to make adjustments to the Valuation Roll. We cannot therefore provide a comprehensive update on buoyancy part way through the current year.

**Scottish Non-savings, Non-dividend (NSND) Income Tax Liabilities**

Chapter 3 presents, the economic forecasts which underlie the NSND forecasts.

Chapter 4 sets out our 5-year revenue forecasts for the newly devolved powers over Scottish NSND Income Tax which Scottish Government will take on following the passing of the Scotland Act 2016 and which take effect from 1 April 2017. These income tax powers are expected to raise £11,829 million in 2017-18 thus changing the entire scale of devolved taxation revenue in Scotland from what has existed previously. Looking ahead, revenue from Scottish Income Tax is forecast to rise to £14,559 million by 2021-22. These tax forecasts, outlined in Table 1, have been assessed as reasonable by the Commission in their Final Report on the Draft Budget 2017-18.[2]

**Table 1: Forecast of Scottish NSND Income Tax Liabilities, 2017-18 to 2021-22, £ million**

|  | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|
| **Scottish Income Tax (NSND Liabilities)** | 11,829 | 12,290 | 12,912 | 13,647 | 14,559 |

**Land and Buildings Transaction Tax (LBTT) and Scottish Landfill Tax (SLfT)**

Chapters 5 and 6 set out our 5-year revenue forecasts for the two existing fully devolved tax revenue forecasts presented in the 2017-18 Draft Budget - LBTT and SLfT. These tax powers were devolved in the Scotland Act 2012 which took effect from 1 April 2015. The two taxes are expected to raise £656 million in 2017-18 with this figure rising to £730 million by 2021-22. The LBTT forecasts, which are broken down into their component parts in Table 2, have been assessed as reasonable by the Commission in their Final Report on the Draft Budget 2017-18.

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[2]http://www.fiscal.scot/reportspublicationsandcorrespondence/

**Table 2: Forecasts for Land and Buildings Transaction Tax, 2017-18 to 2021-22, £ million**

|  | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|
| **Land and Buildings Transaction Tax** | 507 | 543 | 571 | 597 | 624 |
| of which: | | | | | |
| Residential transactions (excl. ADS) | 211 | 235 | 251 | 265 | 280 |
| Additional Dwelling Supplement (ADS) | 72 | 75 | 78 | 80 | 82 |
| Non-residential transactions | 224 | 233 | 242 | 252 | 262 |

The SLfT forecast, as laid out in Table 3, has also been assessed as reasonable by the Commission in their Final Report on the Draft Budget 2017-18.

**Table 3: Forecast for Scottish Landfill Tax, 2017-18 to 2021-22, £ million**

|  | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|
| Scottish Landfill Tax | 149 | 118 | 109 | 112 | 106 |

The two fully devolved taxes are together forecast to raise the following revenues:

**Table 4: Forecast for fully devolved taxes, 2017-18 to 2021-22, £ million**

|  | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|
| Fully devolved taxes | 656 | 661 | 680 | 709 | 730 |

1. Land and Buildings Transaction Tax and Scottish Landfill Tax.

**Non-domestic rates Income (NDRi)**

NDRi is an important component of the Scottish Budget - the latest published income figures are for 2014015 – when NDR accounted for £2.5 billion.  Chapter 7 sets out the forecasts for inflation and buoyancy which are the economic determinants underpinning this figure. There are many other factors listed in the NDRi methodology detailed in the Chapter which also underpin NDRI.  The forecast for buoyancy (broadly thought of as the growth in the tax base, corrected for revaluation appeals) in 2017-18 is 1.7% with the 5-year forecast laid out in Table 28.  The estimate for September 2016 RPI inflation is 2.0% based on outturn data from the ONS.  It should be noted however, that the implications of the upcoming revaluation of Non Domestic Properties will also affect the poundage rate applied in 2017-18.  The methodology underlying the economic determinants of NDRi was assessed as reasonable by the Commission in their Final report on Draft Budget 2017-18.

**Air Passenger Duty and the Aggregates Levy**

This analysis excludes the forecast revenues and methodologies of two reserved taxes which Scottish and UK Governments have already agreed will be devolved in future years. These are Air Passenger Duty (APD) from 2018-19 and the Aggregates Levy (date to be determined).  For completeness, these taxes are estimated to have raised £275 million and £53 million respectively in Scotland in 2015-16.[3]

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[3] Government Expenditure and Revenues in Scotland 2015-16

# CHAPTER 1 – INTRODUCTION AND BACKGROUND

This paper sets out the methodology and assumptions in relation to the Scottish Government's forecasts for devolved tax revenues which underpin the Scottish Budget in 2017-18 and beyond as well as the forecasts themselves

As in the 2015-16 and 2016-17 Draft Budgets, the spending plans set out in the Draft Budget 2017-18 will partly be funded by revenues from the two fully devolved taxes – Land and Buildings Transaction Tax (LBTT) and Scottish Landfill Tax (SLfT) – which replaced the existing UK taxes from April 2015 through powers devolved under the Scotland Act 2012. However, these devolved tax powers have now been augmented by the passing of the Scotland Act 2016 which provides significant additional powers to Scottish Government from 2017-18 onwards with respect to income tax.

Building on the first set of five-year forecasts published in Draft Budget 2016-17, we have again produced five-year forecasts for the devolved taxes (existing and new) to provide transparency around the medium-term assessment of Scotland's devolved public finances. The forecasts for Scottish Income Tax that tax rates and thresholds are based on the Scottish Government's income tax proposals for 2017-18 as set out in Chapter 4. The forecasts for LBTT assume that 2017-18 tax rates and thresholds are as laid out in Chapter 5; the forecasts for SLfT assume our proposed tax rates in and Scottish Landfill Communities Fund (SLCF) credit rate for 2017-18 is laid out as in Chapter 6.

The Scottish Fiscal Commission (the Commission) is responsible for scrutinising our forecasts until it takes responsibility for producing these and wider economic forecasts in April 2017 for the 2018-19 forecasting round. Over the course of this year, the Commission has independently challenged the methodology, assumptions and data inputs used in the preparation of forecasts through a series of 12 forecast challenge meetings which took place between May 2016 and November 2016. The Commission's remit, with regard to non-domestic rates income (NDRi), was extended to include consideration of the reasonableness of the economic determinants underpinning the forecasts. Thus, in a change from previous publications, we also detail the methodology underlying the forecasts for these economic determinants.

## CHAPTER 2 – 2015-16 AND 2016-17 OUTTURN

### Land and Buildings Transaction Tax (LBTT)

The Scottish Government published its original devolved tax revenue forecasts for 2015-16 in the Scottish Draft Budget of October 2014. The residential LBTT forecast was updated in January 2015 following a revision to rates proposed in light of changes made to SDLT by the UK Government in December 2014.  These forecasts were then endorsed as reasonable by the Commission. Provisional LBTT whole-year outturn data for 2015-16 became available in April 2016 (on a cash basis) with the publication of March 2016 revenues. The publication of Revenue Scotland's Devolved Taxes Report (September 2016) contained the outturn data on an accruals basis.[4]

### 2015-16: Total Revenues

Total LBTT revenues in 2015-16 exceeded our original forecast by around £44 million, driven in the main by higher than expected non-residential revenues as shown in Table 2.

### Table 5: LBTT revenue outturns versus Scottish Government forecasts, 2015-16, £ million

|  | Forecast | Outturn | Variance against forecast |
|---|---|---|---|
| Residential | 235 | 208 | (27) |
| Non-residential | 146 | 217 | 71 |
| **Total** | **381** | **425** | **44** |

*Source*: Forecasts - Scottish Government, Outturns (accruals basis) – Revenue Scotland (pre-audit – accruals basis)

### 2015-16: Residential Revenues

The revised 2015-16 forecast of £235 million, published in January 2015,[5] excluded an estimate of forestalling losses, i.e. the expected impact on revenues due to the timing of transactions being altered in response to the different tax rates under LBTT and SDLT, which were at the time the subject of a funding negotiation with the UK Government.

The Scottish Government estimated that this forestalling impact would result in a loss of revenue in the range of £12 million to £37 million. This was in anticipation of a significant volume of high value purchases being brought forward into the 2014-15 financial year, since they would be liable for less tax under the UK Government's Stamp Duty Land Tax (SDLT) regime than the LBTT regime. The introduction of the Additional Dwelling Supplement (ADS) in April 2016 was also expected to generate forestalling behaviour that would increase revenues in 2015-16 in the range of £5 - £7 million, as purchases were brought forward into the 2015-16 financial year so that no

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[4] https://www.revenue.scot/sites/default/files/Revenue%20Scotland%20-%20Annual%20Report%20-%20Devolved%20taxes%20August%202016%20-%20FINAL%20PDF.pdf

[5] http://www.parliament.scot/S4_FinanceCommittee/General%20Documents/Cabinet_Secretary_for_Finance_Constitution_and_Economy_to_the_Convener_dated_22_January_2015.pdf

ADS would be payable. Table 6 summarises these various factors and shows that the adjusted Scottish Government forecast for residential revenues in 2015-16 was that they would lie in a range from £203 - £230 million.

**Table 6: Residential LBTT revenue outturn versus forecasts, 2015-16**

|  | £ million |
|---|---|
| Original residential LBTT revenue forecast for 2015-16 | 235 |
| Forecast *loss* in revenue from forestalling due to transition from SDLT to LBTT on 1 April 2015 | (12 – 37) |
| Forecast *increase* in revenue from forestalling due to introduction of Additional Dwelling Supplement on 1 April 2016 | 5 - 7 |
| Revised range for residential LBTT forecast | 203 - 230 |
| Actual revenue outturn | 208 |

*Sources*: Forecasts – Scottish Government, Outturn – Revenue Scotland (pre-audit basis)

The residential revenue outturn for 2015-16 of £208 million fell within the forecast range, when taking into account the estimated ranges of forestalling impacts. The strong growth in the number of transactions was in line with forecasts. However, the main reason why the outturn was towards the lower end of the forecast range was that average residential property prices in Scotland were relatively flat over 2015-16, in contrast to an original forecast assumption (October 2014) of around 5% growth. This lower-than-forecast price growth applied to the market as a whole rather than specific segments.

**2015-16: Non-residential Revenues**

As Table 6 above shows, the non-residential LBTT revenue outturn of £217 million was £71 million above forecast.

Historically, non-residential property taxes tend to have a volatile tax base, with large swings in both the number and average value of transactions being common. Tax receipts can be significantly affected by a relatively small number of high-value transactions. In 2015-16, conveyances with a taxable consideration in excess of £1 million accounted for 80% of the revenue, but less than 10% of all non-residential transactions (including leases). Thus, a few high-value commercial transactions can create a significant spike in tax revenues in a particular month which may or may not be repeated in later months in the year.

**2016-17: Total Revenues**

For the seven-month period April-October 2016, provisional total LBTT revenues (adjusted downwards by £9 million of revenue recorded in 2016-17 but which relate to transactions which completed in 2015-16) amounted to approximately £269 million. This compares with a forecast in Draft Budget 2016-17 that total LBTT revenues in 2016-17 would total £538 million. The revenue outturns include net ADS revenue of £51 million, comprising gross ADS revenue of £57 million less £6 million repayments of ADS (and the level of repayments can be expected to rise further).

While outturn residential LBTT revenues in the early months of 2016-17 will have been affected by forestalling behaviour to bring forward a proportion of transactions

from 2016-17 into 2015-16 in order to avoid liability for ADS,[6] lower-than-expected revenue outturns to date can be attributed to lower growth in both transactions and in prices across all price segments of the residential market than had been forecast. One significant contributor to this trend has been the slowdown in north-east Scotland, where the impact of a drop in oil prices on the local economy has contributed to residential prices declining by nearly 10% in Aberdeen City, and volumes in both Aberdeen City and Aberdeenshire dropping by nearly a quarter. Excluding these two local authority areas, residential property prices and transactions in Scotland were still rising in the year to September 2016, albeit more modestly than previously forecast.

In terms of non-residential revenues, £93 million of revenue has been collected in seven months to October, compared with a forecast of £220 million.[7] General economic uncertainty, including the aftermath of the EU Referendum result in June 2016, could be a contributing factor to this trend. However, given the dependence of non-residential revenues on a small number of high-value transactions (in 2015-16, about 80% of revenues came from the approximately 10% of transactions where the purchase price was above £1 million), monthly outturns tend to be volatile, and thus it is too soon to draw strong conclusions.

Actual tax revenues raised in the remainder of 2016-17 will depend on the performance of both the residential and non-residential property markets and, in particular, the number of transactions and trajectory of property prices in the residential and non-residential sectors in the remainder of 2016-17. As full year outturn figures for 2016-17 become available, we will report on these in future years' Draft Budget documents including any variances between forecast and outturn receipts. This outturn information will be available for 2016-17 as a whole in time for the preparation of the Draft Budget for 2018-19 in Autumn/Winter 2017.

**Scottish Landfill Tax (SLfT)**

**2015-16: Total Revenues**

The Scottish Government published its original SLfT revenue forecasts for 2015-16 in the Scottish Draft Budget of October 2014. The forecast of £117 million was endorsed as reasonable by the Commission. Provisional SLfT outturn data for the whole of 2015-16 first became available in June 2016 with the publication of January-March 2016 revenues by Revenue Scotland. As for LBTT above, the publication of Revenue Scotland's Devolved Taxes Report (September 2016) contained the official outturn data for 2015-16.

Total SLfT revenues in 2015-16 (£147 million) exceeded our original forecast by around £30 million. There were three factors which, in effect, suppressed the forecast of £117 million. Two of those factors were statistical and couldn't have been anticipated; and the third is due to a modelling assumption.

    a) at the time of the October 2014 forecast, we assumed that a previously observed discrepancy between HMRC and Environment Agency waste data for

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[6] An estimate for forestalling behaviour was factored into the forecasts.
[7] This figure is on an accruals basis has been adjusted downwards by £3 million to account for transactions recorded in 2016-17 that actually took place at the end of 2015-16.

England (the HMRC data implied lower waste volumes) and that would also apply in Scotland when Revenue Scotland data became available for the first time in mid-2015. We therefore reduced the forecast proportionally in anticipation of this. As Revenue Scotland data became available from mid-2015 onwards, it became clear that the expected discrepancy between their data and Scottish Environmental Protection Agency (SEPA) data did not seem to apply for Scotland. The effect of this was to push outturn up by £20 million.

b) when actual 2013 waste volume data from SEPA was published it pushed up our estimated landfill waste volumes for 2015-16 beyond our initial forecast (which was based on 2011 SEPA waste volume data). The effect of this was to push outturn up by £5 million.

c) we had assumed steady progress in reducing landfill tonnage through the second half of 2015-16. The actual decline in waste volumes in the second half of 2015-16 was lower than anticipated. The effect of this was to also push outturn up by £5 million.

These factors were only observable with hindsight. The final reconciliation between the original forecast for 2015-16 and the eventual outturn is as set out in Table 7:

**Table 7: Scottish Landfill Tax Forecast Outturn Reconciliation, 2015-16**

|  |  | £million |
|---|---|---|
|  | **Draft Budget 2015-16 forecast (October 2014)** | **117** |
| Factor a) | Add HMRC/Environment Agency forecast correction | +20 |
| Factor b) | Add SEPA 2013 data forecast correction | +5 |
| Factor c) | Add lower than anticipated landfill reduction in 2015-16H2 | +5 |
| Equals | **2015-16 Revenue Scotland Outturn (June 2016)** | **147** |

**2016-17: Total Revenues**

Over the first quarter of 2016-17, Revenue Scotland collected £39 million in SLfT revenues. With only one quarter of outturn figures available, it is too early in the financial year to say if annual revenues as a whole will exceed or fall short of the original forecast of £133 million (Draft Budget 2016-17, December 2015). However, with 29 per cent of forecast revenue collected after one quarter and little seasonal variation in landfill volumes expected, SLfT revenues are currently on track to meet the annual forecast. Actual tax revenues for the full year will depend on trends in landfill volumes between now and 31 March 2017. As full year outturn figures for SLfT become available for 2016-17 (around June 2017) we will report on these in future Draft Budget documents.

**Economic Determinants of NDRi**

**2015-16 outturn**

In terms of the economic determinants of non-domestic rates income (NDRi), the Draft Budget 2015-16 used March 2014 OBR forecasts of September 2014 RPI of 2.5%. The actual outturn was slightly lower at 2.3%. After the publication of the Draft Budget 2015-16, the uplift in poundage was capped at 2.0% rather than increasing in line with September RPI. An error of 0.2 percentage points would typically result in an error in the poundage assumption of 0.1 pence – which is equivalent to around £5 – 6 million

in NDRi terms.  Outturn buoyancy in 2015-16 was 1.3%, marginally above the forecast for that year of 1.25%. The impact on 2015-16 NDRi of this forecast error was around £1 million.

**2016-17 outturn**

The Draft Budget 2016-17, presented in December 2015, used the September 2015 RPI of 0.8% which was known at the time the forecast.   Scottish Assessors have the full year to make adjustments to the Valuation Roll (with resulting bills backdated to the effective date of the valuation). We therefore cannot provide a comprehensive update on buoyancy part way through the current year.

**CHAPTER 3 - MACROECONOMIC FORECASTS UNDERPINNING THE INCOME TAX FORECASTS**

**Economic forecasts overview**

This chapter provides a summary of the process for creating the economic determinants of income tax forecasts in Chapter 4.

The Scottish Fiscal Commission has deemed the Scottish Government's forecasts of non-saving, non-dividend income tax, which are underpinned by these economic forecasts, to be reasonable.

The forecasts contained in this paper use statistics published up to the 21st November 2016.

**Overview of the forecasting process**

The economic forecasting process is primarily focused on creating forecasts of earnings and employment to feed into income tax forecasts. This requires broader forecasts of the Scottish economy to produce the underlying assumptions which will determine the growth in earnings and employment.

The Scottish Government's macroeconometric forecasting model, known as "SGGEM", is central to the forecasting process. SGGEM was built by the Scottish Government and the National Institute of Economic and Social Research (NIESR), an economic research institute. SGGEM uses extensive Scottish and global historic economic data to project a pathway for the Scottish economy. It is underpinned by NiGEM, NIESR's global macroeconomic model, which is used by a large number of organisations including the OECD, the Bank of England and the European Central Bank.

Whilst SGGEM is central to the forecasting process, it is adjusted in a number of ways using what is known as "off-model" analysis - bespoke econometric models and expert user judgement based on available evidence and external projections.

Because the UK is Scotland's largest trading partner, and Scotland is part of the UK monetary system, the UK has an important role in determining the path of the Scottish economy. The Office for Budget Responsibility's (OBR's) forecast for the UK economy published alongside the Autumn Statement 2016 is used to fix the path of the UK economy in SGGEM. This achieves a degree of coherence between the Scottish Government's forecasts of Scotland's economic performance and the OBR's forecasts of the UK. Key UK-wide variables, such as interest rates and inflation, are also fixed within SGGEM to the OBR's forecasts. This means that many of the OBR's assumptions around the impact of the EU Referendum outcome are implicitly included in the Scottish Government's forecasts.
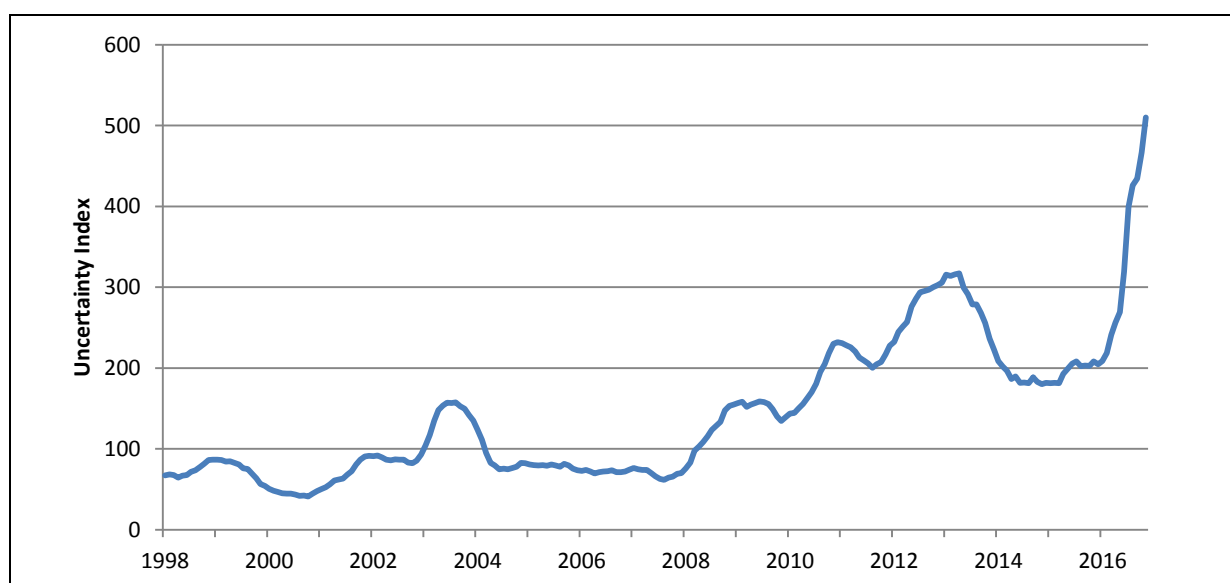
**Scottish forecasts**

This section sets out the methodology used to produce the Scottish economic forecasts. All forecasts are presented on a financial year basis as this is the time period over which the Scottish Government's income tax forecasts must be made.

The forecasts provide an indication of the future direction of the Scottish economy based on the information currently available about the state of the economy, its historic performance, and a series of assumptions about the future direction of individual components of the economy. However, economic forecasts are always subject to uncertainty and a margin of error. The result of the EU referendum and current uncertainty about the future relationship between the UK and the EU greatly increases the level of uncertainty within these forecasts. The process and outcome of UK negotiations with the EU could result in growth being either higher, or lower, than forecast.

This increase in uncertainty is highlighted in a number of economic indicators. For example, recent measures, based on UK media reports suggest that economic uncertainty is currently at historically high levels, as summarised in Chart 1 below.

**Chart 1**: **UK Economic Policy Uncertainty Index: 12 Month Moving Average**



Source: Source: "Measuring Economic Policy Uncertainty" by Scott R. Baker, Nicholas Bloom and Steven J. Davis (www.PolicyUncertainty.com).

**Short term outlook for the Scottish economy**

Recent GDP growth has been below trend in Scotland. This has been due to two main factors. Firstly, global economic growth has been relatively subdued, affecting growth in Scottish exports. Secondly, the fall in oil prices which occurred in 2015 has reduced investment in the North Sea and resulted in oil and gas operators cutting costs. This has reduced activity across the sector and has fed through to a slowdown in the wider Scottish economy. This has been reflected in the latest GDP statistics, with the Scottish economy growing by 0.3% in the first half of 2016.

This slowdown in the oil and gas sector is expected to continue in the short term, with below trend growth forecast for 2016-17 as a whole. However, there are indications that the oil and gas sector may be approaching its nadir. A review by PwC suggests that globally, companies are increasingly reporting that the industry has reached the bottom of the cycle.[8] In Scotland, the Aberdeen and Grampian Chambers of Commerce's 25th Oil and Gas Survey found that around two-thirds of firms felt that the sector was nearing the bottom of the cycle, with around half of these feeling that the bottom had already been reached.[9] The latest labour market data also provide tentative signs that the industry may be stabilising. After reaching an historic low of 0.8% in December 2014, claimant count unemployment in Aberdeen and Aberdeenshire increased steadily to 1.9% in August 2016. However, it has since fallen in both September and October 2016, the first time that there have been two successive monthly falls since December 2014.

Looking forward, future economic growth will be affected by the impact of the EU Referendum result (see Box 1 overleaf). The short term impact of this is modelled through four key channels, as summarised below.

- The depreciation of sterling pushes up inflation, which in turn depresses real wages and, coupled with an increase in economic uncertainty, depresses consumption.
- Increased economic uncertainty  delays or suppresses business investment.
- Lower economic growth in the rest of the UK, Scotland's largest trading partner, reduces intra-UK trade.
- This is partly offset by the depreciation in sterling providing a boost to Scotland's international exports.

**Longer term outlook for the Scottish economy**

To forecast the Scottish economy over the longer term, an estimate of Scotland's potential level of GDP is needed. Given the size of Scotland's labour force and levels of productivity, it is possible to produce a certain amount of goods and services in any one year. However, the actual amount of goods and services that Scotland produces in any one year will vary around this hypothetical level of potential as the economy cycles through stronger and weaker growth in demand. The difference between actual GDP in any one year and potential output is known as the output gap.

Given the Scottish Government's estimates of potential output in Scotland, the output gap in Scotland is estimated to have been around -0.6% in 2015-16, that is, GDP is below its potential level. This gap implies that some labour and capital is being underutilised, and that Scotland could see faster growth over the longer term forecast horizon as it catches up with its potential level of GDP.

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[8] PWC, *A Sea Change: The future of the North Sea Oil & Gas,* http://www.pwc.co.uk/seachange
[9] Aberdeen and Grampian Chambers of Commerce , *25th Oil and Gas Survey*

**Box 1: Impact of the EU referendum result on forecasts of the Scottish economy**

The OBR's central forecast assumes that the UK leaves the EU in April 2019. They do not model a specific post-exit trading regime. Instead, they assume that the negotiation of new trading arrangements with the EU and other countries slows the pace of import and export growth in future years. The OBR further assume that the UK adopts a tighter migration regime, resulting in net migration being lower than would otherwise be the case. In addition, they have reduced their assumption about trend productivity growth, and in turn potential output growth, to reflect the cumulative impact of reductions in openness, investment and R&D, and net inward migration that the EU referendum result is expected to trigger.

The same medium term assumptions have been adopted in the forecasts below. This ensures that the key elements which feed into the Scottish budget process – the Block Grant Adjustment (which uses OBR forecasts) and the Scottish income tax forecast (using Scottish Government forecasts) – are based on the same expectations of the impact of the EU referendum.

The impact of the EU referendum result is imposed on the forecast in a number of ways.

1. The SGGEM model captures some aspects of uncertainty through the risk premia in the model. This is the additional return investors demand on capital due to increased risk, which feeds through to real effective interest rates. Risk premia are adjusted in line with historic episodes of uncertainty.
2. The productivity assumption underpinning growth in potential output is aligned with the OBR's forecast. The OBR's forecast of productivity growth has been reduced due to the impacts of the EU referendum result.
3. The OBR use the principal population projection to project the UK population rather than the high migration variant, to reflect lower than expected population growth as a result of the EU referendum result. The principal population projection for Scotland is also used in the Scottish forecast.
4. The OBR make judgements about the likely pathway of key variables such as investment and consumption in light of the EU referendum result, projecting softer growth in these. The Scottish Government forecast reflects similar impacts in Scotland on consumption and investment using judgement based on the available evidence.

The level of potential output in Scotland will grow over time as the population grows and productivity increases. Potential output is determined by population, labour force, average hours worked and productivity. In estimating potential output, the following assumptions are used:

- The ONS's principal population projection is used to project the size of Scotland's population in future years.
- Available labour market data shows different trends in labour market participation rates by age groups. These trends within each age group are projected to continue over the forecast horizon, and when combined with population projections on the relative size of each age group over time, create a projection of the Scottish labour force.
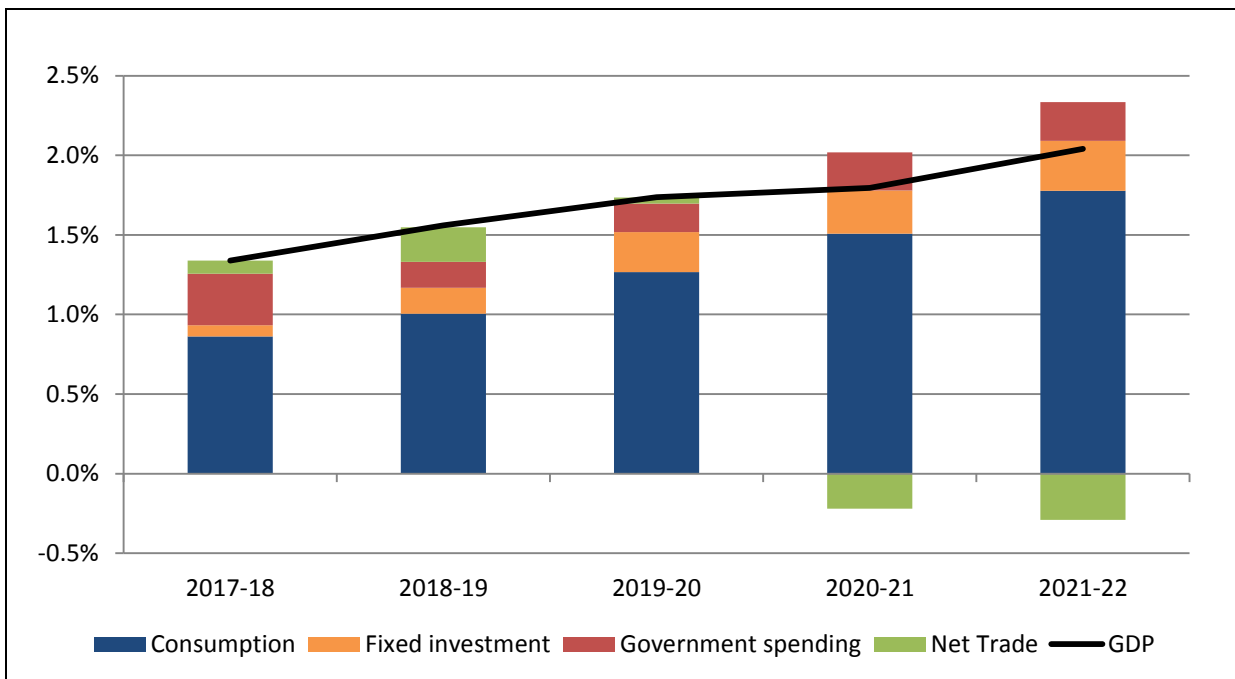
- A projection of average hours worked in Scotland is created by disaggregating hours worked into part-time and full-time work. There was a shock to the share of the labour force working part-time following the 2008 recession which is gradually unwinding, with working hours returning to previous levels. Projecting the share of full-time vs part-time work, with projected trends for average hours worked in each group, creates a forecast of average hours worked for all those in employment.
- A projection of Scottish potential productivity, i.e. potential output per hour worked, is required. Given the current uncertainty for the outlook for productivity, and the close historical relationship between Scottish and UK productivity, the OBR's forecast of productivity is used to project productivity in Scotland. Adopting this assumption also means the OBR's assumption about the impact that leaving the EU will have on productivity is implicitly included in the forecast of potential output presented in this paper (see Box 1).

Combining all these elements creates a projection of Scottish potential output.

**Forecasts of Scottish GDP and components**

The total value of GDP – i.e. the size of the economy - is made up of household consumption of goods and services, investment by firms and households, government spending and trade – imports and exports. Each of these components is modelled separately to build up a forecast of GDP, as summarised in Chart 2 below.

**Chart 2**: Annual GDP growth (%) and contributions by component



**Household Consumption** is determined by real disposable household income, which is in turn determined by changes in real wages and employment, and the decision of households about whether to spend or save.  Growth in household consumption is expected to be below trend over the forecast horizon.  This is primarily driven by the uncertainty created by the referendum result, as well as rising inflation eroding real

wage growth, and in turn suppressing growth in consumption over the forecast horizon.

**Government spending** is fixed based on Scottish Government and UK Government spending plans as set out in the Autumn Statement. With the UK Government planning further fiscal consolidation over the forecast period, government spending is expected to make a smaller contribution to economic growth in the coming years than it has done historically.

**Fixed investment** is made up of business investment in, for example, plant and machinery, and business and household investment in the housing stock. Incentives to invest are affected by the potential returns to investment, uncertainty, and the cost of investment, including interest rates and taxes. Investment is expected to be weaker over the forecast horizon, and in particular in 2017-18 than it has been historically. This is because the confidence shock caused by the referendum result is assumed to increase the risk premia on investments[10]. When combined with weak domestic and external demand, this is likely to constrain growth in investment in the early years of the forecast. Beyond 2019-20, growth in investment starts to return to historic trends.
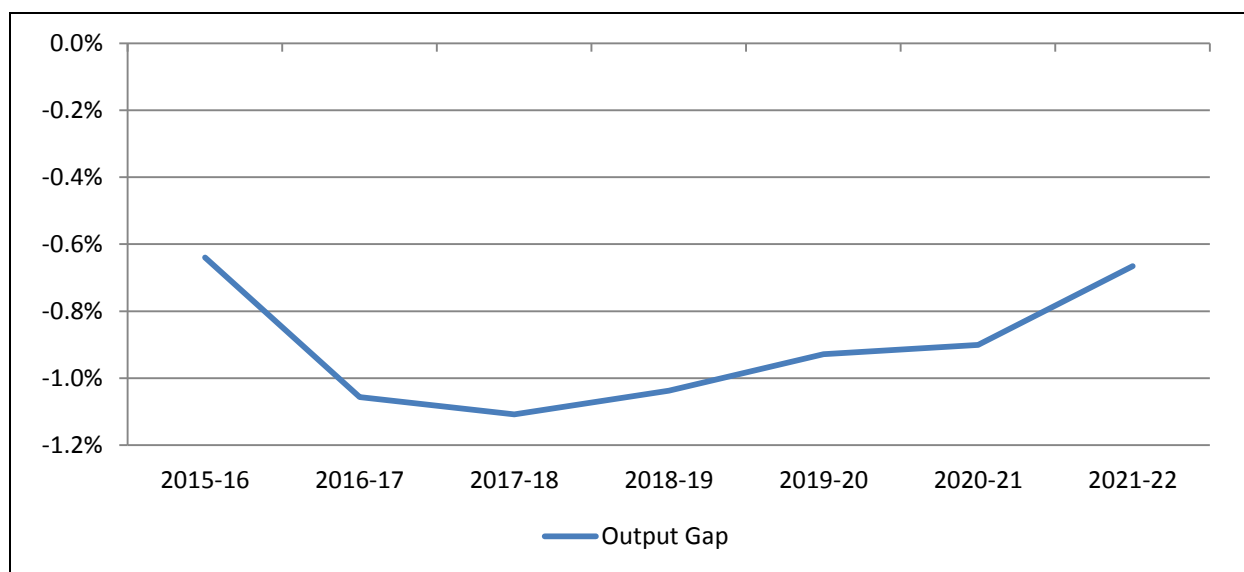
**Scottish net trade** is expected to be supportive of economic growth in 2017-18 and 2018-19 as growth in exports exceeds growth in imports. This is as a result of the depreciation of Sterling making imports relatively more expensive and Scottish exports relatively cheaper. As can be seen in Chart 2, from 2020-21 net trade turns slightly negative, in line with its historic contribution to GDP growth, as the positive effect of the sterling depreciation on exports diminishes. The above projections make no assumptions about the long run impact of the UK leaving the EU on Scottish trade except a judgement that growth in international exports are likely to be somewhat weaker than historically. Forecast growth in exports is also affected by slower growth in the rest of the UK, Scotland's largest export market.

Chart 3 shows the pathway of the output gap over the forecast horizon. As discussed above, the output gap is estimated to be around -0.6% in 2015-16 due to recent weakness in the Scottish economy. Continuing weakness in consumption and investment in the Scottish economy then causes the output gap to become more negative in 2016-17 and 2017-18. The output gap then starts to close over the forecast horizon.

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[10] See http://www.niesr.ac.uk/sites/default/files/publications/National%20Institute%20Economic%20Review-2016-Baker-108-20%20%281%29.pdf

**Chart 3: Pathway of the Scottish output gap as a percentage of potential output**



Bringing the above together, the forecasts of Scottish GDP are shown in Table 8. Historically, Scottish GDP has grown by around 2% per year. The forecasts for Scotland show growth is expected to be below this 2% trend over the next two years as the impact of Brexit depresses economic activity. GDP growth is then forecast to gradually return to trend by 2021-22.
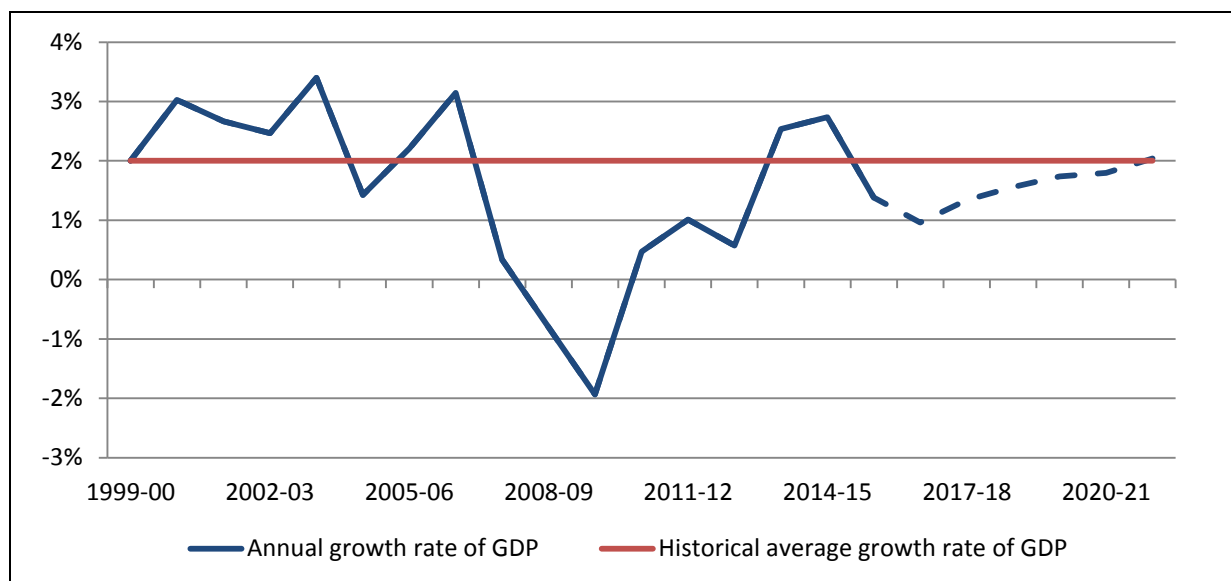
**Table 8: Economic forecast (% change on previous financial year)**

| | 15-16 | 16-17 | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 |
|---|---|---|---|---|---|---|---|
| **Headline GDP** | **Outturn** | **Forecast** | | | | | |
| GDP | 1.4 | 1.0 | 1.3 | 1.6 | 1.7 | 1.8 | 2.0 |
| Output GDP (% of GDP) | -0.6 | -1.1 | -1.1 | -1.0 | -0.9 | -0.9 | -0.7 |
| GDP per capita | 1.1 | 0.7 | 1.0 | 1.3 | 1.4 | 1.5 | 1.7 |
| **Components of GDP** | | | | | | | |
| Domestic demand | 3.8 | 0.7 | 1.3 | 1.2 | 1.6 | 1.8 | 2.1 |
| Household Consumption | 2.3 | 1.7 | 1.6 | 1.5 | 1.9 | 2.2 | 2.6 |
| Government Consumption | 1.1 | 0.2 | 1.5 | 0.3 | 0.3 | 0.6 | 0.7 |
| Fixed Investment[1] | 10.9 | 1.5 | 0.9 | 1.5 | 2.1 | 2.1 | 2.2 |
| Exports | -0.6 | -0.1 | 2.2 | 2.2 | 1.8 | 1.5 | 1.4 |
| Imports | 3.1 | 1.2 | 1.7 | 1.5 | 1.5 | 1.6 | 1.7 |

[1] **Fixed investment** is sum of business investment, housing investment, and government investment

Chart 4 shows the projected pathway of Scottish GDP growth in the context of its historic growth rate.

**Chart 4: Historic and forecast annual growth rate (%) of Scottish GDP**



**The Scottish labour market**

A forecast of the Scottish employment level is required as a determinant for the forecast of income tax liabilities in Scotland. The forecast of employment in Scotland starts with projections of the Scottish 16+ population from the ONS principal population projections. A projection of labour market participation is then created to provide a projection of the size of the Scottish labour force.[11]

Given the projected size of the Scottish labour force, the pathways of employment and unemployment are forecast based on movements in the wider economy.
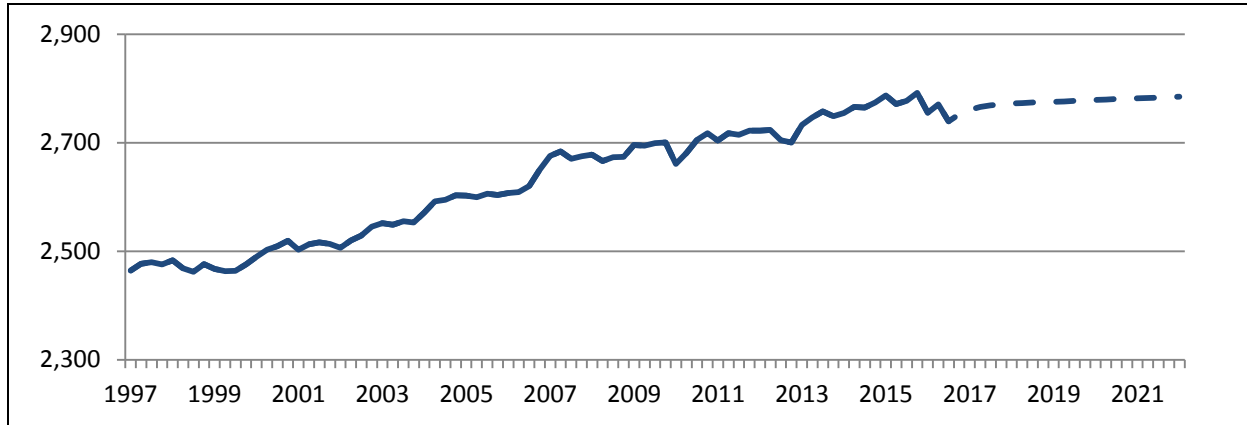
Over recent years, the Scottish labour market has been more resilient than may have been expected given the depth of the 2008 recession. Labour market participation and employment have grown whilst unemployment has been relatively low and stable since 2013. However, the Scottish labour market has been volatile during 2016. The latest data, covering the period July – September 2016, show the unemployment rate now at 4.7%, close to its lowest level since 2008, and down from 6.1% at the beginning of the year. This has been driven by a combination of rising employment and a fall in labour market participation .

The size of the Scottish labour force is projected based on long term trends in participation by age group, population changes and demographic changes. The projection of the Scottish 16+ labour force is presented in Chart 5. This forecast takes

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[11] The labour force, also known as the labour market participation level or economic activity level, is the total number of individuals in employment plus the number of individuals who are  unemployed, that is, those actively looking for work and available to start.  Many individuals may not be actively participating in the labour market due to, for example,  retirement, caring for the family or home or to study. To create forecasts of employment, we project the size of the pool of individuals either in work or actively looking for work, i.e. the size of the labour force.

into account the impact of recent falls in participation but assumes a gradual return to the longer term trend projections over the forecast horizon.

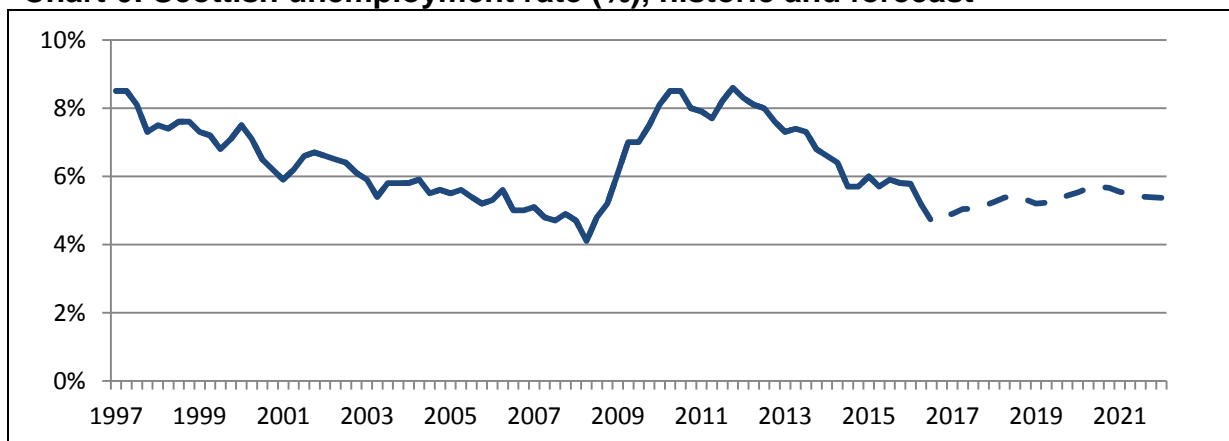**Chart 5: Projections of the Scottish (16+) labour force (thousands)**



This projection is for lower growth in the Scottish labour force than has occurred historically. This is due to the underpinning population and demographic projections, with a shift in the Scottish population to those aged over 65, who are less likely to participate in the labour market.

Once a projection of the Scottish labour force is produced, employment and unemployment are modelled based on movements in the broader economy. Over the forecast horizon, as the economy returns to trend, we expect the Scottish unemployment rate to return to its trend rate, often referred to as the "NAIRU" (non-accelerating inflation rate of unemployment). This is the rate of unemployment sustainable without firms starting to struggle to find people to employ putting excess upwards pressures on wages. Based on Scottish Government analysis and comparing to the OBR's estimate for the UK, the NAIRU in Scotland is estimated to be around 5.4%.  This should not be viewed as a floor on unemployment in Scotland. Unemployment can be below the NAIRU as the economy goes through cycles. The NAIRU itself can also fall over time, for example in response to changes in working practices or government policies.

Charts 6 and 7 overleaf present forecasts of Scottish unemployment and employment respectively.

**Chart 6: Scottish unemployment rate (%), historic and forecast**



**Chart 7: Scottish historic and future forecast employment level (thousands)**



The employment level is expected to grow in every year of the forecast, albeit at a slower rate of growth than historically. This is due in part to slower projected growth in the labour force. The level of employment is expected to be around 40,000 higher in 2021-22 than it was in 2015-16. In the later years of the forecast, employment growth starts to increase more rapidly as participation increases, unemployment falls and economic growth picks up as shown in Table 9.

Despite increasing employment over the forecast period, unemployment is forecast to rise. This is due to the size of the Scottish labour force growing more quickly than the number of people in employment. It primarily reflects an increase in the number of people assumed to move from economic inactivity back into the labour market to look for work, rather than individuals moving from employment to unemployment.

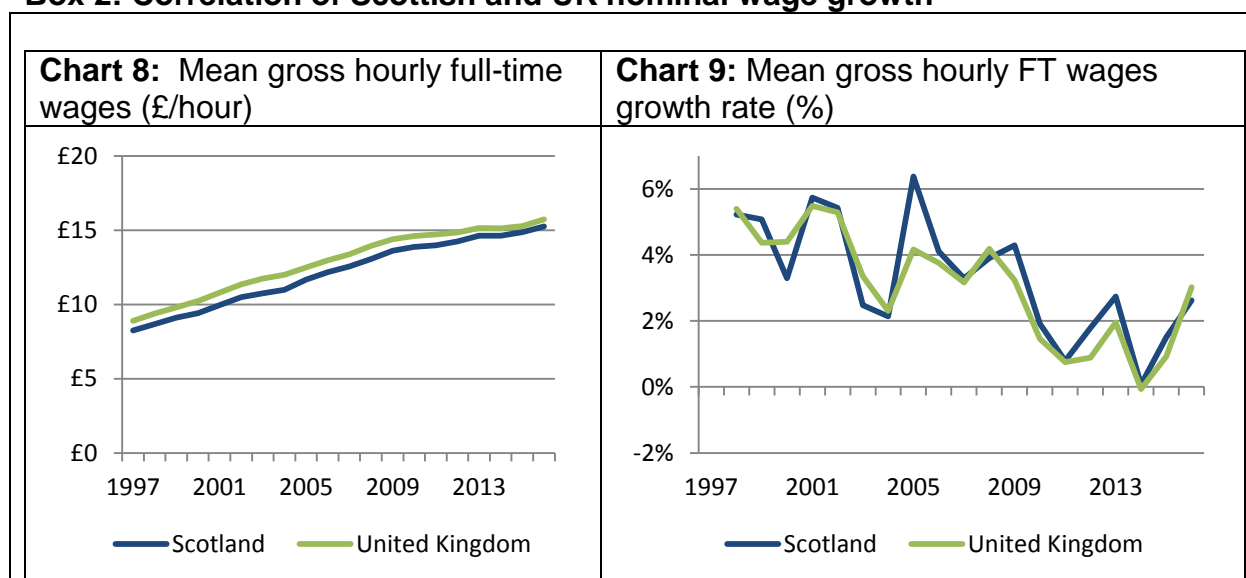**Table 9: Labour Market Forecast (% change on previous financial year)**

| | 15-16 | 16-17 | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 |
|---|---|---|---|---|---|---|---|
| | **Outturn** | **Forecast** | | | | | |
| Total Population (thousands) | 5,364 | 5,380 | 5,396 | 5,411 | 5,428 | 5,445 | 5,462 |
| Labour Force (thousands) | 2,774 | 2,753 | 2,768 | 2,780 | 2,789 | 2,798 | 2,806 |
| Employment (thousands) | 2,614 | 2,618 | 2,626 | 2,632 | 2,639 | 2,640 | 2,655 |
| Unemployment (%) | 5.8 | 4.9 | 5.1 | 5.3 | 5.4 | 5.6 | 5.4 |

**Scottish wages**

As discussed in Box 2 below, growth in Scottish and UK wages have historically been closely correlated, even when differences in economic performance are observed at the aggregate level. Scottish wages are therefore assumed to grow in line with the corresponding OBR forecasts for the UK as a whole. In the initial period of the forecast, this approach is supplemented with additional modelling and forecasting to include any short run shocks to Scottish wages. This relies on surveys and other timely data of the Scottish and UK economies.

Scottish and UK nominal wages tend to grow in a similar way. Historically, the annual growth rates have been very close. This is shown in Charts 8 and 9 in Box 2 below.

**Box 2: Correlation of Scottish and UK nominal wage growth**



**Chart 8:** Mean gross hourly full-time wages (£/hour)

**Chart 9:** Mean gross hourly FT wages growth rate (%)

Source: Annual Survey of Hours and Earnings. There is a discontinuity in the time series ASHE data around 2005 creating some volatility in the series.

The growth rate of nominal wages in Scotland and the UK are highly correlated, having a correlation coefficient of over 0.9 (where 1 is perfectly correlated and 0 is no correlation). Given the strong historic relationship between Scottish and UK wages, the growth rate of Scottish average nominal hourly wages is projected in line with the OBR's forecast for the UK.

The forecasts summarised in Table 10 assume that growth in nominal wages returns to its historic trend. However, the increase in inflation expected in the coming years means that growth in real wages, and therefore households' purchasing power, remains subdued.

**Table 10: % Wages and earnings forecast (change on previous financial year)**

|  | 15-16 | 16-17 | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 |
|---|---|---|---|---|---|---|---|
|  | Outturn | Forecast | | | | | |
| Nominal wages[1] | 2.3 | 2.3 | 2.2 | 2.9 | 3.6 | 4.0 | 4.1 |
| Inflation | 0.3 | 1.5 | 2.4 | 2.4 | 2.1 | 2.0 | 2.0 |
| Real wages[2] | 2.1 | 0.8 | -0.1 | 0.5 | 1.5 | 2.0 | 2.0 |
| Average hours worked per week | -1.2 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| Average annual earnings[3] | 1.1 | 2.3 | 2.3 | 2.9 | 3.6 | 4.1 | 4.1 |

[1] **Nominal wages** growth is growth in average hourly earnings per worker
[2] **Real wages** are calculated by deflating the nominal wage with the consumer expenditure deflator
[3] **Average earnings** growth is growth in total annual earnings. Growth from 2016-17 onward is a determinant in the income tax forecast

**CHAPTER 4 INCOME TAX FORECASTS**

**Introduction**

This chapter provides an overview of the methodology used to prepare the forecasts of non-savings non-dividend (NSND) income tax liabilities published in the 2017-18 Draft Budget.

The Scotland Act 2016 provides the Scottish Parliament with the power to set the rates of income tax as well as the thresholds at which these are paid for all NSND[12] income tax paid by Scottish taxpayers, in addition to devolving the power to create new bands. However, certain elements of income tax will continue to be determined by the UK Government. This includes the definition of taxable income, the Personal Allowance, the ability to introduce or change tax reliefs or exemptions and the taxation of income from savings and dividends.

**Implications for the Draft Budget**

Table 11 provides the forecast of Scottish NSND income tax liabilities based on the income tax policy announced in the Draft Budget for the five year period 2017-18 to 2021-22.

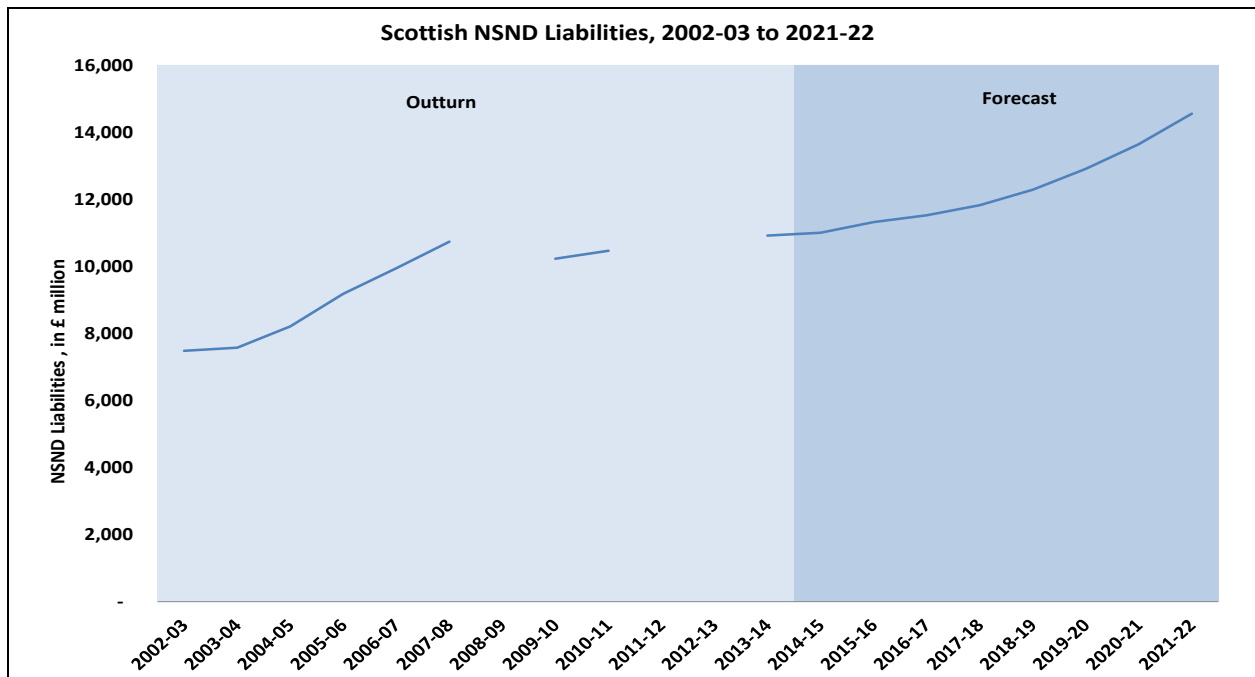**Table 11**: **Forecast of Scottish NSND Income Tax Liabilities**, **2017-18 to 2021-22, £ million**

|  | **2017-18** | **2018-19** | **2019-20** | **2020-21** | **2021-22** |
|---|---|---|---|---|---|
| NSND Liabilities | 11,829 | 12,290 | 12,912 | 13,647 | 14,559 |

NSND income tax is forecast to raise £11.8 billion in Scotland in 2017-18, with liabilities increasing to reach £14.6 billion in 2021-22. NSND liabilities are forecast to grow by 2.6% between 2016-17 and 2017-18, with growth rising to 3.9% in the following year. Thereafter, growth rates are forecast to accelerate as nominal wage growth is projected to return to its long term trend, with NSND liabilities expanding by 6.7% in 2021-22. Chart 10 illustrates the path of Scottish NSND liabilities over the period 2002-03 until 2021-22. The gaps in the data reflect the years for which detailed income tax statistics for Scotland are not currently available.

Over the period 2002-03 to 2010-11, NSND liabilities grew at an average annual rate of 6.7%. Chart 10 also shows that annual growth in NSND income tax liabilities has been quite variable, with growth ranging from 1.3% in 2003-04 to 11.8% in 2005-06. This reflects a myriad of factors, such as variation in economic growth, and hence income tax liabilities, across years, changes in the income distribution and changes in income tax policy.

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[12] This primarily consists of earnings from employment, profits from self-employment, pensions, taxable social security benefits and income from property.

**Chart 10: Scottish NSND Income Tax Liabilities, 2002-03 to 2021-22, £ million**[13]



## Modelling approach

### Overview

The Scottish Government has developed a process for forecasting income tax that includes multiple building blocks, models and data sources. The steps involved in producing the income tax forecast are summarised in Chart 11 overleaf.

The sections below discuss each of these building blocks in turn. The details and results of the economic forecasts underpinning the income tax forecasts are discussed in Chapter 3.

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[13] Source: Scottish Government's Income Tax Simulation Model and Survey of Personal Incomes (SPI).

**Chart 11: Schematic Overview of Forecasting NSND Income Tax Liabilities in Scotland**



**The Income Tax Simulation Model: creating the static income tax forecast**

The starting point for forecasting income tax in Scotland is to project forward the Scottish tax base, i.e. the total value of all income in Scotland which is subject to NSND income tax. The Scottish NSND tax base is estimated using data on taxable incomes taken from the Survey of Personal Incomes (SPI). This is the primary resource used by HM Revenue and Customs (HMRC) and the Office for Budget Responsibility (OBR) for UK income tax analysis and for estimating the revenue effects of proposed policies. The SPI comprises a detailed sample of over 40,000 anonymised Scottish tax records, weighted to be representative of all Scottish taxpayers. For each record, there is detailed information on sources and level of income, age group, and a range of other relevant variables. The latest available data is for the financial year 2013-14. The SPI data is then rolled forward, using assumptions about future growth in NSND income and the number of taxpayers, to provide forecasts of the Scottish income tax base in future years, as described in detail in the next section. Box 3 provides further detail on the current income distribution in Scotland.

**Box 3: The Income Distribution in Scotland**

Table 12 illustrates the number of projected taxpayers in Scotland according to the highest marginal tax rate they face in 2016-17.[14] These figures relate to total income tax, i.e. they include tax paid on savings and/or dividends, but the trends are broadly similar for NSND income.

**Table 12: Number of Taxpayers in Scotland by Marginal Rate, 2016-17**

| Number of Taxpayers | Basic Rate | Higher Rate | Additional Rate | All Taxpayers |
|---|---|---|---|---|
| in '000s | 2,150 | 356 | 18 | 2,560 |
| as % of Taxpayers | 84.0% | 13.9% | 0.7% | 100.0% |
| as % of 16+ Population | 48.0% | 8.0% | 0.4% | 57.2% |

The key points are:
- There are estimated to be 4.5 million adults in Scotland in 2016-17.
- Over 40% of Scottish adults - around 1.9 million individuals - pay no income tax.
- The large majority of taxpayers - around 2.2 million adults - only pay the basic rate of income tax.
- Less than 10% of Scottish adults, or around 360,000 individuals, are subject to the higher 40p rate.
- Less than 0.5% of Scottish adults, or around 20,000 individuals, are Additional Rate taxpayers.

**Forecasting growth in NSND income**

Each source of NSND income, such as income from employment, pensions and property income, is forecast separately. Public and private sector earnings are also forecast separately.

Table 13 shows the level and share of income arising from each source in Scotland in 2013-14, the latest year for which such detailed SPI outturn data is available. Earnings from private sector employment constitute the largest source, accounting for 59% of all NSND income, followed by earnings from the public sector.

**Table 13**: **Level and Share of Different Sources of NSND income in Scotland in 2013-14, £ million**

| | State pensions | Non-state pensions | Income from employment - public sector | Income from employment - private sector | Income - other | Total |
|---|---|---|---|---|---|---|
| Levels (£m) | 4,025 | 7,161 | 17,132 | 41,817 | 788 | 70,923 |
| Share of total (%) | 5.7 | 10.1 | 24.2 | 59.0 | 1.1 | - |

The remainder of this section sets out the growth assumptions for each of these five sources of income which feed into the income tax forecasts.

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[14] Available at https://www.gov.uk/government/collections/income-tax-statistics-and-distributions. Note that figures do not add up to 100% as a small share of taxpayers pays tax at the so called "savers rate" which is not reported here.

The **State Pension** is set for the UK as a whole and, under current UK Government policy, will increase in line with the *triple lock.* This means that the State Pension will increase each year by the greatest of growth in average earnings, CPI inflation or 2.5%. The Office for Budget Responsibility publish a table of their forecast for the triple lock guarantee in their *Economic and Fiscal Outlook*[15] and this is used to grow State Pension income in the income tax forecasting model.

There are a range of **private pension** products available which grow in different ways over time. Moreover, there will be an existing stock of pensions, with that stock growing in the income it delivers from year to year, plus an on-flow and off-flow of new and ceased pensions each year. The SPI shows that private pensions have grown by an average 3.1% per year between 2002-03 and 2013-14. For simplicity and transparency, the income tax model projects this annual growth rate forward across the forecast period.

For 2014-15 and 2015-16, earnings from **private and public sector employment** are updated using outturn data from the *Annual Survey of Hours and Earnings* (ASHE) for annual average pay for employees in the public and private sector respectively.

From 2016-17 onwards, a forecast of earnings growth is needed. In reality, **earnings in the public sector** will be determined by a range of factors including the public sector pay arrangements of the Scottish and UK Governments and Local Government. The historic SPI data shows that, over the period 2009-10 to 2013-14, during which the UK Government was implementing its fiscal consolidation programme, average employee earnings from public sector employment have grown by 2.2% each year in Scotland. With the UK Government continuing its policy of fiscal consolidation in future years, public sector earnings are therefore assumed in the model to continue growing at their average rate between 2009-10 and 2013-14.

From 2016-17 onwards, the forecast for average **earnings from private sector employment** in the model is driven by the Scottish Government's forecast of wages. These are for earnings growth in the economy as a whole, i.e. both the public and private sectors. Since public sector wages are forecast separately in the income tax model, as outlined above, a further adjustment is therefore made before the Scottish Government's wage forecasts are applied to private sector earnings.

Property income and other income not shown elsewhere are grouped under the heading '**all other income'** and grown in line with the growth in average earnings, consistent with the Scottish Government's economic forecast. The assumptions for each category of NSND income growth are summarised in Table 14.

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[15] Table 4.1, Economic and Fiscal Outlook, November 2016.

**Table 14: Assumptions for % Growth in NSND Incomes, 2014-15 to 2021-22**

| NSND Income | Year | Pensions | | Employment income | | All other Income |
| | | State pension[16] | All other Pensions | Private sector | Public sector | |
|---|---|---|---|---|---|---|
| **Outturn** | **2014-15** | 2.7 | 3.1 | 0.9 | 1.8 | 1.3 |
| | **2015-16** | 2.5 | 3.1 | 2.6 | 3.3 | 2.8 |
| **Forecast** | **2016-17** | 2.9 | 3.1 | 2.3 | 2.2 | 2.3 |
| | **2017-18** | 2.5 | 3.1 | 2.3 | 2.2 | 2.3 |
| | **2018-19** | 2.5 | 3.1 | 3.2 | 2.2 | 2.9 |
| | **2019-20** | 2.7 | 3.1 | 4.2 | 2.2 | 3.6 |
| | **2020-21** | 3.3 | 3.1 | 4.8 | 2.2 | 4.1 |
| | **2021-22** | 3.6 | 3.1 | 4.9 | 2.2 | 4.1 |

**Forecasting the number of taxpayers**

The number of taxpayers is projected separately for different age bands to factor in demographic shifts in the Scottish population. This approach has the advantage of exploiting the fact that average earnings, and hence NSND liabilities, vary significantly with age. According to the SPI dataset, average incomes peak for middle aged taxpayers and are lower for older taxpayers who primarily receive their incomes through pensions. Relatively faster, or slower, growth in the number of taxpayers in an age group with high average incomes, for example, may therefore boost Scotland's revenue raising capacity, and vice versa.
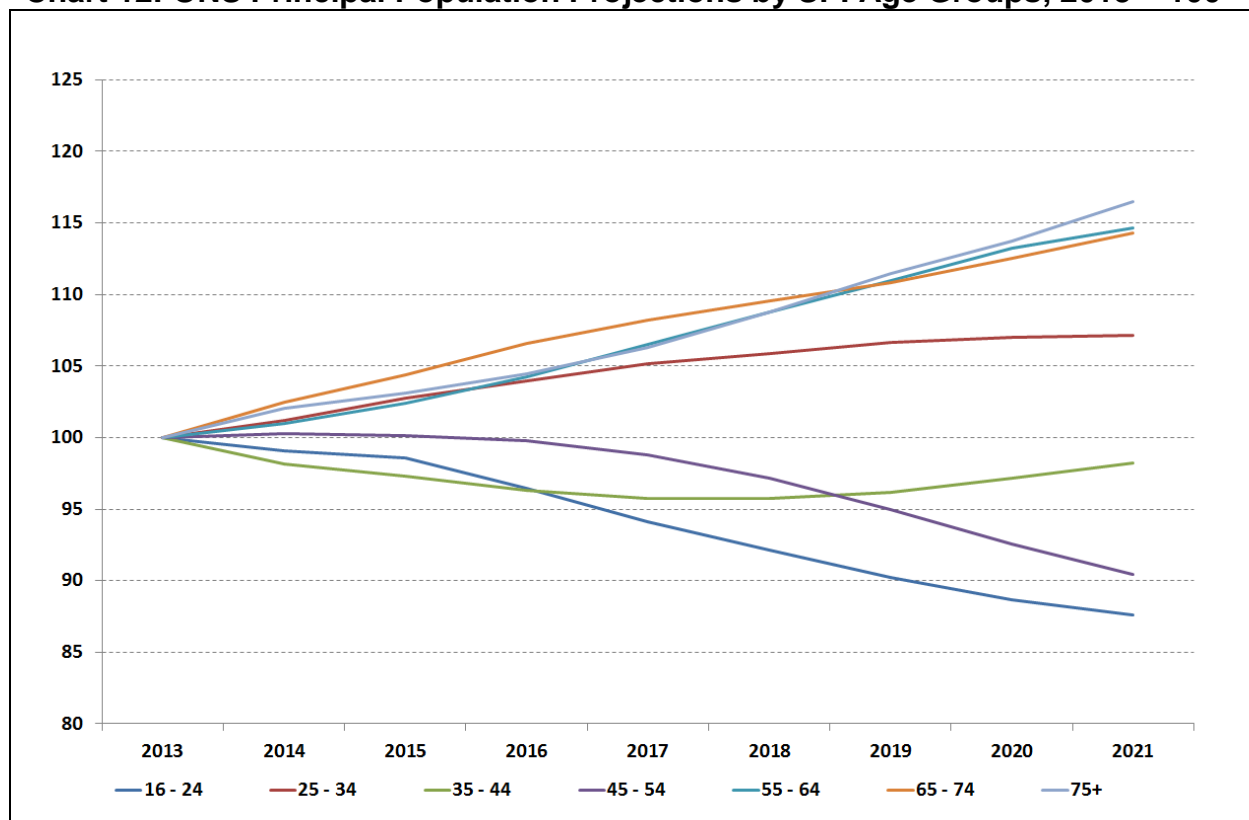
The SPI dataset allows us to split taxpayers into seven different age groups: under 25, 25-34, 35-44, 45-54, 55-64, 65-74 and 75+. **For the two oldest groups (65-74 and 75+)**, the number of taxpayers is projected in line with the latest 2014-based principal population projections for these age categories, which are produced by the ONS. **For those of working age (16-64)**, the projections are consistent with the Scottish Government's economic forecasts of growth in total employment, reflecting the fact that taxpayers of working age tend to be employed. However, the Scottish Government's economic forecasts only provide a projection of the <u>total</u> employment level in Scotland. In order to project trends in employment growth by age, two additional data sources are therefore incorporated into the analysis: the latest 2014-based ONS principal population projections and labour market data on participation and unemployment in Scotland from the *Annual Population Survey* (APS).

Chart 12 overleaf presents the ONS population projections by SPI age groups indexed to 2013-14.

The ONS population projections are then combined with forecasts of labour market participation by age group from the Scottish Government's core economic forecast. From this, the number of people in employment in each age group can be calculated for each year, using disaggregated labour market statistics by age group. A final adjustment is made to these projections to ensure that the resulting growth in total employment matches that from the core economic forecast.

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[16] Ibid. It should be noted that triple lock values for a given financial year affect the uprating of the state pension in the next financial year.

**Chart 12: ONS Principal Population Projections by SPI Age Groups, 2013 = 100**



The resulting projections for the growth in the number of taxpayers by age group are summarised in Table 15.

**Table 15: Assumptions for Percentage Growth in the Number of Taxpayers, by Age Group**

| | | 16 - 24 | 25 - 34 | 35 - 44 | 45 - 54 | 55 - 64 | 65 - 74 | 75+ | Employment Growth (%)[17] |
|---|---|---|---|---|---|---|---|---|---|
| **Outturn** | **2014-15** | 2.6 | 3.3 | -0.6 | 2.0 | 3.4 | 2.5 | 2.0 | 2.0 |
| | **2015-16** | -0.1 | 1.7 | -1.4 | -0.1 | 2.1 | 1.9 | 1.0 | 0.4 |
| **Forecast** | **2016-17** | -3.2 | 0.4 | -1.3 | 0.4 | 3.9 | 2.1 | 1.3 | 0.2 |
| | **2017-18** | -3.0 | 0.8 | -0.3 | -0.3 | 3.3 | 1.5 | 1.8 | 0.3 |
| | **2018-19** | -3.0 | 0.8 | 0.2 | -1.1 | 3.2 | 1.2 | 2.4 | 0.2 |
| | **2019-20** | -3.0 | 1.0 | 0.8 | -1.6 | 3.1 | 1.2 | 2.5 | 0.3 |
| | **2020-21** | -2.8 | 0.3 | 1.0 | -2.2 | 2.8 | 1.5 | 2.0 | 0.0 |
| | **2021-22** | -1.8 | 0.6 | 1.7 | -1.4 | 2.6 | 1.6 | 2.4 | 0.5 |

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[17] From the Scottish Government's core economic forecast.

**Tax parameters**

The income tax simulation model then combines the forecasts of the Scottish tax base with the assumed tax parameters for a given year, as detailed in Table 16, to provide a static forecast of NSND liabilities.

**Table 16: Tax Parameters, based on the Proposal in the Draft Budget 2017-18**

|  | Effective Personal Allowance | Basic rate (%) | Basic rate limit | Higher rate threshold | Higher rate (%) | Personal allowance limit | Additional Rate threshold | Additional rate (%) |
|---|---|---|---|---|---|---|---|---|
| **2017-18** | 11,500 | 20 | 31,930 | 43,430 | 40 | 100,000 | 150,000 | 45 |
| **2018-19** | 11,833 | 20 | 32,682 | 44,516 | 40 | 100,000 | 150,000 | 45 |
| **2019-20** | 12,167 | 20 | 33,462 | 45,629 | 40 | 100,000 | 150,000 | 45 |
| **2020-21** | 12,500 | 20 | 34,051 | 46,551 | 40 | 100,000 | 150,000 | 45 |
| **2021-22** | 12,750 | 20 | 34,732 | 47,482 | 40 | 100,000 | 150,000 | 45 |

The Draft Budget 2017-18 confirms the Scottish Government's proposal from 22 March 2016 to freeze the Higher Rate Threshold in real terms in 2017-18 and increase it by no more than inflation until 2021-22. The exact level of the Higher Rate Threshold will be set out each year by the Scottish Government at the Draft Budget. For modelling purposes, it is assumed that the Higher Rate Threshold is increased in line with inflation each year, using September CPI inflation outturn data from the ONS and inflation forecasts published by the OBR[18].

The power to set the Personal Allowance remains with the UK Government. The Autumn Statement confirmed that the UK Government plans to gradually increase the Personal Allowance to £12,500 by the end of the UK Parliament. The proposals published in March stated that the Scottish Government will implement an effective Personal Allowance of £12,750 in 2021-22 by creating a zero rate band to ensure that this is delivered if necessary. In order to model this aspect of the policy, it is assumed that the personal allowance increases in a straight line from its current level to £12,500 by 2020-21 and reaches £12,750 in 2021-22.

**Behavioural analysis**

The static forecasts generated by the income tax simulation model do not incorporate behavioural change in response to changes in policy. This means that a further adjustment has to be made to the static forecasts. The methodology used for calculating the behavioural response broadly follows the approach adopted by HMRC for UK-wide tax policy changes. It examines each group of taxpayers affected by the policy change separately and applies *Taxable Income Elasticities* (TIEs) to estimate the changes in their taxable income as a result of their behaviour changing in response to a policy change. A broad range of TIEs have been employed to capture individuals' responses to a change in their marginal or average tax rate as a result of a policy change. This is discussed in more detail in Box 5 (on page 33).

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[18] Table 4.1, Economic and Fiscal Outlook, November 2016.

**Box 4: Comparing the OBR and Scottish Government Income Tax Forecasts**

The Office for Budget Responsibility (OBR) also produces forecasts of Scottish NSND liabilities. However, these do not impact upon the forecasts of Scottish income tax liabilities used in the Scottish budget. The OBR and Scottish Government forecasting approaches differ and this section briefly summarises the OBR's methodology and compares the two sets of forecasts.

The OBR employs a 'top down' approach which uses the forecasts of UK-wide NSND liabilities as a starting point and then derives a Scottish 'share' based on the proportion of UK NSND liabilities historically raised in Scotland. The OBR assume that these historic shares will continue at recent levels unless evidence suggests otherwise. For example, adjustments are made to these historic shares if an announced income tax policy is estimated to have a disproportionate impact on Scottish taxpayers or if outturn data points to different trends in the underlying Scottish tax base.[19]

The OBR forecasts published alongside the Autumn Statement 2016 also assume that Scotland matches the UK's income tax policy. Moreover, they do not model the UK Government's commitment to raise the Personal Allowance to £12,500 and the Higher Rate Threshold to £50,000 by the end of the UK Parliament. The OBR instead assume that all tax thresholds and allowances are uprated in line with inflation after 2017-18. More details on the OBR's methodology can be found in its latest forecast report for the devolved taxes.[20]

The Scottish Government takes a 'bottom up' approach, forecasting Scotland-specific trends in employment and earnings growth to build up the forecast of NSND liabilities. In addition, the Scottish Government's forecasts incorporate announced changes to income tax policy across the entire forecast period.

The Scottish Government and OBR forecasts of Scottish NSND income tax liabilities are therefore not directly comparable. They are based on different modelling techniques and make different assumptions about the future path of income tax policy.

Table 17 summarises the OBR's and the Scottish Government's forecasts for Scottish NSND liabilities for the five year period from 2017-18.

**Table 17: Comparison of the OBR's and Scottish Government's Forecasts, £ million**

|  | **2017-18** | **2018-19** | **2019-20** | **2020-21** | **2021-22** |
|---|---|---|---|---|---|
| **Scottish Government** | 11,829 | 12,290 | 12,912 | 13,647 | 14,559 |
| **OBR** | 11,768 | 12,220 | 12,770 | 13,432 | 14,181 |
| *Difference (SG-OBR)* | *61* | *70* | *142* | *215* | *378* |

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[19] Full details are available at: http://budgetresponsibility.org.uk/docs/dlm_uploads/Forecasting-Scottish-taxes.pdf
[20] The report is available at: http://cdn.budgetresponsibility.org.uk/DevolvedAS2016.pdf

**Box 5: Accounting for Taxpayer Behaviour in Response to a Change in Scottish Income Tax**

Estimates of the behavioural effects are determined by the *Taxable Income Elasticity* (TIE) used, the *Marginal Retention Rate* (MRR) and the taxable income of the individual. TIEs measure how responsive total taxable income is to a 1% change in the MRR, which is the amount of each additional pound earned and received by the individual after tax. The behavioural effect is calculated as follows:

Behavioural Effect = TIE x (% Change in MRR) x Taxable Income

The revenue implications in terms of tax lost, or gained, is then derived by multiplying the behavioural effect with the average tax rate in that group. Whilst there is a general consensus in the academic literature that TIEs are much higher for those on higher incomes, the impact of behaviour change is uncertain and is influenced by a range of factors.

There are a series of TIEs previously applied by HMRC. However, evidence from historical tax policy changes in the UK may not always provide the most appropriate indication of the behaviour response which can be expected to occur as a result of future income tax policy changes in Scotland.

- Scottish income tax powers only apply to NSND income. Since this is largely income from employment, there may be fewer opportunities for individuals to artificially minimise their tax liabilities compared to income from savings and dividends. This could reduce the TIE.

- Behavioural effects between Scottish and the rest of the UK taxpayers may be more significant than estimated in the existing literature because labour mobility between Scotland and the rest of the UK could be larger than between the UK and other countries. This means that TIEs in Scotland could potentially be much higher, particularly for the highest earners.

Given these uncertainties, a set of low-high TIEs have been adopted, as set out in Table 18.

**Table 18: TIEs, Response to Changes in the Marginal Rate of Income Tax**

| Applied TIE | Basic Rate | Higher Rate | Additional Rate |
|-------------|------------|-------------|-----------------|
| Low | 0.015 | 0.1 | 0.35 |
| High | 0.015 | 0.1 | 0.75 |

These TIEs only apply where a taxpayer sees a change in their marginal rate of tax. However, taxpayers will not only react to a change in their marginal rate but may also respond to a change in their average rate of tax, for example when tax thresholds are changed. Evidence suggests that there is a much lower response to changes in average than marginal tax rate changes. Therefore, lower TIEs were applied to calculate this aspect of the behavioural response.

These TIEs are kept under review as new information on the behaviour of Scottish taxpayers becomes available.

When considering the behavioural response from the Scottish Government's income tax proposal announced in the Draft Budget, the forecasts under the Scottish Government's policy are compared with a 'do nothing' scenario where the key income tax thresholds remain unchanged in real terms. The Personal Allowance is higher under the Draft Budget proposal, thus reducing NSND liabilities whilst the Basic Rate Limit is marginally lower[21], resulting in a small boost to NSND liabilities. Since the changes to income tax policy are small, relative to the counterfactual, and the impact is concentrated amongst basic rate taxpayers who tend to be less sensitive to policy changes, the behavioural response is estimated to have little impact on the headline numbers.

**Off model adjustments to the income tax forecasts**

In addition to accounting for behavioural change, a number of further adjustments have been applied to the forecasts of NSND liabilities for Scotland.

i.     In its *Economic and Fiscal Outlook*, the OBR highlighted the growing cost to the public finances of the recent rise in incorporations as more people set themselves up as a company to minimise their tax bill. The OBR expects UK incorporations to rise by 5% per annum over the forecast period, much faster than the 0.4% increase in total employment. It forecasts that this could cut total UK income tax receipts by £3.1 billion in 2021-22, compared with a situation where incorporations increased in line with employment.[22] The rising trend in incorporations therefore implies that relatively more taxpayers are expected to pay tax on dividends and profits rather than employment income which would depress NSND liabilities. A downward adjustment has been made to the final Scottish income tax forecast to account for this revenue risk. It is estimated that incorporations reduce Scottish NSND liabilities by around £200 million in 2021-22.

ii.    A deduction is made to the income tax forecasts to reflect the gift aid that charities claim from HMRC on charitable donations made by Scottish taxpayers. This reduces Scottish NSND liabilities by over £100 million each year.

iii.   An upwards adjustment has been made to the forecasts to take into account new income tax policies announced at the Autumn Statement which apply in Scotland and are expected to boost liabilities. This includes the removal of tax and National Insurance advantages in salary sacrifice schemes, the reduction in the money purchase annual allowance and the extension of disguised remuneration targeting the self-employed as well as some other smaller measures. The revenue implications of these tax policies in Scotland is taken directly from the OBR's *Devolved Taxes Forecast* and the tax measures are estimated to boost NSND liabilities by £26 million in 2021-22[23].

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[21] The Scottish Government proposes to uprate the Higher Rate Threshold (HRT) in line with inflation as opposed to the Basic Rate Limit. Due to above inflation increases in the Personal Allowance, the Basic Rate Limit (= HRT - Personal Allowance) would be lower under the Scottish Government's policy than under Statutory Indexation, i.e. uprating in line with inflation.
[22] See Box 4.1, Economic and Fiscal Outlook, November 2016.
[23] See Table 2.3. The full publication is available at: http://cdn.budgetresponsibility.org.uk/DevolvedAS2016.pdf

**Final forecast**

Taking all the different components together results in the forecast of Scottish income tax liabilities presented in Table 19.

**Table 19: Forecast for Scottish NSND Income Tax Liabilities, 2017-18 to 2021-22, £ million**

|  | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|
| NSND Liabilities | 11,829 | 12,290 | 12,912 | 13,647 | 14,559 |

NSND income tax is forecast to raise £11.8 billion in Scotland in 2017-18, with liabilities increasing each year, albeit at varying rates, to reach £14.6 billion in 2021-22.

## CHAPTER 5 - LAND AND BUILDINGS TRANSACTION TAX

### Introduction

The Land and Buildings Transaction Tax (LBTT) was introduced as a fully devolved tax in Scotland from 1 April 2015. LBTT is a tax applied to residential and commercial land and buildings transactions (including commercial purchases and commercial leases) where a chargeable interest is acquired. In 2015-16, LBTT raised a total of £425 million and, so far in 2016-17 (7 months to end-October 2016), it has raised £269 million.[24] Different LBTT rates and thresholds apply for residential, non-residential and lease transactions. Draft Budget 2017-18 does not propose any change to the 2016-17 rates and thresholds which apply to the various elements of LBTT. Therefore the rates and thresholds will continue to be as set out below in Table 20.

### Table 20: Proposed LBTT rates and bands for residential and non-residential property transactions, 2017-18

| Purchase price (**Residential transactions**) | LBTT Rate | Purchase price (**Non-residential transactions**) | LBTT Rate | Net present value of rental payments (**Non-residential leases**) | LBTT Rate |
|---|---|---|---|---|---|
| Up to £145,000 | 0% | Up to £150,000 | 0% | Up to £150,000 | 0% |
| Above £145,000 to £250,000 | 2% | Above £150,000 to £350,000 | 3% | Above £150,000 | 1% |
| Above £250,000 to £325,000 | 5% | Above £350,000 | 4.5% | | |
| Above £325,000 to £750,000 | 10% | | | | |
| Above £750,000 | 12% | | | | |

In Draft Budget 2016-17, the Scottish Government introduced the Additional Dwelling Supplement (ADS) on the purchase of additional residential properties, such as buy-to-let properties or second homes from 1 April 2016. This supplement, is levied at 3 percentage points of the total price of the property for all relevant transactions of £40,000 and above, and is levied in addition to the LBTT rates in Table 20. Net ADS revenues in 2016-17 to date are £51 million consisting of £57 million of gross ADS revenue less about £6 million of repayment.[25]

The policy intentions of the residential LBTT structure and ADS are related. Residential LBTT is structured in such a way that it most benefits those buying at the lower end of the housing market, which typically includes first-time buyers. ADS was introduced to allow first-time buyers to compete more effectively in the market with (for example) buy-to-let landlords or second home owners. For non-residential LBTT, the

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[24] Including revenue from the Additional Dwelling Supplement (ADS) but excluding £9 million of revenue recorded in 2016-17 but which related to transactions in 2015-16.
[25] Where the ADS has been paid and the buyer has been able to dispose of their previous main residence within an 18 month period beginning with the day after the effective date of the next main residence purchase transaction, the buyer (or their solicitor acting on their behalf) may claim a repayment of the TAS paid.

structure is again aimed at protecting smaller businesses with the lower rate of 3% charged between £150,000 and £350,000 and no LBTT charged at £150,000 or below.[26]

## Revenue forecasts

Five-year forecasts for the various elements of LBTT as contained in Draft Budget 2017-18 are set out below in Table 21.

**Table 21: Five-year LBTT forecasts for Draft Budget 2017-18 to 2021-22 (£ million)**

| | | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|---|
| Residential LBTT | Standard | 211 | 235 | 251 | 265 | 280 |
| | ADS* | 72 | 75 | 78 | 80 | 82 |
| | Total | 283 | 310 | 329 | 345 | 362 |
| Non-residential LBTT | | 224 | 233 | 242 | 252 | 262 |
| **Total LBTT** | | **507** | **543** | **571** | **597** | **624** |

*ADS forecasts presented on a net basis, i.e. once all repayments have been made[27]

In overall terms, LBTT revenues are forecast to rise from £507 million in 2017-18 to £624 million in 2021-22 an increase of 23 per cent.   In 2017-18, we forecast that about 42 per cent of total LBTT revenue will come from residential LBTT, about 14 per cent from ADS and the remaining 44 per cent from non-residential LBTT. This distribution is not expected to shift significantly over the 5-year forecast period.

## Methodology

### Residential LBTT – standard element

The house-price distribution is modelled using a log-normal distribution, which can be fully characterised by its mean and median. Therefore, forecasts of mean and median house prices are required, as well as the volume of housing transactions.

Autoregressive integrated moving average (ARIMA) models are used to model each of these three housing-market determinants.[28] Mean house prices are modelled using their annual growth rate as the dependent variable, median house prices using the ratio of median to mean house prices, and volumes using the turnover ratio (the proportion of the private housing stock that is sold each period). Forecasts for mean house prices are derived by applying the forecast growth rates to base-year prices, forecasts for median house prices by multiplying forecast mean house price by the forecast median-mean ratio, and forecasts for transactions by using National Records of Scotland household-growth projections to estimate future levels of the private housing stock, and then multiplying these by the forecast turnover ratio.
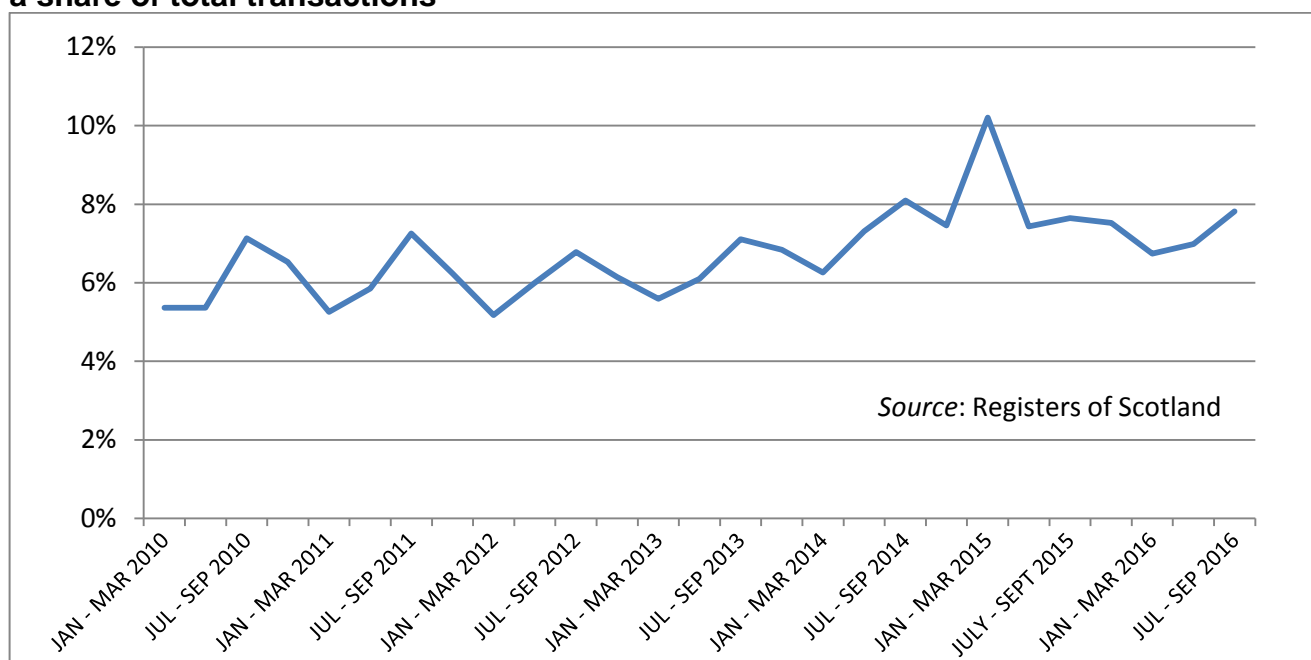
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[26] Further information on calculating rates and thresholds for LBTT including those applied on leases of non-residential property is available online: https://www.revenue.scot/
[27] That is, the forecasts are of the final revenues attributable to transactions in each fiscal year, once all repayments have been made. The final outturn for each year will only be fully determined 18 months after the end of the fiscal year.
[28] ARIMA models are a class of model which uses historical trends in a data series to project its future values.

The log-normal house price distribution is then parameterised using these forecast mean and median house prices. Revenues are calculated by applying the tax rates to this distribution and multiplying by forecast volumes. Since the log-normal distribution does not match the house-price distribution exactly – for example, in 2015-16 there were somewhat more sales in the highest LBTT band (£750k and above) and somewhat fewer in the band just below this (£350k to £750k) than the log-normal distribution predicted – correction factors (calculated from the 2015-16 data) are applied in order to improve the fit. While these factors increase the projected share in some bands, and reduce them in others, the overall impact on revenues is small.[29]
It is important to note that a small degree of over/underprediction by the log-normal distribution for different price ranges was present in the historical data as well, and has not increased since the introduction of LBTT. As Figure 13 illustrates, outside the quarters affected by forestalling behaviour, the share of transactions in the £325k-£750k band is at similar levels in the post-LBTT period to the pre-LBTT period – there is no evidence in the data so far of a sustained underperformance of this segment of the market.[30]

**Chart 13**: **Transactions with a purchase price between £325,000 and £750,000, as a share of total transactions**



*Source*: Registers of Scotland

### Residential LBTT – ADS

Robust data on the sale of homes not for owner occupation was unavailable prior to the introduction of ADS on 1 April 2016, and at this stage there is only limited data for the period of its operation. Analysis is further complicated by the fact that the early months are likely to have been affected by forestalling behaviour, and also because the supplement can be reclaimed if the buyer is able to dispose of their previous main

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[29]  In 2015-16 data, the log-normal distribution under forecast revenues by less than 3% in periods when the house-price distribution was not distorted by forestalling activity.
[30] There is evidence of strong forestalling impacts, a short-run behavioural impact whereby the timing of transactions changes in response to a change in tax rates. For example, in Figure 13 the spike in January-March 2015 is related to the introduction of LBTT on 1 April 2015, while the dip in January-March 2016 may be linked to the introduction of the Additional Dwelling Supplement on 1 April 2016.

residence within an 18-month period, meaning the final value of ADS liabilities relating to transactions in 2016-17 will only be known in October 2018.

The approach followed has therefore been to use data from the July-September quarter to estimate the size of the market, since this excludes the period most likely to have been affected by forestalling. Furthermore, when ADS is paid, the taxpayer can indicate whether they intend to reclaim the supplement. For the period April-September 2016, taxpayers indicated an intention to reclaim 25% of transactions, amounting to 34% of ADS liabilities. Given that the pattern of repayments so far is not inconsistent with these expressed intentions, we consider it prudent to assume for budgeting purposes that repayment will be in line with expressed intentions.  This produces an estimate that the transactions permanently liable for ADS constitute 16% of total residential transactions.

With respect to prices, the limited outturn data available, once corrected for those transactions where the taxpayer has reclaimed or intends to reclaim ADS, are consistent with our previous assumption that the mean purchase price for an ADS transaction is approximately 10% lower than for all residential transactions. This assumption is therefore maintained.

In the absence of robust time-series data for this segment of the market, it is assumed that the average price and volume for ADS transactions will grow at the same rate as the overall market. Since the ADS tax rate is a fixed 3%, it is sufficient to use the forecast mean price and volumes to calculate the forecast revenue without having to first fit a house-price distribution.

**Non-residential LBTT**

Historically, trends in non-residential tax receipts in Scotland have closely tracked those of the UK. As Chart 14 shows, this pattern continued in 2015-16 after the introduction of LBTT, which has a similar rate structure for non-residential transactions to the UK Government's Stamp Duty Land Tax. Accordingly, as in previous forecasting rounds, we have used the latest Office for Budget Responsibility forecasts for commercial price and transactions at the UK level as an input to the non-residential LBTT forecasts.

**Chart 14: Historic non-residential SDLT/LBTT receipts in Scotland and UK, £ million**
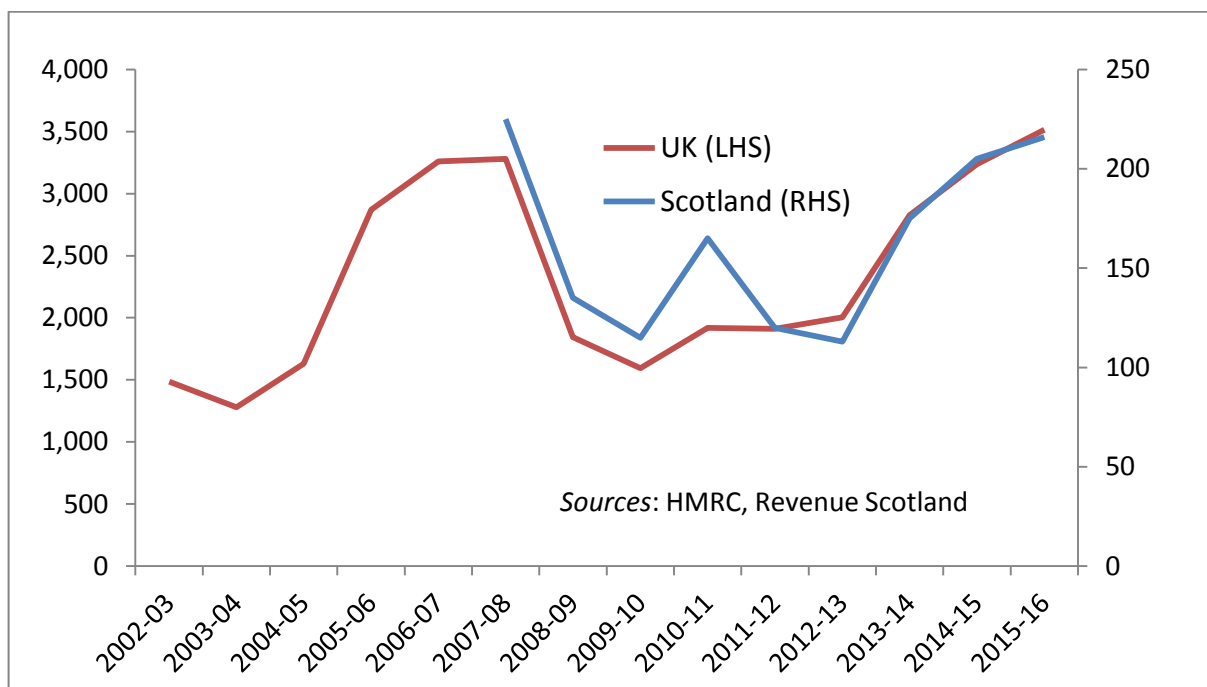


*Sources*: HMRC, Revenue Scotland

Chart 14 also illustrates the volatility of non-residential revenues, with the volatility in the overall level of transactions exacerbated by the fact that much of the revenue is generated by a small proportion of high-value transactions. Therefore, in order to smooth out some of the volatility in the historical revenue series, multi-year averages are used as a baseline. In particular, the latest three years of non-residential revenue outturns for Scotland, i.e. 2013-14, 2014-15 and 2015-16, are averaged to form a base from which to project future revenues. In doing this, the first two years of revenue outturns are uplifted by the average increase in non-residential prices. This resultant base, which is expressed in 2015-16 non-residential prices, is then grown by the product of the most recent OBR price and volume forecasts from 2016-17 onwards.

**Behavioural effects**

In Draft Budget 2016-17, it was assumed that there would be a long-run behavioural response to the introduction of ADS, which would reduce the number of transactions in this segment of the market either because these transactions switched into the owner-occupied market or because they did not take place at all – which in the latter case implied a reduction in revenues from the standard element of residential LBTT as well as reduced ADS revenues. Forecast revenues for both the ADS and standard elements were also adjusted to take into account forestalling behaviour. Since the residential LBTT forecasts set out in the 2017-18 Draft Budget use the latest available outturn data from 2016-17, it is assumed that these long-run behavioural impacts are already reflected in the baseline, and so no further adjustment is made. Since no change in rates and thresholds is proposed for 2017-18, there is also no need to adjust forecasts for residential and non-residential LBTT revenues for forestalling behaviour.

## Evolution of the LBTT forecasts

Table 22 shows how the LBTT forecasts have evolved from Draft Budget 2016-17 to Draft Budget 2017-18. There is a significant downward revision in the standard element of residential LBTT revenues, a significant upward revision in the ADS element relative to its size, while non-residential revenue forecasts are little changed.

**Table 22: Forecast comparison in Draft Budget 2017-18 and Draft Budget 2016-17, £ million**

| | | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|---|---|
| **Draft Budget 2017-18** | | | | | | | |
| Residential | Standard | | 211 | 235 | 251 | 265 | 280 |
| | ADS | | 72 | 75 | 78 | 80 | 82 |
| | Total | | 283 | 310 | 329 | 345 | 362 |
| Non-residential | | | 224 | 233 | 242 | 252 | 262 |
| **Total LBTT** | | | **507** | **543** | **571** | **597** | **624** |
| **Draft Budget 2016-17** | | | | | | | |
| Residential 31 | Standard | 282 | 347 | 406 | 469 | 533 | |
| | ADS | 36 | 51 | 56 | 62 | 66 | |
| | Total | 318 | 398 | 462 | 531 | 599 | |
| Non-residential | | 220 | 230 | 240 | 250 | 260 | |
| **Total LBTT** | | **538** | **628** | **702** | **781** | **859** | |
| **Change** | | | | | | | |
| Residential | Standard | | -136 | -171 | -218 | -268 | |
| | ADS | | 21 | 20 | 17 | 15 | |
| | Total | | -115 | -152 | -202 | -254 | |
| Non-residential | | | -6 | -7 | -8 | -8 | |
| **Total LBTT** | | | **-121** | **-158** | **-209** | **-262** | |

## Residential LBTT – standard element

The downward revision to the standard element of residential LBTT is due to weaker forecasts for both prices and transactions. This is the result of outturn data in 2015-16 and 2016-17 being weaker than was forecast at the time of Draft Budget 2016-17, as well as changes to the forecast methodology, which has been developed in the light of feedback from the Scottish Fiscal Commission. It is important to note that these downward revisions relate to the market as whole, rather than particular segments of the market.[32]

Previously, mean house prices were forecast using an ARIMA model for the short run and then smoothing back to an assumed long-run growth rate of 4.5%, comprising 2.5% real house-price growth and an assumption that inflation would be in line with the 2% target. Mean house prices are now forecast using an ARIMA model

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[31] The presentation of residential LBTT differs from Draft Budget 2016-17, which was based on a pre-measures and post-measures breakdown. The post-measures line included the combined effect of the additional ADS revenues as well as the reduction in standard residential LBTT revenues which was forecast to result from the introduction of ADS.

[32] The data at this stage do not indicate any significant over/underperformance of different segments of the market following the introduction of LBTT, as is illustrated by Chart 13 in relation to the £325,000 to £750,000 band.

throughout the five-year period. Suggestions from the Commission also led to further development of the ARIMA model, with structural breaks added so as to divide the period into pre-, during- and post-financial-crisis periods, and dummy variables added to capture the two episodes of forestalling behaviour around the introduction of LBTT and ADS.

Median house prices were previously assumed to grow at the same rate as mean house prices, implying a constant median-mean ratio. Given the considerations raised by the Commission as to the impact that changes in this ratio could have on the house-price distribution, this ratio is now modelled separately, allowing its value to vary over time.

Transactions were previously forecast assuming that their growth rate would fall linearly until the turnover ratio reached its long-run average. Transactions are now modelled using an ARIMA model, using the turnover ratio as the dependent variable so that its long-run value is generated by the ARIMA model itself. As in the case of the ARIMA model for mean house prices, the ARIMA model for transactions includes structural breaks to take account of the impact of the financial crisis.

The forecasts for mean and median prices and the growth rates of transactions are set out below, together with the corresponding forecasts from Draft Budget 2016-17.

**Table 23: Comparison of forecast growth rates in residential prices and transactions in Draft Budget 2017-18 and Draft Budget 2016-17**

|  | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|---|---|
| **Draft Budget 2017-18** | | | | | | | |
| Mean | -0.5% | -0.1% | 1.8% | 1.4% | 1.3% | 1.3% | 1.3% |
| Median | 0.5% | 0.9% | 0.1% | 0.6% | 1.2% | 1.2% | 1.2% |
| Transactions | 7.5% | -2.3% | 0.8% | 2.4% | 1.9% | 1.5% | 1.2% |
| **Draft Budget 2016-17** | | | | | | | |
| Mean | 5.9% | 5.6% | 5.3% | 5.1% | 4.8% | 4.5% | |
| Median | 5.9% | 5.6% | 5.3% | 5.1% | 4.8% | 4.5% | |
| Transactions | 5.4% | 4.6% | 3.8% | 2.9% | 2.1% | 1.3% | |

**Residential LBTT – ADS**

Since transactions liable for ADS are forecast to grow at the same rate as the overall residential market, the downward revisions to prices and forecasts described above also reduce forecast ADS revenues. However, this is more than offset by the fact that the outturn data available so far indicate that the number of transactions in this segment of the market is larger than was expected at the time of Draft Budget 2016-17.

**Non-residential LBTT**

The forecasting approach to non-residential LBTT remains largely the same as in Draft-Budget 2016-17. The fact that there was only a small downward revision in revenues was as a result of a downward revision to the OBR forecast for price growth

being largely offset by an upward revision to their forecast for transactions growth. As a result, the overall growth factor applied to produce the Scottish Government forecasts did not change significantly.

**Table 24: Office for Budget Responsibility forecasts for non-residential price and transactions growth**

|  | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|---|---|
| **November 2016 OBR Economic and Fiscal Outlook** | | | | | | | |
| Prices | 11.9% | -5.1% | -3.2% | 2.1% | 1.8% | 1.9% | 2.0% |
| Transactions | 4.7% | 6.7% | 1.3% | 1.9% | 2.1% | 2.1% | 2.0% |
| **November 2015 OBR Economic and Fiscal Outlook** | | | | | | | |
| Prices | 7.4% | 3.1% | 1.8% | 1.9% | 2.1% | 2.1% | |
| Transactions | 3.7% | 2.4% | 2.5% | 2.5% | 2.3% | 2.3% | |

**Risks and sensitivities**

**Residential LBTT – standard element**

With respect to both prices and transactions, a significant element of the downward revision is due to the change in methodology described above. In particular, the addition of structural breaks means that the models allow the long-run growth rate in the post-financial crisis period to differ from the earlier periods. This means that the high level of price and transactions growth in the early 2000s housing boom, which was arguably unsustainable, has much less influence on the modelled future long-term average growth rates. In particular, house-price growth is now modelled to converge on a long-run average of 1.3% rather than 4.5%, while the turnover ratio is modelled to converge on 5.1% rather than 6%.

The advantage of new modelling approach is that it uses a consistent approach to all the housing-market determinants, by applying an ARIMA approach to each variable, using data from the same source. It also minimises the amount of subjective judgement applied, since forecasts for all five years are now produced from the same model and same dataset, rather than using one approach for the earlier years of the forecast and then converging, in a somewhat ad hoc manner, on a long-run average calculated from another dataset. A risk, however, is that the downward adjustment in forecast price and transaction growth due to the adoption of this new modelling approach is too large. In particular, the introduction of structural breaks related to the financial crisis implies that the post-crisis period will be different, even in the long run, to the pre-crisis period. On the other hand, it can be argued that the boom years of the early 2000s were characterised by unsustainably high transaction and house-price growth, and it is therefore desirable that the model minimises the impact that data from this period has on long-run forecasts.[33]

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[33] The Registers of Scotland quarterly house-price statistics (https://www.ros.gov.uk/property-data/property-statistics/quarterly-house-price-statistics) which is used for the ARIMA modelling is only available from 2003 onwards. Thus housing-boom years of the early 2000s would arguable carry too much weight if a return to an unconditioned average of this dataset is hypothesised.

**Residential LBTT – ADS**

The ADS segment of the forecast is assumed to follow the same trends as the overall market; therefore, sensitivities identified above apply to the ADS forecasts as well. In addition, any change in price and transaction growth relating specifically to this segment of the market could also lead to revenues diverging from forecasts. Another key risk relates to repayments, especially as, with an 18-month window to reclaim repayment, it will take some time to build up a robust profile of repayment behaviour.

**Non-residential LBTT**

As Chart 14 illustrates, non-residential forecasts are particularly volatile, due to the fact that the timing of major business investment decisions can be strongly influenced by economic conditions. Given the uncertainties in the current economic environment, including but not limited to the final form of Brexit, there is a significant risk that any adverse shocks could increase uncertainty and cause investment decisions to be delayed.

**Scottish Fiscal Commission view of the forecast**

The final LBTT forecast, published as part of the Draft Budget 2017-18, is set out in Table 21 above. The Commission has endorsed the final forecast as reasonable. Further details on their views together with additional analysis and commentary are set out in the Commission's Final Report.

## CHAPTER 6 - SCOTTISH LANDFILL TAX
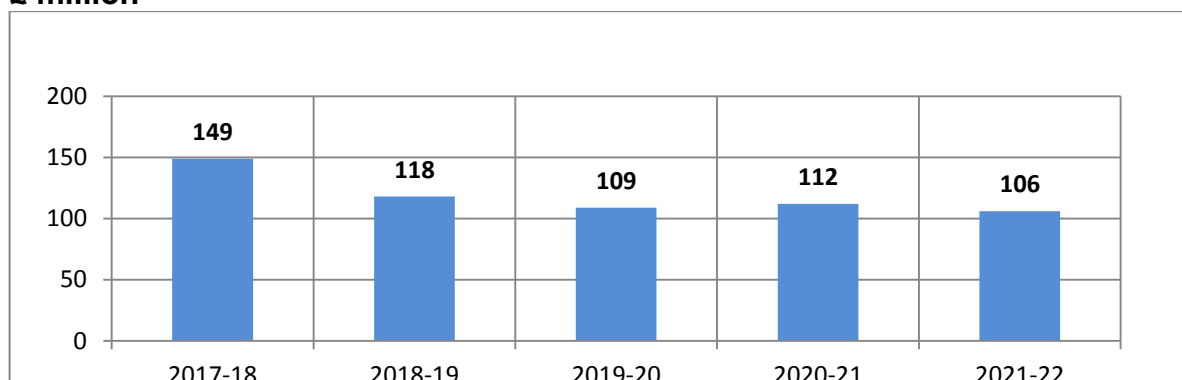
### Introduction

The Scottish Landfill Tax (SLfT) was introduced in April 2015 and is a fully devolved tax. SLfT is an environmental tax whose aim is to help reduce the amount of material which ends up in landfill sites located in Scotland. For 2017-18, we propose there will be two rates of tax payable; a 'Standard Rate' of £86.10 per tonne for 'active' waste and a 'Lower Rate' of £2.70 per tonne for 'inert' waste (such as building materials). The associated tax revenues are collected by Revenue Scotland who publish the taxable landfill volumes and tax revenue statistics on a quarterly basis.[34]

Whilst the main policy aim is to incentivise reductions in waste volumes going to landfill, a particular feature of the tax is that a small proportion of 'gross' revenues are reserved to pay for environmental restoration projects near to landfill sites which qualify for funding under the Scottish Landfill Communities Fund (SLCF). The remaining 'net revenues' are paid into the Scottish Consolidated Fund by Revenue Scotland and made available for public services generally.

### Revenue forecasts

The SLfT forecast for 2017-18 is £149 million. Total revenues are forecast to fall in three of the four subsequent years of the forecast period and are projected to decline to £106 million by 2021-22 (a fall of 29 per cent) as detailed in Chart 15.

**Chart 15: Forecast for Scottish Landfill Tax Revenue, 2017-18 to 2021-22, £ million**



1. Net revenue excluding Scottish Landfill Communities Fund (SLCF) Credits

### Methodology

This section sets out the methodology which was applied to the production of revenue forecasts for Scottish Landfill Tax (SLfT) to support the 2017-18 Draft Budget and to provide provisional forecasts for the period 2017-18 to 2021-22 and how this methodology has changed.

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[34] https://www.revenue.scot/about-us/publications/statistics

This methodology differs significantly from the 2016-17 methodology where the forecast was driven explicitly by two headline waste policy targets.[35] The former method assumed a linear time-trajectory of waste based on the policy targets. There was a consensus with the Commission that the previous methodology could be improved and that a more clearly evidence-based methodology be developed. Scottish Government has revised the methodology substantively as a result of these challenges.

A central driver of the new forecasting model is the effect of forecast growth in incineration facilities in Scotland on diverting waste from landfill.

The model takes 2016-17 as its starting point for forecasting taxable waste (Standard Rate and Lower Rate) that is sent to landfill. For the purposes of the forecast, we assume a flat underlying trajectory of both waste types over the forecast period. From this trajectory, the model subtracts the estimated increases in incinerator capacity in Scotland, adjusted to reflect average operating levels. Incineration leads to residues (ash), which are assumed to go into landfill in the same time period, with some of this residue being Standard Rate (4% of tonnage incinerated) and some being Lower Rate (15% of tonnage incinerated). This describes primarily the estimation of Standard Rate waste. The only change to Lower Rate waste over the forecast period is that it accumulates incineration residues.

The model does not incorporate the impacts of waste policy around waste prevention, recycling or the ban on biodegradable municipal waste (BMW) going to landfill from January 2021 due to limitations in the evidence to predict their trajectories. The model considers Scottish incineration capacity only and does not estimate the future scope for residual waste export markets (either to RUK or overseas) or the impact of the expected increase in residual waste pre-treatment capacity. All of these factors may divert waste from landfill and this is discussed below as a risk to the forecast.

**Waste modelling assumptions: baseline tonnage**

Our central forecast is based on estimated Scottish taxable tonnages at 2016-17. This is calculated from the existing outturn data for 2016-17 and the pattern of 2015-16 taxable tonnages in Scotland. We estimate the full year Standard Rate and Lower Rate tonnage using the quarterly shares shown in the Revenue Scotland data for 2015-16.

We assume that the underlying level of taxable waste – before consideration of incinerator effects – is flat over the forecast period. That is, we assume no additional trend reductions in taxable waste resulting from the range of other policies and incentives in place.

**Waste incinerator capacity in Scotland**

We have worked closely with Zero Waste Scotland, SEPA and an external consultant to set out our best estimates to the Commission of dates when incinerator capacity
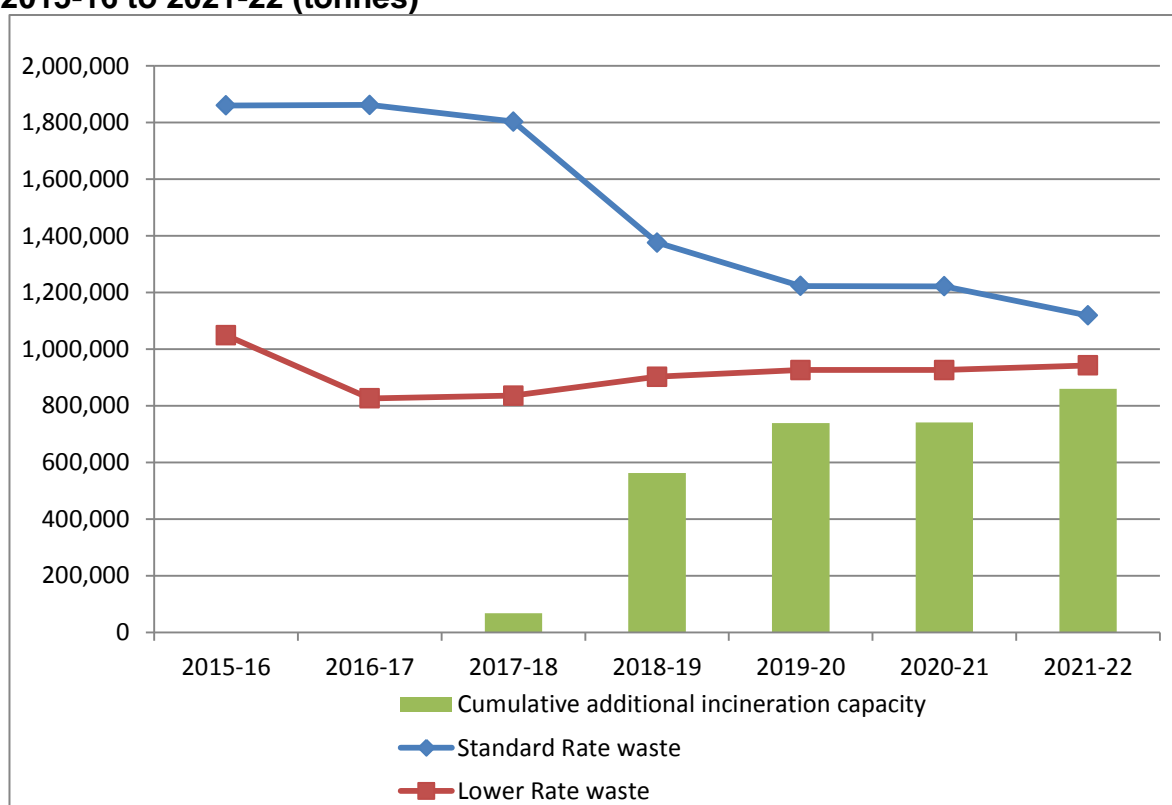
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[35] Total disposals to landfill fall to 5% of total waste arisings by 2025; and total waste arisings in 2025 reduce to 85% of the 2011 level

will come on stream. We have incorporated these capacity and timing data into the model.

Chart 16 summarises, the downward forecast trajectory for Standard Rate waste volume from 1.86 million tonnes in 2015-16 to 1.1 million tonnes in 2021-22; the much flatter trajectory for Lower Rate waste volume; and also the cumulative additional incineration capacity which is projected to build from 67,500 tonnes in 2017-18 to 860,000 tonnes in 2021-22.  Chart 15 provides the picture of the waste modelling assumptions that drive the revenue forecasts for 2017-18 to 2021-22.

**Chart 16: Projected taxable waste volumes and forecast incinerator capacity, 2015-16 to 2021-22 (tonnes)**

## Tax rates

The Scottish Government set the 2015-16 and 2016-17 SLfT rates to mirror UK rates in order to address concerns over potential "waste tourism" (creating a financial incentive to dispose of landfill in neighbouring countries with different landfill tax regimes and rates). The Scottish Government proposes that rates of SLfT for 2017-18 should continue to mirror UK rates, as set out in the Draft Budget. For modelling purposes, we also assume that Scottish rates will mirror those set at the UK level for 2018-19, which have already been announced by UK Government.  For the rest of the forecasting period, tax rates are increased using RPI inflation projections, in line with the stated policy of the UK Government and using Office of Budget Responsibility (OBR) RPI forecasts released at the time of the UKG Autumn Statement.[36]  Table 25 shows the assumed landfill tax rates for the forecast period.

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[36]  http://budgetresponsibility.org.uk/topics/scotland-wales-and-northern-ireland/

**Table 25: Scottish Landfill Tax rates per tonne of material, 2016-17 to 2021-22**

|  | 2016-17 Actual | 2017-18 Proposed | 2018-19 Assumed | 2019-20 Assumed | 2020-21 Assumed | 2021-22 Assumed |
|---|---|---|---|---|---|---|
| Standard Rate | £84.40 | £86.10 | £88.95 | £92.10 | £95.00 | £98.00 |
| Lower rate | £2.65 | £2.70 | £2.80 | £2.90 | £3.00 | £3.10 |

**Tax credits for contributions to the Scottish Landfill Communities Fund (SLCF)**

The 'gross' tax receipt projections are adjusted to take account of tax credits due in respect of payments to the Scottish Landfill Communities Fund (SLCF). The credit rate is the maximum proportion of Landfill Tax liability that an operator can offset by making payments into SLCF-approved projects. The Scottish Government proposes to maintain the 2016-17 SLCF credit rate of 5.6% for 2017-18. This credit rate is approximately one-third higher than the comparable UK credit rate of 4.2% for 2017-18.

We have assumed, for modelling purposes, that the SLCF credit rate is held constant for the rest of the forecast period and have also assumed full uptake of 5.6% by operators as shown in Table 26.

**Table 26: Actual/proposed/assumed SLCF tax credit rates used in modelling, 2016-17 to 2021-22**

|  | 2016-17 Actual | 2017-18 Proposed | 2018-19 Assumed | 2019-20 Assumed | 2020-21 Assumed | 2021-22 Assumed |
|---|---|---|---|---|---|---|
| SLCF Tax Credit Rate | 5.6% | 5.6% | 5.6% | 5.6% | 5.6% | 5.6% |

**Evolution of the SLfT forecasts**

Throughout the scrutiny process involving the SFC, a number of changes have been made to the SLfT forecast methodology of 2016-17. These have been outlined above with the central driver of the new forecasting model being the effect of forecast growth in incineration facilities in Scotland on diverting waste from landfill. In addition, the release of a further three quarters of Scottish landfill volume and tax data from Revenue Scotland has allowed the new forecasts to be better informed by a longer series of Scottish outturn data.

Table 27 shows how the SLFT forecasts have evolved from Draft Budget 2016-17 to Draft Budget 2017-18.

**Table 27: Comparison of five-year forecasts in Draft Budget 2017-18 and Draft Budget 2016-17, £ million**

|  | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|---|
| Draft Budget 2017-18 |  | 149 | 118 | 109 | 112 | 106 |
| Draft Budget 2016-17 | 133 | 123 | 114 | 104 | 94 |  |
| Change |  | +25 | +4 | +5 | +19 |  |

The significant factor in reconciling the two forecast series is the fundamental change to the methodology that took place for production of this year's five year forecast.

This change to methodology is set out above. Table 27 shows that the biggest change for an individual year's forecast is seen in 2017-18 where the forecast has increased by £25m. The two sets of forecasts are closer over 2018-19 and 2019-20, and then diverge in 2020-21.

**Forecast risks and sensitivities**

Having set out the waste modelling and financial assumptions, there are also a number of potential risks and sensitivities to the accuracy of the revenue forecasts to consider.

**Delays to incinerators coming on stream**

As the model is primarily based on our best estimate of new incineration capacity coming on stream, the potential for delays in such large infrastructure projects is an upside risk to the forecast. This risk is mitigated to an extent by the fact that three of the five new incinerators expected to start operating within the forecast period also have some form of on-site pre-processing which is less vulnerable to delay and could potentially begin operating before the incinerator is commissioned. We tested the sensitivity to a 12 month delay (based on experience of similar infrastructure in England and Wales). Revenues over the full forecast period are 11% greater than forecast.

**Additional recycling and pre-processing capacity comes on stream**

A second significant risk to the accuracy of the forecast trajectory is that landfilling of standard rated waste is reduced through a combination of two factors which do not form part of the modelling:

a) further additional diversions from landfill towards recycling due to improvements in local authority collections and changes in household and business behaviours;
b) further additional waste pre-processing capacity diverting more materials towards recycling and for possible incineration abroad.

**The ban on biodegradable municipal waste (BMW)**

The ban on BMW will come into effect in January 2021. As noted, in developing the forecast we have not modelled the effect of the ban on BMW going to landfill. This is due to limitations in the evidence to underpin estimates of the effects of the ban. However, we have accounted for this as a sensitivity test which suggests it could reduce total revenues over the 5-year forecast period by as much as 11 per cent. This reduction occurs in the final two years of the forecast from (2020-21 and 2021-22).

**Scottish Fiscal Commission view of the forecast**

The final SLfT forecast, published as part of the Draft Budget 2017-18, is set out in Chart 15 above. The Commission has endorsed the final forecast as reasonable. Further details on their views together with additional analysis and commentary are set out in the Commission's Final Report.

**CHAPTER 7 - NON–DOMESTIC RATES INCOME (NDRi)**

**Introduction**

Non-domestic rate income forecasts have been produced by the Scottish Government for each draft budget since devolution in 1999. There are many factors which affect NDRi with the key components relating to changes in the underlying tax base, tax rates and reliefs and any subsequent backdating that might occur.

The underlying tax base is made up of every non-domestic property in Scotland that is valued by the Scottish Assessors and documented on the publically available valuation rolls (from which some type of property are exempt). All properties are valued to a common 'tone date' (for 2016-17 the tone date was 1 April 2008, relating to the 2010 revaluation). Revaluations take place periodically (generally every five years under current legislation) and a new tone date of 1 April 2015 will apply to the valuation rolls from 1 April 2017.

Changes to the tax base occur each year due to new properties being entered onto the Valuation Roll, changes to existing properties (e.g. physical changes or changes of use, which can involve removal from the Valuation Roll) and successful valuation appeals. We classify appeals into two categories: running roll appeals typically occur due to a material change of circumstance that affects a property and revaluation appeals refer to disagreement on the initial value set at revaluation – revaluation appeals are accounted for outwith the buoyancy forecast. Growth in the tax base once revaluation appeals have been accounted for is known as buoyancy.

The amount of NDR that each property must pay depends on the poundage rate and any applicable supplements and/or reliefs. NDRi in a given year is also dependent on collection rates, backdating of appeals and reliefs and any other adjustments that affect income such as Tax Incremental Finance projects.

For Draft Budget 2017-18, the SFC has responsibility for scrutinising the economic determinants of the forecast, which extend to inflation and buoyancy.

Inflation forecasts typically feed into the uprating of the poundage rate each year although the decision on the level of poundage is for Scottish Ministers, subject to parliamentary approval. In recent years, the Scottish Government has adopted the same poundage rate as the UK Government. The UK Government typically uprates poundage each year by September RPI of the preceding financial year (e.g. September 2016 RPI is used to uprate 2017-18 poundage). From 2020-21 the UK Government have indicated a change of policy to use September CPI rather than RPI. Our inflation forecasts mirror this adjustment, and we use the OBR figures published at Autumn Statement 2016 as the best available evidence – an approach which the Commission have confirmed as reasonable.

This extends to inflation forecasts where they are used for the purpose of the forecast, and expected growth in the rateable values (RV) of the underlying tax base once revaluation appeals have been taken into account - this growth in RV is otherwise referred to as "buoyancy". From April 2017, the Commission will also be responsible for an overall NDRi forecast.  However, the forecast methodology included in this paper only covers the parts of the forecast under the Commission's current remit.

**Forecasts of buoyancy**

The Scottish Government forecasts for buoyancy are as follows:

**Table 28: Buoyancy Forecast (%) as at Draft Budget 2017/18**

| Financial Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|
| Assumed Year of 2017 Revaluation Cycle | 1 | 2 | 3 | 4 | 5 |
| Long Term Average Buoyancy | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Cyclical Adjustment | +0.5 | +0.6 | -0.2 | -0.4 | -0.3 |
| Buoyancy Forecast[37] | 1.7 | 1.8 | 1.1 | 0.9 | 1.0 |

Only the 2017/18 forecast is used as part of Draft Budget 2017/18. The remaining figures are provided only to illustrate the methodology used.

The rest of this chapter focuses on the modelling approach for forecasting buoyancy including the limitations and some basic sensitivity tests to understand the risk of deviation from forecast.

**Modelling approach**

The key challenge with buoyancy forecasting continues to be the lack of data, with just 15 reliable outturn data points on buoyancy available over a 20 year period. Buoyancy is a relatively stable series and we have not observed large fluctuations in growth.  However, we have noted minor fluctuations around the long run average. For this reason, our approach to date has been to use the long run average of the outturn series with adjustments made if we have sufficient evidence.

In the run-up to Draft Budget 2016-17, following challenge from the Commission, the Scottish Government started to analyse whether a cyclical pattern could be partly responsible for the small fluctuations in buoyancy during the revaluation cycle. The cycle is apparent in visual inspections of the data with higher buoyancy in the early years of a cycle then in the later years on average. This is shown in Chart 17 with dotted vertical lines denoting revaluation years.

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[37] The slight discrepancy that can be observed in this table between some of these figures is due to rounding. Scottish Government analysts have taken the approach of rounding buoyancy for the purpose of the forecasts to the nearest 1 decimal place, however left the long term average of buoyancy (and therefore deviations from this average) at 2 decimal places.

**Chart 17: Buoyancy outturn as known at Draft Budget 2016-17** (data not available for 1995-96, 1999-00, 2000-01, 2004-05, 2005-06)



We have been unable to confirm the existence of a cyclical pattern using statistical tests[38] but through discussions with the Scottish Assessors, we determined that delays and subsequent backdating of running roll appeals could be causing a cyclical pattern in buoyancy. In the run-up to Draft Budget 2016-17, some data analysis was taken forward that provided quantitative evidence to support this explanation. However, the scope of this analysis was limited.

To better evidence the observed cyclical adjustment for Draft Budget 2017-18, we filtered the Valuation Roll to identify each of the 100,000+ changes made to any entry over the period 2010-11 to 2015-16. By comparing "effective dates" (the date at which a change was made to a property) and "valuation notice dates" (the date that these changes were recorded on the Valuation Roll) we were able to identify a cyclical effect consistent with the previously observed cyclical pattern. The data supported the theory that changes in RV which were delayed as a result of the lead-time between running roll appeals being raised (which references the effective date) and running roll appeals being resolved (the valuation notice date). However, because running roll appeals cannot be systematically identified within the data, there is not definitive evidence that running roll appeals are causing this cyclical effect – even if it would appear to be a reasonable explanation.

We further cross-checked the results of this analysis with a subset of running-roll appeal records from the Renfrewshire Valuation Joint Board[39]. This work confirmed that delays to running-roll appeals here were the same as our effective date/valuation notice date analysis had indicated.

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[38] A number of tests were conducted, including a formal ANOVA test and two ARIMA forecasting models. Some evidence of cyclicality was found but validity of these results was not judged to be sufficient due to the lack of data points.
[39] We were advised that not all Assessors routinely kept records of running-roll appeals hence we were unable to repeat this exercise across the whole of Scotland.

As a result of these two pieces of analysis, the evidence base supporting the use of a cyclical adjustment has been strengthened considerably over the course of the year – and we have chosen to continue to apply the same cyclical adjustment that was applied in Draft Budget 2016-17.

New data for 2015-16 also gave us information regarding the suitability of using the long-run average as the buoyancy figure for this year was higher than the current forecast methodology would have implied. As noted in Chapter 2 on outturn, we were able to identify the reason for this higher than average figure as being down to two particularly large entries to the Valuation Roll (+£10m RV) [40].

As a result of this, and following on from the recommendation from the Commission of the importance of tracking large projects in development, we sought advice from the Scottish Assessors Association who routinely monitor planning information and progress of developments to ensure that new properties are added to the Valuation Roll at the appropriate time.  They have not indicated that they know of any RV projects in excess of £10 million in the near term. As a result, we have continued to use the long run average as part of our forecast methodology.

**Modelling limitations**

We still lack enough data points to be able to run robust statistical tests both in relation to the cyclical adjustment and on any relationship of the cyclically adjusted outturn data to economic conditions. It will be a number of years before this is possible.

Whilst we judge evidence we have used to explain the cyclical adjustment to be extensive we weren't able to systematically identify running roll appeals as opposed to general changes to the valuation roll. Therefore we have assumed that changes to the valuation roll with effective dates in a different financial year from valuation notice dates to be running roll appeals. Our efforts to verify this with data for Renfrewshire was helpful, but we could not extend this to  the whole of Scotland.

In addition, whilst we have observed a similar cyclical pattern over four revaluation cycles, we cannot conclusively  predict that the same cycle will repeat in future.

**Sensitivity analysis**

To try and produce a meaningful guide to the impact of potential forecast error we have looked retrospectively at previous outturn and applied the current forecast methodology to understand the degree of error that could be expected.

Applying the forecasts in retrospect shows that the largest implied forecast error would have been +0.9 percentage point difference compared to forecast in 1997-98. The average deviation over the 20 year period, where we have data, is 0.25 percentage points for under-forecasts and for over-forecasts it is 0.35 percentage points. It therefore seems reasonable to expect that the scale of any forecast error will

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[40] Only four other properties on the Valuation Roll have comparable RVs to these two properties, excluding cumulo entries which comprise infrastructure networks – e.g. Scottish Power.

not exceed 1 percentage points. By way of illustration, an error of +1 percentage point (implying higher forecast than outturn) would lead to an overestimate of NDRi of around £15 million in the first year of the forecast period and £30 million thereafter.

**Scottish Fiscal Commission view of the forecast**

The methodology underlying the economic determinants of NDRi was assessed as reasonable by the Commission in their Final Report on the Draft Budget 2017-18. Further details on their views together with additional analysis and commentary are set out in their Final Report.

## CHAPTER 8 – CONCLUSIONS

This report has presented the forecast assumptions and methodologies underlying the forecasts for the devolved taxes and the economic determinants of NDRi. The Commission's conclusions on the reasonableness of the forecasts are presented in their Final Report on the Draft Budget 2017-18. Their report, now in its third year, provides detailed comments, observations and recommendations and further analysis on the forecasting approach that we have taken.

The minutes of the 12 forecast challenge meetings between Scottish Government and Commission which took place between May and November 2016, that have resulted in the final forecasts, are included in an Annex to the Commission's Draft Final Report. These document how the various forecast methodologies presented above developed over the course of 2016. Though the Commission has concluded that the Scottish Government's Draft Budget 2017-18 devolved tax forecasts' and NDRi economic determinants' methodologies are reasonable, it has also set out further areas for improvement.

Over the first 3 years of forecasting devolved tax revenues in Scotland and assessing the economic determinants of NDRi, Scottish Government has welcomed the challenge from the Commission to improve the robustness of the forecasting methodologies. Scottish Government will continue to work closely with the Commission as it takes on its new role of producing the devolved tax forecasts, as well as wider economic forecasts, for Draft Budget 2018-19 onwards.

Finally, as further outturn data becomes available for the devolved taxes in 2016-17 and 2017-18, Scottish Government will continue to report on the comparative performance of outturn revenues in relation to our Draft Budget forecasts for 2016-17 and 2017-18.