Scottish Fiscal Commission

Forecast Evaluation Report Summary

September 2018

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Foreword

As Scotland's independent and official forecaster, the Commission has a duty not only to produce the forecasts used to inform the Scottish Government's Budget but also to evaluate those forecasts. We see evaluation as an essential part of performing our role. It allows us to learn lessons to improve our approaches, builds the confidence of our users in our approach, allows others to understand the likely accuracy of future forecasts, and can help to elicit feedback on our models and analysis.

This report fulfils our statutory obligation to evaluate our forecasts once per year and marks the first opportunity we have had to evaluate our own forecasts published in December 2017 and May 2018. Previously we evaluated the Scottish Government's forecasts, which we had assessed as reasonable in our non-statutory role.

Forecasting has inherent uncertainties. We look to past trends to inform our judgements on the future. The past, however, is an imperfect guide to the future with rapid changes in the global economy, society, politics and technology. Analytical models, based on historic data and theory, can help provide insight and guidance, but all have limitations. Forecasts cannot perfectly predict the future.

These uncertainties are an inescapable part of forecasting. However, given the importance of our forecasts in Scotland's finances, it is essential that we critically evaluate our previous forecasts and look for ways of improving them in the future. Our approach to forecasting is never static, it needs to evolve as the world around us changes. Forecasting is an on-going process of intelligence gathering, learning from previous forecasts, reflection and refinement.

Forecasting error can arise for a number of reasons. Only by properly understanding the reason for our forecast errors can we hope to improve our approach. Unexpected and unpredictable events can change the course of the economy, or our models may not correctly predict changing trends in taxpayer behaviour. In some instances, the available historic data can shift and significantly change our understanding of the economy or tax revenues. This has been the case in particular with our economy and income tax forecasts. The latest release of economic data from the Scottish Government has considerably revised historic data, and the first data covering outturn income tax receipts for Scotland for 2016-17 differ significantly from previous estimates.

We are committed to openness and transparency in all of our work. By being transparent in our forecasting, we hope to engage users in our approach to help improve our forecasts. This report is no different. We have tried to be as open as possible in critically evaluating our forecasts, and we hope this is apparent in the analysis below. All of the figures, charts and tables are available to download in workbooks. Where possible, we have also provided databases of our historic forecasts and the historic data, so that interested users can perform their own evaluations. If you have your own insights into our forecasting performance and where there is room for improvement, please don't hesitate to get in touch.

Dame Susan Rice DBE Professor Alasdair Smith

Summary

1 This report contains detailed evaluations of our economy, income tax, Non-Domestic Rates (NDR), Land and Buildings Transactions Tax (LBTT) and Scottish Landfill Tax (SLfT) forecasts, published in December 2017 and May 2018. Where relevant we also include an evaluation of the Scottish Government's earlier forecasts which we assessed as reasonable. Below we summarise the main messages and lessons learned across these evaluations.

2 The extent to which we can evaluate forecasts varies, depending on how long we, or the Scottish Government, have been producing forecasts, and on the availability of outturn data. Over time, we will be able to evaluate our forecasts against more outturn data and be able to evaluate whether there have been any systemic forecasting errors.

3 Although availability of data limits what evaluation is possible in this report, nevertheless this exercise has generated valuable lessons and key messages:

- There are some aspects of our forecasts we might have done differently, but overall we believe the scale of forecast error in our forecasts is reasonable compared to other forecasters.

- Developments in outturn data can have a significant impact on our understanding of the economy and taxes, including revisions to historic data. In future, we will seek to assess any mitigating actions we can take to control for revisions to outturn data where there are known issues. We will communicate with our forecast users when we think major revisions are likely, and the potential impact of this on our forecasts.

- The further ahead we look, the more uncertain the future. The scale of forecast error generally increases for forecasts further in the future.

- In some cases, before powers are devolved there is uncertainty as to the level of receipts or spending in Scotland. This creates additional uncertainties until a baseline level of revenue or spending is developed. In the case of income tax, the release of the first baseline receipts data will improve the accuracy of future forecasts.

4 Most of the SFC forecasts evaluated in this report are made within the financial year that they are forecasting. We call these in-year forecasts. We also produce forecasts for one year ahead and longer periods. Our evaluation report next year will provide the first opportunity to evaluate some of our one-year ahead forecasts for 2018-19 made in December 2017. We have included comparisons to the forecast errors made by other organisations, but these should not be considered directly comparable because of the timings of the forecasts and differences in availability, quality and timeliness of data available to each organisation.

5 Alongside this report we are publishing our first annual Statement of Data Needs.[1] As shown throughout this report, good data are critical to both creating our forecasts and evaluating them. Our role and our approach to forecasting continue to evolve, and so our data needs continue to change over time. This is reflected in our Statement of Data Needs, in which we set out a number of requests to those who supply us with data including the Scottish Government, HMRC, Revenue Scotland and DWP.

Evaluations in this report

6 The table below shows the forecasts which are evaluated in this report

Table 1: Evaluations included in this report

Forecast subject	Period covered by forecast being evaluated	Forecast producer	Date forecasts produced	Most recent outturn data period
Economy	2017-18	SFC	December 2017 May 2018	2017-18
Income tax	2016-17	SG SFC	February 2017 December 2017[2] May 2018	2016-17

[1] Scottish Fiscal Commission (2018) Statement of Data Needs September 2018 (link)

[2] We also produced an updated income tax forecast in February 2018, this reflected changes in the Scottish Government's income tax policy from 2018 onwards and did not affect our forecasts of receipts in 2016-17.

NDR	2017-18	SFC	December 2017 May 2018	2017-18
LBTT	2017-18	SG SFC	December 2016 December 2017 May 2018	2017-18
SLfT	2017-18	SG SFC	December 2016 December 2017 May 2018	2017-18

7 For income tax, a full evaluation of our 2017-18 forecasts cannot take place until after the outturn data are published next year so our evaluation focuses on the impact of the new outturn data published for 2016-17.

8 We have not evaluated our forecasts of the Scottish share of Air Passenger Duty (APD) produced in December 2017 because there are no Scottish outturn data available, as the tax is collected on a UK-wide basis.

9 We produced our first forecasts of social security spending in December 2017, and including in-year estimates for 2017-18 spending. We are not evaluating those forecasts in this report because we do not have adequate data for a meaningful evaluation. The lack of data is due, in part, to DWP outturn data not being available until the expenditure by country and region tables are published later in September, and the Social Fund Annual Report is published in the autumn. Future reports will include evaluations of our social security forecasts. We are continuing to develop our work on social security, and on 19 September 2018 we will publish a paper describing our approach to forecasting social security expenditure.

Economy

10 Overall, our GDP forecast error is within what we believe is a reasonable range based on the track record of the OBR forecasting the UK economy. In May 2018 we forecast GDP growth in 2017-18 of 0.7 per cent, this compares to the latest data release showing growth of 1.3 per cent. Our forecast error of 0.55 percentage points was slightly greater than the OBR's average GDP forecast error of 0.42 points, but close to the OBR average when considering the typical variation of the OBR's forecast error. Looking in more depth at our economy forecast, our forecast of employment appears particularly accurate.

11 The publication of Quarterly National Accounts Scotland (QNAS) data in August 2018 included significant revisions to historic GDP growth. This is primarily because of revisions to data on construction industry activity since 2015. GDP growth in 2017-18 was revised up by 0.5 percentage points, from

0.8 per cent to 1.3 per cent. This is an exceptionally large revision by historic standards – around five times what is typically the size of revision to annual GDP growth between publications.

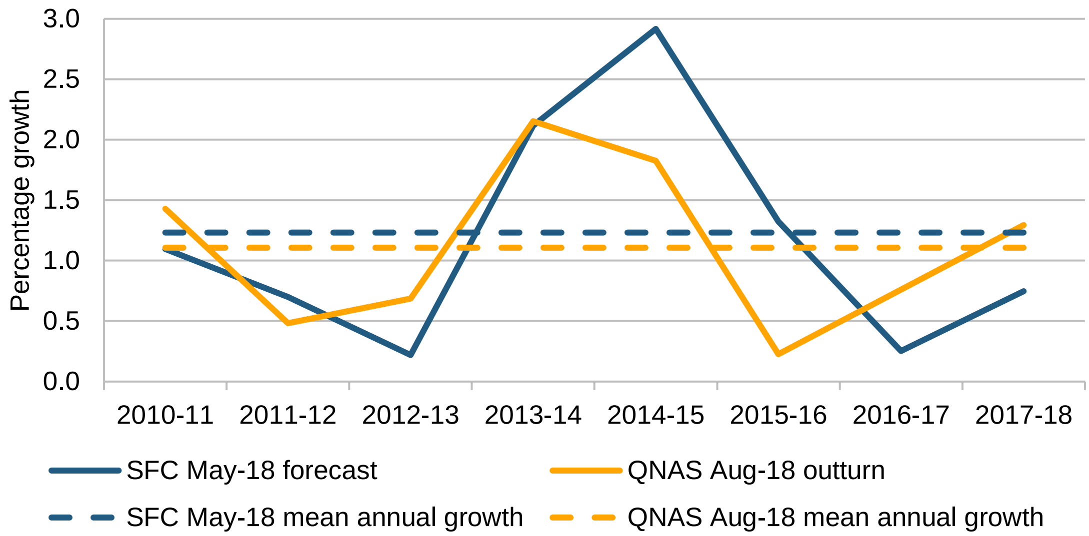
12 Before this revision, the data showed the construction industry shrinking by 12 per cent from a peak in 2015 to the latest period. In our previous reports we discussed the impact on the economy of volatility in the construction industry. We noted the possibility that this volatility was the result of problems in the measurement of construction industry activity, and that we would have to continue to monitor the data closely. We anticipated that revisions were likely at some point, though we made a judgement that it was not possible to pinpoint the exact scale, direction and timing of these revisions.

13 The latest data now show the construction industry growing by 4 per cent since 2015, rather than falling by 12 per cent. This is a significant revision and affects estimates of GDP growth. The scale of this revision was a large contributing factor in our in-year GDP forecasting error of 0.55 percentage points for 2017-18.

14 When we produced our May 2018 forecast report, we already had three quarters of official GDP outturn data for 2017-18. These outturn data were then significantly revised. In order to have correctly forecast 2017-18, we would have had to create our own divergent estimates of economic activity in 2017-18. While we were conscious that revisions to the construction series could lead to revisions in GDP, we took the decision to not make explicit adjustments to our short run modelling. This decision was based on the view that the then official estimates produced by the Scottish Government statisticians were the best current estimates of activity.

15 Looking beyond 2017-18, our previous forecasts included a subdued outlook for economic growth. Although the QNAS revisions have a significant impact on the historic year-on-year GDP growth estimates, they do not change the underlying picture of the Scottish economy as the upward revisions to growth in 2017-18 are more than offset by other revisions in earlier years. Overall, we do not anticipate that the revised GDP data will significantly alter our medium- to long-run view of the Scottish economy when it comes to our next forecasts. We had already controlled for the volatility in construction industry data in our longer-term modelling of the economy. The QNAS revisions have actually resulted in average GDP growth since 2010-11 being revised down, from 1.2 per cent at the time of our May 2018 forecast to 1.1 per cent, as shown in Figure 1.

Figure 1: GDP growth data available at time of May 2018 forecast and revised GDP growth 2010-11 to 2017-18, per cent growth



Source: Scottish Fiscal Commission, Scottish Government (2018) Quarterly National Accounts Scotland, 2018 Quarter 1 (link)

16 In future, we will enhance our communication of the likely impact of revisions on our forecasts and discuss the risks these pose to our forecasts.

Income Tax

17 On 12 July 2018 HMRC published its first outturn data on income tax liabilities in Scotland, covering the year 2016-17. For the first time, this was based on full administrative data using Scottish taxpayer codes.

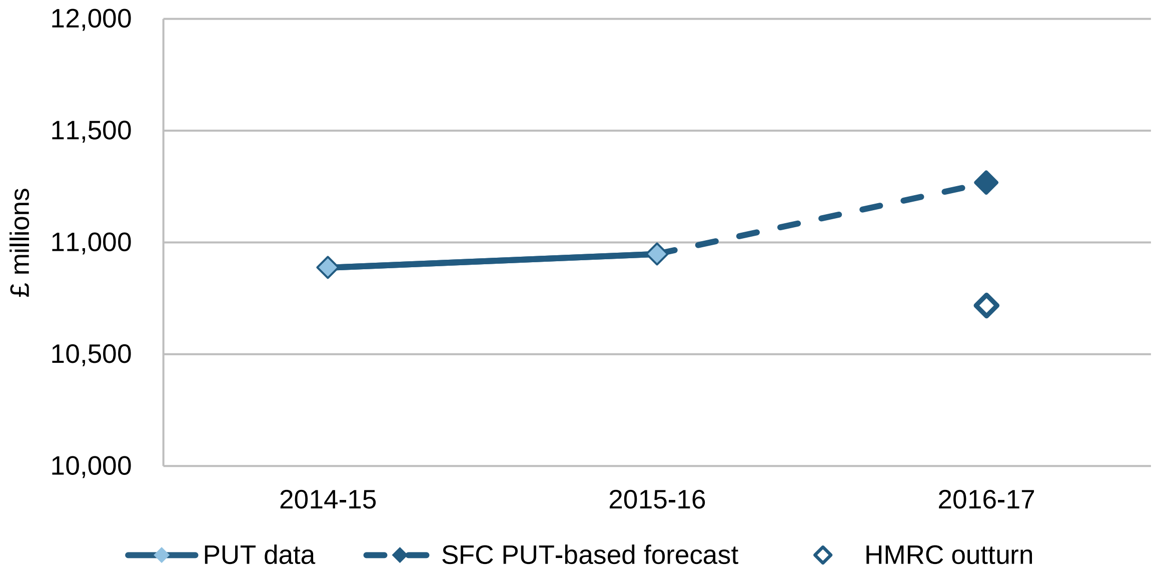
18 When we produced our May 2018 forecasts, the Survey of Personal Incomes (SPI) for 2015-16 was the best available source of information on income tax liabilities in Scotland. The SPI is a sample of UK administrative data held by HMRC with the identification of Scottish taxpayers based on postcodes held by HMRC. Our forecasts are based on the Public Use Tape (PUT), an anonymised and publically available version of the SPI. The newly available outturn data are created in a different way from the SPI and the PUT, following a Scottish taxpayer identification exercise carried out by HMRC.

19 When we published our May forecast, we highlighted that we anticipated a number of significant underlying differences between our 2015-16 PUT-based estimate of income tax liabilities in 2016-17 and those that would be published by HMRC using outturn data. At the time, there was insufficient information to predict the likely magnitude or direction of this difference.

20 The HMRC outturn data show liabilities of £10.7 billion in 2016-17 compared to our estimate in May of £11.3 billion.

21 The new HMRC outturn data are now the primary estimate of income tax liabilities in Scotland. While the differences between these data and the PUT will not be known until HMRC produce the 2016-17 PUT next year, the data release appears to show the PUT has overestimated income tax liabilities and this is the main explanation of our income tax forecast error of £550 million. Figure 2 shows the previously available PUT data, our forecast for 2016-17 and then outturn data.

Figure 2: Scottish non-savings non-dividend income tax liabilities, estimates and outturn data



Source: HMRC outturn data supplied to Scottish Fiscal Commission, Scottish Fiscal Commission
Notes to table: We use the publically available version of HMRC's SPI called the Public Use Tape (PUT).

22 In May, we estimated income tax liabilities of £11.3 billion in 2016-17. The new outturn data show liabilities of £10.7 billion, a difference of £550 million, or 5.1 per cent.[3] This was a greater forecast error than the benchmark Office for Budget Responsibility's (OBR) average UK income tax forecasting error we have calculated.

23 We believe most of this headline error of £550 million is because of data issues. Differences in the estimated number of taxpayers with higher levels of income between the PUT and outturn data appears to contribute a significant amount to the total error, in particular differences in the number of additional rate taxpayers. Our analysis suggests that around £500 million of the £550 million error could be due to differences in the number of taxpayers between the two data sources.

24 We do not believe it would have been possible to predict the difference between the PUT and the outturn data in advance of its publication. As with revisions to economic data, we will continue to make clear to our users when

[3] Note numbers may not sum because of rounding.

we think there are weaknesses in data underpinning our forecast and how this may affect our forecast accuracy.

25 Now that we have outturn data for the first time, we will explore options for how best to adjust our forecasts to this new information and present a new approach in the next forecasts. By calibrating our forecasts to this new information, our future forecasts are less likely to be subject to such large errors caused by underlying data differences.

Non-Domestic Rates (NDR)

26 Our December 2017 forecast for NDR income of £2.8 billion in 2017-18 produced a 1.8 per cent (or £50 million) overestimate of revenue raised. £38 million of this error can be attributed to our forecast for gross NDR income, the tax due before accounting for reliefs. The remaining £12 million is attributable to an under-forecast of mandatory reliefs claimed. The forecast error was comparable in size to typical in-year forecast errors made by the OBR and the Scottish Government.

27 In evaluating the gross income forecast error, we are only able to assess the contribution of growth in the tax base (also known as buoyancy), given the data available to us. Buoyancy contributed 35 per cent, or £13 million of the £38 million overestimate of gross income in 2017-18, and 27 per cent of the total NDR overestimate. The main reason for this overestimate was that our projections of growth in the tax base were based on long-term average growth, which included pre-crisis data of lesser quality. Therefore for our May 2018 forecast we updated our approach, instead basing our projections on more recent and complete data. If we had used this approach in December our forecast error would have been £8 million lower.

28 The major drivers of our forecast error attributable to mandatory reliefs were higher than expected expenditure on Empty Property Relief (£15 million) and Charitable Rate Relief (£4 million). This was somewhat balanced out by lower than expected expenditure on Transitional Relief (£7 million). The forecast error for Empty Property Relief highlights what is likely to be a persistent source of error in our forecast. There is no easily predictable trend for the amount of relief claimed. This can in part be attributed to the frequency with which the criteria for and administration of the relief are changed.

Land and Building Transaction Tax (LBTT)

29 Our December 2017 forecast for total LBTT of £557 million was an overestimate of £0.2 million against the provisional outturn data for 2017-18 released by Revenue Scotland; this was a 0.0 per cent forecast error. However individually there were larger errors in the forecasts for each component of the tax, but these errors cancelled one another out. The major components were a 5 per cent overestimate for residential LBTT, a 2 per cent underestimate for Additional Dwelling Supplement (ADS) and a 5 per cent underestimate for non-residential LBTT. In our May 2018 forecast, the

errors for residential and non-residential LBTT forecasts for 2017-18 were lower, but our overall forecast error increased to 1 per cent. All of our forecast errors were comparable in scale to the equivalent forecasts from the Office for Budget Responsibility (OBR).

30 Our December 2017 residential LBTT forecast included an expectation that transactions would increase during this period. This proved to be the main source of the £13 million overestimate in revenue raised. Following increases in property sales in the first six months in 2017-18, the Scottish housing market saw a fall of 1,780 transactions in the second half of the financial year, when compared with the same period of the year before. This was driven by transactions with a value of £250,000 and under, which made up 81 per cent of transactions.

31 Our Additional Dwelling Supplement (ADS) December 2017 forecast produced a £2 million underestimate. As the ADS forecast is linked to our residential LBTT model, our overestimate of transactions was again a source of error. This would have led to an overestimate of ADS revenue, but for our projection that 30 per cent of ADS paid would be reclaimed after 18 months. This proved to be too high an estimate, which resulted in our forecast underestimating ADS. We reduced the assumed repayment rate in our May 2018 forecasts.

32 For our non-residential LBTT forecast, the £11 million underestimate was due a higher proportion of revenue being raised in the second half of the financial year than in the first two years of the tax's existence. We have developed the non-residential model considerably since December 2017 and as of our May 2018 forecast, our approach is based entirely on Scotland-specific data on revenues, transactions and prices.

Scottish Landfill Tax (SLfT)

33 Our December 2017 forecast for SLfT was £11 million, or eight per cent, lower than the provisional outturn released by Revenue Scotland of £148 million in 2017-18. The in-year forecast was created by scaling up the first quarter of outturn data available at the time which led to an underestimate of the level of waste landfilled and therefore tax receipts.

Conclusion

34 Whilst most of our forecasts have been within the historic range of accuracy of equivalent forecasters, we must emphasise that forecasts of the economy and tax revenue can never be completely accurate and that some error should always be expected. By evaluating our forecasts against outturn data, and sharing that analysis for public critique in this report, we hope to improve our analytical modelling and our judgements. However the largest of the forecast errors evaluated here are because of new or revised data becoming available. This illustrates how data quality and availability are critical to our

ability to produce accurate forecasts, and we welcome the new data sources that are becoming available to us.

35 The main actions we will take as a result of the evaluations in this report are: to revise our modelling of income tax taking account of the new outturn data; to assess whether mitigating actions can be taken when we know of likely data issues; to ensure we give users of our forecasts more detail about how data issues may affect our forecasts; and where necessary to seek improvements in data quality or availability.

36 Finally, we recognise the limitations of the evaluation possible with less than one year of forecasts. Looking to the future, we will be able to produce more detailed evaluations as the Commission produces more forecasts and more outturn data become available.

37 We do welcome constructive feedback to help us improve our work, so if you have suggestions or comments about our approaches to forecasting, or our approach to evaluation, please do contact us at info@fiscalcommission.scot.

Voluntary compliance with the Code of Practice for Official Statistics

The Commission seeks to adhere to the highest standards for analysis possible. While we do not produce official statistics (we produce forecasts), the Commission and our work voluntarily complies as much as possible with the UK Statistic Authority's Code of Practice for Statistics. Further details and our statement of voluntary compliance can be found on our website.

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