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INDEPENDENT SCRUTINY AND ASSURANCE OF DEVOLVED TAX FORECASTS FOR WALES

FINAL REPORT

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** Numbers in the tables may not equal to the total due to rounding.*

EXECUTIVE SUMMARY

This report sets out the methodologies and assumptions relating to the Welsh Government's forecasts for devolved taxes which underpin the Welsh Government Draft Budget 2018/19, together with Bangor Business School's conclusion on their suitability for use in the budgeting process.

The Welsh Government, under the terms of the fiscal framework, committed to putting in place arrangements for the independent scrutiny of its devolved tax revenue forecasts. Following a competitive procurement exercise, Bangor Business School, Bangor University was appointed to undertake this work. The aims of this work are:

- The provision of independent scrutiny and assurance about the Welsh Government's forecasts for devolved taxes – land transaction tax, landfill disposals tax and non-domestic rates – for inclusion in the Welsh Government's Budget for 2018/19,
- The provision of advice about improving methodologies for future years' forecasts.

The overall aim of the report is to show how each of the forecasts have been calculated to provide greater transparency on how devolved tax forecasts have been incorporated into the Draft Budget 2018/19 and to explain the independent scrutiny and assurance of the process.

By its very nature, forecasting tax revenues is subject to margins of error. Assumptions are built into forecasts based on the best available information at the time. However these assumptions are often proven too optimistic or pessimistic as new economic events continuously unfold. Such uncertainty is particularly high in the current economic climate. For example, the outcome of the EU referendum, coupled with the lack of clarity on the future relationship between the UK and EU, inevitably increases the economic uncertainty faced in Wales and, in turn, the future path of tax revenues. These uncertainties need to be considered when appraising the devolved tax revenue forecasts.

Section 2 presents the economic scenario which underpins the tax revenue forecasts. The UK has an important role in determining the path of the Welsh economy, and therefore the work of the Office for Budget Responsibility (OBR) in providing independent forecasts for the UK economy is of relevance in constructing the profile and composition of economic activity in Wales. These OBR forecasts and assumptions are part of a broader macro-economic picture and set of assumptions. In the absence of alternative information, such as detailed Wales-specific information, it is considered appropriate to make use of these OBR determinants.

Sections 3 and 4 set out revenue forecasts for the two newly devolved taxes – Landfill Disposals Tax and Land Transaction Tax – for the period up to 2021/22. This coincides with the current range of forecasts published by the OBR. The methodology for the Landfill Disposals Tax is based on forecasting the amount and type of waste sent to Welsh landfill sites and applying the appropriate tax rate to derive a tax revenue. The Land Transaction Tax forecast for residential main rates, non-residential main rates, and non-residential leasehold is based on a bottom-up methodology which utilises all available information to create a base-year price distribution. This is adjusted to reflect changes in economic conditions and behavioural effects, and tax revenues are derived from future distributions. The Land Transaction Tax forecast for additional properties is based on a top-down methodology given limited data availability, forestalling behaviour, and anticipated refunds.

Section 5 sets out the revenue forecast for Non Domestic Rates, a tax which has already been financially devolved to the Welsh Government since April 2015. The forecasting of Non Domestic Rates revenues is not derived from a specific model, but from aggregate data from the administrative exercise undertaken to determine the distributable amount for local authorities. A number of reliefs and other adjustments need to be taken into account before the final forecast amount available to distribute back to local authorities can be derived.

For each of these taxes Bangor Business School has worked with the Welsh Treasury to review and test their methodology, and is making recommendations on how these methods could be improved. This has been an iterative process developed over each phase of our work. A summary of this development work is provided in the next section and discussed further in each section. We have also made a number of recommendations for the future development of the methods. These recommendations could not be actioned by the Welsh Government as part of this process as many can only be incorporated once further information is available or development work is undertaken.

Based on the economic scenario described in Section 2 and the methodologies discussed in this report, the Welsh Government revenue forecasted from Landfill Disposals Tax, Land Transaction Tax, and Non Domestic Rates is given below.

Welsh Government tax revenue forecasts for 2018/19 to 2021/22 (£ millions)

Period	2018/19	2019/20	2020/21	2021/22
Landfill Disposals Tax	28	26	23	22
Land Transaction Tax	266	291	318	348
Non Domestic Rates	1,052	1,078	1,112	1,146
Total	**1,346**	**1,395**	**1,453**	**1,516**

The forecasts for the devolved taxes and their underlying methodology and assumptions have been scrutinised by Bangor Business School. **Based on the information provided by the Welsh Government Treasury, discussion with academics and practitioners on the theoretical assumptions of the models (including factor selection) and analytical examination of the tools and models, Bangor Business School concludes that the forecasts are based on robust and appropriate methodologies and assumptions.** Expected variation in the revenue forecast for different economic scenarios and model assumptions support the suitability of the forecasts' inclusion in the budget setting process.

DEVELOPMENT OF METHODOLOGY AND FUTURE RECOMMENDATIONS

Development of methodology

Through the process of working with the Welsh Government to scrutinise their forecasting methodologies, Bangor Business School made a number of recommendations which have then been incorporated in order to develop the methodology.

For example, with regard to the Landfill Disposals Tax forecast, one of the main challenges is the lack of Welsh revenue data for the predecessor tax. Based on a suggestion from Bangor Business School, the Welsh Treasury carried out further assessment work on the forecasting methodology to make sure it was making best use of the available data. The impact on the forecast of varying some of the key assumptions which affect the prospects for future revenues from landfill was also looked at.

On Land Transaction Tax, the Welsh Treasury was asked to look at alternative sources for forecast determinants for both residential and non-residential revenues, providing assurance that it was using the most appropriate sources available. Independent back testing of the methodology and testing of the stability of the price distributions of transactions underpinning the forecast was also carried out.

The Non Domestic Rates forecast methodology has been established longer than the others, but as a result of this scrutiny, it has been simplified and made more accessible and transparent.

Future recommendations

The following is a list of recommendations which it was not appropriate to fully implement in this first forecasting year. These are matters which are advised to be explored and implemented as part of subsequent forecasting work.

No.	Model	Recommendation
1	General	Forecasting of revenues from these newly devolved taxes is in the early stages. Subsequently, any forecast errors from these forecasts should be scrutinised to appraise how well the models coincide with the outturns. Evaluating forecast accuracy can be a crucial element of forecasting procedures: it is relevant for monitoring purposes and allows for improving forecasts by learning from past errors.
2	General	Consideration should be given to the possibility of undertaking further work to provide Welsh specific data to help to inform the forecasting exercise. However, it is acknowledged that this is challenging and time-consuming, and therefore the costs and benefits of any in-depth work on this should also be appraised.
3	Landfill Disposals Tax	It is recommended that the forecasts incorporate some of the potential tax revenue from unauthorised disposals and determine how landfill waste volume will respond to an increase or decrease in the number of illegal waste sites.
4	Landfill Disposals Tax	Work should be done to link waste from sources other than local authorities to economic determinants, in order to provide estimates of what this will be in the future.
5	Landfill Disposals Tax	It is recommended that in-year data is used to monitor tax revenues and to inform forecasts, once Landfill Disposals Tax becomes operational.
6	Landfill Disposals Tax	Close links with local authorities should be further developed and maintained in order to capture and leverage information on future waste management plans which could affect tax revenues.
7	Land Transaction Tax	The model used to forecast additional residential property revenue will require further refinement once more relevant information is available on transactions subject to this rate and on those which are refunded.
8	Land Transaction Tax	It is recommended that Welsh specific elasticities should be calculated when suitable data becomes available.
9	Non-Domestic Rates	Work should be undertaken to investigate and to incorporate a probability element of successful appeals into forecast calculations.

CONTENTS

Executive summary	pages 3 to 5
Development of methodology and future recommendations	page 6 to 7
Contents	page 8
Section 1 – Introduction	pages 9 to 11
Section 2 - Forecasting uncertainty, the Welsh economy, and the block-grant adjustment	pages 12 to 18
Section 3 – Landfill Disposals Tax (LDT)	pages 19 to 26
Section 4 – Land Transaction Tax (LTT)	pages 27 to 45
Section 5 - Non Domestic Rates (NDR)	pages 46 to 51
Section 6 – Conclusion	page 52
Appendix	pages 53

SECTION 1 – INTRODUCTION

This report sets out the work undertaken in the independent scrutiny and assurance of the Welsh Government's forecasts of devolved taxes. In April 2015, financial responsibility for non-domestic rates (NDR) was devolved to the Welsh Ministers and Land Transaction tax (LTT) and Landfill Disposals Tax (LDT) are due to replace UK Stamp Duty Land Tax (SDLT) and UK Landfill Tax (LfT) in April 2018. This is to be followed by the partial devolution of income tax from April 2019. Most aspects of income tax will remain the responsibility of the UK Government and the tax will be administered and collected by HMRC. Work is underway between the Welsh Government and HMRC to implement Welsh rates of Income Tax. This work will inform the development of tax revenue forecast models with those forecasts being incorporated into future Welsh Government budgets. Therefore the Welsh Government budget will increasingly depend on Welsh taxes and forecasts of tax revenue will become a more significant component of the budget setting process in Wales.

The Welsh Government has undertaken a forecasting process in order to forecast revenues from these devolved taxes. The forecasting of revenues from the new LTT and LDT is undertaken within the Treasury team of the Welsh Government. The forecasting of NDR revenues is undertaken by the Local Government Strategic Finance Division, with input from the Welsh Treasury. All forecasts are presented on a financial year basis.

These forecasts have been developed by using economic models and accounting tools, drawing on different data sources for inclusion in the models. These models and forecasting tools have been designed with the objective of forecasting tax revenues, and to act as an analytical tool to help analyse the revenue implications of future changes in the taxes.

Contract objectives

The main objectives of this independent review are:

- The provision of independent scrutiny of the forecasting models and tools used to forecast tax revenue (from NDR, LTT and LDT) to be included in the 2018/19 Budget;
- The provision of advice on improving the methodologies for future years' forecasts.

Methodology

As part of this scrutiny Bangor University Business School worked with the Welsh Treasury, firstly to gain an understanding of the forecasting process and then to review their economic models and

accounting tools, and the different sources of input data used. The quality of the input data was appraised and alternative data was considered; data not currently being used in the forecasting process, but which merits consideration. Sensitivity analysis to help highlight some of the areas where the impact on revenues could be most significant was done. This also assisted in recognising the uncertainty involved in economic forecasting and provide an insight into possible alternative tax revenue paths.

In recognising the uncertainty involved in economic forecasting we made use of sensitivity analysis to help to highlight some of the areas where the impact on revenues could be most significant.

Process

The scrutiny work by Bangor Business School commenced at the end of March 2017, when the Welsh Treasury made their forecasting information and supporting documents available for review. Further information was provided on an on-going basis as it became available. The models and the forecasts were updated and continuously reviewed during the process. There were four distinct phases to the contract specification for this work and the output from each phase is described below. This report covers phases 1 to 3 and, and as outlined below, a further written submission will be produced following the UK autumn 2017 Budget (phase 4).

Phase	Summary description
Phase 1	Initial work to gain an understanding of the approach being adopted for the production of devolved tax forecasts, including a context setting meeting; Appraisal work to assess these methodologies; Production of an interim report setting out the assessment of the methodologies, including highlighting areas for improvement or modification; End of Phase meeting to discuss the report and any other issues.
Phase 2	Undertake on-going appraisal work as the Welsh Government works on Budget allocations and interim developed tax forecast; Appraise this process and consider revised forecasts; Production of updated interim report; End of Phase meeting to discuss the report and any other issues.
Phase 3	Continue to consider the on-going Welsh Government work prior to the publication of the Draft Budget and be responsive to any revisions in forecasts; Production of a report drawing on the processes and outcomes of the previous phases; End of phase meeting to discuss the report and any other issues.

Phase	Summary description
Phase 4	Assess forecasts published by the OBR and any other relevant information; An exercise to consider whether any changes are required to the forecast figures proposed by the Welsh Government; Work to conclude an agreed statement to be published with the Final Budget, including any changes between the Draft Budget Forecast and the Final Budget Forecast that are required due to changes in data inputs; Production of guidance for improving methodologies for forecasts in future years; End of contract meeting to discuss the suggestions for the future and to finalise the agreed statement.

Bangor Business School worked alongside the Welsh Treasury, reviewing new material and the revised forecasts, and considering different potential approaches and scenarios. During this iterative process recommendations were made by Bangor Business School and incorporated into the forecasting process by the Welsh Treasury. This work is summarised in the Executive Summary and in the discussion of the methodology in each section. There are a number of further recommendations for the future development of the forecast methodology and these are set out after the Executive Summary.

Knowledge exchange

Forecasting tax revenues is a new function for the Welsh Government. As part of the review work Bangor Business School had communications with representatives from the OBR and the Scottish Fiscal Commission (SFC), discussing their approaches to forecasting tax revenues. The OBR produces forecasts for the UK as a whole and the SFC reports on devolved taxes in Scotland. There are currently more devolved taxes in Scotland than in Wales, including income tax and air departure tax. A representative from the Business School attended the 9th Annual Meeting of the Organisation for Economic Co-operation and Development (OECD) Parliamentary Budget Officials and Independent Fiscal Institutions, where current methodologies and best practices were presented and discussed.

Summary information on knowledge exchange and communications can be found in Appendix 1. These communications provided a useful opportunity to discuss the approaches of different institutions with respect to forecasting tax revenues and insights from these were integrated into the scrutiny of devolved tax forecast for Wales.

SECTION 2 – FORECASTING UNCERTAINTY, THE WELSH ECONOMY, AND THE BLOCK-GRANT ADJUSTMENT

Introduction

The purpose of this section is to explain the background to the independent scrutiny of the Welsh Government's forecast of Welsh tax revenues, and the challenges of forecasting these tax revenues.

The Wales Act 2014 gave new powers to the National Assembly relating to taxation and borrowing: powers to introduce Welsh taxes to replace UK stamp duty land tax and UK landfill tax, partial devolution of income tax, powers to introduce other devolved taxes on a case by case basis and borrowing powers. Financial responsibility for Non-domestic rates was devolved from April 2015 and from April 2018 Land Transaction tax and Landfill Disposals tax will replace UK stamp duty land tax and landfill tax. Subsequently, from April 2019 income tax will be partially devolved, with rates set by the Welsh Government.

The tax revenue forecast is an essential component of the government budget, and of short and medium term fiscal policy. However, research on appropriate techniques for forecasting detailed tax revenues is under-developed and it is recognised that some types of taxes might be more difficult to predict than others. For example, with respect to Wales' devolved taxes, the OBR has reviewed volatility-adjusted fiscal forecasting errors for a range of different UK taxes over the last five years[1]. This showed that, historically, Non Domestic Rates and SDLT were similar in this regard, with below 1.5% volatility of average fiscal forecasting errors. Landfill tax is listed at over 5% volatility of average fiscal forecasting errors, which is classed as well above average errors.

Given the prevailing uncertainty in preparing medium and long-term forecasts, the OBR now produces a fiscal risk report that identifies possible shocks or pressures to projections[2]. According to the OBR, the biggest peacetime fiscal risks over the medium term relate to the economy with the chance of a recession in any five-year period is circa. one-in-two. Recessions associated with financial crises are typically the most costly, especially when their economic effects persist. These

[1] Forecast Evaluation (October 2016) report by the Office for Budget Responsibility available at www.gov.uk/government/publications.
[2] See Fiscal Risk Report (July 2017) by the Office for Budget Responsibility for the most recent report available at www.gov.uk/government/publications.

long-term costs are generally much more significant, and the chance of a financial crisis in any five-year period is circa. one-in-four. The likelihood of these uncertainties need to be taken into account when reflecting on the forecasts presented in this report.

Forecasting uncertainty

Uncertainty is inherent in forecasting as the future cannot be known with certainty and any forecast is unlikely to be completely accurate. Forecasts of future tax revenues, or wider economic variables are, by their very nature, subject to margins of error. There is considerable uncertainty in attempting to predict the economy, and economic uncertainty is heightened following the uncertainty linked with the EU referendum result. The OBR report that "risks to financial stability remain, particularly associated with: the global environment; the commercial real estate market; the financing the UK's large current account deficit; and the high level of household debt"[3].

In reviewing forecasts and considering forecasting errors, identified as differences between the forecast and the outturn, Bangor University share the approach of the OBR's stated view of forecasting errors as being an arithmetic difference and "this does not imply that it would have been possible to avoid them given the information available at the time of the forecast. Differences with outturns may reflect unforeseeable developments after the forecast was made. It does not mean the errors could necessarily have been avoided given the information available at the time."[4]

There is also uncertainty related to new policy measures and these forecasts relate to new taxes and a new tax administration. Preparing revenue forecasts involves not only predictions about the macroeconomic development, but also predictions about the functioning of the tax law and its enforcement.

Uncertainty about revenues also stems from changes in the tax law: changes or adaptations in the tax law have the potential for behavioural effects, with revenue consequences that are hard to quantify. This suggests that revenue forecasts tend to be more difficult in the presence of tax law changes as there is a risk that some taxpayers may respond by changing their behaviour, and this requires judgement in the forecasting process. The Welsh Revenue Authority (WRA) is being

[3] Economic and Fiscal Outlook (March 2017) report by the Office for Budget Responsibility available at www.gov.uk/government/publications.
[4] Forecast Evaluation (October 2016) report by the Office for Budget Responsibility available at www.gov.uk/government/publications.

established to collect and manage the new devolved taxes. As the WRA is not currently fully operational this adds additional uncertainty to predictions about the functioning of the tax law in practice. Over time the approach, actions and public statements of the WRA will help to set precedents and inform expectations as to its approach to administration and enforcement, thus lessening this uncertainty.

In developing these forecasting models, the Welsh Treasury was reliant on data from HMRC. Annual Wales level data were only made available for SDLT, and in-year data was not available in time for the development of these methods. Very little information is available for UK Landfill tax in Wales from HMRC over and above HMRCs estimate of annual revenues. A comparison of actual and expected tax revenues, along with ongoing scrutiny of model performance, would be limited if HMRC continued to be the only data source for the required information. However, the establishment of the WRA will ensure that appropriate data is available in a timely manner to appraise how well the models coincide with the outturns and so aid future model developments. Therefore, over time it is expected better data will be available to inform the development of tax revenue forecasts in Wales.

The Welsh economy

A view of the future of the economy as a whole informs the broader macro-economic picture and the assumptions that are the context for these forecasts. Forecasts of tax receipts are particularly dependent on the profile and composition of economic activity. If there were to be significant changes or differences in the profile or composition of economic activity there would be an impact on the assumptions used in the models for the devolved Welsh taxes covered in this report, for example the Multiplier for the NDR forecasts is increased by the OBR's forecast for Retail Price Index (RPI), and a number of OBR forecasts are incorporated into the other models.

The UK has an important role in determining the path of the Welsh economy; therefore the work of the OBR in providing independent analysis of the UK's public finances, and forecasts for the UK economy, is of relevance in constructing the profile and composition of economic activity. These OBR forecasts and assumptions are part of a broader macro-economic picture and set of assumptions. In the absence of alternative information, such as detailed Wales-specific information, it is considered appropriate to make use of these OBR determinants.

A summary of the wide ranging determinants of the OBR forecast is set out below. Any changes to these by the OBR or any updated in-year forecasts will have an impact on Welsh revenue projections. In addition to setting out the determinants specifically drawn on for these forecast, these determinants also provide an indication of the future direction of the economy. This is one of improving economic activity associated with improved consumer spending and improved average earnings. The forecast incorporates employment growth and growth in GDP in the years to 2019/20. Determinants directly drawn on to produce the Welsh Government's forecasts in this report are marked by ●. 2015/16 are outturn data.

Table 2.1: Key determinants of the OBR Fiscal Forecast to 2021/22 (published March 2017)

Period	2017/18	2018/19	2019/20	2020/21	2021/22
GDP and its components					
Real GDP (%)	1.8	1.6	1.8	1.9	2.0
Nominal GDP (%)	3.3	3.3	3.5	3.8	4.0
Nominal GDP (£ billion)	2,029	2,095	2,168	2,251	2,340
Consumer spending (%)	4.3	3.2	3.7	3.7	3.9
Prices and earnings					
GDP deflator (%)	1.6	1.6	1.7	1.9	1.9
● RPI (%)	3.9	3.4	3.1	3.1	3.2
CPI (%)	2.6	2.2	2.0	2.0	2.0
Average earnings (%)	2.6	2.8	3.0	3.5	3.7
Key fiscal determinants					
Claimant count (millions)	0.85	0.87	0.88	0.88	0.88
Employment (millions)	31.9	32.1	32.2	32.4	32.5
Property sector					
● Residential property prices (%)	5.8	4.0	4.5	4.5	4.7
● Residential property transactions (000s)	1,280	1,294	1,305	1,315	1,322
● Commercial property prices (%)	-2.8	1.6	1.7	1.9	1.9
● Commercial property transactions (%)	1.7	1.7	1.8	1.9	2.0
Interest rates and exchange rates					
Short term interest rate (%)	0.4	0.6	0.8	1.0	1.2
Euro/Sterling exchange rate	1.16	1.16	1.15	1.14	1.14

There are many uncertainties underpinning the forecasts in Table 2.1. The OBR's key assumptions underpinning the forecast are:

- the UK leaves the EU in April 2019, that the trading regime will be less open than before and that the UK adopts a tighter migration regime than is currently in place;
- monetary policy remains highly accommodative, reflecting slightly higher expectations of Bank Rate on the part of market participants;
- there will be little change in credit conditions given the orientation of macro-prudential policy, while the financial system will continue on a path of gradual normalisation;
- fiscal policy follows a broadly similar path, with fiscal consolidation set to continue throughout the forecast period;
- slight increase in sterling's strength;
- dollar oil prices are higher than currently observed. Beyond the two-year horizon they are assumed to remain constant in real terms; and
- global GDP and the demand for UK exports increases steadily.

The OBR fiscal outlook and fiscal determinants are for the UK as a whole. In different ways the economy of Wales does not track the UK average, but where OBR determinants have been used Bangor Business School have worked with the Welsh Treasury to test their suitability for Wales. There is little in the way of Wales-specific economic forecast data and it is also recognised that there are significant variations and regional differences within Wales. A macro-economic model for the Wales economy is being studied and developed at Cardiff University, overseen by Prof. Max Munday. This draws on work done at Cardiff University on input-output tables for Wales. As regards other economic information there is a lack of Wales-specific information; a significant difficulty is the lack of information on Welsh trade flows and cross border trade. Given this, it will be important to assess the costs and benefits in any development of Welsh specific determinants for the purposes of forecasting tax revenues.

Block grant adjustment

The Welsh and UK Governments reached agreement on the Welsh Government's fiscal framework in December 2016. This framework establishes a mechanism for adjusting the Welsh Government's

block grant to reflect the devolution of tax powers: the block grant will be determined via the Barnett formula plus a new 'needs-based factor' as recommended by the Holtham Commission.

A provisional baseline for the adjustment will use the OBR's autumn 2017 forecast of receipts in Wales in 2017/18, which will be published alongside the UK autumn 2017 Budget. The Welsh Government has used the OBR's forecasts from March 2017 for SDLT and LfT in 2017/18 as the baseline for both the estimated block grant adjustment and the devolved tax revenue forecast for subsequent years. This is consistent with terms of the fiscal framework and is appropriate because the OBR currently has access to more detailed information to forecast tax revenues for the current UK taxes to be devolved to Wales from April 2018[5]. If the OBR 2017/18 forecast for the taxes to be devolved is changed in the autumn 2017, then both the block grant adjustment and the Welsh Government forecast for the devolved taxes should change in a similar fashion and so minimise the net impact on the Welsh Government Budget.

Bangor Business School view

There is uncertainty around all such economic forecasts and this is acknowledged in this scrutiny work. As there is a lack of Welsh specific data, the forecasts use a number of OBR determinants that are only available at the UK level. Given the information available and the work undertaken to test their suitability, the use of the OBR determinants is considered appropriate.

[5] The agreement between the Welsh Government and the United Kingdom Government on the Welsh Government's fiscal framework (December 2016) report by HM Government and the Welsh Government available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/578836/Wales_Fiscal_Framework_Agreement_Dec_2016_2.pdf.

Recommendation 1

Forecasting of revenues from these newly devolved taxes is in the early stages. Subsequently, any forecast errors from these forecasts should be scrutinised to appraise how well the models coincide with the outturns. Evaluating forecast accuracy can be a crucial element of forecasting procedures: it is relevant for monitoring purposes and allows for improving forecasts by learning from past errors.

Recommendation 2

Consideration should be given to the possibility of undertaking further work to provide Welsh specific data to help to inform the forecasting exercise. However, it is acknowledged that this is challenging and time-consuming, and therefore the costs and benefits of any in-depth work on this should also be appraised.

SECTION 3 – LANDFILL DISPOSALS TAX

Introduction

The Landfill Disposals Tax (LDT) will be introduced as a fully devolved tax in Wales from 1 April 2018, replacing the UK Landfill Tax (LfT). Like LfT, LDT is an environmental tax aimed at helping to reduce the amount of waste sent to landfill sites in Wales. The tax is payable by the landfill site operators and there were around 20 landfill sites registered with HMRC as of May 2016.

Different tax rates apply for two different type of waste; standard and lower rate. The lower rate applies to waste disposals that are non-hazardous, have a low potential for greenhouse gas emissions, and have low polluting potential in the landfill environment. The standard rate applies to all other taxable waste.

Some 9.5 million tonnes of standard rate waste and 10.6 million tonnes of lower rate waste was sent to UK landfill sites in 2016/17. Despite similar amounts of waste, the difference in the rates shown has a significant effect on the amount of revenue collected from both waste types. The UK revenue from standard waste in 2016/17 was around £800 million and £28 million from lower rate, before adjusting for any tax reliefs and credits.

The Draft Budget 2018/19 proposes that the LDT rates for standard and lower rate waste remain consistent with the UK LfT rates (the UK government has not yet set the rate for 2019/20. The rate in table 3.1 uprates the 2018/19 rate by a forecast for the retail price index). The Welsh Government has also introduced a rate for disposals made at sites other than an authorised landfill site – known as the unauthorised disposals rate.

The rates will be as set out below in Table 3.1.

Table 3.1: LDT rates for standard and lower rate waste for 2018/19 and 2019/20 (£ per tonne)

Period	**2018/19**	**2019/20** *Assumed rate*
Standard waste	88.95	91.70
Lower waste	2.80	2.90
Unauthorised disposals	133.45	137.55

LfT revenue forecast

The OBR's forecast for the UK LfT in Wales is set out in table 3.2 below.

Table 3.2 OBR March 2017 forecast for Landfill Tax in Wales, 2016/17 – 2017/18 (£ millions)

	2016/17	2017/18
OBR forecast (£ millions)	33	28

In 2016/17, LfT is estimated to raise a total of £33 million in Wales under the UK Landfill Tax system, then fall to £28 million in 2017/18 as an increasing amount of waste is diverted away from landfill[6].

The Welsh share of landfill tax receipts is not available from HMRC administrative systems, since landfill operators submit data returns that cover sites across England, Wales and Northern Ireland combined. Therefore, the OBR's current approach to forecasting Welsh landfill tax is to apply an assumption about the path of the Welsh share of landfill tax to the UK forecast. The UK forecast is compiled using a forecast for the tonnage of waste sent to landfill, which is multiplied by the appropriate tax rate. An adjustment is made for the landfill communities fund.

LDT revenue forecast

The Welsh Government's forecasts for LDT as contained in the Draft Budget 2018-19 are set out below in Table 3.3. These forecasts are not on the same basis as those produced by OBR as they do not make an adjustment for the landfill communities scheme, as the scheme does not operate as a tax credit in Wales.

Table 3.3: LDT forecasts for 2018/19 to 2021/22 (£' millions)

Period	2018/19	2019/20	2020/21	2021/22
Landfill Disposals Tax forecast	28	26	23	22

[6] 2016/17 and 2017/18 Welsh revenues are estimated as a proportion of revenues from UK Landfill Tax.

In overall terms LDT revenues are forecast to decrease from £28 million in 2018/19 to £22 million in 2021/22, a decrease of 26 per cent. The fall in the revenue generated by standard rate waste is the main driver of the decrease, which is forecasted to fall from around 275,000 tonnes in 2018/19 to 190,000 tonnes in 2021/22. This decrease in standard rate waste is driven by Welsh Local Authorities' strategies to reduce the amount of waste sent to landfill.

Methodology

The LDT forecast is produced by using a model based on the estimated standard rate waste and lower rate waste to be sent to Welsh landfill sites in the future. The forecasts are based on the bottom-up methodology to utilise all available information. As there is no information available on historical landfill tax revenues in Wales, information from Natural Resources Wales (NRW) and Welsh local authorities has been drawn on to produce a base year of the waste received by landfill sites in Wales during the 2015/16 period.

All the waste information from NRW is categorised according to European Waste Catalogue (EWC) codes, which are used to determine if the waste is standard or lower rate waste. This method has been developed by the Welsh Government as there is no information available on the split in standard and lower rate waste in Wales under LfT; therefore Bangor University suggested carrying out further work to assess the method's suitability. Following this work, the method was considered to be suitable.

Standard rate waste

The model divides standard rate waste into waste coming from Welsh local authorities and waste from other sources. The model assumes that all waste coming from Welsh Local Authorities is standard rate waste. 285,000 tonnes of standard waste is reported to have come from Welsh Local Authorities in 2015/16 with the remaining 164,000 coming from either the Welsh private sector or outside of Wales.

Welsh Local Authorities also provide information on their waste management strategy and how the amount sent to landfill sites will be reduced (e.g. through the export or incineration of waste) over the forecasted years. The ability of Local Authorities to achieve future targets on landfilling will depend, in part, on the development of new incineration capacity in Wales, which is built into the model. Bangor Business School suggested that the Welsh Government assess the risk that there is a

delay to new incineration capacity coming online. If this were to happen, Welsh Government analysis suggested this would lead to a small increase in LDT revenue. If no waste management strategy is provided by the Local Authority, it is assumed that their landfilled waste reduces in-line with their trend over the previous three years.

Standard rate waste from non-Welsh Local Authorities is assumed to decline by 10% per annum over the forecast period, in line with the UK trend for waste disposed of at landfill. Bangor Business School suggested that the Welsh Government explores whether economic determinants could be used to forecast this amount of waste in future.

Lower rate and exempt waste

The amount of lower rate waste is assumed to reduce by 1.1% per annum over the forecasted period, which is the average decline between 2012/13 and 2015/16.

Some landfill sites in Wales do not pay the current UK landfill tax as they qualify for exemptions. All waste disposed of at these sites is classed as exempt waste in the model. Some waste which is disposed of at other sites is also likely to be exempt from tax, but it is not possible to identify this waste using the available data sources. Bangor University asked the Welsh Government to consider the impact an increased amount of exempt waste might have on the forecast. As exempt waste can only be made up of lower rate material, this work concluded that the impact on the forecast is likely to be small.

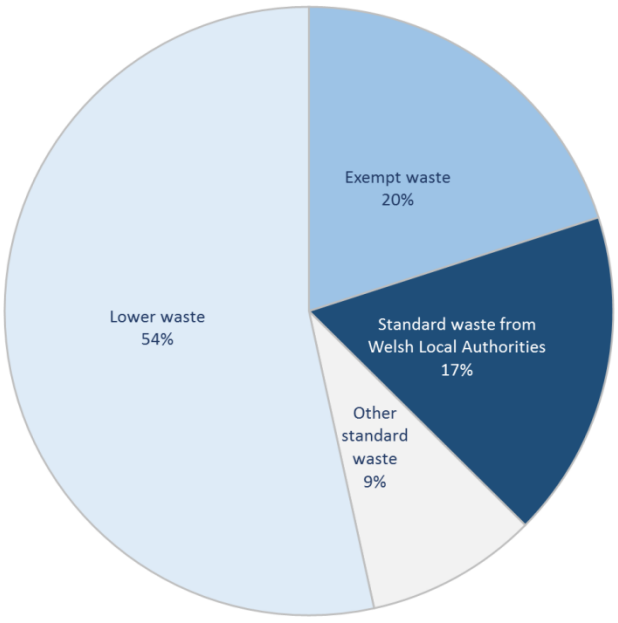


Figure 3.1 – Estimated breakdown of 2015/16 waste sent to Welsh landfill sites

Figure 3.2 shows estimates of the historical (pre-2015/16) and forecasted (post-2015/16) trends for standard rate waste (Welsh Local Authorities and non-Welsh Local Authorities) and lower rate waste.

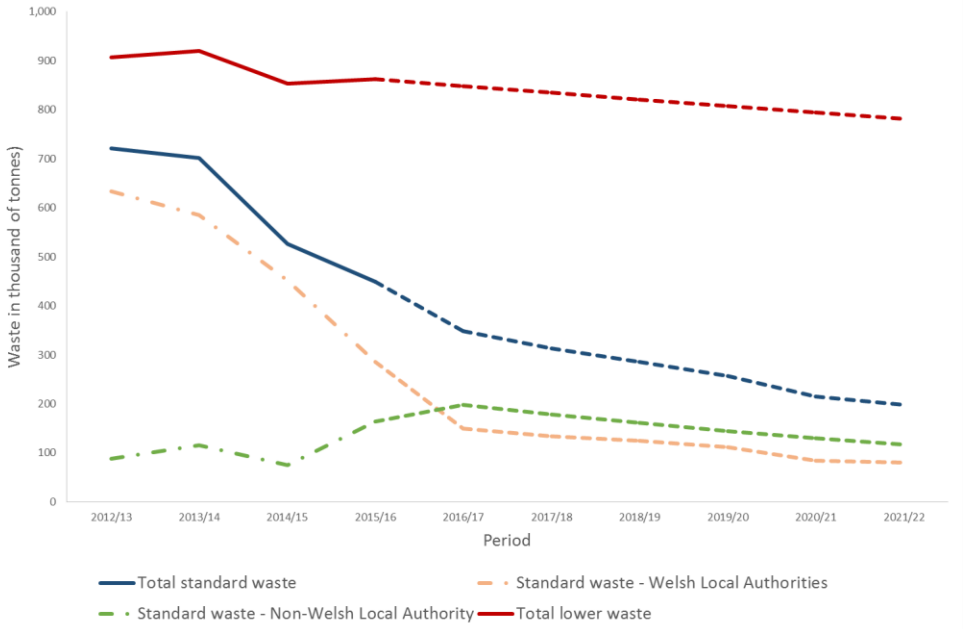


Figure 3.2 - Historical and forecasted estimates for standard rate waste and lower rate waste

Unauthorised disposals

The model has the capacity to include potential revenue from unauthorised disposals but does not currently do so as there is very limited evidence on which to base a forecast. The Welsh Government should consider incorporating revenue from unauthorised disposals in future, when information on the operation of this element of the tax is available.

Tax revenues

The LDT forecast uses OBR's 2017/18 forecast for LfT as a baseline. Tax revenues for 2018/19 onwards are calculated by applying the tax rates stated in Table 3.1 to the forecasted standard rate waste and lower rate waste amount. These tax rates are adjusted for future years based on the RPI forecasted in Table 2.1.

Table 3.4 – Final forecasted revenues (£ millions)

Period	2018/19	2019/20	2020/21	2021/22
Final forecasted revenues	28	26	23	22

Sensitivity Testing

The sensitivity of the LDT model is analysed by assuming no change from 2015/16 waste sent by Welsh Local Authorities to landfill sites and by varying the RPI input. The results of this sensitivity analysis is shown in Table 3.5.

Table 3.5a – Forecasted revenues (£ millions) if there is no change from 2015/16 waste sent by Welsh Local Authorities to landfill sites

Period	2018/19	2019/20	2020/21	2021/22
Forecasted revenues	29	29	29	29
Original revenues	*28*	*26*	*23*	*22*

Table 3.5b – 1.5 percentage point increase in UK RPI (£ 'millions)

Period	2018/19	2019/20	2020/21	2021/22
RPI	4.9%	4.6%	4.6%	4.7%
Forecasted revenues	28	27	24	23
Original revenues	*28*	*26*	*23*	*22*

Table 3.5c – 1.5 percentage point decrease in UK RPI (£ 'millions)

Period	2018/19	2019/20	2020/21	2021/22
RPI	1.9%	1.6%	1.6%	1.7%
Forecasted revenues	28	26	22	21
Original revenues	*28*	*26*	*23*	*22*

In addition, the sensitivity of the forecasts to changes in the assumed annual changes in non-Welsh Local Authority waste was tested (this is currently assumed to be -10% in the model). An increase (or decrease) of 50% in this assumption would have less than +/- 7.3% impact on the total forecasted revenues raised between 2018/19 and 2021/22.

Back-testing

There is limited opportunity to back-test the LDT model as there is no information on historical tax revenues from landfill tax in Wales.

A major driver of LDT revenue forecast is the amount of waste sent by Welsh Local Authorities to landfill sites. This account for 64% of standard waste in 2015/16 and account for £23.6 million of the revenue raised in that period. The waste management plans of Welsh Local Authorities is known by the Welsh Government, which limits the benefit of back-testing of the model.

The Welsh Government has used the model to produce estimates of LfT revenues in Wales back to 2007/08. These have been compared with published HMRC estimates of landfill tax in Wales. Despite using different methods, the two sets of estimates are broadly comparable up until 2013/14, after which the two begin to diverge. This is when there was an acceleration in the amount of waste diverted away from landfill in Wales.

Bangor Business School view on the forecast

Based on the information provided by the Welsh Government Treasury Team, Bangor Business School views the methodology described in Section 3 as an appropriate approach for forecasting Welsh LDT revenues. This decision is based on the discussion with academics and practitioners on the theoretical assumptions of the models (including factor selection), analytical analysis of the models, and the variation in revenue forecast for different scenarios.

All of the models used by the Welsh Government Treasury Team to produce this forecast have been independently reproduced by Bangor Business School as part of the validation process. The final LDT forecast is set out in Table 3.2.

Recommendation 3

It is recommended that the forecasts incorporate some of the potential tax revenue from unauthorised disposals and determine how landfill waste volume will respond to an increase or decrease in the number of illegal waste sites.

Recommendation 4

Work should be done to link waste from sources other than local authorities to economic determinants, in order to provide estimates of what this will be in the future.

Recommendation 5

It is recommend that in-year data is used to monitor tax revenues and to inform forecasts, once Landfill Disposals Tax becomes operational.

Recommendation 6

Close links with local authorities should be further developed and maintained in order to capture and leverage information on future waste management plans which could affect tax revenues.

SECTION 4 – LAND TRANSACTION TAX

Introduction

The Land Transaction Tax (LTT) will be introduced as a fully devolved tax in Wales from 1 April 2018, replacing Stamp duty land tax (SDLT) in Wales. Like SDLT, LTT 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, SDLT raised a total of £151 million under the UK system[7]. Different rates and thresholds apply for the four different segments; main residential (main rates), additional residential property, non-residential main rates and non-residential lease rent transactions.

The Draft Budget 2018/19 proposes LTT rates which differ from the current SDLT rates and thresholds. The LTT rates and thresholds are set out below in Table 4.1.

Table 4.1a: LTT rates and bands for residential transactions, 2018/19

Purchase price/lease premium or transfer value	LTT rate	Additional property rate
Up to £150,000	Zero	3.0%
Above £150,000 to £250,000	2.5%	5.5%
Above £250,000 to £400,000	5.0%	8.0%
Above £400,000 to £750,000	7.5%	10.5%
Above £750,000 to £1,500,000	10.0%	13.0%
Above £1,500,000	12.0%	15.0%

Table 4.1b: LTT rates and bands for non-residential property transactions, 2018/19

Price/value	LTT rate	Net present value of rent	LTT rate
Up to £150,000	Zero	Up to £150,000	Zero
Above £150,000 to £250,000	1.0%	Above £150,000 to £2,000,000	1.0%
Above £250,000 to £1,000,000	5.0%	Above £2,000,000	2.0%
Above £1,000,000	6.0%		

[7] Revenues relate to 2015/16 apart from the additional residential property rate which applies from 2016/17.

SDLT revenue forecast

The OBR forecasts for the various elements of SDLT in Wales up to the devolution of SDLT in 2018/19 are set out below in Table 4.2.

Table 4.2: OBR (March 2017) SDLT forecasts for 2016/17 to 2017/18 (£' millions)[8]

Period		2016/17	2017/18
Residential	Main rates	96	126
	Additional[9]	44	53
	Total	140	179
Non-residential	Total[10]	64	64
Total		203	243

In overall terms SDLT revenues are forecast to rise from £203 million in 2016/17 to £243 million in 2017/18, an increase of 20 per cent. The revenue generated by the residential main rates is the principal driver of this increase, which is forecasted to increase from £96 million in 2016/17 to £126 million in 2017/18. Revenues from residential main rates accounts for 47 per cent of total SDLT revenue in 2016/17 but this increases to 52 per cent in 2017/18. This is increase is driven by the strong residential price and transaction growth forecasted during the period.

LTT revenue forecast

From 2018/19 SDLT will no longer apply in Wales and LTT will replace it. The LTT revenue forecasts for 2018/19 to 2021/22 by the Welsh Government as contained in the Draft Budget 2018/19 are set out below in Table 4.3.

[8] Forecasts available at http://budgetresponsibility.org.uk/download/march-2017-devolved-taxes-forecast/.
[9] Additional residential properties are forecasted by the OBR on a cash basis. The years forecasted show less refunds and therefore a higher net revenue than if estimated on an accruals basis. The Welsh Government forecast is based on an accruals basis.
[10] OBR do not produce a separate forecast for the main non-residential rate and the leasehold rent elements.

Table 4.3: Four year LTT forecasts for 2018/19 to 2021/22 (£' millions)

Period		2018/19	2019/20	2020/21	2021/22
Residential	Main rates	142	161	182	205
	Additional	53	56	59	62
	Total	195	217	241	267
Non-residential	Main rates	64	66	68	71
	Lease	7	8	9	9
	Total	71	74	77	80
Total		266	291	318	348

In overall terms LTT revenues are forecast to rise from £266 million in 2018/19 to £348 million in 2021/22, an increase of 31 per cent. The revenue generated by the residential main rates is the principal driver of this increase, which is forecasted to increase from £142 million in 2018/19 to £205 million in 2021/22. Revenues from residential main rates accounts for 53 per cent of total LTT revenue in 2018/19 but this increases to 59 per cent in 2021/22. This increase is driven by the strong residential price growth forecasted between 2018/19 and 2021/22.

Methodology

The Welsh Government's LTT forecast is produced by using four separate models; main residential model, additional residential property rates model, non-residential main rates model, and a non-residential leasehold rent model.

Main rates residential model

The main residential model uses a bottom-up methodology to forecast the revenues generated from this segment of LTT. A bottom-up methodology is used to utilise all available information and ensure that the price distribution is captured by the model.

Information from HMRC's Datalab (administrative datasets) is used to produce a distribution from frequency price bins of the residential main rates properties sold in Wales during the 2015/16 period. This distribution contains information on the number of taxable (excludes relieved and exempt) transactions, the total taxable value and the total amount of tax paid during the period. The

data contains 53,202 properties in Wales during 2015/16 with an average value of £162 thousands. The total value of these properties was £8.6 billion, which raised £82 million in tax revenues[11].

The price bins are selected to extract the maximum information from the price distributions while still maintaining its shape. This price distribution is analysed in terms of 5 thousand and 10 thousand bins. While the price bins become wider as the price increases this does not significantly affect the performance of the model[12].

The price distribution is used to produce a base year from which future revenues will be derived. Figures 4.1 shows the shape of the distribution in terms of number of transactions, total property values per bin, and the amount of tax revenue.

[11] Calculations based on HMRC administrative datasets, which may differ from the 2015/16 HMRC SDLT Statistics.
[12] The price bins change size towards the top-end of the distribution.

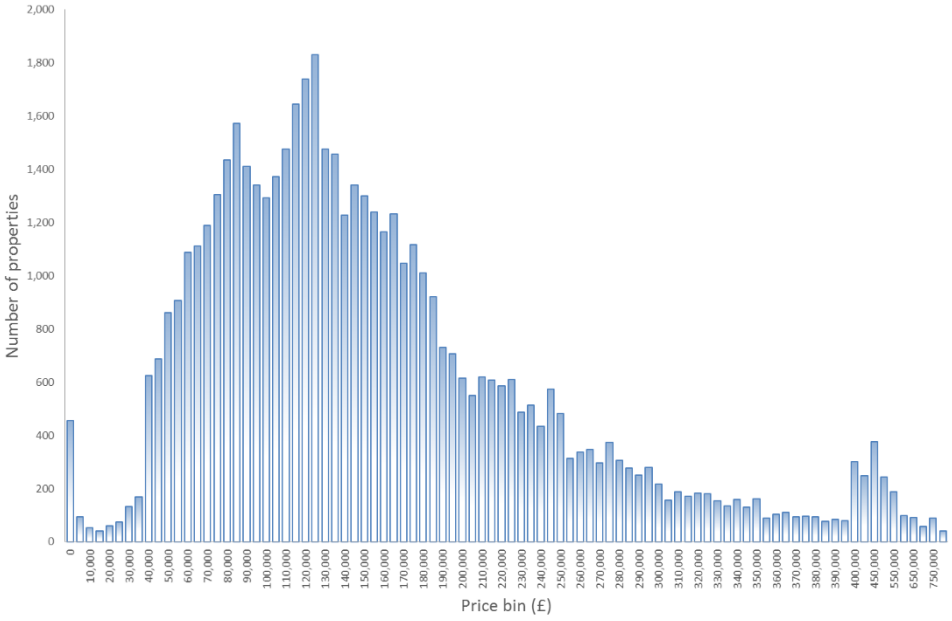


Figure 4.1a – Base year distribution (number of transactions per bin)

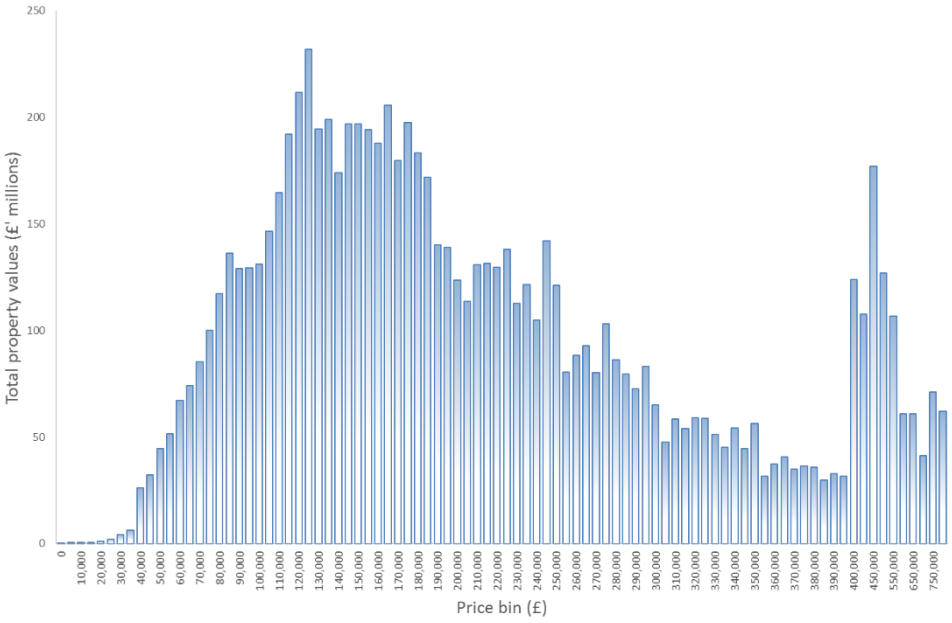


Figure 4.1b – Base year distribution (total property values per bin)

The distributions in Figure 4.1a and Figure 4.1b are adjusted to take account of forecasted residential property price growth and forecasted residential property transaction growth. The number of transactions per bin (Figure 4.1a) is adjusted to take account of future growth in transactions. Total property values per bin (Figure 4.1b) is adjusted to take account of future growth in transactions and growth in residential property prices.

The OBR's residential transactions and price growth forecast for the UK as a whole are used as inputs into the main residential model. Wales' residential transactions follow a similar trend to those in the UK. Correlation analysis is used to show the strength of this relationship using information from the Office for National Statistics (ONS)[13]. The correlation between UK and Wales' residential transactions growth is 0.99, which implies a strong relationship between both series[14]. The UK residential property market is likely to be heavily influenced by London's property market, which is likely to be influenced by global trends and not national economic fundamentals. Despite this, the correlation between UK and Wales' residential price growth is 0.98, which implies a strong relationship between both series[15].

Bangor Business School requested the Welsh Government Treasury to consider economic determinants from alternative sources for this model. Given the strong positive relationship between the different series and the economic rationale, the OBR forecasts are considered suitable inputs into the main residential model. The OBR's forecasts are given in Table 4.4.

Table 4.4 – OBR UK residential transaction and price growth forecasts 2016/17 to 2021/22

Period	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Transaction growth	-11.8%	10.0%	1.1%	0.9%	0.7%	0.6%
Price growth	7.4%	5.8%	4.0%	4.5%	4.5%	4.7%

Tax revenues are calculated by applying the tax rates stated in Table 4.1a to the forecasted transaction and value distributions. The model has the functionality to incorporate the impact of

[13] Correlation is a measure of relationship strength between two series and can take any value between +1 and -1. A correlation of +1 indicates a perfect positive relationship between the two series while a correlation of -1 indicates a perfect negative relationship.
[14] This correlation is calculated using annual house transaction growth on a quarterly basis in the UK and Wales between Q2 2006 and Q4 2016.
[15] This correlation is calculated using annual house price growth on a quarterly basis in the UK and Wales between Q1 2006 and Q4 2016.

behavioural change through transaction elasticity, price elasticity, and forestalling activity. These three capture changes in behaviour due to changes in tax rates and bands.

The transaction and price elasticities are based on the OBR's estimates and are applied at a granule level (i.e. bin level) [16]. The forestalling factors are estimated based on observations in Scotland during the transition from SDLT to LBTT system. While it is anticipated that these elasticities could be higher in Wales, whilst there are no Welsh specific elasticities available, the empirical driven OBR elasticities and forestalling factors are the preferred inputs into the model. The behavioural effects used in the model are given in Table 4.5.

Table 4.5 – Behavioural effects (semi-elasticities)

Tax band	£0k - £250K	£250K - £500K	£500K - £1MM	£1MM - £2MM	£2MM+
Transaction elasticity	-3.7	-2.5	-2.0	-2.8	-3.2
Price elasticity	-2.2	-1.7	-1.7	-1.7	-1.7
Forestalling	-6.0	-6.0	-6.0	-6.0	-10.7

Due to the limited information currently available, the behavioural effects in Table 4.4 are taken from research done by the OBR on behavioural effects within the UK[17]. These represent the most suitable elasticities available for use in the main residential model.

Two adjustments are made to the revenue forecasts which are applied to all future years. The first adjustment takes account of the difference between Wales' SDLT outturn revenue for 2015/16 (the base year) and the calculated amount based on the methodology used for the LTT model for 2015/16. The second adjustment ensures that the LTT model can match the OBR forecast of SDLT in 2017/18 SDLT (£126 million) when run from the base year of 2015/16 for this element. This adjustment is made to baseline the LTT forecast to the OBR's forecast of SDLT in Wales 2017/18. Any movements in the OBR forecast in the autumn will then feed through to both the forecast for LTT and the block grant adjustment.

[16] See OBR (2014) http://budgetresponsibility.org.uk/docs/dlm_uploads/SDLT-costing-elasticities.pdf
[17] The elasticities in Table 4.4 are taken from the work done by the OBR on elasticities for use in the costing of the reform of stamp duty land tax, which is available here http://budgetresponsibility.org.uk/docs/dlm_uploads/SDLT-costing-elasticities.pdf.

The sensitivity of the main residential model is analysed by varying the economic inputs (Table 4.4) of the model. These sensitivity analyses give an indication how revenue will vary if the economic scenario changes. The results of these sensitivity analyses are shown in Table 4.6.

Table 4.6a – 2.5 percentage point increase in UK residential transaction and price growth forecasts

Period	2018/19	2019/20	2020/21	2021/22
Transaction growth	3.6%	3.4%	3.2%	3.1%
Price growth	6.5%	7.0%	7.0%	7.2%
Forecasted revenues	155	191	233	284
Original forecast	*142*	*161*	*182*	*205*

Table 4.6b – 2.5 percentage point decrease in UK residential transaction and price growth forecasts

Period	2018/19	2019/20	2020/21	2021/22
Transaction growth	-1.4%	-1.6%	-1.8%	-1.9%
Price growth	1.5%	2.0%	2.0%	2.2%
Forecasted revenues	129	135	140	145
Original forecast	*142*	*161*	*182*	*205*

Sensitivity analysis has also been performed for changes in the behavioural effects. Changes in the behavioural effects had little impact on the revenue forecast.

Additional property model

The additional property model uses a top-down methodology to forecast the revenues generated from this segment of LTT. A top-down methodology is used due to the limited data available. Any available data is likely to have been affected by forestalling behaviour, and also due to refund anticipated for this segment.

The OBR 2016/17 revenue forecast from additional property in Wales is £44 million[18] and this is used as base point for the LTT forecast. Assumptions are made regarding the refund rate (8 per cent for cash and 15 per cent for accruals) applied to the OBR 2016/17 revenue forecast to transform the

[18] In cash terms.

amount from cash to accruals. The gross revenue of £41 million is calculated for 2016/17 by taking into account the refund rates assumption.

Revenue forecasts from additional property need to take into account the forestalling behaviour in the OBR 2016/17 forecast. A forestalling factor is estimated based on HMRC's experience with revenue from additional property between Q2 2016 and Q1 2017. The revenue anticipated from additional property without forestalling is calculated and the difference between this and the actual revenue collected is used as the forestalling factor. The forestalling factor used to adjust the 2016/17 gross revenue is 0.86.

This 2016/17 gross revenue post forestalling is adjusted to take account of forecasted residential property price growth and forecasted residential property transaction growth (as per Table 4.3). The forecasted gross revenues are adjusted to take account the 15 per cent refund assumption.

The sensitivity of the additional property model is analysed by varying the economic inputs (Table 4.4) of the model[19]. These sensitivity analyses give an indication how revenue will vary if the economic scenario changes or they are different to that anticipated. The results of these sensitivity analyses are shown in Table 4.8.

Table 4.8a – 2.5 percentage point increase in UK residential transaction and price growth forecasts

Period	2018/19	2019/20	2020/21	2021/22
Transaction growth	3.6%	3.4%	3.2%	3.1%
Price growth	6.5%	7.0%	7.0%	7.2%
Forecasted revenues	56	62	68	75
Original forecast	*53*	*56*	*59*	*62*

[19] Given the severity of the transaction growth fall in 2016/17 (-11.8%) this is not changed in the sensitivity analysis.

Table 4.8b – 2.5 per centage point decrease in UK residential transaction and price growth forecasts

Period	2018/19	2019/20	2020/21	2021/22
Transaction growth	-1.4%	-1.6%	-1.8%	-1.9%
Price growth	1.5%	2.0%	2.0%	2.2%
Forecasted revenues	51	51	51	51
Original forecast	*53*	*56*	*59*	*62*

Non-residential main rates model

The non-residential main rates model uses a bottom-up methodology to forecast the revenues generated from this segment of LTT. A bottom-up methodology is used to ensure that the price distribution is captured by the model.

Information from HMRC's Datalab (administrative datasets) is used to produce frequency price bins of the price distribution based on the non-residential properties relevant for the main non-residential rates sold in Wales during the 2015/16 period. This distribution contains information on the number of taxable transactions (excluding exempt and relieved), the total taxable value and the total amount of tax paid during the period. 3,908 properties were sold in Wales during 2015/16 with an average value of £480 thousand. The total value of these properties sold was £1.9 billion, which raised £63 million in tax revenues[20].

The price bins are selected to extract the maximum information from the price distributions while still maintaining its shape. This price distribution is analysed in terms of 25 thousand, 500 thousand, and 3 million bins. While the price bins become wider as the price increases this does not significantly affect the shape of the distribution. The price distribution is used to produce a base year from which future revenues will be derived. Figures 4.2 shows the shape of the distribution in terms of number of transactions, total property values per bin, and the amount of tax revenue[21].

[20] Calculations based on HMRC administrative datasets, which may differ from the 2015/16 HMRC SDLT Statistics.
[21] The price bins change size towards the top-end of the distribution.

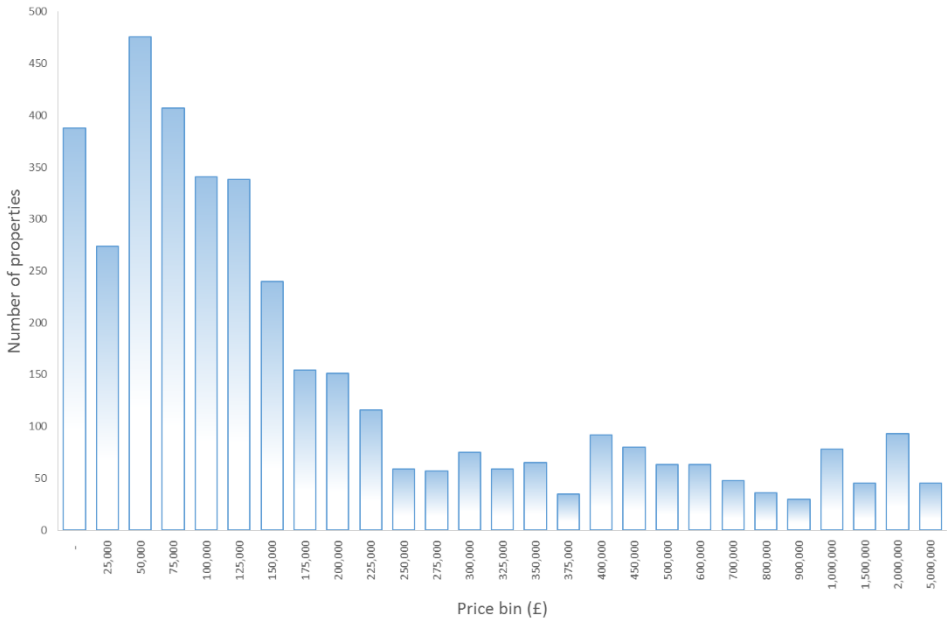


Figure 4.2a – Base year distribution (number of transactions per bin)

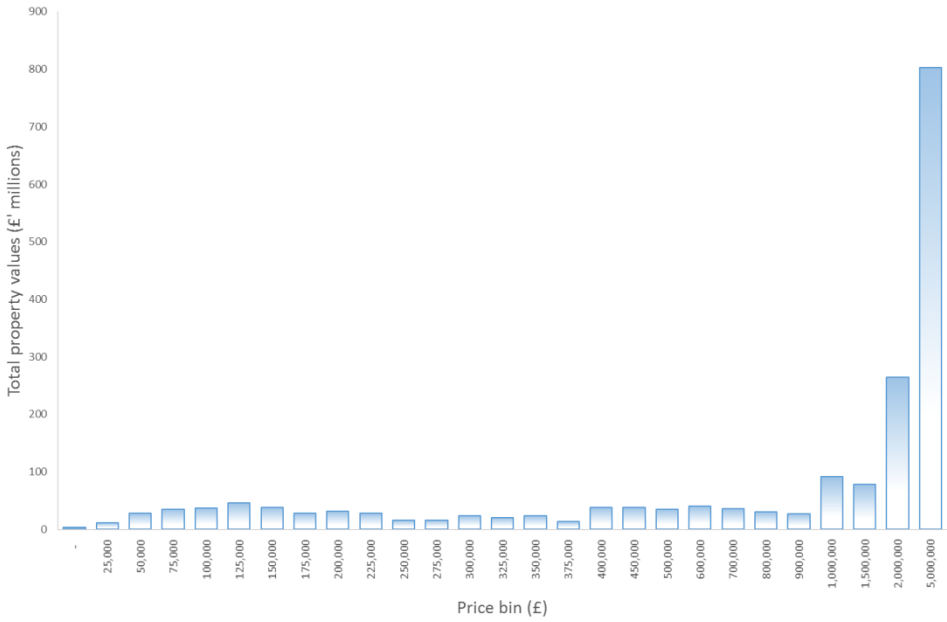


Figure 4.2b – Base year distribution (total property values per bin)

The distributions in Figure 4.2a and Figure 4.2b are adjusted to take account of forecasted non-residential property price growth and forecasted non-residential property transaction growth. The number of transactions per bin (Figure 4.2a) is adjusted to take account of future growth in transactions. Total property values per bin (Figure 4.2b) is adjusted to take account of future growth in transactions and growth in non-residential property prices.

The OBR's non-residential main rates transactions and price growth forecast for the UK as a whole are used as inputs into the non-residential main rates model. Wales' non-residential main rates transactions follow a similar trend to those in the UK. The correlation between UK and Wales' commercial transaction growth is 0.94, which implies a very strong relationship between both series[22]. No non-residential price time series is available for Wales and therefore no correlation measure can be calculated. Further economic determinants from alternative sources were considered, as suggested by Bangor Business School. However, there are limited sources for these, at least at a Wales level. In the absence of a macroeconomic model for Wales and given the economic rationale, the OBR forecasts are suitable inputs into the non-residential main rates model. The OBR's forecasts are given in Table 4.10.

Table 4.10 – OBR UK non-residential transaction and price growth forecasts

Period	2018/19	2019/20	2020/21	2021/22
Transaction growth	1.7%	1.8%	1.9%	2.0%
Price growth	1.6%	1.7%	1.9%	1.9%

Tax revenues are calculated by applying the tax rates stated in Table 4.1b to the forecasted transaction and value distributions. The model has the functionality to incorporate the impact of behavioural change through transaction elasticity and price elasticity measures.

The transaction and price elasticities factors are taken from the OBR and are applied at a granule level (i.e. bin level). The OBR elasticities factors are estimated based on observations during the transition from UK non-residential main tax rates reform from slab to marginal tax rates in March 2016[23]. While it is possible that these elasticities may be higher in Wales than at the UK level, the empirically driven OBR elasticities and forestalling factors are the preferred inputs into the model

[22] This correlation is calculated using annual commercial transaction growth on a quarterly basis in the UK and Wales between Q1 2006 and Q4 2016.
[23] See OBR (2017) http://budgetresponsibility.org.uk/docs/dlm_uploads/SDLT-elasticities.pdf.

whilst there are no Welsh specific elasticities available. While no information is available to calculate the impact, forestalling is assumed to occur in the forecast equivalent to 5 per cent of revenues. The behavioural effects used in the model are given in Table 4.11.

Table 4.11 – Behavioural effects (semi-elasticities)

Band	£0k - £250K	£250K - £500K	£500K - £1MM	£1MM - £2MM	£2MM+
Transaction elasticity	-5.4	-5.4	-5.4	-5.4	-5.4
Price elasticity	-2.0	-2.0	-2.0	-2.0	-2.0
Forestalling[24]	-5.0	-5.0	-5.0	-5.0	-5.0

The base year price distribution is based on the former SDLT slab tax rate system while forecasts are required for a marginal tax rate system.

Two adjustments are made to the non-residential revenue forecasts, similar to those applied to the residential main rates forecast. The first adjustment takes account of the difference between the SDLT revenue outturn data 2015/16 (base year) for Wales and the calculated amount based on the methodology used for this model for the same year. The second adjustment ensures that the LTT model can match the OBR forecast of non-residential SDLT in 2017/18 SDLT (£64 million) when run from the base year of 2015/16 for this element. These adjustments are applied to the leasehold and main rates revenue forecasts combined because the OBR only reports at this level.

The sensitivity of the non-residential main rates and lease rent models are analysed together as they use the same determinants and the relative size of the lease rent revenue is small.

Non-residential leasehold rent model

The non-residential leasehold rent model uses a bottom-up methodology to forecast the revenues generated from this segment of LTT. A bottom-up methodology is used to ensure that the price distribution is captured by the model.

Information from HMRC's Datalab (administrative datasets) is used to produce frequency price bins of the price distribution based on the non-residential leasehold properties traded in Wales during the 2015/16 period. This distribution contains information on the number of taxable transactions

[24] Unlike transactions and price elasticities, forestalling is a percentage of revenues and not a semi-elasticity.

(excludes exempt and relieved), the total taxable value and the total amount of tax paid during the period. 2,231 leases were traded in Wales during 2015/16 with an average value of £384 thousand. The total value of these leases was £856 million, which raised £6 million in tax revenues[25].

The price bins are selected to extract the maximum information from the price distributions while still maintaining its shape. Appropriate bin widths are selected to analyse this price distribution[26].

The price distribution is used to produce a base year from which future revenues will be derived. Figures 4.3 shows the shape of the distribution in terms of number of transactions, total property values per bin, and the amount of tax revenue.

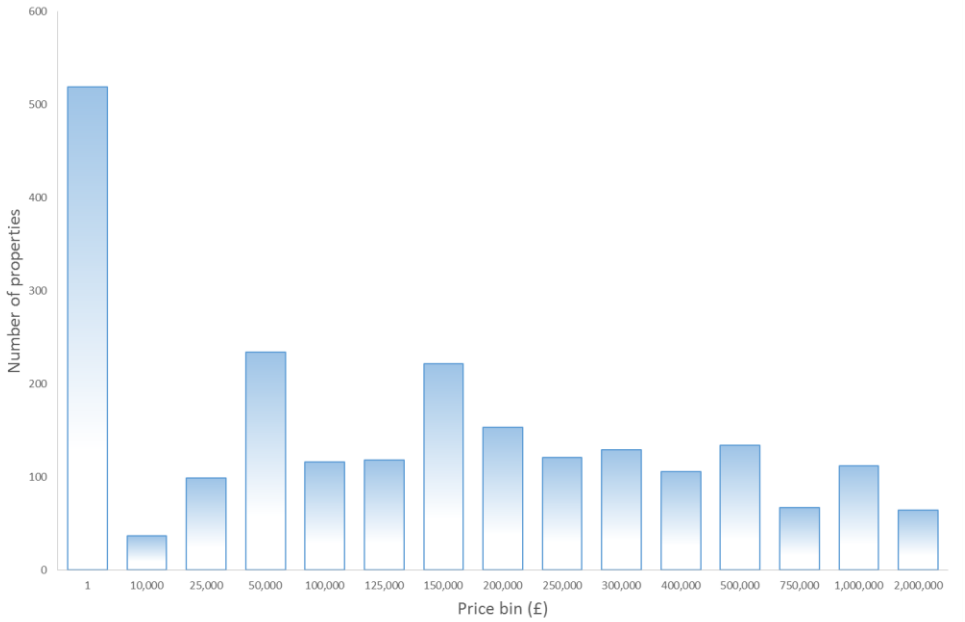


Figure 4.3a – Base year distribution (number of transactions per bin)

[25] Calculations based on HMRC administrative datasets, which may differ from the 2015/16 HMRC SDLT Statistics.
[26] The price bins change size towards the top-end of the distribution.

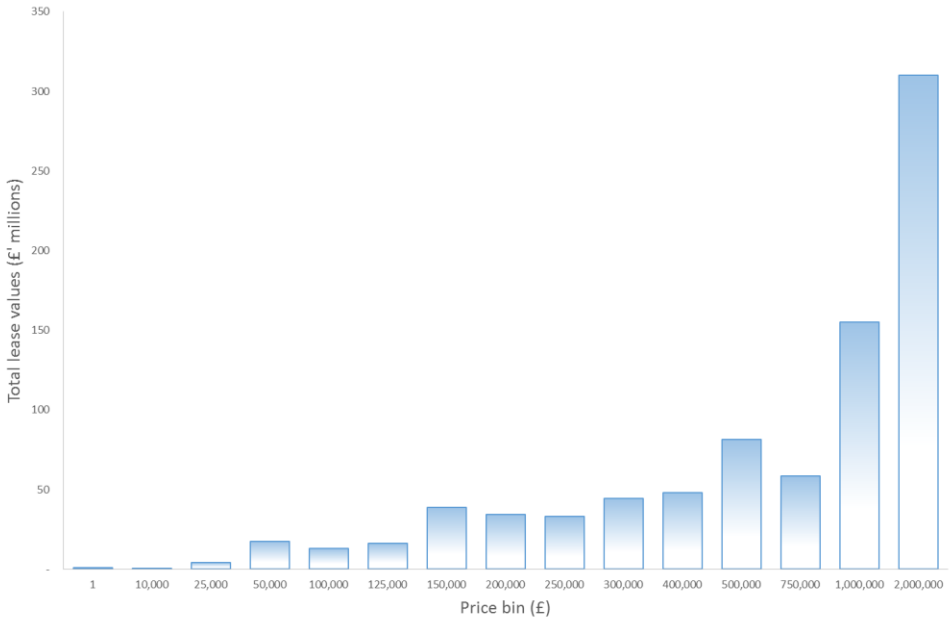


Figure 4.3b – Base year distribution (total lease values per bin)

The distributions in Figure 4.3a and Figure 4.3b are adjusted to take account of forecasted price and transactions growth, which are the main drivers of changes in leases. The price of leases per bin is adjusted by the OBR's forecast of commercial price growth. The number of transactions per bin (Figure 4.3a) is adjusted by the OBR's forecast of commercial transaction growth. Total lease values per bin (Figure 4.3b) is adjusted to take account of increased transaction activity and price growth.

In the absence of a macroeconomic model for Wales, the OBR forecasts are suitable inputs into the non-residential main rates model.

Tax revenues are calculated by applying the tax rates stated in Table 4.1b to the forecasted transaction and value distributions. The model has the functionality to incorporate the impact of behavioural change through transaction elasticity and price elasticity measures. No forestalling effects are applied to these forecasts as the revenues are relatively low and the forestalling estimate for non-residential main rates is more of a judgement at this stage.

Given that the OBR reports non-residential main rates and leasehold revenues combined, no adjustments are made to the non-residential leasehold rent revenue forecast. These are incorporated into the adjustments of the non-residential main rates model.

The sensitivity of the non-residential main rates and lease rent models are analysed together as they use the same determinants and the relative size of the lease rent revenue is small. The sensitivity is

undertaken by varying the economic inputs (Table 4.10). These sensitivity analyses give an indication how revenue will vary if the economic scenario changes or behaviour is different to that anticipated. The results of these sensitivity analyses are shown in Table 4.14.

Table 4.14a – 2.5 percentage point increase in UK non-residential transaction and price growth forecasts

Period	2018/19	2019/20	2020/21	2021/22
Transaction growth	4.2%	4.3%	4.4%	4.5%
Price growth	4.1%	4.2%	4.4%	4.4%
Forecasted revenues	75	82	91	100
Original forecast	*71*	*74*	*77*	*80*

Table 4.14b – 2.5 percentage point decrease in UK non-residential transaction and price growth forecasts

Period	2018/19	2019/20	2020/21	2021/22
Transaction growth	-0.8%	-0.7%	-0.6%	-0.5%
Price growth	-0.9%	-0.8%	-0.6%	-0.6%
Forecasted revenues	67	66	66	65
Original forecast	*71*	*74*	*77*	*80*

Sensitivity analysis has also been performed for changes in the behavioural effects. Changes in the behavioural effects had little impact on the revenue forecast.

Back-testing

Staff from Bangor Business School have performed independent back testing of the Welsh Government's LTT models to test their suitability, stability and give assurance about forecasts for devolved taxes.

A key driver of the forecast for all four models is the base-year distributions for the number of transactions per bin and the total property values per bin. These distributions are adjusted to take account of future growth in transactions and prices/inflation and tax revenues are calculated from

these adjusted distributions. It is therefore important that the base-year distributions reflect the property market at that time and are stable.

As part of this, Bangor Business School suggested the Welsh Government Treasury to analyse past years' data of Land Registry's house price paid data to confirm the shape and stability of the distribution over time. Although this data is not an exact set of those transactions which were also subject to SDLT, it can act as a guide on the stability of the house price distribution in Wales over time. This analysis confirmed that between years the distribution is stable.

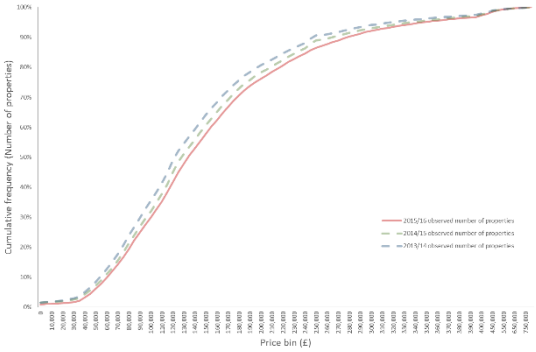
In addition, Figures 4.4 show how the distributions for residential (main rates), non-residential (main rates), and non-residential (leasehold) have changed between 2013/14 and 2015/16 (the base-year) using data from HMRC's Datalab (administrative datasets). The cumulative frequency of each distribution is shown in Figures 4.4 to illustrate how the proportion of transactions and values vary across bins and periods. Despite changes in the tax system (from slab to marginal rate), there is little variation in the distributions across the different periods, with the exception of non-residential (leasehold) transaction per bins. This difference is driven by the substantial increase in the number of leases in the first bin (519 in 2015/16 compared with 78 in 2014/15 and 70 in 2013/14)[27]. Despite this, there is little change in the distribution of total lease values per bin between 2013/14 and 2015/16.

A two-sample Kolmogorov-Smirnov statistical test can be used to test whether two samples come from the same distribution. This test considers the maximum deviation between the distributions in addition to the characteristics of the individual distributions. By testing each base-year distribution against historical distributions, the results show no significant change in distributions across time[28].

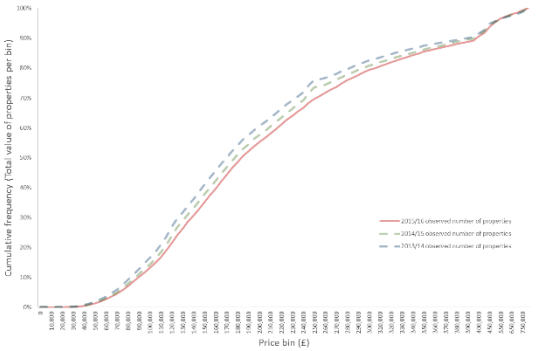
This analysis by Bangor Business School supports the view that the models are appropriate for forecasting Welsh LTT revenues.

[27] It is worth noting that the first bin are below the tax liabilities, therefore, would not affect the tax revenue forecast.
[28] This is despite a difference in the tax system (from slab to marginal rate) during the periods.

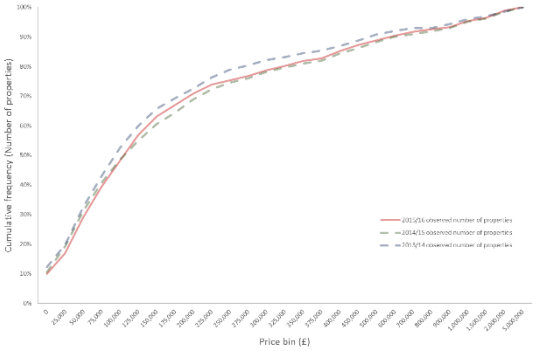
Figure 4.4 – Cumulative frequency of transaction and values



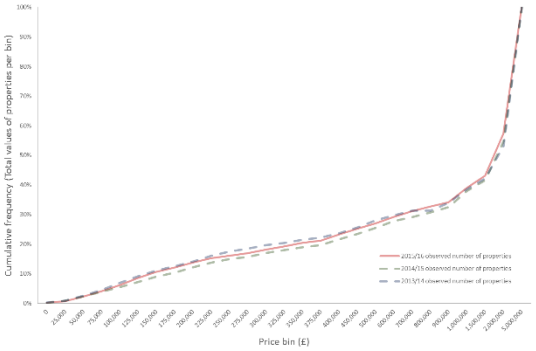
Changes in number of transactions per bin (main residential rates)



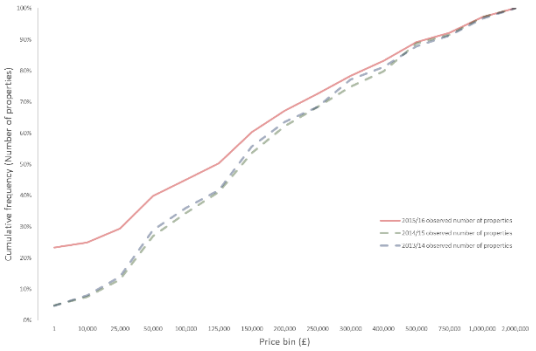
Changes in total property values per bin (main residential rates)



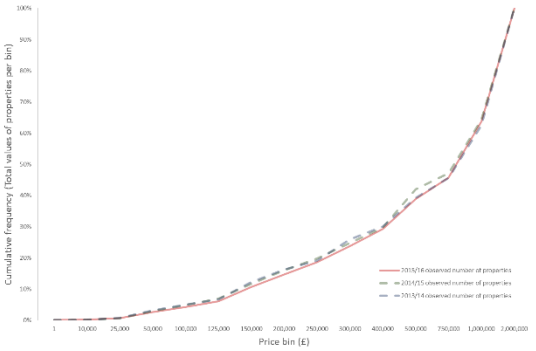
Changes in number of transactions per bin (non-residential (main rates))



Changes in total property values per bin (non-residential (main rates))



Changes in number of transactions per bin (non-residential (leasehold))



Changes in total lease values per bin (non-residential (leasehold))

Bangor Business School view on the forecast

Based on the information provided by the Welsh Government Treasury Team, Bangor Business School views the methodology described in Section 4 as an appropriate approach for forecasting LTT revenues. This decision is based on the discussion with academics and practitioners on the

theoretical assumptions of the models (including factor selection), analytical analysis of the models, and the expected variation in revenue forecast for different scenarios.

All of the models used by the Welsh Government Treasury to produce this forecast have been independently reproduced by Bangor Business School as part of the validation process. The final LTT forecast is set out in Table 4.2.

Recommendation 7

The model used to forecast additional residential property revenue will require further refinement once more information is available on transactions subject to this rate and those which are refunded.

Recommendation 8

Welsh specific elasticities should be calculated when suitable data becomes available.

SECTION 5 - NON DOMESTIC RATES

Introduction

In an important step in fiscal devolution, in April 2015, financial responsibility for NDR was devolved to Welsh Ministers. This section sets out some background to the operation of NDR, and the forecasting of NDR revenue, and Bangor University's assessment of this approach.

NDR is a way of taxing business and other non-domestic properties, with all the tax revenue raised being pooled and then distributed back to local authorities (principal councils and Police and Crime Commissioners) based on a needs formula. In 2016-17 the distributable amount contributed in respect of NDR revenue was £977m. The tax is based on the rateable value of non-domestic property in Wales. The rateable value is multiplied by the multiplier to calculate the rates for the property. The VOA (Valuation Office Agency for England and Wales) assesses the rateable value. The Welsh Government sets the multiplier every year, usually according to the Retail Prices Index for September in the preceding financial year (which it cannot exceed).

Non-domestic properties in Wales are normally revalued every 5 years. The latest revaluation came into effect on 1 April 2017, based on rental values at 1 April 2015, and the next revaluation is due to take place in 2022. A rise in rateable value at a revaluation does not lead to a rise in overall NDR revenue: the multiplier must be adjusted to ensure that the overall yield remains the same. Therefore, as revaluations are required to be overall revenue neutral, a fall in rateable values may not translate into a fall in NDR for an individual property. The multiplier is provisionally set in September of each year, up to the RPI limit. Therefore, in most years, tax bills increase or decrease in line with the RPI measure of inflation. However, NDR revenues can rise more quickly due to a changing tax base: the value of properties added to the tax base exceeding the value of properties removed from the tax base (such changes in the tax base are referred to as buoyancy).

A number of reliefs and other adjustments need to be taken into account before the final amount available to distribute back to local authorities can be derived. There are a number of reliefs (both mandatory and discretionary) in respect of NDR. These include Small Business Rates Relief, charitable relief, relief on empty properties and hardship relief. The profile of these reliefs is not constant.

Appeals can have a significant impact on the final amount of NDR revenue available to redistribute to local authorities. In Wales, there has been a relatively high proportion of challenges received in relation to the number of hereditaments on the list, around 40% for the 2010 list over the lifetime of the list. However, of these challenges, only around a third have resulted in changes to the list, meaning approximately two-thirds of challenges result in no change to a hereditament's rateable value. Appeals are processed by the VOA and successful appeals may be backdated over a number of years (until the beginning of the relevant list).

NDR revenue forecast

The forecasts for NDR revenues are set out below:

Table: 5.1 Forecast for NDR revenues – distributable amount 2018/19 to 2021/22 (£ millions)

Period	2018/19	2019/20	2020/21	2021/22
Distributable amount	1,052	1,078	1,112	1,146

The figure for 2018/19 is derived from the forecasting procedure discussed in this chapter, and forecast figures for later years are derived by increasing forecast receipts, less any prior year adjustments, in line with the OBR forecast for RPI.

Forecasting approach

The forecast of NDR revenues is not derived from a specific NDR economic model, but from aggregate data from the administrative exercise undertaken to determine the distributable amount for local authorities. Each year, the Welsh Government must determine the amount of Annually Managed Expenditure (AME) which will be available for distribution to local authorities in the following year. As part of this there are two ways of collecting NDR tax; approximately 90% of the net yield is collected by local authorities (local list), with the remainder being collected centrally by the Welsh Government (central list) from large organisations, typically utilities, that span a number of local authorities. The yield is pooled and centrally redistributed by the Welsh Government.

Local List

Prior to knowing how much will be collected, local authorities are requested at the beginning of the financial year to report how much NDR revenue they expect to collect to contribute to the pool. A best estimate is given in February by each local authority, along with other estimates, for example, for reliefs, and calculations of costs of collections, in line with the Notes for guidance issued by the Welsh Government. At this stage no detailed information is provided on the expected effect of appeals as local authorities would not have information on this as they are dealt with by the VOA.

While best estimates are given in February by the local authorities, the Welsh Government needs to confirm by the previous December how much money it will be distributing for the following year. As such there is a disparity between when information becomes available and when tax revenues need to be distributed among local authorities. The forecast of NDR revenues is a by-product of this process, rather than being derived from a separate economic forecast carried out with the sole purpose of determining NDR revenue. Those preparing the AME forecast do not hold taxpayer level data and so the forecast of NDR revenue is derived from the reported aggregates. This process has operated in a similar way for many years, including the years prior to the devolution of financial responsibility of NDR in 2015 and there are some difficulties due to the timing of the receipt of information. The in-year schedule for when information becomes available is as follows:

> February – NDR1 completed by local authorities, in accordance with the Notes for guidance and returned to Welsh Government. The NDR1 is a forecast for the coming financial year based on the information on the local rating lists and this information is used to calculate the amount distributed back to local authorities.
>
> April / May– NDR3 made available by local authorities which report the unaudited actual amount of their NDR tax contribution to the pool for the previous year, and includes impact of appeals.
>
> November – Audited NDR3, showing actual income collected completed by local authorities.

Therefore 14 months elapse between the submission of an NDR1 (forecast) and NDR3 (actual) to the Welsh Government. (NDR2 forms, completed by local authorities, are used to notify any significant deviance expected from their initial forecast). As such, a correction is always made to balance the over/under amount of funds distributed to local authorities. The difference between the NDR3 income and the NDR1 forecast forms the basis of a balancing payment or prior year adjustment for each local authority.

The distributable amount for 2018-19 is based upon the information made available in 2017 and a number of assumptions about factors which might affect the amount to be collected. Estimates for the following reliefs are included in the NDR1: reliefs for charities, community amateur sports clubs, Small Business Rate Relief scheme, partly occupied and empties. If a property is occupied by a registered charity or community amateur sports club, relief between 80% and 100% is granted. Relief for partly occupied properties is available where part of a property is temporarily empty due to the need to vacate or occupy a property over a period of time. Empty business properties are exempt from paying Non Domestic Rates for at least 3 months after the property becomes vacant. A new scheme for Small Business Rates Relief (SBRR) is due to be in place from April 2018.

Central List

This is a set list of businesses, with infrastructure spanning local authority boundaries. The figure for the distributable amount net yield for the central list is uprated by RPI each year, unless the VOA provides specific information, such as in a year of revaluation. In recent years (since 2013/14) previous forecasts of the central list have not given rise to significant forecasting errors (with the exception of one large appeal).

Components of the forecasting tool

The gross yield is the total rateable value, adjusted for buoyancy, less reliefs, losses in collection, costs of collection and “in year reductions”, which are predominantly appeals (and any revised information subsequently provided). There is scope for uncertainty, and so forecasting error, in respect of each of these adjustments.

In this forecasting process an estimate of buoyancy is used to take changes in the tax base into account and applied to the local list. (The businesses on the central list, and their properties are not likely to expand). This is derived from the rateable value at the start of the year as a percentage of the average rateable value. (The start year and end year rateable value are provided by VOA). In recent years this has been virtually static in this forecasting exercise, with buoyancy factors employed of 1.000 or 0.999. With regard to the tax base of the Central List, the possibility of increasing this in line with a measure of economic growth was considered. However the Central List businesses are not ones that would typically track economic growth and therefore RPI is considered to be appropriate.

Local authorities forecast the reliefs expected to be given in the year, and are considered to be best placed to forecast this. Their initial returns do not include appeals. These are unpredictable and are

processed by the VOA, so not much information is available until appeals are resolved. Predicting the outcome of appeals is difficult and commercially sensitive.

For losses in collection, the initial NDR1 forecast from local authorities provides for a 1% allowance, with the figure for losses in collection included on the NDR 3. In recent years, the initial provision of 1% has proved to be slightly higher than the outturn losses.

The figure for NDR revenues forecast by this accounting tool are after deducting notional costs of collection and prior year adjustments. The costs of collection are calculated, without specific reference to the costs directly incurred in collecting NDR revenue, but in accordance with a prescribed allowance (£39.50 per hereditament and the aggregate rateable value for the authority's rating list multiplied by 0.00087). Each local authority withholds this amount, contributing NDR revenues, net of these notional costs of collection, to the pool.

Analysis of the forecast and sensitivity analysis

A review of the forecasts of NDR revenue compared with actual revenues indicates that this is an approach which has not produced significant forecast errors in NDR revenue in recent years.

Sensitivity analysis was undertaken to consider the impact on total NDR revenue of a change in some of the components of the forecasting tool. Of the reliefs available the most significant is SBRR. Sensitivity analysis was not undertaken in respect of this as details are not yet known about the new SBRR scheme, to be in place from April 2018. Sensitivity analysis was carried out in respect of two areas: a change in the profile of NDR contributed from different local authorities and a fall in the number of properties with a high rateable value.

Change in the profile of revenues from local authorities

A breakdown of the local list, showing the returns from the 22 local authorities was analysed, to consider the potential impact on total NDR revenue of a fall in NDR revenue from a particular geographical region or local authority. Of the NDR revenue from the local list, the most significant is in respect of Cardiff, 20% in 2015/16 (the share of Cardiff NDR revenue as a percentage of total local authority NDR revenue has stayed fairly constant, between 19% and 20.3% since 2005-06). Therefore, should there be a significant change in the Cardiff tax base, with a consequent impact on NDR revenue, this would have a significant impact on total NDR revenue. For example, in 2015/16, a 10% rise or fall in NDR revenue from Cardiff (£19 million) would have led to a 2% change in total local authority NDR revenue.

Change in the number of properties with a high rateable value

The range of rateable values from across the local authorities was appraised. There is a wide range of rateable values for non-domestic properties, but only a very small number with a high rateable value (just under 200 hereditaments with a rateable value over £1m). Should there be a drop in the number of these high rateable value properties (for example, due to closure or relocation) the loss of revenue from them will have a consequent impact on total NDR revenues. For example, with respect to the 2018/19 forecast, if there were to be a loss of revenue from 10 properties with a rateable value of £3m each, this would lead to a 1.5% fall in the total distributable amount for the year.

Bangor Business School view of the forecast

Based on the information provided by the Welsh Government Treasury Team, Bangor Business School views the methodology described in this chapter as an appropriate approach for forecasting Welsh NDR revenues.

The forecast of NDR revenues is not derived from a specific NDR economic model, which couldbe reproduced, but from aggregate data from the administrative exercise undertaken to determine the distributable amount for local authorities. This data was reviewed, including a review of how it is collated, and the steps in the forecasting process, including the Notes of Guidance. This is an established process that has operated for many years by experienced staff, and, in recent years, the divergence of actual figures from the forecast has been small, suggesting this is a well understood procedure undertaken by those experienced in making judgments in this area. The final NDR forecast is set out in Table 5.1.

Recommendation 9

Work should be undertaken to investigate and to incorporate a probability element of successful appeals into forecast calculations.

SECTION 6 – CONCLUSION

This report presents the assumptions and methodologies underlying the Welsh Government's forecasts for the devolved taxes, and Bangor Business School's work and conclusion on their suitability for inclusion in the budget setting process in Wales.

The Wales Act 2014 gave new powers to the Welsh Assembly relating to taxation and borrowing: powers to introduce Welsh taxes to replace UK stamp duty land tax and UK landfill tax, partial devolution of income tax, powers to introduce other devolved taxes on a case by case basis and borrowing powers. Non domestic rates have been devolved in April 2015.

The work completed in this report involved a review of the projections and approach for determining the projections in respect of these three taxes; LDT, LTT, and NDR. Different methodologies are used to forecast the revenue collected by each tax. The difference in methodologies reflect available information and the economic activity relating to the tax.

Based on the information provided by the Welsh Government Treasury Team, discussions with academics and practitioners on the theoretical assumptions of the models (including factor selection) and analytical analysis of the models, Bangor Business School conclude that forecasts are based on robust and appropriate methodologies and assumptions.

The absence of large variation in the revenue forecast for different economic scenarios and model assumptions support the suitability of the forecasts inclusion in the budget setting process. In addition, all models used by the Welsh Government Treasury Team to produce this forecast have been independently reproduced by Bangor Business School as part of a validation process.

The Welsh Government Treasury Team has taken actions to address the advice and recommendations from Bangor Business School on ways to improve the methodologies made during the process.

As further outturn data becomes available for the devolved taxes in 2016/17, this report will be updated to reflect the comparative performance of the outturn revenues in relation to the 2016/17 forecast. The report will also be updated to reflect revisions to economic expectations and the impact of these for the Draft Budget 2018/19.

APPENDIX 1 – SUMMARY OF KEY COMMUNICATIONS

Date	Meeting
24 Mar. 2017	Meeting between Welsh Government and Bangor Business School
06 to 07 Apr. 2017	Bangor Business School attend OECD 9th Annual Meeting of OECD Parliamentary Budget Officials and Independent Fiscal Institutions
19 Apr. 2017	Conference call between OBR and Bangor Business School
26 Apr. 2017	Conference call between Scottish Fiscal Commission and Bangor Business School
28 Apr. 2017	Meeting between Welsh Government and Bangor Business School
05 May 2017	E-mail correspondence between National Bank of Belgium Research Department and Bangor Business School
19 May 2017	Meeting between Welsh Government and Bangor Business School
8 Jun. 2017	Conference call between Prof. Max Munday (Cardiff University) and Bangor Business School

Subsequent phone calls and ad-hoc communications are not detailed.